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CONNTENTS

Solar power could be produced cheaply in specially designed optical fibres, say researchers.

The work, published in the journal Angewandte Chemie, makes use of nanometre-scale wires built around optical fibres like bristles.

Those wires give the light much more surface area to interact with, leading to higher overall efficiencies.

However, only the ends of the fibres must be exposed - they funnel the light elsewhere for power generation.

Instead of roof-sized panels, small collectors could be used on the roof, with the real machinery of solar power generation tucked away, for example, between a home's walls.

"Using this technology, we can make photovoltaic generators that are foldable, concealed and mobile," said Zhong Lin Wang of the Georgia Institute of Technology in the US.

Dye job

The most efficient - and the most familiar - solar cells are those based on silicon, which absorbs light, generates electrons, and shuttles them around to create a current.

Recent years have seen leaps and bounds in the use of so-called dye-sensitised solar cells, in which the electrons are released from special dye molecules designed to absorb sunlight.

While dye-sensitised cells are promising because they make use of cheap and robust materials, they are comparatively inefficient.

The new method starts with commercial optical fibre, like that used in telecommunications, with the outer layer stripped off.

The team then creates a "forest" of zinc oxide nanowires around the fibre, and deposits the dye molecules over them. This creates a much larger effective surface area that helps to boost the cells' efficiency.

" **It's a clever way to make better use of the light** "
Saif Haque, Imperial College London

What is more, the light needs enter only at the ends of the fibres, so a large-scale implementation could see just small collectors on a roof, with the bulk of the power-generating materials tucked away.

"Optical fibre could conduct sunlight into a building's walls where the nanostructures would convert it to electricity. This is truly a three-dimensional solar cell," Professor Wang said.

Professor Wang said that future modifications to the surfaces of the nanowires could boost the devices' efficiency.

"It's really nice, elegant work," said Saif Haque, a solar cell researcher from Imperial College London.

"It's a clever way to make better use of the light."

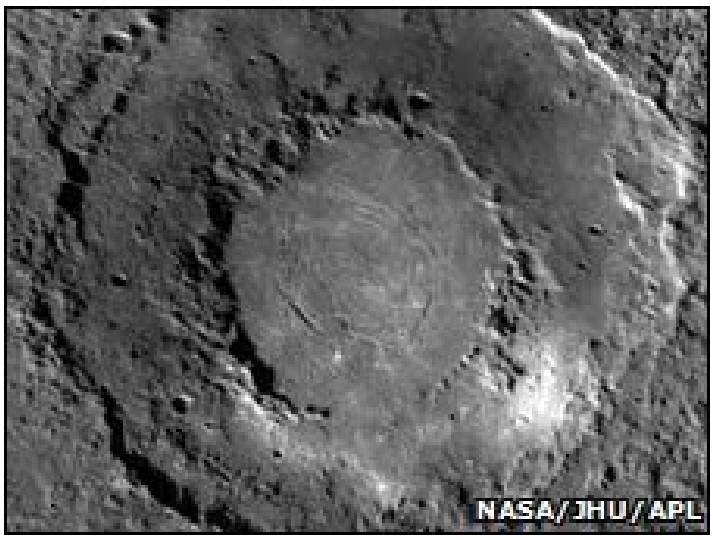
Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8341186.stm

Published: 2009/11/04 15:48:01 GMT

Messenger spies iron on Mercury

By Jonathan Amos
Science reporter, BBC News

Mercury is even more of an "iron planet" than scientists had previously supposed.



Richer concentrations of iron and titanium have been seen on Mercury's surface by Nasa's Messenger probe.

Previous Earth and spacecraft-based observations had detected only very low amounts of iron in the silicate minerals covering the innermost world.

Because of its immense density, scientists have already assumed much of Mercury's interior contains iron.

Messenger sees the surface iron bound up in oxides with titanium.

The mission's principal investigator, Sean Solomon, said the new observations would keep theoreticians busy.

PLANET MERCURY
- Closest planet to the Sun; smallest in Solar System
- Visited by Mariner 10 in 1970s; by Messenger currently
- Diameter: 4,880km, about one-third the size of Earth
- Second densest planet in Solar System; 5.3x that of water
- Caloris basin is largest known feature (1,300km in diameter)
- Possibility of water-ice in permanently shadowed craters
- Huge iron core takes up more than 60% of the planet's mass
- Surface temperatures swing between 425C and -180C
- Has an extremely thin atmosphere (exosphere)
- Only inner planet besides Earth with global magnetic field

"The iron is in a form that we don't normally encounter in other planetary situations and so it's going be a volley back to our geochemists and petrologists to come up with a scenario that's consistent with everything we are measuring now at Mercury," he told reporters.

Theories on how the planet formed would also have to take the information into account, he added.

Some of these propose that Mercury is predominantly the remnant core of a body which lost its outer layers in a mighty collision early in its history.

The new data was returned on Messenger's third and final flyby of the planet in September.

The pass, just 228km from the surface, was intended as a brake manoeuvre, using the planet's gravity to help slow the spacecraft enough to enable it to enter into orbit in 2011.

The spacecraft acquired only about half the data it was expected to because of a power "hiccup" just before closest approach.

Nonetheless, Messenger's cameras and instruments collected many high-resolution and colour images, unveiling another 6% of the planet's surface never before seen up-close.

Messenger has now viewed about 98% of the surface at various resolutions.

New features observed in the pass include a region with a bright area surrounding an irregular depression, suspected to be volcanic in origin.

It also spied a very young double-ring impact basin approximately 290-km across.

"However, to a planetary geologist, 'young' is a billion years or so. But compared to most of the basins on Mercury, those are three billion years older that. So in a relative sense it is very geologically young," explained Brett Denevi, a member of the probe's imaging team from Arizona State University in Tempe.

The low numbers of superposed impact craters and marked differences in colour across the basin suggest that the smooth area within the innermost ring may be the site of some of the most recent volcanism on Mercury, she added.

Messenger also made new measurements of Mercury's "atmosphere", the extremely tenuous cloud of atoms which is lifted off the surface by solar activity and micro-meteorite impacts.

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Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8342000.stm

Published: 2009/11/04 10:57:49 GMT

Major quakes could be aftershocks

Many recent earthquakes may have been the aftershocks of large quakes that occurred hundreds of years ago, according to scientists.

In the journal Nature, researchers described a new pattern in the frequency of aftershocks that could explain some major quakes.

They found that, away from plate boundaries, echoes of past earthquakes can continue for several hundred years.

Here, in the middle of a continent, the earth takes longer to recover.

It's something we had never spotted before," said Seth Stein from Northwestern University in Illinois, US.

"Most big earthquakes happen at [plate] boundaries - like the San Andreas fault. There is a lot of movement there and aftershocks go on for about ten years after a big quake."

When the aftershocks have dissipated, scientists monitor regular movement of the earth to gauge the likelihood of a future quake.

But small earthquakes also occur where there is none of this regular movement, he explained. "So if the ground has not been storing up energy for future earthquakes, these must be aftershocks."

This, the scientists say, could explain the disastrous earthquake in 2008 in China's Sichuan province. The event shocked many scientists as this was an area where there had been hardly any earthquakes in the past few centuries.

But these "aftershock quakes", the scientists say, get smaller over time.

"It even looks like we see small earthquakes today in the area along Canada's Saint Lawrence valley where a large earthquake occurred in 1663," Professor Stein said.

"If you look at where they are - they're on the fault plane of the big earthquake."

He and his colleague, Mian Liu from the University of Missouri, found the same pattern repeated in seismic data from faults around the world.

Forecasting tremors

This discovery could help scientists to foresee the location of big earthquakes.

"Predicting big quakes based on small quakes is like the 'whack-a-mole' game," Professor Stein explained. "You wait for the mole to come up where it went down.

"But we now know the big earthquakes can pop up somewhere else."

He recommended that, instead of just focusing on the regions where small, regular earthquakes happen, scientists should use methods like GPS satellites and computer modelling to look for places where the earth is "storing up energy for a large future earthquake".

Tom Parsons, a scientist from the US Geological Survey (USGS) in California was not involved in this study, but wrote an accompanying article in the same issue of Nature, explaining its significance.

He said that with a more comprehensive approach to studying earthquakes, researchers would eventually be able to "arrive at a practical solution" - balancing the available resources with the need to protect areas that were at risk.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8342600.stm

Published: 2009/11/04 19:45:57 GMT

Central Africa's Tropical Congo Basin Was Arid, Treeless In Late Jurassic

An ancient soil crack, called a clastic dike, from alternate wetting and drying cycles of seasonal rainfall. (Credit: Image courtesy of Southern Methodist University)

ScienceDaily (Nov. 11, 2009) — The Congo Basin -- with its massive, lush tropical rain forest -- was far different 150 million to 200 million years ago. At that time Africa and South America were part of the single continent Gondwana. The Congo Basin was arid, with a small amount of seasonal rainfall, and few bushes or trees populated the landscape, according to a new geochemical analysis of rare ancient soils.

The geochemical analysis provides new data for the Jurassic period, when very little is known about Central Africa's paleoclimate, says Timothy S. Myers, a paleontology doctoral student in the Roy M. Huffington Department of Earth Sciences at Southern Methodist University in Dallas.

"There aren't a whole lot of terrestrial deposits from that time period preserved in Central Africa," Myers says. "Scientists have been looking at Africa's paleoclimate for some time, but data from this time period is unique."

There are several reasons for the scarcity of deposits: Ongoing armed conflict makes it difficult and challenging to retrieve them; and the thick vegetation, a humid climate and continual erosion prevent the preservation of ancient deposits, which would safeguard clues to Africa's paleoclimate.

Myers' research is based on a core sample drilled by a syndicate interested in the oil and mineral deposits in the Congo Basin. Myers accessed the sample -- drilled from a depth of more than 2 kilometers -- from the Royal Museum for Central Africa in Tervuren, Belgium, where it is housed. With the permission of the museum, he analyzed pieces of the core at the SMU Huffington Department of Earth Sciences Isotope Laboratory.

"I would love to look at an outcrop in the Congo," Myers says, "but I was happy to be able to do this."

The Samba borehole, as it's known, was drilled near the center of the Congo Basin. The Congo Basin today is a closed canopy tropical forest -- the world's second largest after the Amazon. It's home to elephants, great apes, many species of birds and mammals, as well as the Congo River. Myers' results are

consistent with data from other low paleolatitude, continental, Upper Jurassic deposits in Africa and with regional projections of paleoclimate generated by general circulation models, he says.

"It provides a good context for the vertebrate fossils found in Central Africa," Myers says. "At times, any indications of the paleoclimate are listed as an afterthought, because climate is more abstract. But it's important because it yields data about the ecological conditions. Climate determines the plant communities, and not just how many, but also the diversity of plants."

While there was no evidence of terrestrial vertebrates in the deposits that Myers studied, dinosaurs were present in Africa at the same time. Their fossils appear in places that were once closer to the coast, he says, and probably wetter and more hospitable.

The Belgium samples yielded good evidence of the paleoclimate. Myers found minerals indicative of an extremely arid climate typical of a marshy, saline environment. With the Congo Basin at the center of Gondwana, humid marine air from the coasts would have lost much of its moisture content by the time it reached the interior of the massive continent.

"There probably wouldn't have been a whole lot of trees; more scrubby kinds of plants," Myers says.

The clay minerals that form in soils have an isotopic composition related to that of the local rainfall and shallow groundwater. The difference in isotopic composition between these waters and the clay minerals is a function of surface temperature, he says. By measuring the oxygen and hydrogen isotopic values of the clays in the soils, researchers can estimate the temperature at which the clays formed. For more information see www.smuresearch.com.

Myers presented his research, "Late Jurassic Paleoclimate of Central Africa," at a scientific session of the 2009 annual meeting of The Geological Society of America in Portland, Ore., Oct. 18-21.

The research was funded by the Roy M. Huffington Department of Earth Sciences at SMU, and the Institute for the Study of Earth and Man at SMU.

Adapted from materials provided by Southern Methodist University.

http://www.sciencedaily.com/releases/2009/11/091110202859.htm

Simple Questionaire Can Identify Patients At High Risk For Lung Cancer, Study Suggests

ScienceDaily (Nov. 11, 2009) — A study featured in the November issue of the *Journal of Thoracic Oncology* confirms the success of a simple questionnaire designed to identify patients at high risk of lung cancer. Initiated in 2001, the current study confirmed 18 cases of cancer of the original 430 patients who qualified as high risk after completing a five-minute questionnaire.

The study was conducted in primary care physician offices among patients seeking care for general health issues. The evaluating physician incorporated a simple questionnaire focused in three areas: risks, environments and genetics. Specific questions included smoking habit, occupational environments (mining, construction or railroad),subsequent exposure to chemicals and family history.

Colorado's Primary Care Partners surveyed more than 1,000 patients to evaluate their corresponding risk of lung cancer. Almost half of those surveyed qualified as high risk, and 126 of these identified underwent spinometry, a non-invasive breath measurement procedure. Of the patients with airflow obstruction, 88 underwent a full lung cancer screening. After five years, the study confirmed lung cancer in eight patients with obstructed airflow and 10 in of the patients without.

The study opened the door to mitigate late diagnosis through embedding these simple questions into the patient-physician dialogue. "Simple by design, our initiative received widespread community support from physicians, patients and hospitals," said lead investigator Thomas Petty, MD. By providing the guidelines for pointed questions when patients are face-to-face with physicians, we can begin to identify those at risk."

Adapted from materials provided by International Association for the Study of Lung Cancer, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/11/091101132533.htm

Controversial New Climate Change Data: Is Earth's Capacity To Absorb CO_2 Much Greater Than Expected?

New data show that the balance between the airborne and the absorbed fraction of carbon dioxide has stayed approximately constant since 1850, despite emissions of carbon dioxide having risen from about 2 billion tons a year in 1850 to 35 billion tons a year now. (Credit: iStockphoto/Karl Dolenc)

ScienceDaily (Nov. 11, 2009) — New data show that the balance between the airborne and the absorbed fraction of carbon dioxide has stayed approximately constant since 1850, despite emissions of carbon dioxide having risen from about 2 billion tons a year in 1850 to 35 billion tons a year now.

This suggests that terrestrial ecosystems and the oceans have a much greater capacity to absorb CO_2 than had been previously expected.The results run contrary to a significant body of recent research which expects that the capacity of terrestrial ecosystems and the oceans to absorb CO_2 should start to diminish as CO_2 emissions increase, letting greenhouse gas levels skyrocket. Dr Wolfgang Knorr at the University of Bristol found that in fact the trend in the airborne fraction since 1850 has only been 0.7 ± 1.4% per decade, which is essentially zero.

The strength of the new study, published online in *Geophysical Research Letters*, is that it rests solely on measurements and statistical data, including historical records extracted from Antarctic ice, and does not rely on computations with complex climate models.This work is extremely important for climate change policy, because emission targets to be negotiated at the United Nations Climate Change Conference in Copenhagen early in December have been based on projections that have a carbon free sink of already factored in. Some researchers have cautioned against this approach, pointing at evidence that suggests the sink has already started to decrease.

So is this good news for climate negotiations in Copenhagen? "Not necessarily," says Knorr. "Like all studies of this kind, there are uncertainties in the data, so rather than relying on Nature to provide a free service, soaking up our waste carbon, we need to ascertain why the proportion being absorbed has not changed." Another result of the study is that emissions from deforestation might have been overestimated by between 18 and 75 per cent. This would agree with results published in early November in *Nature Geoscience* by a team led by Guido van der Werf from VU University Amsterdam. They re-visited deforestation data and concluded that emissions have been overestimated by at least a factor of two.

Journal reference:

1. Knorr et al. **Is the airborne fraction of anthropogenic CO2 emissions increasing?** *Geophysical Research Letters*, 2009; 36 (21): L21710 DOI: 10.1029/2009GL040613

Adapted from materials provided by University of Bristol.

http://www.sciencedaily.com/releases/2009/11/091110141842.htm

IUD Is Most Popular Long-acting Contraceptive Amongst Europeans

New research finds that the IUD is the most popular long-acting contraceptive amongst Europeans. (Credit: SINC)

ScienceDaily (Nov. 11, 2009) — A European study has defined the profile for the usage of long-acting contraceptive methods. The work, presented with the National Congress of Gynaecology award, shows, amongst other things, that 10% of women use these methods, the majority over 30 years old.

"Long-acting contraceptives (the IUD, contraceptive injection or contraceptive implant) are still not widely used," Sergio Haimovich, researcher at the Hospital del Mar in Barcelona and author of the study published in the *European Journal Of Contraception And Reproductive Health Care*, explains.

After the male condom, the pill is the most popular contraceptive method amongst European women, while intrauterine contraception (copper IUD or hormone-releasing IUS) is most popular as a long-term solution. Of the more than 11,000 women surveyed in 14 European countries, longer-lasting methods were used by 1,088 women, 10% of the sample.

The Spanish research, part of a broader study on the general contraceptive profile of European women, evaluates the use of long-acting reversible contraceptives. According to Haimovich, "those using them are women over the age of 30 who do not want more children and who are looking for a long-term solution." Younger girls use different methods, according to the expert.

The reasons why certain contraceptive methods are chosen, and how, are unknown. But why is there a scientific interest in the user profile? "The answers to these questions can help us to formulate contraceptive advice that is better adapted to the needs of the users," explains Haimovich.

The condom triumphs in Spain

The data consider the specific needs of each country. Spain is one of the European countries where the condom is used most, by all ages. However, according to the study hormonal methods, such as the pill or the ring, are increasingly being used.

The results of this research, awarded best work at the National Congress of Gynaecology on 25 September this year, "help to explain what users want and enable a more appropriate contraceptive check to be created," affirms Haimovich. "That is why we must always adapt our discourse to the demands of the users, and work such as this makes us aware of these requirements," the scientist points out.

Journal reference:

1. Sergio Haimovich. **Profile of long-acting reversible contraception users in Europe**. *European Journal Of Contraception And Reproductive Health Care*, 2009

Adapted from materials provided by FECYT - Spanish Foundation for Science and Technology, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/10/091028134635.htm

Cell Phones Become Handheld Tools For Global Development

University of Washington computer scientists are turning cell phones into flexible tools for collecting data in the field. Here, UW doctoral student Yaw Anokwa (right) watches an employee of a Ugandan nonprofit try out the tool he developed. (Credit: Carl Hartung, University of Washington)

ScienceDaily (Nov. 11, 2009) — Mobile phones are on the verge of becoming powerful tools to collect data on many issues, ranging from global health to the environment.

Computer scientists at the University of Washington have used Android, the open-source mobile operating system championed by Google, to turn a cell phone into a versatile data-collection device. Organizations that want a fully customizable way to, say, snap pictures of a deforested area, add the location coordinates and instantly submit that information to a global environmental database now have a flexible and free way to do it.

UW computer scientists were already working on mobile tools for the developing world when Android, the first comprehensive open-source platform for mobile devices, was announced two years ago by the Open Handset Alliance, a group of companies of which Google is a member. For the past year UW computer science and engineering doctoral students Carl Hartung, Yaw Anokwa and Waylon Brunette have worked at Google's Seattle office using Android to create a data-collection platform for use in developing regions.

Their free suite of tools, named Open Data Kit, is already used by organizations around the world that need inexpensive ways to gather information in areas with little infrastructure. Seattle's Grameen Foundation Technology Center is using it to evaluate its Ugandan text-messaging information hotline; D-Tree International, a Boston-based nonprofit, is using it in Tanzania to guide health workers treating children under 5 years old; the University of California, Berkeley's Human Rights Center is using it to record human rights violations in the Central African Republic. This fall the Jane Goodall Foundation in Tanzania and the Brazilian Forest Service signed up to use it to monitor deforestation.

"Many organizations need to be able to make evidence-based decisions, and to do that they need data," Anokwa said. "We hope our toolkit enables organizations to gather the data quickly so they can analyze it quickly and make the best decisions for the communities they serve."

They tool is described in an article published this month in the *Institute of Electrical and Electronics Engineers' Computer* magazine. Gaetano Borriello, UW professor of computer science and engineering, and Adam Lerer, a graduate student at the Massachusetts Institute of Technology, are co-authors.

In the past some researchers have harnessed individual cell phone models to collect data in the field. But when the phone gets outdated, so does the software. Instead of creating a tool for a single phone, or even a single purpose, the UW team built something that would provide a reusable platform to collect all types of mobile data.

"We found a lot of organizations were building a lot of one-off tools that were very similar," Hartung said. "We're trying to make ours as compatible and flexible as possible."

Open Data Kit's versatile suite of tools can collect data; store, view and export data on remote servers; and manage devices in the field from a central office. The output is compatible with emerging data standards such as the Open Medical Records System, which aims to coordinate health records in the developing world.

Many organizations are using Open Data Kit, but the biggest project so far is a major effort to track and treat HIV patients in Kenya. Led by the Academic Model Providing Access to Healthcare, a U.S. Agency for International Development-funded partnership between Indiana University and Kenya's Moi University, it is one of the most comprehensive HIV treatment programs in sub-Saharan Africa. AMPATH trains Kenyan community health workers who conduct door-to-door testing in rural areas for HIV, tuberculosis and malaria, and offer ongoing personalized health counseling.

Hartung and Anokwa traveled to Kenya this summer to meet with AMPATH's community health workers and do a trial run with 10 phones. They spent two weeks working with Kenyan collaborators, then accompanied community health workers on home visits to see the phone being used in the field.

"It's a pretty amazing experience to be sitting in a mud hut seeing someone get counseled, maybe for the first time, on HIV, and the counselor is using your tool to record information," Hartung said. "It gives a whole new perspective on the need for reliable software."

For the past two years AMPATH workers have conducted field visits using a Palm Pilot and separate GPS unit. This required workers to key in a 10-digit identifier for each patient, stand outside and wait up to two minutes to get location coordinates, and at the end of each day return to the main office to upload their information to a central database, which adds travel time and expense.

Phones running Open Data Kit can record location in seconds, scan a barcode rather than requiring the numbers to be entered by hand, and upload the data automatically using a cellular network. AMPATH plans to deploy 100 Google-powered phones by the end of this year. Ultimately, it aims to use 300 phones powered with Open Data Kit to reach 2 million people.

"Adopting this technology was kind of a win-win-win in terms of direction for our organization," said Dr. Burke Mamlin, an assistant professor of medicine at the Indiana University School of Medicine and research scientist with the nonprofit Regenstrief Institute, which supports AMPATH. "This opens doors by allowing us to bring data collected in the field directly into our medical records system. And now we have a phone, all the personal digital assistant capability, the ability to read barcodes, and the ability to capture images or video, all in one unit."

The device also opens up new possibilities for the future. If one family member is absent during a site visit health workers can schedule a follow-up visit and have it automatically appear in their calendars. Health workers could cue up public-health videos if they thought the family could benefit. Program managers in a central office could track data in real time and send updates to field workers without them having to come back to the base.

Building technology for use in the developing world offers new challenges for computer scientists. Power and connectivity may be intermittent, and users may have poor eyesight or literacy.

There are also other issues specific to mobile devices. Web developers in the Western world generally create white text on a dark background, but it turns out dark text on a white background works better in bright sunlight, where most of these devices will be used. And touch-screen phones rely on an electrical signal from users' fingers, but that signal gets blocked by calluses. UW students found some rural users needed to use a softer part of the finger pad, and this meant designing bigger buttons.

The team is now back at the UW, where they are part of a group called Change that studies technology in the developing world. Funding for the project comes from Google.org, the philanthropic arm of the company. The code is freely available and ongoing research will be based at the university.

Adapted from materials provided by University of Washington.

http://www.sciencedaily.com/releases/2009/10/091029141249.htm

Pain In The Neck: Too Much Texting Could Lead To Overuse Injuries

Text messaging on a mobile phone. (Credit: iStockphoto)

ScienceDaily (Nov. 10, 2009) — The world record for fastest text message typing is held by a 21-year old college student from Utah, but his dexterous digits could mean serious injury later on. Most adults aged 18-21 prefer texting over e-mail or phone calls, and ergonomics researchers are starting to wonder whether it's putting the younger generation at risk for some overuse injuries -- once reserved for older adults who have spent years in front of a computer.

Judith Gold, an assistant professor of Epidemiology at the College of Health Professions and Social Work, thinks this might be the case. At this year's annual meeting of the American Public Health Association, she presented preliminary research which suggested that among college students, the more they texted, the more pain they had in their neck and shoulders.

"What we've seen so far is very similar to what we see with office workers who've spent most of their time at a computer," said Gold, who directs the Ergonomics and Work Physiology Laboratory. "The way the body is positioned for texting -- stationary shoulders and back with rapidly moving fingers -- is similar to the position for typing on a computer."

Text messaging is a fairly new technology, Gold says, so this is a new area of research among ergonomists. "But given the similarities in body position, findings from research on overuse injuries from computers could be applicable here," she said.

Current studies on computer use show office workers are prone to carpal tunnel syndrome, bursitis, and tendonitis.

In Gold's lab, she and her team use tools like infrared cameras, motion analysis and heart rate monitors to study the body's position in several job-related simulations. But given the prevalence of text messaging among young adults, Gold wants to delve further into the physiological effects of this latest form of communication.

"Looking around our campus, you see every student on their cell phones, typing away," she said. "It's the age group that texts the most, so it's important to know what the health effects may be to learn whether it will cause long term damage."

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

http://www.sciencedaily.com/releases/2009/11/091110105355.htm

Plentiful Poinsettias Without Plant Growth Regulators

This photo shows poinsettia plants cultivated under a photoselective (left) and a transparent (right) film. (Credit: Photo by Diego Mata)

ScienceDaily (Nov. 10, 2009) — Poinsettias can be a lucrative crop for ornamental plant growers, particularly during the Christmas season. In the temperate regions of the southern hemisphere, where poinsettias are grown for both export and local markets, high-demand time for holiday sales occurs during the summer, when warm temperatures and stronger light can accelerate plant growth, often resulting in unmarketable plants.

To produce more sought-after consumer favorites, commercial growers are challenged to control poinsettias' growth rates in unfavorable environmental conditions. Many growers use chemical plant growth regulators (PGRs) to achieve desired plant height, but the high cost of PGRs, environmental use restrictions, and increasing pressure from consumers to find alternatives to contaminant chemicals are driving researchers to explore new, sustainable alternatives.

Prior research has reported the successful use of a technique termed "light manipulation" to affect plant height in some ornamental plants. The technique involves using specific photoselective films to reduce the far-red component of light in the environment surrounding the plants. Consequently, the proportion of the active form of the phytochromes -- a family of photoreceptors that absorb red and far-red light in plants -- increases, playing an important role in defining the makeup of plants and, ultimately, their market value.

Argentine researchers recently completed a study to determine if manipulation of light quality can be a successful alternative to the use of chemical plant growth regulators for producing high-quality poinsettia plants. Diego A. Mata of the Instituto de Floricultura (INTA) and Javier F. Botto of the Universidad de Buenos Aires published the results of their experiment in a recent issue of HortScience.

The team evaluated different architectural and quality components of 'Freedom Red' poinsettia plants cultivated with natural radiation under different red (R) and far-red (FR) ratios in combination with or without the application of plant growth regulators. Photoselective film was used to significantly reduce the FR component of the light, and a transparent film was used as control to obtain high and low R/FR ratios (5.7 and 1.1, respectively).

Results of the experiments indicated that poinsettia plants cultivated under a high R/FR ratio were shorter and more compact than those grown under transparent film. Flowering time was slightly delayed in plants grown under a high R/FR ratio compared with those cultivated under the control treatment. Additive effects were detected between light quality and PGR factors, indicating that light quality manipulation is an alternative strategy to reduce or to replace the use of PGRs in commercial production systems that usually require several PGR applications.

"In summary," stated Mata and Botto, "our results show that light manipulation is an effective alternative to the application of PGR to control plant architecture in 'Freedom Red' poinsettias without affecting plant quality components under high natural irradiance conditions of temperate regions. The use of photoselective filters that increase the R/FR ratio in the cultivation environment reduces plant height and conserves the plant quality parameters."

Although the experiment suggests that light manipulation can be beneficial for producing ornamental poinsettia plants using an environmentally friendly strategy, the scientists caution that the techniques used in this study should be evaluated under realistic production systems before it can be recommended to growers.

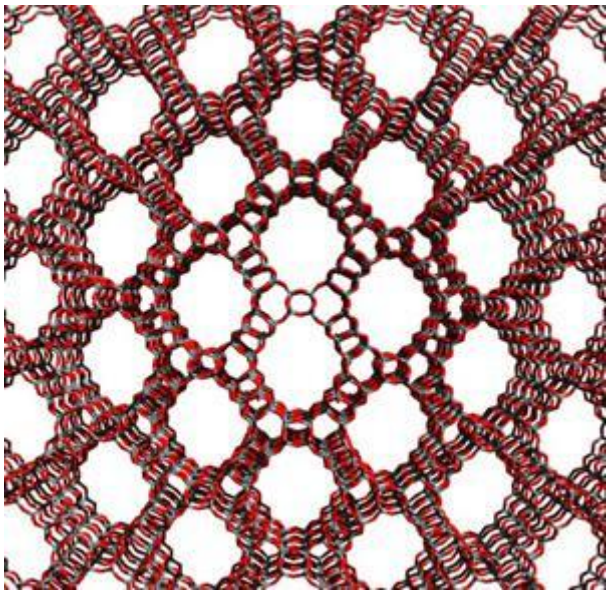
Journal reference:

1. Mata, Diego A., Botto, Javier F. **Manipulation of Light Environment to Produce High-quality Poinsettia Plants**. *HortScience*, 2009; 44: 702-706 [link]

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

http://www.sciencedaily.com/releases/2009/11/091104123036.htm

Researchers Hunt For New Zeolites



New computations suggest there could be many more types of zeolites than once thought. (Credit: Image courtesy of Rice University)

ScienceDaily (Nov. 10, 2009) — In all the world, there are about 200 types of zeolite, a compound of silicon, aluminum and oxygen that gives civilization such things as laundry detergent, kitty litter and gasoline. But thanks to computations by Rice University professor Michael Deem and his colleagues, it appears there are -- or could be -- more types of zeolites than once thought.

A lot more.

A project that goes back 20 years came to fruition earlier this year when Deem, Rice's John W. Cox Professor in Biochemical and Genetic Engineering and a professor of physics and astronomy, and his team came up with a list that shows the structures of more than 2.7 million zeolite-like materials.

Of those, they found the thermodynamic characteristics of as many as 314,000 are near enough to currently known zeolites that it should be possible to manufacture these materials.

Creation of the public database is the focus of a new paper, posted online by the American Chemical Society's *Journal of Physical Chemistry C* and planned as the cover of the Dec. 24 print edition. The paper's authors include Ramdas Pophale, a postdoctoral research associate in Deem's lab; Phillip Cheeseman, senior scientific applications analyst at Purdue's Rosen Center for Advanced Computing; and David Earl, an assistant professor of chemistry at the University of Pittsburgh.

Zeolites can be viewed as "a membrane that will only let molecules of a certain size pass through," Deem said. "But they also do other things. They have an affinity for some molecules, so they're used to absorb odors, for instance, in flower shops."

In laundry detergents, zeolites trade soft ions for hard ones in the water, and the petrochemical industry uses zeolites to crack petroleum into gasoline, diesel and other products. After the accident at the Three Mile Island nuclear power plant, zeolites were used to adsorb radioactive ions.

Zeolites are a fine lattice, a molecular sieve that can let molecules of a certain size pass while blocking others. They can also adsorb molecules, attracting and gripping certain substances -- for which cats and their owners are grateful.

Natural zeolites are often the product of volcanic activity, as rocks, ash and alkaline water combine and crystallize over thousands of years. "The term zeolite comes from the combination of two Greek words that mean 'boiling' and 'stone,'" Deem said.

About a third of zeolites used for commercial purposes are mined, while the rest are synthesized into custom configurations that tend to be more pure, he said.

The fact that only 200 or so zeolites are known makes the creation of Deem's database a real breakthrough, as it gives industries new clues to optimizing their techniques. "That's one possibility, to look for related materials," he said. "In many catalytic applications, there's only one material that currently works."

It took serious computer time to figure out all the possibilities, said Deem, who has lately gained a measure of fame for his study of viruses, particularly H1N1. He began looking at zeolites two decades ago while at Exxon and published his first paper on the subject in the journal Nature. With support from the National Science Foundation (NSF) and the use of the Deem lab's Zefsa II software, researchers needed three years to complete the computations on the NSF's TeraGrid node at Purdue. "I think we were the biggest user of computer time there in 2006, and the fifth- or sixth-largest on the TeraGrid," Deem said. "At Purdue, we were making use of unused computer cycles, like the SETI@home project that searches for extraterrestrial life using people's home computers. We finished around the start of 2009."

The "big question," he said, is how to turn theoretical zeolites into real ones, a project his lab plans to pursue. "A couple of things have to happen. One is that we have to identify materials that look like they would have good properties, and then we have to find a synthesis mechanism to make those materials."

But how does one narrow the practicalities from 2.7 million possibilities? "It depends on the properties we're looking for," Deem said. "We have some ideas of what's practical, but of course we would love to work with other people."

The work received support from the U.S. Department of Energy Basic Energy Sciences Program and from the NSF.

Journal reference:

1. Michael W. Deem, Ramdas Pophale, Phillip A. Cheeseman and David J. Earl. **Computational Discovery of New Zeolite-Like Materials**. *The Journal of Physical Chemistry C*, 2009; 091009095953064 DOI: 10.1021/jp906984z

Adapted from materials provided by Rice University.

http://www.sciencedaily.com/releases/2009/11/091102171730.htm

When Is A Fetus Able To Survive Outside The Womb?

When a fetus is smaller than expected for the number of weeks of pregnancy, due to associated problems like a poorly developed heart, health concerns as severe as brain damage can result. (Credit: iStockphoto/Noel Powell)

ScienceDaily (Nov. 10, 2009) — When a fetus is smaller than expected for the number of weeks of pregnancy, due to associated problems like a poorly developed heart, health concerns as severe as brain damage can result.

The condition, known as Intra-uterine growth restriction (IUGR), prompts doctors to use ultrasound to track a baby's health and determine the best time for delivery. But these measurements are often incomplete, and obstetricians have had to rely on educated guesses about the strength of a fetus's circulatory system.

Now, thanks to new research from *Tel Aviv University*, IUGR babies will have a better chance for a healthy life.

Prof. Ofer Barnea of TAU's *Department of Biomedical Engineering*, in collaboration with Prof. Jacob Bar from the Wolfson Medical Center, couples mathematical models with information about a baby's physiology inside the womb. Combining ultrasound with powerful algorithms based on real-life data, pediatricians get critical data on the development of the fetal circulatory system, so they can determine when the baby is strong enough to survive on its own.

"Babies with IUGR experience stress and growth restrictions inside the womb," says Prof. Barnea. "Doctors need to assess their growth, but currently have to rely on partial data from ultrasound systems. If they leave the baby inside too long, she may suffer from brain damage. On the other hand, we need to be sure her heart is strong enough to survive outside the womb."

Adding it all up

Prof. Barnea's team of biomedical engineers and physicians provides a way for doctors to "see" the whole picture so better medical decisions can be made.

"We can show doctors mathematically what the human eye can't see," says Prof. Barnea. "Our system integrates observable data with mathematical models of the fetus's or newborn's circulation."

Prof. Barnea is currently developing the technology in a new direction with Prof. William P. Santamore of Temple University and Nemours Children's Hospital to manage and optimize surgical repairs in newborns with cardiac malformation. It may one day be available to treat adults as well.

"This is a major advance in pediatric medicine," Prof. Santamore says. "We measure data that is available from babies and deliver it to the computer to estimate pressure, flow and other parameters that cannot be otherwise accessed in their tiny hearts."

The system was first developed to treat hypoplastic left heart syndrome, a condition in which the left side of the heart does not function. If not caught right away, the consequences can be terminal. Today, doctors medicate with prostaglandins and then operate. But since measurements of blood flow to the lung of the preemie or newborn are not possible, it's hard for them to know how to optimize flow distribution and manage the baby.

The equation for a safer delivery

Prof. Barnea's mathematical model of the baby's cardiovascular system provides this information to doctors treating congenital heart disease, and has already changed the way the health of these babies is managed. "We are now combining these basic physiological findings with a more sophisticated mathematical model of circulation in newborns, adapting it to the individual patient using online measured data," he says.

"It's about better medicine and better healthcare. We also want fewer birth defects and better survival rates," Prof. Barnea, an inventor of other OB/GYN diagnostic devices, adds. His publications in this field include the *American College of Cardiology* journal and *Circulation.*

The scientists hope to develop their new IUGR tool as a bedside monitor based on real data. Feasibility studies are now under way, and the tool could find its way into hospitals in as few as two years.

Adapted from materials provided by Tel Aviv University.

http://www.sciencedaily.com/releases/2009/11/091110135413.htm

Costs Of Plug-in Cars Key To Broad Consumer Acceptance

Example of plug-in electric car. (Credit: iStockphoto/Karen Keczmerski)

ScienceDaily (Nov. 10, 2009) — A University of Michigan survey released today shows widespread consumer interest in buying plug-in hybrid electric vehicles (PHEVs). But the cost of the cars is much more influential than environmental and other non-economic factors as a predictor of purchase probabilities.

The survey of a nationally representative sample of 2,513 adults age 18 and over was conducted between July and November 2008 as part of the Reuters/University of Michigan Surveys of Consumers. The findings were released at The Business of Plugging In: A Plug-In Electric Vehicle Conference in Detroit.

"The data provide strong evidence that a combination of economic and social incentives may be most effective in successfully introducing these vehicles," said economist Richard Curtin, director of the Reuters/University of Michigan Surveys of Consumers, conducted by the U-M Institute for Social Research.

The study was supported by funds from the Pacific Northwest National Laboratory and the U-M Transportation Research Institute. In addition to assessing the current state of knowledge and opinions about PHEVs, the survey addressed the willingness to pay for these vehicles given different cost and fuel savings scenarios.

Overall, when given no cost or fuel-saving estimates, 42 percent of those surveyed said there was at least some chance that they would buy a PHEV sometime in the future.

The researchers then asked respondents to rate the likelihood of purchasing a PHEV under three different cost-scenarios, each time assuming they would save 75 percent in fuel costs compared to a traditional, gasoline-powered vehicle. With each successive doubling of the price of PHEVs, the probability of purchase fell by 16 percentage points.

On average, 46 percent of those surveyed said there was some chance they would purchase a PHEV that cost $2,500 more than a traditional vehicle; 30 percent said there was a chance they would buy if the PHEV cost $5,000 more; but just 14 percent said there was a chance if it cost an additional $10,000.

The relationship between cost and purchase probabilities was clearly indicated by the proportions who said there was zero chance of buying or 100 percent chance of buying at the three different cost premiums presented in the survey.

"Indeed, 56 percent of all consumers responded that there was no chance that they would buy a PHEV at the top premium," Curtin said. "The proportion indicating a zero probability of purchase moves from

nearly one-in-four at $2,500, to one in three at $5,000, to more than one in two at an added cost of $10,000. At the other extreme, those who said they were 100 percent certain that they would buy a PHEV reached a high of just 10 percent for the lowest added cost and fell to just 1 percent for the highest added cost."

It should be no surprise that vehicle purchases, typically the second largest purchase households make, would be very sensitive to price, Curtin says. But although consumer acceptance of PHEVs was not determined solely by cost issues, the role of environmental considerations played a smaller role in consumer attitudes about PHEVs than had been anticipated.

Half of all consumers reported that showing a commitment to the environment through the purchase of a PHEV was "very important" to them. This kind of overt demonstration of a commitment to buying environmentally friendly products -- known as "badging" -- has long been recognized as a powerful influence on purchases of many different "green" products, Curtin says.

But when asked what they thought was the main advantage of a PHEV -- reducing money spent on fuel, reducing vehicle emissions or reducing dependence on foreign oil -- 54 percent reported that reducing dependence on foreign oil was the main advantage.

"Reducing vehicle emissions was by far the least frequently cited advantage," Curtin said. "Just 15 percent of all consumers cited that as the main advantage."

Surprisingly, only 31 percent thought reducing money spent on fuel was the main advantage, even though the price of gas was high during the time the survey was conducted. When the survey started in July 2008, gas prices were near their all-time peak level ($4.28 per gallon) and then fell sharply during the period of data collection. But the researchers found no relationship between PHEV purchase probabilities and the price of gas.

"The data provide strong evidence that a combination of economic and social incentives may be most effective for the successful introduction of PHEVs," Curtin said. "The survey also showed the significant influence of hybrid vehicles in signaling people's commitment to a clean environment.

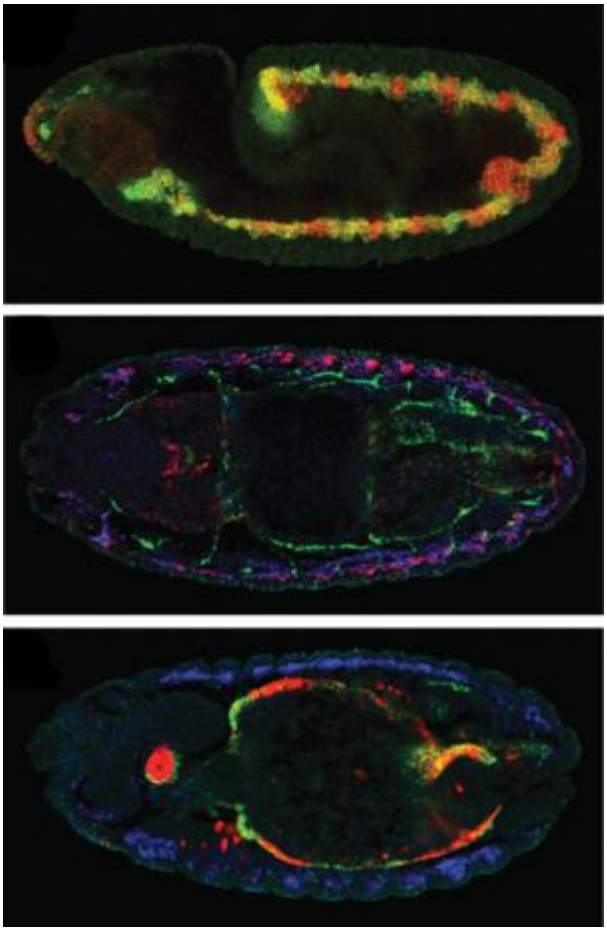
"Nonetheless, consumer attitudes toward the environment are less compelling than economic criteria in explaining hybrid purchase probabilities. Presumably, if PHEVs are priced so that consumers can recoup their initial investments over a reasonable time period, consumers would find ample economic justification for their purchase. The critical role of environmental and other non-economic attitudes may be to provide the initial burst of interest and sales to propel the appeal of PHEVs to the mass market."

The analysis also examined how vehicle usage patterns and currently owned vehicle choices, as well as demographic characteristics such as age, income, education and gender, are connected to preferences for PHEVs. Additional correlates of purchase probabilities, including location and availability of outlets for recharging, and preferences for new technologies, are also analyzed in the survey report.

Adapted from materials provided by University of Michigan.

http://www.sciencedaily.com/releases/2009/10/091021115145.htm

Deciphering The Regulatory Code: Scientists Take New Approach To Predict Gene Expression



These fluorescence microscopy images of fruit fly embryos demonstrate that the scientists' computer predictions were correct. As predicted, during the early stages of development (top) a CRM called 1070 is active (red) in the mesoderm (green) – the tissue which will give rise to all muscle types. At a later developmental stage (middle), the same CRM is active (red/pink) in the embryo's body wall muscle (blue), but not in its gut muscle (green). At the same time (bottom), another CRM, called 5570 (red), drives development in the gut muscle (green) but not in the body wall muscle (blue). (Credit: Furlong/EMBL)

ScienceDaily (Nov. 10, 2009) — Embryonic development is like a well-organised building project, with the embryo's DNA serving as the blueprint from which all construction details are derived. Cells carry out different functions according to a developmental plan, by expressing, i.e. turning on, different combinations of genes. These patterns of gene expression are controlled by transcription factors: molecules which bind to stretches of DNA called cis-regulatory modules (CRMs), and, once bound, switch the relevant genes on or off.

Thanks to scientists at the European Molecular Biology Laboratory (EMBL) in Heidelberg, Germany, it is now possible to accurately predict when and where different CRMs will be active. The study, published today in *Nature*, is a first step towards forecasting the expression of all genes in a given organism and demonstrates that the genetic regulation that is crucial for correct embryonic development is more flexible than previously thought.

Through an interdisciplinary collaboration between biologist Robert P. Zinzen, computer scientist Charles Girardot and statistician Julien Gagneur, a novel, integrated approach was possible. They combined detailed experimental data about where and when transcription factors are binding to CRMs with a computational approach, and were able to forecast CRM activity.

"Going from global binding data to CRM activity was a big challenge in the field -- one which we have now begun to overcome," says Eileen Furlong, who headed the study.

Using a comprehensive, systematic approach, the scientists identified and recorded the binding profiles -- i.e. the combinations of transcription factors binding at different times and places -- of approximately 8000 CRMs involved in regulating muscle development in the fruit fly Drosophila. The activity of a number of such CRMs had been previously studied, and the EMBL team used this information to group them into classes according to the type of muscle and developmental stages they were active in. The scientists then trained a computer to unravel the binding profiles for each of these groups, and search the 8000 newly identified CRMs for ones whose binding profiles fitted that picture. Such CRMs were predicted to have similar activity patterns, implying they are involved in regulating the development of the same muscle type.

When the scientists tested their predictions experimentally, the results were not only accurate but also enlightening. It turns out that the regulatory code, in which one binding profile leads to one pattern of CRM activity, is actually not that straightforward. CRMs with strikingly different binding profiles can have similar patterns of activity. This plasticity was unexpected, but makes sense in evolutionary terms, the researchers say. The fact that different combinations of transcription factors, or binding codes, can regulate the same developmental process means that even if some transcription factors or CRMs change or are lost during an organism's evolution, it can still develop a gut muscle, for instance.

"What's exciting for me is that this study shows that it is possible to predict when and where genes are expressed, which is a crucial first step towards understanding how regulatory networks drive development," Furlong concludes.

Journal reference:

1. Zinzen, R.P., Girardot, C., Gagneur, J., Braun, M. & Furlong, E.E.M. **Combinatorial binding predicts spatio-temporal cis-regulatory activity**. *Nature*, 2009; 462 (7269): 65 DOI: 10.1038/nature08531

Adapted from materials provided by European Molecular Biology Laboratory.

http://www.sciencedaily.com/releases/2009/11/091105102722.htm

Men Leave: Separation And Divorce Far More Common When The Wife Is The Patient

ScienceDaily (Nov. 10, 2009) — A woman is six times more likely to be separated or divorced soon after a diagnosis of cancer or multiple sclerosis than if a man in the relationship is the patient, according to a study that examined the role gender played in so-called "partner abandonment." The study also found that the longer the marriage the more likely it would remain intact. The study confirmed earlier research that put the overall divorce or separation rate among cancer patients at 11.6 percent, similar to the population as a whole. However, researchers were surprised by the difference in separation and divorce rates by gender. The rate when the woman was the patient was 20.8 percent compared to 2.9 percent when the man was the patient.

"Female gender was the strongest predictor of separation or divorce in each of the patient groups we studied," said Marc Chamberlain, M.D., a co-corresponding author and director of the neuro-oncology program at the Seattle Cancer Care Alliance (SCCA). Chamberlain is also a professor of neurology and neurosurgery at the University of Washington School of Medicine.

The study, "Gender Disparity in the Rate of Partner Abandonment in Patients with Serious Medical Illness," was published in the Nov. 15 issue of the journal *Cancer*. The other corresponding author is Michael Glanz, M.D., of the Huntsman Cancer Institute at the University of Utah School of Medicine.

Why men leave a sick spouse can be partly explained by their lack of ability, compared to women, to make more rapid commitments to being caregivers to a sick partner and women's better ability to assume the burdens of maintaining a home and family, the study authors said.

Researchers at three medical centers -- the SCCA, Huntsman and Stanford University School of Medicine -- enrolled a total of 515 patients in 2001 and 2002 and followed them until February 2006. The men and women were in three diagnostic groups: those with a malignant primary brain tumor (214 patients), those with a solid tumor with no central nervous system involvement (193 patients) and those with multiple sclerosis (108 patients). Almost half of the patients were women.Chamberlain said the study was initiated because doctors noticed that in their neuro-oncology practices, divorce occurred almost exclusively when the wife was the patient. The researchers enrolled groups of patients with other cancers and with multiple sclerosis to separate the impact of oncologic versus neurological disease. The results showed a stronger gender disparity for divorce when the wife was the patient in the general oncology and multiple sclerosis groups (93 percent and 96 percent respectively, compared to 78 percent for the primary brain tumor group).

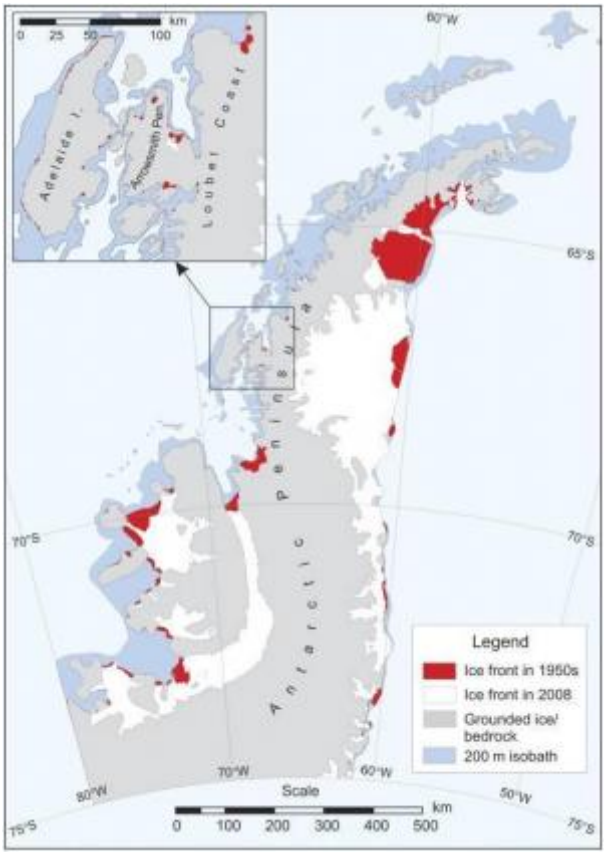
The study also found correlations between age and length of marriage and the likelihood of divorce or separation. The older the woman was the more likely her partnership would end. However, longer marriages remained more stable.

Researchers also measured some health and quality of life outcomes among the patients who separated or divorced. They found that patients used more antidepressants, participated less in clinical trials, had more frequent hospitalizations, were less likely to complete radiation therapy and more likely not to die at home, according to the study."We believe that our findings apply generally to patients with life-altering medical illness," the authors wrote. "We recommend that medical providers be especially sensitive to early suggestions of marital discord in couples affected by the occurrence of a serious medical illness, especially when the woman is the affected spouse and it occurs early in the marriage. Early identification and psychosocial intervention might reduce the frequency of divorce and separation, and in turn improve quality of life and quality of care."

Adapted from materials provided by Fred Hutchinson Cancer Research Center, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/11/091110105401.htm

Antarctica Glacier Retreat Creates New Carbon Dioxide Store; Has Beneficial Impact On Climate Change



Antarctic Peninsula map. (Credit: Image courtesy of British Antarctic Survey)

ScienceDaily (Nov. 10, 2009) — Large blooms of tiny marine plants called phytoplankton are flourishing in areas of open water left exposed by the recent and rapid melting of ice shelves and glaciers around the Antarctic Peninsula. This remarkable colonisation is having a beneficial impact on climate change. As the blooms die back phytoplankton sinks to the sea-bed where it can store carbon for thousands or millions of years.

Reporting recently in the journal *Global Change Biology*, scientists from British Antarctic Survey (BAS) estimate that this new natural 'sink' is taking an estimated 3.5 million tonnes* of carbon from the ocean and atmosphere each year.

Lead author, Professor Lloyd Peck from BAS says, "Although this is a small amount of carbon compared to global emissions of greenhouse gases in the atmosphere it is nevertheless an important discovery. It shows nature's ability to thrive in the face of adversity. We need to factor this natural carbon-absorption into our calculations and models to predict future climate change. So far we don't know if we will see more events like this around the rest of Antarctica's coast but it's something we'll be keeping a close eye on."

Professor Peck and his colleagues compared records of coastal glacial retreat with records of the amount of chlorophyll (green plant pigment essential for photosynthesis) in the ocean. They found that over the past 50 years, melting ice has opened up at least 24,000 km2 of new open water (an area similar to the size of Wales) -- and this has been colonised by carbon-absorbing phytoplankton. According to the authors this new bloom is the second largest factor acting against climate change so far discovered on Earth (the largest is new forest growth on land in the Arctic).

Professor Peck continues, "Elsewhere in the world human activity is undermining the ability of oceans and marine ecosystems to capture and store carbon. At present, there is little change in ice shelves and coastal glaciers away from the Antarctic Peninsula, but if more Antarctic ice is lost as a result of climate change then these new blooms have the potential to be a significant biological sink for carbon."

Phytoplankton use chlorophyll and other pigments to absorb sunlight for photosynthesis, and when they grow in large numbers, they change the way the ocean surface reflects sunlight. They are eaten by krill and are the foundation of the ocean food web. Animals such as sponges and corals also consume phytoplankton. They can live for decades to hundreds of years and when they die they form mats on the seabed that are buried under sedimentation.

*The 3.5 million tonnes of carbon taken from the ocean and atmosphere is equivalent to 12.8 million tonnes of CO_2.

Global carbon dioxide emissions from fossil fuel combustion and land use change reached 8.7 billion tonnes of carbon in 2007.

Sea ice loss and retreat of coastal glaciers on the Antarctic Peninsula were studied using historical accounts, aerial photographs and satellite images. This shows that seven of the major ice shelves and 87% of the 244 marine glaciers have retreated over the past 50 years.

The 24,000 km^2 of new open water is approximately the size of Vermont, New Hampshire, New Jersey, Belize or Israel.

Definitions:

A glacier -- is a 'river of ice' that is fed by the accumulation of snow. Glaciers drain ice from the mountains to lower levels, where the ice either melts, breaks away into the sea as icebergs, or feeds into an ice shelf.

Ice sheet -- is the huge mass of ice, up to 4km thick that covers bedrock in Antarctica or Greenland. It flows from the centre of the continent towards the coast where it feeds ice shelves.

Ice shelf -- is the floating extension of the grounded ice sheet. It is composed of freshwater ice that originally fell as snow, either in situ or inland and brought to the ice shelf by glaciers. As they are already floating, any disintegration will have no impact on sea level. Sea level will rise only if the ice held back by the ice shelf flows more quickly onto the sea.

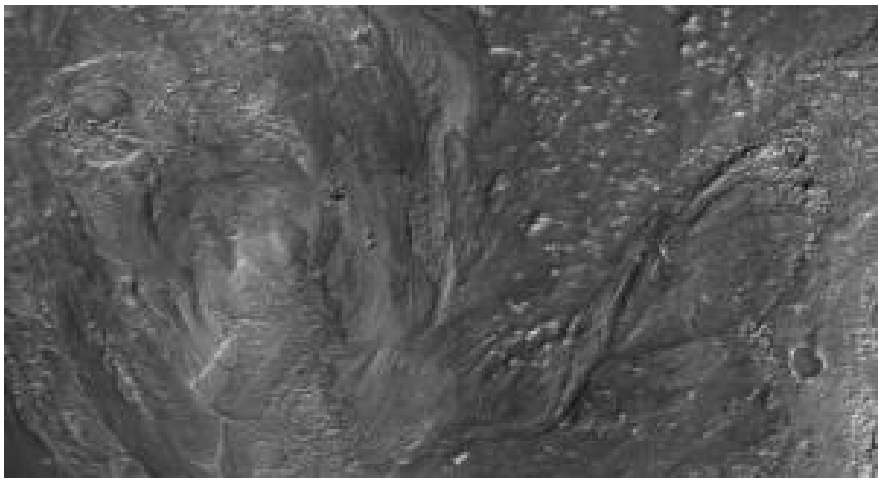
Journal reference:

1. Peck et al. **Negative feedback in the cold: ice retreat produces new carbon sinks in Antarctica**. *Global Change Biology*, 2009; DOI: 10.1111/j.1365-2486.2009.02071.x

Adapted from materials provided by British Antarctic Survey.

http://www.sciencedaily.com/releases/2009/11/091109121117.htm

Mars Reconnaissance Orbiter Sees Channels From Hale Crater



This image from NASA's Mars Reconnaissance Orbiter shows channels to the southeast of Hale crater on southern Mars. (Credit: NASA/JPL-Caltech/University of Arizona)

ScienceDaily (Nov. 10, 2009) — A new image from NASA's Mars Reconnaissance Orbiter shows channels to the southeast of Hale crater on southern Mars. Taken by the orbiter's High Resolution Imaging Science Experiment (HiRISE) camera, this view covers an area about 3 kilometers (2 miles) wide.

Channels associated with impact craters were once thought to be quite rare. Scientists proposed a variety of unusual circumstances to explain them, such as impacts by comets or precipitation caused by the impact event. As more of Mars is photographed with high-resolution imagery, more craters surrounded by channel systems are being discovered.

The channels in this HiRISE image are from Hale crater, an exceptionally well-preserved, 125-by-150-kilometer (78-by-93-mile) impact crater located on the northern rim of Mars' Argyre basin. Hale crater is roughly 170 kilometers (100 miles) to the southeast of the site seen here. The channels in this image are up to about 250 meters (820 feet) across, though most are much smaller. The channels appear to emanate directly from material ejected from Hale. They were likely formed by the impact event. The heat of the impact could have melted large amounts of subsurface ice and generated surface runoff capable of carving the channels.

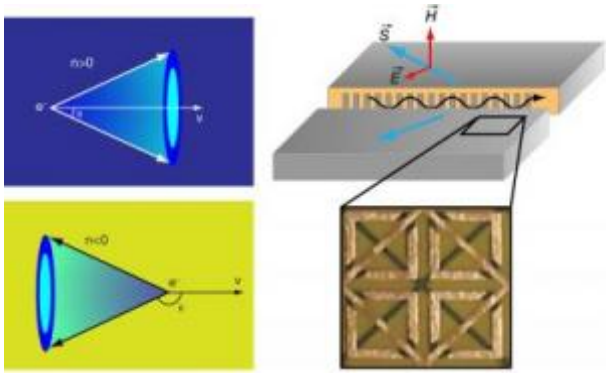
If a significant amount of water was released or mobilized by the Hale crater impact, larger impacts that formed during the early days of the Solar System may have been able to bring even more water to the surface of Mars. If this is true, a long-term, stable, warm and wet climate may not be required to explain the presence of such channels in the ancient Martian landscapes.

This view is a portion of a HiRISE observation taken on Oct. 7, 2007, at 32.6 degrees south latitude and 320.5 degrees east longitude. The full-frame image is available at http://hirise.lpl.arizona.edu/PSP_005609_1470.

Adapted from materials provided by NASA/Jet Propulsion Laboratory.

http://www.sciencedaily.com/releases/2009/11/091102110228.htm

Flipping A Photonic Shock Wave



(Top left) Schematic of Cerenkov radiation in a conventional natural medium with positive refractive index, such as water, in which the radiation falls in a cone in the forward direction. (Bottom left) Schematic of backward Cerenkov radiation in a left-handed medium, showing the reversed cone. (Right) Schematic of the two-dimensional experimental configuration and the photographic image of the negative index metamaterials used to demonstrate backward Cerenkov radiation. The metamaterials consist of in-plane split-ring resonators and metal wires.

ScienceDaily (Nov. 10, 2009) — Physicists have developed a new metamaterial structure that successfully demonstrates reverse Cerenkov radiation. They have directly observed a reverse shock wave of light in a specially tailored structure known as a left-handed metamaterial.

Although it was first predicted over forty years ago, this is the first unambiguous experimental demonstration of the effect. The research is reported in *Physical Review Letters* and highlighted in the November 2 issue of *Physics*.

Light moving in a vacuum sets the ultimate speed limit, but light travels more slowly through materials like glass and air. Speedy electrons or other charged particles can briefly outrun light in matter, producing a shock wave in the form of a cone of light known as Cerenkov radiation. The eerie blue glow in the cooling water of nuclear reactors is result of particles moving faster than the speed of light in water. In normal substances, the radiation is emitted in a forward cone. Left-handed metamaterials, however, have unusual effects on light that should reverse the cone's direction.

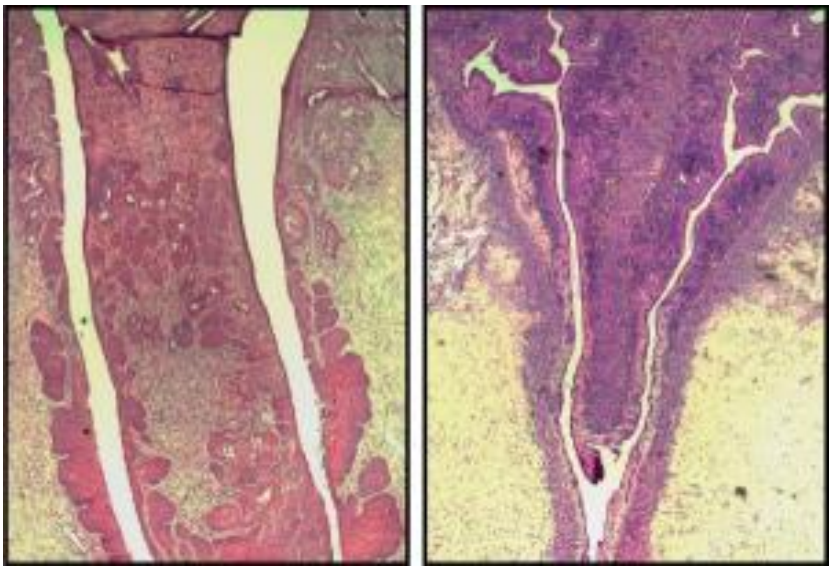
When light enters a normal material like glass, it changes direction, allowing us to make lenses that correct poor vision. When light enters a left-handed metamaterial, the change is opposite to the direction that would occur in normal materials. (The materials are "left-handed" because they affect light oppositely from "right-handed" normal materials.) This means that the cone of Cerenkov radiation from a faster-than-light particle should propagate backward in a left-handed metamaterial. But experimental difficulties have prevented confirmation of the effect despite its prediction in 1968.

Now a team of physicists at Zhejiang University in China and the Massachusetts Institute of Technology has developed a new metamaterial structure that successfully demonstrates reverse Cerenkov radiation. Instead of injecting faster-than-light particles into their metamaterial, they created an optical analogue of particles moving at twice light speed. This allowed them to produce a much stronger burst of reverse Cerenkov light than they could have gotten with a real particle beam. Besides verifying a decades-old theoretical prediction, the experiment suggests a new possible application of left-handed metamaterials as detectors of high-speed particles in accelerators and other experiments.

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

http://www.sciencedaily.com/releases/2009/11/091102111841.htm

FDA-approved Drugs Eliminate, Prevent Cervical Cancer In Mice



The cervix of a mouse that didn't receive the estrogen receptor-blocking drugs, left, displayed multiple lesions and malignant tumors. A mouse that was given the drugs, right, displayed a healthy cervix with no abnormal growths. (Credit: Image courtesy of University of Wisconsin-Madison)

ScienceDaily (Nov. 10, 2009) — Researchers at the University of Wisconsin-Madison School of Medicine and Public Health have eliminated cervical cancer in mice with two FDA-approved drugs currently used to treat breast cancer and osteoporosis.

Published in the Nov. 9 edition of the *Proceedings of the National Academy of Sciences*, the findings offer hope for the 500,000 women around the world who are diagnosed with cervical cancer each year. Half of them will not survive.

The drugs, which keep estrogen from working in cells, also cleared precancerous growths, or lesions, in both the cervix and vagina, and prevented the onset of cancer in mice that had the precancerous lesions.

"We have begun to test whether the drugs are as effective in treating cervical cancer in human cells as they are in our mice," says senior author Paul Lambert, of the McArdle Laboratory for Cancer Research and the UW-Madison Carbone Cancer Center.

The lab studies, which should take one or two years to complete, could be followed quickly with phase-two or phase-three clinical trials. Early phase trials would not be necessary since the drugs have already been approved for clinical use.

Lambert and his team use special mice they developed more than 20 years ago to study cervical cancer. The mice were genetically engineered to carry human papillomavirus (HPV) 16, known to be strongly associated with cervical cancer.

HPV is also the most common sexually transmitted infection in women in the United States. While new vaccines can prevent some of the many kinds of HPV infections, they do not eliminate already-existing infections or cervical cancers or precancerous lesions arising from pre-existing infections.

"Virtually all cervical cancers in women test positive for HPV 16," says Lambert, a professor of oncology at the UW-Madison School of Medicine and Public Health.

But not everyone who becomes infected with HPV gets cervical cancer, so scientists have suspected that something else was going on.

"Since the cervix and other female reproductive organs are so responsive to estrogen, our lab and others began to focus on that hormone," Lambert says.

Sang-Hyuk Chung, a postdoctoral fellow in Lambert's lab, zeroed in on one of the two receptors that mediate estrogen function in cells -- estrogen receptor (ER) alpha. He crossed his HPV mice with mice in which ER alpha had been knocked out, then gave the animals estrogen. When the mice didn't develop cervical cancer or even precancerous lesions, Chung knew that ER alpha was an essential player in the slow cancerous process.

"We then wanted to learn if drugs that interfere with the receptor and block estrogen's ability to bind to it could be used to treat or prevent cervical cancer," he says.

Chung turned to an ER alpha blocker used to treat breast cancer, fulvestrant, and tested it on the HPV-positive mice with cervical cancer. After one month, he found that 11 of 13 mice lost all signs of cancer. But cancer remained in all the control mice that hadn't gotten the drug.

"It was amazing to see that not only was the cancer gone, but all the precancerous lesions that give rise to cancer were also gone," says Lambert.

Chung then tested a second drug, raloxifene, which is used to treat breast cancer and osteoporosis, to make sure that the first results weren't a fluke. He found the same strong, blocking effect.

Finally, the researchers gave the drugs to animals with the precancerous lesions and found that the ER alpha blockers prevented the lesions from progressing to cancer.

Lambert's team is now testing human cervical cancer cell lines to see if ER alpha blockers stop the growth of the malignant cells. The next step will be to test the drugs on tissue samples removed from women following surgery for the cervical cancer.

"We can't be sure how the science will translate from animals to humans," says Lambert, "but we have faith in our mouse model. There are many similarities in how cervical cancer develops and manifests itself in women and in mice."

Adapted from materials provided by University of Wisconsin-Madison.

http://www.sciencedaily.com/releases/2009/11/091109173608.htm

Ice Cream Researchers Making Sweet Strides With 'Functional Foods'

Laura Ortinau (left), a graduate student in food sciences at the University of Missouri helps Rick Linhardt, coordinator of research operations and manager of Buck's Ice Cream store, and Jessica Roland, a junior in food science and nutrition, make a batch of Tiger Stripe Ice Cream. MU researchers are working on ways to make ice cream not only tastier, but healthier as well. (Credit: Pinar Istek/University of Missouri)

ScienceDaily (Nov. 10, 2009) — A comfort food, a tasty treat, an indulgence -- ice cream conjures feelings of happiness and satisfaction for millions. Ice cream researchers at the University of Missouri have discovered ways to make ice cream tastier and healthier and have contributed to ice cream development and manufacturing for more than a century. Today, MU researchers are working to make ice cream into a functional food, adding nutrients such as fiber, antioxidants and pro-biotics to premium ice cream.

"The idea of putting a functional ingredient into a food instead of just using the nutrients found in the food naturally takes a multi-functional approach," said Ingolf Gruen, MU professor of food chemistry and ice cream researcher in the College of Agriculture, Food and Natural Resources. "Food provides calories and comfort -- people want to indulge. We're working on making ice cream satisfying and healthy."

Adding nutrients such as pro-biotics, which are already found in some dairy products, and fiber to ice cream can improve digestive health. Many diseases are caused by inflammation that starts in the intestines, Gruen said. Improving digestive health with functional foods might reduce that inflammation. Although functional foods have health benefits, there are many challenges to adding nutrients to ice cream.

"Our major challenges are texture, flavor and psychological acceptance," Gruen said. "The nutrients we add often have bitter tastes and affect the texture of ice cream that we have to mask. Flavors like chocolate are easier to work with because the flavor is so strong that it can overcome other flavors from the nutrients. Another challenge is determining whether people would be upset that we're 'tampering' with a comfort food. We need to know if they would be more willing to pay for ice cream with added nutritional benefits."

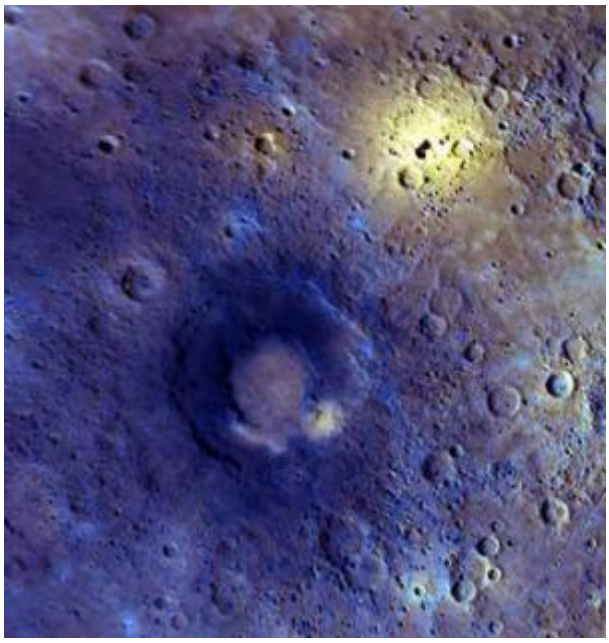
Gruen and his research team are looking at using the açai berry and remnants from grapes in wine-making to add nutrients to ice cream. They hope to have a prototype ready for tasting in the next six months.

This new research on ice cream as a functional food coincides with the 20th anniversary of Buck's Ice Cream Parlor, an ice cream shop and research facility at MU. In 1989, Wendall and Ruth Arbuckle contributed about $160,000 to ice cream research at MU and were the namesake for Buck's Ice Cream Parlor, previously Eckles Hall Ice Cream Shop from the 1920s to 1972. Buck's might be best known for the invention of Tiger Stripe ice cream, a popular MU frozen treat made with French Vanilla ice cream and dark chocolate stripes, that is sent to people around the world.

MU has a long history of ice cream research that dates back to the 1920s. William Henry Eddie Reid, professor emeritus of dairy manufacturing, and graduate student Wendell Arbuckle, started the program by studying the texture of ice cream. In the 1960s, Robert Marshall, professor emeritus of the Department of Food Science and Nutrition, began studying ways to make ice cream meet the nutritional needs of consumers. This work led to pioneering research of low-fat ice cream. Researchers found that replacing milk fat with ingredients made from carbohydrates and proteins created low-fat frozen desserts that were similar to high-fat desserts. The ice cream industry adapted those formulas to produce the ice cream consumed today.

Adapted from materials provided by University of Missouri-Columbia, via EurekAlert!, a service of AAAS.
http://www.sciencedaily.com/releases/2009/11/091109194745.htm

MESSENGER Spacecraft Reveals More Hidden Territory On Mercury



This enhanced-color view was created with a statistical technique that highlights subtle color variations seen in the 11 filters of MESSENGER's wide-angle camera that are often related to composition. Merged with images from the higher-resolution narrow-angle camera, the two sets of observations tell the story of the geology of the area and the compositional differences of the features observed. This region, viewed in detail for the first time during the third flyby, appears to have experienced a high level of volcanic activity. (Credit: Image courtesy of NASA)

ScienceDaily (Nov. 10, 2009) — A NASA spacecraft gliding over the battered surface of Mercury for the second time this year has revealed more previously unseen real estate on the innermost planet. The probe also has produced several science firsts and is returning hundreds of new photos and measurements of the planet's surface, atmosphere and magnetic field.

The MErcury Surface, Space ENvironment, GEochemistry, and Ranging, or MESSENGER, spacecraft flew by Mercury shortly after 4:40 a.m. EDT, on Oct. 6. It completed a critical gravity assist to keep it on course to orbit Mercury in 2011 and unveiled 30 percent of Mercury's surface never before seen by a spacecraft.

"The region of Mercury's surface that we viewed at close range for the first time this month is bigger than the land area of South America," said Sean Solomon, principal investigator and director of the Department of Terrestrial Magnetism at the Carnegie Institution of Washington. "When combined with data from our first flyby and from Mariner 10, our latest coverage means that we have now seen about 95 percent of the planet."

The spacecraft's science instruments operated throughout the flyby. Cameras snapped more than 1,200 pictures of the surface, while topography beneath the spacecraft was profiled with a laser altimeter. The comparison of magnetosphere observations from the spacecraft's first flyby in January with data from the probe's second pass has provided key new insight into the nature of Mercury's internal magnetic field and revealed new features of its magnetosphere. The magnetosphere is the volume surrounding Mercury that is controlled by the planet's magnetic field.

"The previous flybys by MESSENGER and Mariner 10 provided data only about Mercury's eastern hemisphere," explains Brian Anderson of the Johns Hopkins University Applied Physics Laboratory,

known as APL, in Laurel, Md. "The most recent flyby gave us our first measurements on Mercury's western hemisphere, and with them we discovered that the planet's magnetic field is highly symmetric."

The probe's Mercury Laser Altimeter, or MLA, measured the planet's topography, allowing scientists, for the first time, to correlate high-resolution topography measurements with high-resolution images.

"The MLA collected altimetry in regions where images from MESSENGER and Mariner 10 data are available, and new images were obtained of the region sampled by the altimeter in January," said Maria Zuber, co-investigator and head of the Department of Earth, Atmospheric, and Planetary Sciences at the Massachusetts Institute of Technology. "These topographic measurements now improve considerably the ability to interpret surface geology."

The Mercury Atmospheric and Surface Composition Spectrometer observed Mercury's thin atmosphere, known as an exosphere. The instrument searched for emissions from sodium, calcium, magnesium, and hydrogen atoms. Observations of magnesium are the first detection of this chemical in Mercury's exosphere. Preliminary analysis suggests that the spatial distributions of sodium, calcium, and magnesium are different. Simultaneous observations of these spatial distributions, also a first for the spacecraft, have opened an unprecedented window into the interaction of Mercury's surface and exosphere.

Spacecraft images also are revealing for the first time vast geologic differences on the surface.

"Now that MESSENGER's cameras have imaged more than 80 percent of Mercury, it is clear that, unlike the moon and Mars, Mercury's surface is more homogeneously ancient and heavily cratered, with large extents of younger volcanic plains lying within and between giant impact basins," said co-investigator Mark Robinson of Arizona State University in Tempe.

The project is the seventh in NASA's Discovery Program of lower-cost, scientifically focused missions. APL designed, built and operates the spacecraft and manages the mission for NASA's Science Mission Directorate in Washington. Science instruments were built by APL; NASA's Goddard Space Flight Center in Greenbelt, Md.; the University of Michigan, Ann Arbor; and the University of Colorado, Boulder. GenCorp Aerojet of Sacramento, Calif., and Composite Optics Inc. of San Diego, provided the propulsion system and composite structure.

For more information about the Mercury mission, visit: www.nasa.gov/messenger

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Adapted from materials provided by NASA.

http://www.sciencedaily.com/releases/2009/11/091108215449.htm

Diet Switching Can Activate Brain's Stress System, Lead To 'Withdrawal' Symptoms

Rich dessert. Intermittent access to foods rich in fat and sugar induces changes in the brain which are comparable to those observed in drug dependence, according to new research. (Credit: iStockphoto)

ScienceDaily (Nov. 10, 2009) — In research that sheds light on the perils of yo-yo dieting and repeated bouts of sugar-bingeing, researchers from The Scripps Research Institute have shown in animal models that cycling between periods of eating sweet and regular-tasting food can activate the brain's stress system and generate overeating, anxiety, and withdrawal-like symptoms.

"When many people diet, they try to avoid fattening foods that taste good, but ultimately end up going back to their regular eating habits," said senior author Eric Zorrilla, Ph.D., an associate professor and member of the Pearson Center for Alcoholism and Addiction Research and Harold L. Dorris Neurological Research Institute at Scripps Research. "We found that rats cycled in this way between palatable food and less tasty, but otherwise acceptable, food, begin to binge on the sweet food, stop eating their regular food, and show withdrawal-like behaviors often associated with drug addiction. As in addiction to drugs or ethanol, the brain's stress system is involved in each of these changes."

"Our research suggests that this eating pattern leads to a vicious circle," explained Pietro Cottone, Ph.D., who is co-first author of the paper with Valentina Sabino, Ph.D.; both are former postdoctoral fellows at Scripps Research who are now assistant professors and co-directors of the Laboratory of Addictive Disorders at Boston University School of Medicine. "The more you cycle this way, the more likely it is you cycle again. Having a 'free day' in your diet schedule is a risky habit."

The research is being published in an advance, online Early Edition of the journal *Proceedings of the National Academy of Sciences* (PNAS) the week of November 9, 2009.

Seeking Pleasure, Avoiding Pain

According to the U.S. Department of Health and Human Services, about two-thirds of the adult population of the United States is overweight or obese, conditions that cost the country an estimated $117 billion in terms of medical expenses and lost productivity. Understanding the factors that underpin overeating and that undermine attempts at weight loss is important for addressing this major public health concern.

Instead of focusing on the positive motivation derived from eating pleasurable food -- which had previously been the gist of much research in the field -- the Scripps Research team took a new tack and

focused on the questions of whether negative reinforcement, which is thought to drive compulsive drug intake, may play a similar role in excessive eating and whether the brain's stress system was involved in this process.

Cottone explained, "For example, I can be motivated to work hard because I get praise from my boss -- that's positive reinforcement. Conversely, I can work hard to avoid being fired -- that's negative reinforcement. Similarly, I can either eat a lot for the pleasure of eating, or I can eat a lot to relieve the stress of not having certain foods. We wanted to know if negative factors were involved."

To examine this question, the researchers divided the rats into two groups. The first group was fed alternating cycles of five days of regular chow and two days of sweet chow. The second group ate only regular-tasting food. The amount of food consumed was not restricted for either group.

When the researchers examined the results, they found that the two groups showed different patterns of behavior. When the diet-cycled rodents were fed regular chow, they put less effort into obtaining the previously acceptable food, ate less, and were more likely to avoid anxiety-provoking situations. When they returned to a diet of sweet food, their anxiety-related behaviors returned to normal, but they ate more than they needed. The control group showed none of these effects.

A Diet that Causes Stress

Next, the researchers looked at the involvement of the brain's stress system -- which had been shown to contribute to patterns of drug and alcohol binging and withdrawal -- in underpinning these behaviors.

To do this, the team measured levels of stress-related corticotropin-releasing factor (CRF) mRNA and peptide in an area of the brain known as the central amygdala, which is involved in fear, anxiety, and stress responses. Indeed, the researchers found that the diet-cycled group on normal chow displayed five times the control group's levels of CRF. Only when the diet-cycled group was fed sweet food did CRF levels return to normal.

"CRF is a key stress neuropeptide," said Cottone. "In observing the activation of the amygdaloid CRF system during abstinence from sweet foods, we understood the causes of recurrent dieting failures."

Zorrilla pointed out that the increase in stress was due to the withdrawal state, rather than to outside factors.

"People will often say they are eating bad foods or fail a diet because they 'are stressed,'" he said. "Our findings suggest that intermittently eating sweet food changes the brain's stress system so that you might feel stressed, even though nothing that terrible has happened. In other words, you might be self-medicating stress-like symptoms of abstinence with that piece of pie. Or, the adaptations in your brain stress system might make you more reactive to otherwise minor stressors."

To confirm these results and to see whether blocking CRF could reverse some of the effects of diet cycling, the researchers turned to a compound called R121919 (a small molecule CRF1 receptor antagonist).

When administered to the diet-cycled rats, the compound blunted the bingeing on sweet chow, as well as the lackluster pursuit of regular chow and the anxiety-associated behaviors during this part of the diet cycle. As in similar studies modeling alcoholism, on a molecular level diet-cycled rats showed greater sensitivity to the ability of the CRF1 receptor antagonist to reduce central amygdala synaptic transmission of the neurotransmitter GABA, which plays an important role in regulating neuronal excitability.

"We believe we may have identified part of the neurochemical basis underlying behavioral adaptations that can result from yo-yo dieting," said Zorrilla. "The mechanism corresponds to what is colloquially

known as the 'dark side' of addiction to drugs of abuse or ethanol, supporting the idea that the brain shows addiction-like adaptations to intermittent eating of palatable food."

An Unhealthy Cycle

While many questions remain, the study helps explain how a pattern yo-yo dieting can be established and why it is usually ineffective in promoting weight loss. The study also underlines the health risks of such an eating pattern, as activation of the brain's stress system has been linked not only to emotional disorders, but also to conditions such as heart disease.

"The findings suggest that frequent dieting with frequent relapse is worse than dieting by itself," said Cottone.

In addition, the research opens the door to potential development of a drug therapy to assist people escape an unhealthy cycle of eating.

In addition to Zorrilla, Cottone, and Sabino, the paper was authored by Marisa Roberto, Michal Bajo, Lara Pockros, Jennifer B. Frihauf, Eva M. Fekete, Bruno Conti, and George Koob of Scripps Research; Luca Steardo of the University of Roma La Sapienza (Rome, Italy); Kenner C. Rice of the National Institute on Drug Abuse of the National Institutes of Health (NIH); and Dimitri E. Grigoriadis of Neurocrine Biosciences.

This research was supported by the NIH's National Institute of Diabetes and Digestive and Kidney Diseases, National Institute on Drug Abuse, and National Institute on Alcohol Abuse and Alcoholism, as well as the Pearson Center for Alcoholism and Addiction Research at Scripps Research.

Journal reference:

1. Zorrilla et al. **CRF system recruitment mediates dark side of compulsive eating**. *Proceedings of the National Academy of Sciences*, November 9, 2009

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

http://www.sciencedaily.com/releases/2009/11/091109174345.htm

What Matters Most

By: Erik Hayden

The moment before Abraham could plunge a dagger into his beloved son Isaac and sacrifice him in devotion to Yahweh, an angel's voice rang out, steadied his hand — and saved the boy. Shaken, but immensely relieved, Abraham untied the boy, hugged him and wept.

If this sequence from Genesis 22 in the Old Testament seems archaic, well, it is. Religious sacrifice, the giving up of temporary gratification in return (perhaps) for future blessings, has existed in rituals since before the dawn of history. And while the notion of human sacrifice has faded, modern sacrifices can still be incredibly profound.

While the practice of sacrifice is not unknown among secular individuals, it's still most visibly demonstrated among the devoutly religious — especially in youth. These adolescents (13-17 years old) are, on average , more likely than young adults to attend religious services, more certain in their belief in God, and slightly more likely to believe that God is personally involved in their day-to-day lives. For them, sacrifice translates into giving up tangible comforts, pleasures and relations. While this may distance these youth from popular culture, it displays a substantial devotion and solidarity with a religious community and (often) closely watching parents.

A new qualitative study, headed by Brigham Young University's David C. Dollahite, explores reasoning and motivations for these religious sacrifices in devout youth.

The study sample consisted of 55 married couples and their 77 adolescent children in New England and Northern California. Broad swaths of faiths were represented including Orthodox Christians, Hasidic Jews, Mormons, mainline Protestants and Muslims. Researchers did not stack the religions against each other in terms of who was sacrificing "more" but rather discovered common strands in all faiths.

Their findings, compiled from copious amounts of interviews with the youths and their parents, categorized recurring themes that motivated adolescents to sacrifice for their faith. While some themes

that emerged from respondents seem given, including the motivation to "fulfill expectations" (of parents or religious leaders) or "connect to a faith tradition or community," other themes discovered weren't as immediately apparent.

Researchers found that these tangible sacrifices (such as setting aside time for the Sabbath, abstaining from alcohol or peer pressure) are made in order to avoid problems (like the repercussions of illicit drug use or the fallout from a failed romantic relationship) that are perceived to be prevalent in popular culture. In these situations, sacrifices are a relief and a practical solution to avoiding the results of some potentially destructive actions.

Some adolescents took the practice even further, perceiving that they weren't simply offering a sacrifice, but they were being a sacrifice. They were able to conceive that — in contrast to the prevailing emphasis on independence and self-gratification — submitting fully to a higher power can make one feel, at least temporarily, whole.

These sacrificial acts reinforced a purpose and meaning in the lives of the young respondents-giving them much-needed hope to hold on to. Religious youth, as is commonly documented, seem to be satisfied with their lives and have much more success in avoiding depression, hopelessness and delinquency than their secular peers.

Perhaps this is because, as the study notes, they have developed the ability to look past present concerns and tend to focus on what matters most "in the end" or "in the long run."

http://www.miller-mccune.com/news/what-matters-most-1585

Vulcan Logic and the Missing Sink

By: David Richardson

The daily carbon dioxide emissions report probably doesn't come up very often at America's dining room tables, but Kevin Gurney and researchers from the Vulcan Project hope to soon see that change.

Gurney leads Purdue University's Vulcan Project, which has produced the nation's first county-by-county, hour-by-hour snapshot of CO_2 emissions. With Vulcan — named after the Roman god of fire and funded by the federal government through the North American Carbon Program — it is possible to peer, literally, into your own backyard (or your neighbor's) to see how your local area is contributing to the global problem that ultimately leads to global warming.

A little goes a long way

The gases nitrogen and oxygen account for 98 percent of the Earth's atmosphere. As one of the alphabet soup of trace gases naturally present in the air, CO_2 accounts for a mere .038 percent of the atmosphere by mass; however, it has a disproportionate impact on warming.

As Gurney, the associate director of the Climate Change Research Center at Purdue University, explained, "It comes down to how we look at the atmosphere. If we look at it in terms of mass — just the weight of things — then CO_2 is very small, but if we think about it in terms of the amount of infrared radiation it would trap, then CO_2 would look huge."

Although the oceans remove one-third to one-half of the carbon dioxide produced each year, "the bad news is, their ability to do so appears to be diminishing," Gurney said. Meanwhile, the thousand-year atmospheric lifespan of CO_2 means levels will continue to ratchet up even if emissions ended immediately.

Nevertheless, given what is known about carbon dioxide sources and sinks (locales or processes that remove CO_2 from the atmosphere), scientists say CO_2 has not accumulated as fast as one might expect, leading to the ironic question, "Why is the atmosphere not more polluted?"

Gurney and Daniel Mendoza, a graduate student with the Vulcan Project, suspect the answer may lie in an unrecognized carbon sink somewhere on the planet, and in light of the diminishing CO_2 capacity of the seas, they believe this "missing sink" will play an important role in the carbon policy equation.

Though Gurney said CO_2 concentration varies by no more than a few parts per million from pole to pole, he believes that mapping these barely perceptible peaks and valleys in CO_2 levels could lead the way to the missing carbon sinks.

"In effect the weather map is a great analogy," he said. "Most people know that the air has temperature everywhere, but we know that in some places it's a bit higher and in some places it's a bit lower just like a weather map shows. CO_2 is kind of like that. It's everywhere but it definitely has little bumps and valleys depending upon what's happening at the surface.

"The absence of the gas, where it would otherwise be expected, would indicate the possible location of the missing sinks."

To find the hidden sink, Gurney explained, research must first pin down where the observed carbon dioxide in the atmosphere originates. But that is not easy. CO_2 mixes thoroughly with air as it travels over the planet. "You can find CO_2 at the South Pole that was generated by industrial activity in the Northern Hemisphere."

Nonetheless, Gurney said, "We've known at the national level how much is coming from the U.S. as a whole," but prior to the Vulcan Project, the best estimates of emissions at the state level were based on fuel sales figures and shipping records.

Drilling down to the local level the math gets even fuzzier. Gurney says "the gold standard" of CO_2 emissions estimates merely apportioned total discharges among jurisdictions on the basis of population density. Noting the obvious flaw in that approach, he points out that major CO_2 emitters such as interstate highways and power plants, which alone account for 40 percent of U.S. emissions, are often a considerable distance from the population centers they serve.

To get a more accurate view of emissions sources Gurney turned to the U.S. Environmental Protection Agency and its network of local air pollution monitors. "Emission monitoring has gone on for 40 years — since the 1960s — which is an amazing legacy of information and infrastructure built and perfected over four decades," he explained. "In fact it is so good that we almost take it for granted now."

Reverse engineering

Although the EPA monitoring system was never intended to record CO_2 levels, Gurney said their reports can be reverse-engineered to quantify the CO_2 component of the exhaust that produced the pollution, "provided you know the type of device and fuel."

Mendoza is using data recycled from transportation studies picked up by "the thin wires that you can see that run across the road."

"They're the Federal Highway Administration's weight and motion sensors," he said. "They classify vehicles as either light duty or heavier duty" as they pass over the counter. Mendoza says from this and similar data, Vulcan can generate CO_2 emissions figures along major roads.

Although Vulcan collects no original field data, Mendoza says an incredible amount of detail can be coaxed from archival sources. Looking back to the year 2002, he says, Vulcan provides a sector-by-sector breakdown of CO_2 emissions from the power plant sector, residential, commercial sectors, and the cement sector. "We can bring it down to a 10-kilometer-by-10-kilometer grid and provide a temporal pattern for most sectors," he said.

"We were a little bit floored by how much emissions actually come out of very unpopulated areas — a lot of that is due to electricity generation, which is such a great part of the economy here," Mendoza noted.

He said Vulcan delivered an additional surprise, revealing large cities to be "much more" CO_2 efficient than smaller communities. Aside from the efficiency of urban mass transit, Mendoza believes lifestyle plays a role in the disparity. "Here in rural Indiana, we have large houses out in the middle of two acres, so the heating cost are much larger, but in the city you have the urban heat island effect keeping costs down."

The Vulcan Project Web page offers animated displays that show local CO_2 emissions ramping up and down in response to heating and cooling needs, traffic patterns or other cycles of daily American life for the year 2002.

International Appeal
Gurney said U.S. government officials asked him if Vulcan can be used for "verification purposes" for an eventual climate treaty. It's an idea he finds appealing: "It would certainly be better to have an independent scientific body perform that function than a government."

He believes the average citizen can benefit from a dialogue with Vulcan as well. (You can take a look immediately using Google Earth.)

"I was pretty amazed at how interested people were when we released the maps and the movies," he said. "It's always been difficult to communicate the essence of this problem because it's very abstract in a certain way. One of the things that Vulcan has done is start to make this problem a bit more real and at least make it recognizable to people's lives.

"It brings the discussion down to the human scale, to the scale people live, in their state, their county, in some cases, their city. It brings it into their living rooms."

Mendoza said his next tasks will include adding data from Mexico and Canada so the Vulcan grid covers the entire continent.

Gurney, who predicts Vulcan eventually will produce emissions forecasts three months in advance, said he has received funding for a global version of the project and is currently exploring partnership opportunities with candidates in Europe, Asia and South America.

Despite the detour down the public awareness road, Gurney says he has not wavered from his initial quest to discover the missing sink. However, with a better grasp on where the CO_2 originates, he says it will take direct observation, on a global scale, to determine where it might be going, and that job he said, is best performed from space.

http://www.miller-mccune.com/science_environment/vulcan-logic-and-the-missing-sink-1562

A Rock That Helps Out In a Hard Place

By: Sam Kornell

Folded into the mountains of northern Oman is a rare burst of peridotite rock. Viewed from above, its black-and-white striations make it look like a great scoop of marble fudge ice cream has been slathered across the earth.

In January 2008, a Columbia University doctoral student named Sam Krevor traveled to Oman to study the peridotite. For three showerless weeks he and a team of researchers surveyed, observed and catalogued the rock, camping under the stars and subsisting on an unlikely diet of cabbage and canned shellfish (nonperishable food items not being a staple of Omani grocery stores).

What were they looking for? The answer is as intriguing as it is unexpected. Peridotite, it turns out, absorbs carbon dioxide, and according to Krevor it potentially represents one of the greatest — if most bafflingly ignored — solutions to climate change in the world.

Originating deep in the earth, peridotite is a part of a family — "ultramafic rock" — that reacts naturally with CO_2 to form solid minerals. Last May, Krevor was the lead author of a study identifying and mapping enough ultramafic rock in the United States to sequester an enormous amount of carbon dioxide. Taking into account various land-use constraints — private property, proximity to cities, national and state parks — he and his fellow researchers found storage potential for 500 years of the country's CO_2 emissions.

So it's a mystery of current climate studies that the U.S. Department of Energy, the country's largest single source of funding into clean energy research and development, has awarded just one small grant, in 2003, to researchers studying mineral sequestration.

"It's very striking," Krevor said. "This is a technology that's a potential game changer, and there's been very little research done in the area."

Scientists have long mulled various strategies for capturing and storing greenhouse gas, thus far with limited practical success. In recent years, even the idea of sequestering carbon dioxide has become a source of contention. Some experts are skeptical that large amounts of CO_2 can be sucked out of the air and stored safely and permanently, and they worry that "carbon capture" technology could be used to justify the continued expansion of coal power plants, among the most profligate sources of carbon emissions in the world.

And yet the pace of climate change is now so rapid that sequestration may be necessary to avert catastrophe. Even if strong international agreements to reduce global carbon emissions are signed in the near future — a not-at-all-certain prospect — there may now be so much greenhouse gas caked into the atmosphere that actively removing it from circulation is necessary to avoid violent upheaval in weather and temperature patterns across the globe.

"Unless we're able to capture and store CO_2 at a reasonable price, we're in huge trouble," says Wally Broecker, a professor and scientist at Columbia University. One of the world's foremost authorities on climate change — he coined the term "global warming" in 1975 — Broecker worries that without major changes in the global energy infrastructure the world is headed toward climate disaster.

Broecker isn't a Cassandra: A few days after I spoke with him, the Met Office, the leading climate laboratory of the British government, issued a report finding that without a substantial reduction in carbon emissions, within 50 years global average temperatures will rise by up to 10 degrees Fahrenheit, with much of the United States warming by between 13 and 18F — a change which, scientists agree, would make large parts of the Earth more or less unlivable, including large parts of the American Southwest. (By contrast, climate observers hope action now can keep the world's heating to 3.6 degrees F.)

Broecker believes that solar power will eventually become the world's primary energy source, but because it will take time before solar can directly compete with coal and oil, carbon sequestration is an essential stopgap measure to curb climate change.

"There are only three energy sources that can supply the bulk of the world's needs: nuclear power, solar power and fossil fuel," he said. "I have a hard time believing nuclear is going to run the world. Solar is going to eventually come down in price and then it will run the world, but that will take time. And so in the meantime, we're going to have to learn to capture and store CO_2."

Sequestration efforts in the U.S. and Europe have so far focused on geologic storage -capturing the CO_2 at power plants and piping it, in gaseous form, into massive underground wells in, say, Nevada. "Air capture," a less researched field, would suck CO_2 directly out of the atmosphere.

According to Krevor, using ultramafic rock to store CO_2 — which scientists call "mineral sequestration" — has a couple of major advantages over other forms of carbon storage. For one thing, silicate rock, of which ultramafic rock is a subset, is the second most common mineral in the crust of the Earth, which gives it vast storage capacity. For another, it's safe. Once carbon dioxide is incorporated into the chemical structure of ultramafic rock, it's there to stay.

"There are no other forms of carbon as stable as carbonate rocks," Krevor said.

The problem Krevor and other researchers must surmount is that ultramafic rock sequesters CO_2 very slowly — over tens of thousands of years. "This process is important on geological time scales in buffering the CO_2 concentration of the atmosphere, but on a year-to-year time scale it doesn't keep up," he said. "So the question is: Is there a way to speed the process up so that it's fast enough to counteract the emissions from industrial processes?"

In 2003, a group of researchers at the Albany Research Center, a laboratory in Oregon funded by the Department of Energy, attempted to answer that question. They focused on two traditional methods of

accelerating chemical reactions in minerals — pulverizing them into tiny particles, and heating them to extreme temperatures. Both methods worked, but there was a problem: They required so much energy to enact that they produced more CO_2 than they sequestered.

After the ARC study was published, the Department of Energy effectively cut off funding into mineral sequestration research. The decision was based on a simple equation — the cost, in energy and money, appeared to outweigh the benefit. But according to Krevor, the goal of the ARC study was not to find the best way to accelerate mineral sequestration, but simply to prove it could be done. It was supposed to be the first step — "proof of concept" — but funding never arrived to develop step two.

At Columbia, Krevor studied, and eventually wrote his dissertation about, developing a catalyst to speed up the process. The idea is straightforward: If researchers can find a chemical that will accelerate mineral carbonation without itself being consumed or altered in the reaction, they should be able to mine ultramafic rock and use it in chemical reactors to sequester enormous quantities of heat-trapping CO_2.

If such a catalyst were found, Krevor said, it would be a cheap, profoundly safe and environmentally friendly way to combat global warming — a means to transform much of the Earth's crust into a huge carbon depository. "Any greenhouse gas technology is going to be evaluated by four factors: Cost, capacity, permanence and benign environmental impact," he said. "If you were able to find a catalyst that would make this process work quickly and cheaply, you'd have everything."

Klaus Lackner, a professor of geophysics at Columbia who was Krevor's doctoral adviser, and who was one of the first to suggest ultramafic rock as a climate solution, said the lack of funding for mineral sequestration is the result of "a fairly conscious decision that the center of gravity should be injecting CO_2 into the ground. [The scientific community] has decided, for better or for worse, to put all of our eggs into one basket."

Lackner and Krevor both took pains to note that they support developing methods to safely store CO_2 underground. Indeed, Krevor is now a post-doctoral researcher at Stanford, where he is studying geologic sequestration. But both men pointed out that the safety and permanence of mineral sequestration makes it an attractive alternative to traditional geologic sequestration.

"If you store CO_2 as a gas, you are ultimately responsible, virtually indefinitely, for ensuring that that gas doesn't come back into the air," Lackner said. "The more you put underground, the greater the responsibility, because if it begins to leak it would be disastrous."

What's more, both worry that there is simply not enough room underground to store the amount of CO_2 necessary to curb global warming over the long run. "We run the risk that 20, 30, 40 or 50 years from now, we'll run out of space," Lackner said. "The challenge we face right now" — with climate change — "is so big that I'm uncomfortable with the idea of investing entirely in this technology with the possibility that in 50 years it's over."

Krevor readily concedes that a cheap chemical catalyst may not be found. But he argues that the potential benefits of mineral sequestration are so great, and the danger climate change poses so dire, that it's senseless not to fund research into it.

"I understand that there's a very good chance that nothing could be found," he said. "But in science, and especially in the development of technology, you can really never say never. And what's really more illustrative to look at is not whether there's any inherent reason it could happen, so much as is there an inherent reason why it can't happen, and the answer in this case is absolutely not. There's no law of physics that says this is impossible."

Lackner echoed Krevor. As exciting as many new clean energy technologies are, he said, the bare reality is that the world is still far from having a fully viable substitute for coal and oil.

"We do not know how to provide the energy the world needs. We may have some good ideas, we may have some guesses, but if you tell me that energy consumption over the next 100 years will quadruple, which it easily will do, there is no good way right now to provide that energy without creating environmental havoc.

"It is very, very clear that we already have far more CO_2 in the air than we can afford. That must be addressed, and we are not yet accepting, in public view, in public policy and in funding, how dire the situation is."

Insufficient research funding is the working scientist's perennial complaint. But considering how much money the federal government has already extended toward dubious climate solutions like biofuel, and considering how overwhelming the need to develop big solutions to climate change has become, it's difficult to understand why mineral sequestration — the potential merits of which are so impressive — hasn't garnered more attention.

As Krevor put it, "If the cost of the process were low enough, we'd be doing it today."

http://www.miller-mccune.com/science_environment/a-rock-that-helps-out-in-a-hard-place-1563

Power to the Far-Flung People

By: Ben Preston

Imagine being able to produce fuel on a small scale near your home. With a facility no bigger than a shipping container, enough diesel fuel could be processed for your community using crops that neither compete with food crops nor use a lot of water.

Perhaps that sounds crazy in the context of developed nations, where energy is generated and consumed at a tremendous rate and often transmitted hundreds or thousands of miles through expensive cables and pipeline, but there are many remote places in the world where large-scale production facilities are unheard of. These are places that still do not have access to electric power.

Biodiesel Industries, a small company based in Santa Barbara, Calif., says it has a solution to that quandary. Dubbed ARIES (Automated Real-time Remote Integrated Energy System), the system consists of self-contained biodiesel production plants using computer automation to produce a consistent grade of biodiesel fuel from a variety of feedstock.

And while the benefit to the Navy is apparent — energy independence at bases and battlefields worldwide — what works for a sailor will also work for a poor family living miles off the grid.

While there is flexibility with regard to the types of plants used as feedstock, much of Biodiesel Industries' emphasis is on jatropha and algae, both of which are resilient, don't use much water, produce high yields of fuel-grade oil and can be grown near the intended recipients of fuel and electricity.

"Instead of having a huge plant with wires everywhere and transmission costs, every community can utilize local resources to provide energy," said Russ Teall, the company's founder.

While ARIES offers flick-of-a-switch operability, it took awhile for Biodiesel Industries to get where it is. In 1993, Teall, a longtime boat owner, wondered how biodiesel could be made available for the boating

community. Nobody seemed to know, so he took it upon himself to find out. Over the next few years, his quest turned him into a de facto expert in the burgeoning biofuel industry.

By 1997 he had formed Biodiesel Industries, and a year later he secured a Department of Energy contract to investigate the properties of cooking oil. The company's big break came in 2003 when it signed a cooperative research and development agreement with the U.S. Navy, which, aside from being the world's most prolific consumer of diesel fuel, gave the company access to the Naval Facilities Engineering Service Center in Port Hueneme, Calif. A treasure trove of engineering talent, it facilitated rapid improvement of the small company's technology.

Projects in the United States and Australia have been a major part of Teall's work for the past decade, but he also has focused on smaller projects in developing countries — India, Mexico, and within the past year, Haiti and Bolivia — to create "energy islands" for isolated communities with a need for self-sufficiency.

Biodiesel Industries starts at square one, beginning every project with a multipurpose agricultural project aimed at feedstock production, economic stabilization and whatever is needed by the specific community it's working with.

Stabilizing Haiti, Empowering Bolivia

The only nation in the world born of a successful slave revolt, for much of its history, Haiti has been bathed in political turmoil and corruption. Today, it has what is arguably the weakest economy in the Western Hemisphere. Violence is common, infrastructure is unreliable and within the last century, massive deforestation has denuded most of the mountainous nation's steep slopes, leaving it vulnerable to devastating flooding and mudslides during wet weather — all too common during hurricane season.

Although Haiti shares Hispaniola — one of the Caribbean's largest islands — with the Dominican Republic, satellite images reveal a dramatically different landscape on opposite sides of the border. Juxtaposed against the lush green Dominican rainforest, Haiti's barren landscape is a reflection of its voracious hunger for charcoal, its primary source of fuel. Since 1925, Haiti's forested area has fallen from 60 percent of the country to 2 percent.

Biodiesel Industries was recruited by a U.N.-affiliated, nongovernmental agency in May to initiate a grassroots project in Haiti. Already, the company is successfully growing jatropha crops with Haitian farmers in Port-au-Prince and Gonaives.

"The approach is feedstock first. There's no reason to build a plant if you don't have a good source of feedstock," said Teall, adding that in Gonaives, a large city in the north of Haiti where more than 2,000 people were killed in the mudslides brought by Hurricane Jeanne in 2004, feedstock crops will help stabilize eroding hillsides. "In Haiti, people see a tree and they see charcoal. We're trying to shift perception to something productive. They won't want to cut down jatropha trees, because they can sell the nuts."

Endemic to the Caribbean, jatropha can also be intercropped with other plants to maintain diverse subsistence agriculture.

Although it has the second-largest natural gas reserves in South America, landlocked Bolivia also has the one of that continent's lowest gross domestic products ($17.4 billion in 2008, compared with $1.5 trillion in Brazil or $14.2 trillion in the U.S.). The Bolivian state of Santa Cruz, in the south of the country, is a rich producer of mineral and agricultural resources, but the region's native population sees little of it. While natural gas pipelines bypass their communities, along with accompanying revenues, indigenous people there have a major factor working in their favor. Situated on an interior plateau 12,000 feet above sea level, Santa Cruz is fed by snowmelt from the Andes, giving it access to the second-largest aquifer in

the world. Still, without money for infrastructure, native communities in the region have been largely dependent upon state assistance.

Working in the eastern part of Santa Cruz, Teall reached out to one of the beleaguered native communities this year, launching a biodiesel production setup, starting with a jatropha nursery and working up to a full crop.

"It's been a welfare society for years," Teall said, "but the tribal leaders want to be self-sufficient." By growing feedstock with other useful crops, he said they can produce enough biodiesel to produce electricity. Jatropha doesn't use much water, but he said the community has access to plenty of water by pumping the aquifer. All it took to get them going was a different approach using resources they already had.

Pressing Forward
With sights set on creating a more diverse fuel supply that has less of an impact on resources and can still be economically attractive to consumers, Teall said that Biodiesel Industries is constantly looking to improve its technology.

In addition to the projects in Haiti and Bolivia, two projects in rural Mexico and one in Mysore, India, a partnership with the Santa Barbara-based nonprofit Growing Solutions Restoration Education Institute also has led to 250 jatropha trees being planted in Santa Barbara. As in Haiti and Bolivia, the other projects are all still in a feedstock production phase, but, eventually, the plants will be used to make biodiesel in portable, container-sized plants — like those in operation at Port Hueneme and in Australia.

Once production begins, Teall said that the two byproducts created when brewing fuel batches — methane and carbon dioxide — can be reused. Methane, which makes up about 50 percent of the byproduct, will be used to power heat and lighting in each plant, while the remaining carbon dioxide can be routed into an onsite algal pond. Algae absorb CO2 and, by most estimates, produce more than 6,000 gallons of usable oil per acre.

There is no doubt that Biodiesel Industries is a business, but Teall seems to be in the game for other reasons. The technology that his company has developed is adaptable and, when applied, addresses a variety of problems. Although he has a background as an environmental lawyer, his eyes light up with an engineer's zeal when he explains various solutions he and his team have come up with.

In light of what they have discovered over the past 16 years, he has remained open-minded about potential fuel supplies, looking at beef fat from cattle operations, restaurant grease trap sludge; anything that can potentially be burned to create energy without taxing air quality and food supply. As for his company's projects in developing countries, even though the projects are small, he's thinking big. "The ARIES system really makes it possible to do these rural projects," he said. "Otherwise there would be no way to do it — not on the scale that needs to be done."

http://www.miller-mccune.com/science_environment/power-to-the-far-flung-people-1593

America's Food Safety Back on a Front Burner

By: John Greenya

Think IBM and you think food.

You don't? Well, for at least the last decade, the pioneering business machine company has been working to track the quality and safety of food, the essential component of the human machine.

In February, IBM released new software designed to trace food — using bar codes and scanners — in order to monitor the condition, quality, and location of items, thus preventing or mitigating food-contamination outbreaks. IBM touts its ability to use barcodes and radio frequency identification chips to follow food from "farm to fork."

The company described one model program in Manitoba last year in which it "tracked data about product movement, animal history and characteristics, processing history and transportation data throughout the complete value chain." That "value chain" included 16 separate businesses, "including beef and pork producers, animal feed ingredient producers, feed manufacturers, farmers, processing plants, truckers and a retail grocery chain."

Supporting its bid for "smart food," in early July IBM announced the results of a study in which it had asked 1,000 consumers in the United States' 10 largest cities if they felt the food they buy is safe to eat.

According to IBM: "[Our] new study reveals that less than 20 percent of consumers trust food companies to develop and sell food products that are safe and healthy for themselves and their families. The study also shows that 60 percent of consumers are concerned about the safety of food they purchase, and 63 percent are knowledgeable about the content of the food they buy."

With peanut butter as the most-cited example, 87 percent of the respondents could name a food product that had been recalled in the last two years, and said they'd be less likely to buy any product that had been recalled because of contamination.

As one father (not surveyed) said in March, "When I heard peanut products were being contaminated earlier this year, I immediately thought of my 7-year old daughter, Sasha, who has peanut butter sandwiches for lunch probably three times a week." That father was Barack Obama.

Measuring attitudes in February, after the peanut butter scare, an ongoing weekly survey of American attitudes toward food safety noted the lowest confidence rating in its short history. That food safety plebiscite is conducted by the University of Minnesota's Food Industry Center and the Louisiana State University AgCenter. (The research is funded by the National Center for Food Protection and Defense, which views food safety as a national defense concern.)

Meanwhile, 63 percent of the IBM respondents said that over the last two years they have changed the way they shop for groceries, in part because of safety concerns but also in order to get more for their food dollar. "[A]lmost half," the study reported, "have changed shopping behavior to access fresher foods (45 percent) or better quality foods (43 percent)."

That last finding comes as no surprise to Jaydee Hanson, a food policy analyst with the Washington, D.C.-based nonprofit Center for Food Safety, who has been warning people about food safety for some time.

"The good news is people in the United Sates are eating more fresh food now than in the last 50 or so years." he said. "The bad news is the people who are supposed to make sure that food is safe are missing in action. How could that happen? Because, basically, beginning about 30 years ago, they decided they didn't need to regulate. We used to have the best and safest food system in the world. We don't anymore."

The problem of food safety has been very much with us this summer. As Tony Corbo, legislative representative of Food and Water Watch, says, "There have been a number of recalls in recent weeks. The FDA has had a recall of Toll House Cookie Dough that somehow got contaminated with *E. coli*, USDA has had a recall of beef products from a slaughter house in Colorado which caused hundreds of supermarkets to recall their ground beef products, and there's a company that falls under FDA's jurisdiction that apparently has found salmonella in its milk powder. So there's been a litany of recalls."

The White House has taken steps to address food safety. In March, President Obama created the Food Safety Working Group to address the "troubling trend" of reduced food safety.

As he explained during a radio address, "Part of the reason is that many of the laws and regulations governing food safety in America have not been updated since they were written in the time of Teddy Roosevelt. It's also because our system of inspection and enforcement is spread out so widely among so many people that it's difficult for different parts of our government to share information, work together and solve problems. And it's also because the FDA has been underfunded and understaffed in recent years, leaving the agency with the resources to inspect just 7,000 of our 150,000 food processing plants and warehouses each year."

In early July, at a ceremony announcing its key findings, Vice President Joe Biden said, "Our food safety system must be updated - 1 in 4 people get sick every year due to food-borne illness, and children and the elderly are more at risk."

On the same day the administration announced its plans to clean up the food safety mess, Gardner Harris, who covers food safety issues for *The New York Times*, called the proposed measures "more aspirational than actual."

Focusing on the safety of eggs, he noted that jurisdictional turf wars among federal agencies redundantly charged with food safety had kept sensible regulations off the plate since the Reagan administration. (Or even the Clinton administration, when the President's Council on Food Safety "identified egg safety as

one component of the public health issue of food safety that warrants immediate federal, interagency action.")

With that lethargy in mind, Harris wrote on the new initiative, "The Agriculture Department promised to develop new standards to reduce salmonella in chickens and turkeys by the end of the year. The Food and Drug Administration promised to advise the food industry by the end of the month on how to prevent contamination of tomatoes, melons, spinach and lettuce. And within three months, the FDA plans to release advice about how farmers, wholesalers and retailers can build systems to trace contaminated foods quickly from shelf to field."

Observers on all sides of the food aisles are nodding, cautiously, in approval at the signs of changes to come. Scott Faber, vice president of the Grocery Manufacturers Association, told *The New York Times*, "We are re-laying the foundation for our food safety system."

Corbo is also complimentary of the Obama administration's first steps, but with reservations: "I think the FDA has recognized that it needs additional authority to properly regulate food safety in this country, and has actually asked Congress to give it additional authority — mandatory recall authority, the power to order things off the shelf, and additional authority to regulate produce — so that they can do their jobs more effectively.

"There are various bills now before Congress that would give them that authority," Corbo told Miller-McCune.com. "However, we're still waiting for final congressional action." He pointed to Rep. John Dingell's Food Safety and Enhancement Act, which recently passed the House on a 283-142 vote and is in the Senate Committee on Health, Education, Labor, and Pensions.

"It's important that the White House has food safety on its radar, but what's really needed are changes in the law. The attitude is different and there is a recognition that something needs to be done, but at the moment nothing is really happening."

In the interim, Hanson has some practical advice: "Have as much contact with the producers of your food as you can. It won't keep you from getting sick, but at least you'll know who made you sick. The more stops there are in the production chain, the more likelihood there is for something to go wrong. I know that the steak I buy from my local butcher has been in his place, the butcher shop or his stand at the farmers market, and my freezer."

There's an added bonus in going local, especially in these straitened times. As Food and Water Watch points out, in addition to great food safety, buying locally grown food will also stimulate the local economy. And, says the watchdog group, local food usually costs 30 to 40 percent less than grocery-store brands because of the savings on delivery costs.

So, to finish with a bite of language salad, *caveat emptor* and *bon appetit*.

http://www.miller-mccune.com/health/america-food-safety-1415

Binge Eating, Purging — and Aging

By: Cathy Leman

With a mortality rate higher (upward of 20 percent) than any other mental illness, including depression, eating disorders should capture the attention of everyone. Sadly, they don't. While you might be hard-pressed to find anyone unfamiliar with the HIV/AIDS awareness campaign, eating disorders are not a frontrunner for awareness, research, treatment and recovery dollars. Even though each year eating disorders affect 20 times more Americans than HIV/AIDS, for every $20,000 spent on HIV/AIDS research, only $1 is spent on eating disorder research.

This may be due in part to the commonly misunderstood and underestimated characteristics of the illness. While adolescent girls and fashion models are typically viewed as the poster children for eating disorders (particularly anorexia), in reality, they haven't cornered the market. Eating disorders are non-discriminatory, stealthily seeping through economic and cultural boundaries and nimbly leaping the borders of age and gender. It can take decades to reach any semblance of equilibrium, and while recovery is possible, the journey to get there can be excruciatingly long, arduous and fraught with setbacks.

Cheryl
Cheryl, now 50, has struggled with anorexia nervosa for 37 years. As a kid she "bounced from psych ward to psych ward" back when treatment hadn't reached the level of care that we know today. Along the way she had an abortion, lost her gallbladder, suffered three heart attacks, developed osteopenia and was hospitalized 33 times, all a direct result of the disease that until only recently refused to even slightly loosen its grip. Although she is in a relationship, holds a job, owns her own home and juggles other adult responsibilities, she continues to struggle, especially when she feels overwhelmed by those grown-up responsibilities.

It can be difficult, if not impossible to put an exact number on how many women struggle with mid-life eating disorders. Laura Discipio, executive director of the National Association of Anorexia Nervosa and Associated Disorders, says that it's important to remember that the ability to quantify figures can be challenging, particularly because individuals struggling with an eating disorder are often in denial about their illness, and hospitalizations frequently focus on the physical consequences of the disease, rather than

the illness itself. And while a 2009 article in the *International Journal of Eating Disorders* highlights 20-year outcomes of bulimia nervosa and related "eating disorders not otherwise specified," it does offer some insight.

For this study, 654 women and men, 73 percent of whom had been assessed in 1982, completed a 20-year follow-up using questionnaires and structured clinical interviews. Although approximately 75 percent of women with bulimia nervosa were in remission at the 20-year follow-up mark, 4.5 percent reported a clinically significant eating disorder at midlife. The clinical applications portion of this study supports previous studies suggesting that when eating disorders are encountered in middle-aged women, it likely represents a long-standing illness that developed during adolescence and young adulthood.

Battling an eating disorder in midlife can pose significant challenges, the least of which may be attending group therapy with kids worried about going out for cheerleading. Fortunately, to address the increase in the numbers of older women seeking treatment, eating disorder facilities are beginning to develop counseling and treatment specifically geared toward this population's needs.

"Even though we do combine older and younger patients in group therapy, treatment needs to be developmentally appropriate, so we've created a separate track which focuses on issues unique to our older patients," says Adrienne Ressler, national training director for Renfrew Center Foundation and board president of the International Association of Eating Disorder Professionals.

An eating disorder isn't a means to attract attention. It's not something one can turn on and off at will. And it's not a disease that anyone would willingly choose. In fact, when the right combination of life and psychological factors are perfectly aligned, eating disorders actually seem to do the choosing themselves.

While many things can trigger eating disorder behavior, research shows that heredity and genetics can be strong predictors. One recent study in the *Archives of Pediatrics and Adolescent Medicine* reports that while maternal history of an eating disorder was unrelated to risk of binge eating or purging in older adolescent females, in girls younger than 14 years, those whose mothers had a history of an eating disorder were nearly three times more likely than their peers to purge at least weekly.

Yet while the Eating Disorders Coalition reports that 50 to 80 percent of eating disorder risk is genetically linked, genetics alone aren't destiny. Environmental factors, dieting, society's emphasis on appearance and idealization of thinness, and stressful, traumatic or disruptive life events are all triggers, especially in those with a genetic predisposition.

While anorexia and bulimia may have the dubious distinction of being the most well-known eating disorders, other eating disorders, complete with their own set of distinguishing characteristics and behaviors, are equally responsible for wreaking physical and emotional havoc.

A key characteristic of anorexia is the *refusal* to maintain a normal or above normal weight for height and age. While some people are naturally thin, their weight typically is not inordinately outside the healthy range. It's the insistence on maintaining a body weight of at least 15 percent (or more) below ideal body weight and refusing to gain that raises a red flag. Even with an impossibly low body weight, people who have anorexia feel an intense fear of gaining weight or becoming fat; a fear powerful enough to induce self-starvation.

While the term anorexia means "loss of appetite," people battling anorexia are anything but satiated. They think about food constantly, often reading cookbooks, collecting recipes or watching cooking shows; but they rarely prepare, let alone eat those recipes. They're obsessed with calories, total and types of fat grams and exercise. And because their distorted body image reinforces "I'm fat" thinking, they rigidly restrict and control their food. This can easily become a 24/7 obsession, leaving little time for social obligations, a job, family or friends.

While no one is immune to overeating on occasion (Thanksgiving is a perfect example), those who suffer from bulimia nervosa differ in that they consume a larger amount of food (often thousands of calories) than most people would within the same amount of time, typically, 2 hours or less. Even with intense feelings of physical and/or emotional distress, they feel incapable of stopping or controlling their eating. As a compensatory measure for the excess calories, and a way to "undo" their behavior, they purge.

Vomiting isn't the only method used; laxatives or diuretics and excessive exercise or starvation are also a means of purging. Bulimia can be difficult to identify; unlike anorexia, the person with bulimia may be normal, under or overweight.

Through the ingestion of a larger than normal amount of food in a relatively short period of time, binge eating disorder mimics bulimic behavior. However, people with this don't compensate by purging, excessive exercise or laxative use. Embarrassed by their behavior, people with binge eating disorder frequently eat alone. They consume large amounts of food even when they're not hungry and experience strong feelings of disgust, depression or guilt. According to the National Association of Anorexia Nervosa and Associated Disorders, about 30 percent of people in weight-loss programs meet diagnostic criteria for a binge eating disorder.

"Eating disorders not otherwise specified" is a category used to identify those who exhibit some but not all behavioral characteristics of anorexia, bulimia or binge eating disorder. For example, someone may experience binge/purge episodes, but not with the frequency (say more than twice a week for at least 3 months) associated with bulimic behavior.

Cristy

Three criteria typically identify older women with eating disorders: women who have secretly struggled with an eating disorder for years without seeking treatment, women treated when they were younger for an eating disorder that has now reoccurred, and women who first develop an eating disorder as an adult.

Ressler points out that while longtime sufferers are dealing with a chronic disease that has continued through different life stages, first-time sufferers may be employing these behaviors to deal with divorce, death, relocation, empty nest syndrome, caretaking or a "magical" birthday. Additionally, older women must contend with the pull of gravity and the physical changes associated with perimenopause, menopause and beyond.

These life-changing events don't necessarily cause eating disorders, but they contribute to a "perfect storm" that may be difficult to avoid during a particularly vulnerable time. Cristy is a 47-year-old woman who has had "a full-blown eating disorder" for 10 years but experienced mild disorders since the age of 23. "It feels like I had a 'dormant'" eating disorder most of my life, and trauma brought it out in full force about 10 years ago."Cheryl would agree. "I have met a lot of older women who have had an eating disorder their whole life. Some have had hospitalizations and therapy when they couldn't hide it any longer, while others have not gotten quite sick enough; they just live with it and manage it."

Women are particularly adept at employing denial as both a coping mechanism and a way to sidestep treatment, for instance, diverting their own and others' attention away from their eating disorder with the universally accepted idiom, "I'm just dieting." By putting the needs of everyone else first, it's easy to avoid taking the time away from family and other obligations to commit to the treatment necessary for recovery.

But the denial is hard to keep up. Health effects of an eating disorder include impaired mental functioning, endocrine system abnormalities, damage to the stomach, esophagus and gastrointestinal system, musculoskeletal and cardiovascular damage, tooth enamel erosion, gum disease and tooth loss. While these medical problems are serious for anyone, they are likely to be more life threatening in older women; aging bodies don't bounce back as quickly from any medical condition. Additionally, long-term assaults to all systems of the body can cause damage that no amount of medical and nutritional

stabilization can reverse.While medical effects are certainly cause for concern, the psychological destruction cannot be minimized. It's common for women to view and/or shape their identity through body image. When that image is negative, it can result in self-loathing that translates directly to behaviors that don't support healthy self-care and nurturing.

Ressler points out that after years of feeding negative, abusive messages to themselves, such as "I *am* disgusting" versus "I *feel* disgusting," women virtually *become* those messages. "The lens that women view their bodies through is very, very negative, and that only serves to reinforce the unattractive, unappealing feelings that women have about their bodies."
How does having an unhealthy relationship with food or their body, a full-blown eating disorder or a lack of strong coping skills affect the children, particularly daughters, of these women? A 2008 cohort study in the *Journal of Developmental & Behavioral Pediatrics* assessed the interaction between disturbed eating behavior and body mass index (BMI) in 426 children aged 8 to 12, and maternal eating problems and BMI. The results showed that older daughters of overweight mothers were more dissatisfied with their own bodies than younger daughters and children of normal weight mothers.

Perhaps more pointedly, results from a 2008 study in the *International Journal of Eating Disorders* suggest that in girls as well as boys, an association exists between the child's perception of maternal encouragement to be thin, body dissatisfaction and restrained eating.

According to Ressler, the potential effect on children, especially daughters, "is huge.""It's so important to model healthy behaviors and positive self-image. Being obsessed with your image versus who you really are and what you feel can affect relationships because you're really never showing your true self."

Cristy is a mother of three, including a set of twins. "Of course, I am very concerned that my eating disorder will be harmful to my children. I think that by being open and honest in our conversations, we as a family are solid in the fact that what I do is a sickness, and that the healthy way would look much different than Mom's way. Actually, my daughters both love to eat, and are quite willing to be a bit curvier and eat the foods they love."

Perhaps one reason Cristy's daughters have such a healthy relationship with food is that her eating disorder is not the elephant in the room."In my family, for the most part, the topic of my eating disorder is open for discussion. My husband and college-age children are able to express their concerns, or point out when I am demonstrating eating disorder behavior. In the end, I know they have a great sense of love and respect for me, and that they see me as a wife and mother first. They don't just see me as a walking eating disorder."

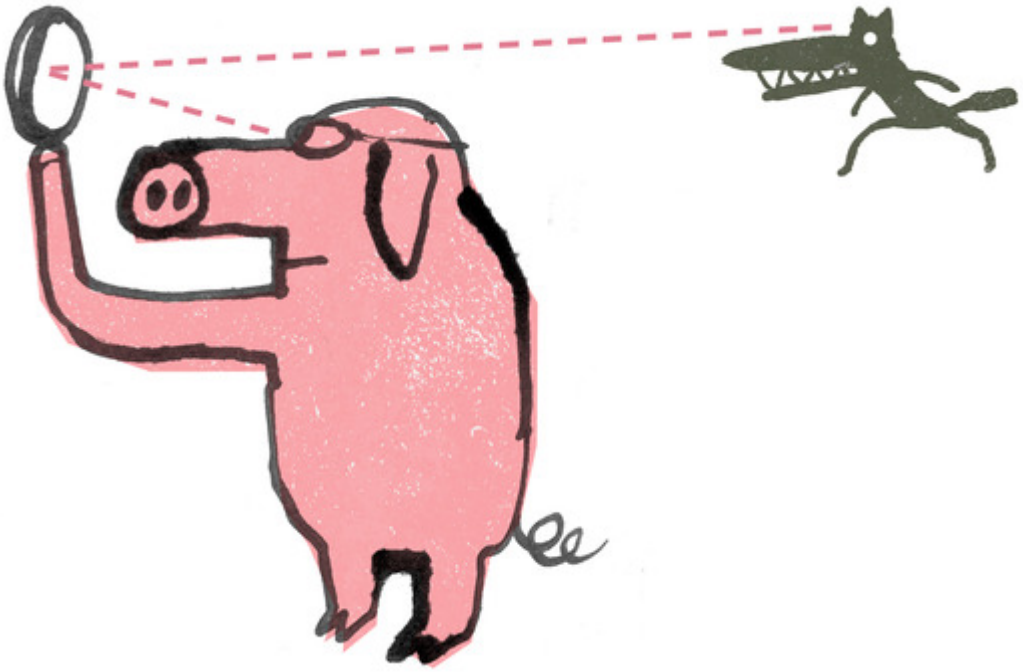
Prevention is the key to avoiding many medical problems in the first place. Because an eating disorder is a medical condition, it begs the question; are eating disorders preventable?Experts say yes.Since many who suffer from these disorders report onset of illness by age 20, there is a need for early education, prevention programs, and information. Targeting both young girls AND boys, educating male coaches, physicians, and fathers about their role in supporting healthy body acceptance for girls, and working to shift our cultural emphasis away from appearance as a measuring stick, is a start. While awareness and education is critical at all ages, stress management and life balance techniques, with an emphasis on healthy lifestyles and the dangers of dieting are particularly appropriate for older women.

Ressler shares this edict, "Older women need role models of women who later in life are going strong or reinventing themselves, staying sexy, productive, and passionate."

http://www.miller-mccune.com/health/binge-eating-purging-and-aging-1500

Pigs Prove to Be Smart, if Not Vain

By NATALIE ANGIER



We've all heard the story of the third Little Pig, who foiled the hyperventilating wolf by building his house out of bricks, rather than with straw or sticks as his brothers had done. Less commonly known is that the pig later improved his home's safety profile by installing convex security mirrors at key points along the driveway.

Well, why not? In the current issue of Animal Behaviour, researchers present evidence that domestic pigs can quickly learn how mirrors work and will use their understanding of reflected images to scope out their surroundings and find their food. The researchers cannot yet say whether the animals realize that the eyes in the mirror are their own, or whether pigs might rank with apes, dolphins and other species that have passed the famed "mirror self-recognition test" thought to be a marker of self-awareness and advanced intelligence.

To which I say, big squeal. Why should the pigs waste precious mirror time inspecting their teeth or straightening the hairs on their chinny-chin-chins, when they could be using the mirror as a tool to find a far prettier sight, the pig heaven that comes in a bowl?

The finding is just one in a series of recent discoveries from the nascent study of pig cognition. Other researchers have found that pigs are brilliant at remembering where food stores are cached and how big each stash is relative to the rest. They've shown that Pig A can almost instantly learn to follow Pig B when the second pig shows signs of knowing where good food is stored, and that Pig B will try to deceive the pursuing pig and throw it off the trail so that Pig B can hog its food in peace.

They've found that pigs are among the quickest of animals to learn a new routine, and pigs can do a circus's worth of tricks: jump hoops, bow and stand, spin and make wordlike sounds on command, roll out rugs, herd sheep, close and open cages, play videogames with joysticks, and more. For better or worse, pigs are also slow to forget. "They can learn something on the first try, but then it's difficult for them to unlearn it," said Suzanne Held of the University of Bristol. "They may get scared once and then have trouble getting over it."

Researchers have also found that no matter what new detail they unearth about pig acumen, the public reaction is the same. "People say, 'Oh yes, pigs really are rather clever, aren't they?' " said Richard W. Byrne, a professor of evolutionary psychology at the University of St. Andrews. "I would recommend that somebody study sheep or goats rather than pigs, so that people would be suitably impressed to find

out your animal is clever." His feigned frustration notwithstanding, he added, "if you want to understand the evolution of intelligence and social behaviors, it's important to work on animals like pigs that are not at all closely related to us" but rather are cousins of whales and hippos.

So far, and yet so near. Last week, an international team of biologists released the first draft sequence of the pig genome, the complete set of genetic instructions for making the ruddy-furred Duroc breed of Sus scrofus. Even on a cursory glance, "the pig genome compares favorably with the human genome," said Lawrence Schook of the University of Illinois at Urbana-Champaign, one of the team leaders.

"Very large sections are maintained in complete pieces," he said, barely changed in the 100-million-plus years since the ancestors of hogs and humans diverged.

Dr. Schook is particularly eager to see if the many physiological and behavioral parallels between humans and pigs are reflected in our respective genomes. Pig hearts are like our hearts, he said, pigs metabolize drugs as we do, their teeth resemble our teeth, and their habits can, too. "I look at the pig as a great animal model for human lifestyle diseases," he said. "Pigs like to lie around, they like to drink if given the chance, they'll smoke and watch TV."

Pigs have been a barnyard staple for at least 8,000 years, when they were domesticated from the wild boar in Asia and Europe. Domestication was easy, given that they loved to root around in dump sites. "The pigs were hard to hunt, but if you put the garbage out, a lot of them would be drawn out from the woods," Dr. Schook said. "After a while, people realized, we don't have to hunt them. All we have to do is put a fence around our garbage."

Pigs were tireless composting machines. "They fed on our scraps," Dr. Byrne said. "Everything we produced, they turned into good meat." Pork is among the world's most popular meats; in many places, pigs are a valuable form of currency. "In parts of New Guinea, they're so important to villages that they're suckled by people," he said.

Of course, pigs aren't always handled so lovingly, and these researchers denounced factory farms. "I'm German and I love sausage, but I would never eat pork that isn't free range," Dr. Held said.

Even in domesticity, pigs have retained much of their foreboar's smarts. Dr. Byrne attributes pig intelligence to the same evolutionary pressures that prompted cleverness in primates: social life and food. Wild pigs live in long-term social groups, keeping track of one another as individuals, the better to protect against predation. They also root around for difficult food sources, requiring a dexterity of the snout not unlike the handiness of a monkey.

Because monkeys had been shown to use mirrors to locate food, Donald M. Broom of the University of Cambridge and his colleagues decided to check for a similar sort of so-called assessment awareness in pigs. They began by exposing seven 4-to-8-week-old pigs to five-hour stints with a mirror and recording their reactions. The pigs were fascinated, pointing their snouts toward the mirror, hesitating, vocalizing, edging closer, walking up and nuzzling the surface, looking at their image from different angles, looking behind the mirror. When the mirror was placed in their pen a day later, the glass-savvy pigs greeted it with a big ho-hum.

Next, the researchers put the mirror in the enclosure, along with a bowl of food that could not be directly seen but whose image was reflected in the mirror. They then compared the responses of the mirror-experienced pigs with a group of mirror-naïve pigs. On spotting the virtual food in the mirror, the experienced pigs turned away and within an average of 23 seconds had found the food. But the naïve pigs took the reflection for reality and sought in vain to find the bowl by rooting around behind the mirror. No doubt the poor frustrated little pigs couldn't wait to get home, crack open a beer and turn on the TV.

http://www.nytimes.com/2009/11/10/science/10angier.html

Speech Gene Shows Its Bossy Nature

By NICHOLAS WADE

Of the 20,000 genes in the human genome, few are more fascinating than FOXP2, a gene that underlies the faculty of human speech.

All animals have an FOXP2 gene, but the human version's product differs at just 2 of its 740 units from that of chimpanzees, suggesting that this tiny evolutionary fix may hold the key to why people can speak and chimps cannot.

FOXP2 came to light in a large London family, half of whose members have severe problems in articulating and understanding speech. All turned out to have a mutation that disrupted this vital gene.

This year, one inquiry bore fruit, although of a somewhat ambiguous nature, when biologists in Leipzig, Germany, genetically engineered a mouse with the human version of FOXP2 substituted for its own. The upgraded mice squeaked somewhat differently from plain mice and were born with subtle alterations in brain structure. But mice and people are rather distant cousins — their last common ancestor lived some 70 million years ago — and the human version of FOXP2 evidently was not able to exert a transformative effect on the mouse.

A scientific team led by Dr. Daniel H. Geschwind of the University of California, Los Angeles, has now completed a parallel experiment, which is to put the chimp version of FOXP2 into human neurons and see what happens. These were neurons living in laboratory glassware, not a human brain, so they gave a snapshot of FOXP2 only at the cellular level. But they confirmed suspicions that FOXP2 was a maestro of the genome.

The gene does not do a single thing but rather controls the activity of at least 116 other genes, Dr. Geschwind's team says in the Thursday issue of Nature.

Like the conductor of an orchestra, the gene quiets the activity of some and summons a crescendo from others. Surprisingly, the chimp version of the gene had a more forceful effect in the human nerve cells than did the human version.

"The human FOXP2 seems to be acting on a more refined set of genes," Dr. Geschwind said in an interview from London.

Several of the genes under FOXP2's thumb show signs of having faced recent evolutionary pressure, meaning they were favored by natural selection. This suggests that the whole network of genes has evolved together in making language and speech a human faculty.

And some of the genes in FOXP2's network have already been implicated in diseases that include disorders of speech, confirming its importance in these faculties.

But the FOXP2 network is certainly not the only set of genes involved in language. For one thing, FOXP2 is equally active on both sides of the human brain, whereas the language faculty is asymmetric, Dr. Geschwind said.

By studying the other genes in the FOXP2 network, Dr. Geschwind said, he hoped "to use FOXP2 as a lever to get a view of the molecular machinery in a biological language circuit."

In a commentary on the new finding, Martin Dominguez and Dr. Pasko Rakic of Yale describe it as an important discovery that "provides a starting point for future studies of the molecular basis of language and human evolution."

http://www.nytimes.com/2009/11/12/science/12gene.html?ref=science

Afloat in the Ocean, Expanding Islands of Trash

By LINDSEY HOSHAW

ABOARD THE ALGUITA, 1,000 miles northeast of Hawaii — In this remote patch of the Pacific Ocean, hundreds of miles from any national boundary, the detritus of human life is collecting in a swirling current so large that it defies precise measurement.

Light bulbs, bottle caps, toothbrushes, Popsicle sticks and tiny pieces of plastic, each the size of a grain of rice, inhabit the Pacific garbage patch, an area of widely dispersed trash that doubles in size every decade and is now believed to be roughly twice the size of Texas. But one research organization estimates that the garbage now actually pervades the Pacific, though most of it is caught in what oceanographers call a gyre like this one — an area of heavy currents and slack winds that keep the trash swirling in a giant whirlpool.

Scientists say the garbage patch is just one of five that may be caught in giant gyres scattered around the world's oceans. Abandoned fishing gear like buoys, fishing line and nets account for some of the waste, but other items come from land after washing into storm drains and out to sea.

Plastic is the most common refuse in the patch because it is lightweight, durable and an omnipresent, disposable product in both advanced and developing societies. It can float along for hundreds of miles before being caught in a gyre and then, over time, breaking down.

But once it does split into pieces, the fragments look like confetti in the water. Millions, billions, trillions and more of these particles are floating in the world's trash-filled gyres.

PCBs, DDT and other toxic chemicals cannot dissolve in water, but the plastic absorbs them like a sponge. Fish that feed on plankton ingest the tiny plastic particles. Scientists from the Algalita Marine Research Foundation say that fish tissues contain some of the same chemicals as the plastic. The scientists speculate that toxic chemicals are leaching into fish tissue from the plastic they eat.

The researchers say that when a predator — a larger fish or a person — eats the fish that eats the plastic, that predator may be transferring toxins to its own tissues, and in greater concentrations since toxins from multiple food sources can accumulate in the body.

Charles Moore found the Pacific garbage patch by accident 12 years ago, when he came upon it on his way back from a sailing race in Hawaii. As captain, Mr. Moore ferried three researchers, his first mate and a journalist here this summer in his 10th scientific trip to the site. He is convinced that several similar garbage patches remain to be discovered.

"Anywhere you really look for it, you're going to see it," he said.

Many scientists believe there is a garbage patch off the coast of Japan and another in the Sargasso Sea, in the middle of the Atlantic Ocean.

Bonnie Monteleone, a University of North Carolina, Wilmington, graduate student researching a master's thesis on plastic accumulation in the ocean, visited the Sargasso Sea in late spring and the Pacific garbage patch with Mr. Moore this summer.

"I saw much higher concentrations of trash in the Pacific garbage patch than in the Sargasso," Ms. Monteleone said, while acknowledging that she might not have found the Atlantic gyre.

Ms. Monteleone, a volunteer crew member on Mr. Moore's ship, kept hoping she would see at least one sample taken from the Pacific garbage patch without any trash in it. "Just one area — just one," she said. "That's all I wanted to see. But everywhere had plastic."

The Pacific garbage patch gained prominence after three independent marine research organizations visited it this summer. One of them, Project Kaisei, based in San Francisco, is trying to devise ways to clean up the patch by turning plastic into diesel fuel.

Environmentalists and celebrities are using the patch to promote their own causes. The actor Ted Danson's nonprofit group Oceana designated Mr. Moore a hero for his work on the patch. Another Hollywood figure, Edward Norton, narrated a public-service announcement about plastic bags, which make their way out to the patch.

Mr. Moore, however, is the first person to have pursued serious scientific research by sampling the garbage patch. In 1999, he dedicated the Algalita foundation to studying it. Now the foundation examines plastic debris and takes samples of polluted water off the California coast and across the Pacific Ocean. By dragging a fine mesh net behind his research vessel Alguita, a 50-foot aluminum catamaran, Mr. Moore is able to collect small plastic fragments.

Researchers measure the amount of plastic in each sample and calculate the weight of each fragment. They also test the tissues of any fish caught in the nets to measure for toxic chemicals. One rainbow runner from a previous voyage had 84 pieces of plastic in its stomach.

The research team has not tested the most recent catch for toxic chemicals, but the water samples show that the amount of plastic in the gyre and the larger Pacific is increasing. Water samples from February contained twice as much plastic as samples from a decade ago.

"This is not the garbage patch I knew in 1999," Mr. Moore said. "This is a totally different animal."

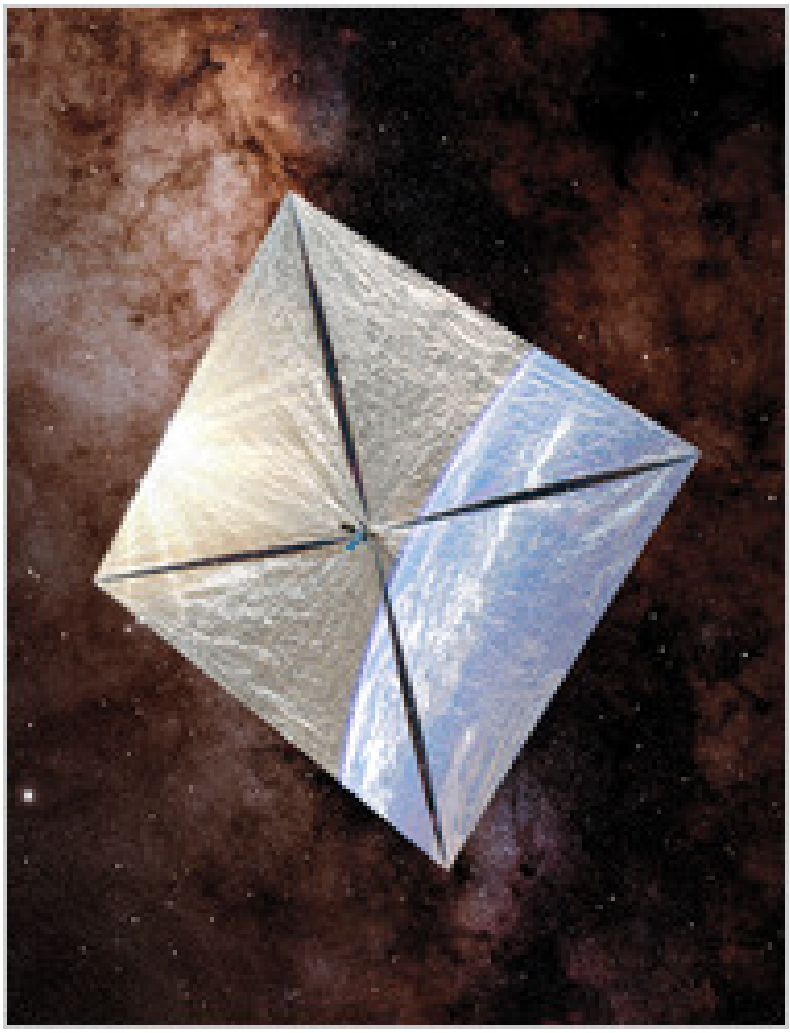
For the captain's first mate, Jeffery Ernst, the patch was "just a reminder that there's nowhere that isn't affected by humanity."

Travel expenses were paid in part by readers of Spot.Us, a nonprofit Web project that supports freelance journalists.

http://www.nytimes.com/2009/11/10/science/10patch.html?ref=science

Setting Sail Into Space, Propelled by Sunshine

By DENNIS OVERBYE



Peter Pan would be so happy.

About a year from now, if all goes well, a box about the size of a loaf of bread will pop out of a rocket some 500 miles above the Earth. There in the vacuum it will unfurl four triangular sails as shiny as moonlight and only barely more substantial. Then it will slowly rise on a sunbeam and move across the stars.

LightSail-1, as it is dubbed, will not make it to Neverland. At best the device will sail a few hours and gain a few miles in altitude. But those hours will mark a milestone for a dream that is almost as old as the rocket age itself, and as romantic: to navigate the cosmos on winds of starlight the way sailors for thousands of years have navigated the ocean on the winds of the Earth.

“Sailing on light is the only technology that can someday take us to the stars,” said Louis Friedman, director of the Planetary Society, the worldwide organization of space enthusiasts.

Even as the National Aeronautics and Space Administration continues to flounder in a search for its future, Dr. Friedman announced Monday that the Planetary Society, with help from an anonymous donor, would be taking baby steps toward a future worthy of science fiction. Over the next three years, the society will build and fly a series of solar-sail spacecraft dubbed LightSails, first in orbit around the Earth and eventually into deeper space.

The voyages are an outgrowth of a long collaboration between the society and Cosmos Studios of Ithaca, N.Y., headed by Ann Druyan, a film producer and widow of the late astronomer and author Carl Sagan. Sagan was a founder of the Planetary Society, in 1980, with Dr. Friedman and Bruce Murray, then director of the Jet Propulsion Laboratory. The announcement was made at the Hart Senate Office Building in Washington at a celebration of what would have been Sagan's 75th birthday. He died in 1996. Ms. Druyan, who has been chief fund-raiser for the society's sailing projects, called the space sail "a Taj Mahal" for Sagan, who loved the notion and had embraced it as a symbol for the wise use of technology. There is a long line of visionaries, stretching back to the Russian rocket pioneers Konstantin Tsiolkovsky and Fridrich Tsander and the author Arthur C. Clarke, who have supported this idea. "Sails are just a marvelous way of getting around the universe," said Freeman Dyson, of the Institute for Advanced Study in Princeton, N.J., and a longtime student of the future, "but it takes a long time to imagine them becoming practical."

The solar sail receives its driving force from the simple fact that light carries not just energy but also momentum — a story told by every comet tail, which consists of dust blown by sunlight from a comet's core. The force on a solar sail is gentle, if not feeble, but unlike a rocket, which fires for a few minutes at most, it is constant. Over days and years a big enough sail, say a mile on a side, could reach speeds of hundreds of thousands of miles an hour, fast enough to traverse the solar system in 5 years. Riding the beam from a powerful laser, a sail could even make the journey to another star system in 100 years, that is to say, a human lifespan.

Whether humans could ever take these trips depends on just how starry-eyed one's view of the future is. Dr. Friedman said it would take too long and involve too much exposure to radiation to sail humans to a place like Mars. He said the only passengers on an interstellar voyage — even after 200 years of additional technological development — were likely to be robots or perhaps our genomes encoded on a chip, a consequence of the need to keep the craft light, like a giant cosmic kite.

In principle, a solar sail can do anything a regular sail can do, like tacking. Unlike other spacecraft, it can act as an antigravity machine, using solar pressure to balance the Sun's gravity and thus hover anyplace in space.

And, of course, it does not have to carry tons of rocket fuel. As the writer and folk singer Jonathan Eberhart wrote in his song "A Solar Privateer":

No cold LOX tanks or reactor banks, just Mylar by the mile.
No stormy blast to rattle the mast, a sober wind and true.
Just haul and tack and ball the jack like the waterlubbers do.

Those are visions for the long haul. "Think centuries or millennia, not decades," said Dr. Dyson, who also said he approved of the Planetary Society project.

"We ought to be doing things that are romantic," he said, adding that nobody knew yet how to build sails big and thin enough for serious travel. "You have to get equipment for unrolling them and stretching them — a big piece of engineering that's not been done. But the joy of technology is that it's unpredictable."

At one time or another, many of NASA's laboratories have studied solar sails. Scientists at the Jet Propulsion Laboratory even once investigated sending a solar sail to rendezvous and ride along with Halley's Comet during its pass in 1986.

But efforts by the agency have dried up as it searches for dollars to keep the human spaceflight program going, said Donna Shirley, a retired J.P.L. engineer and former chairwoman of the NASA Institute for Advanced Concepts. Dr. Shirley said that the solar sail was feasible and that the only question was, "Do you want to spend some money?" Until the technology had been demonstrated, she said, no one would use it.

Japan continues to have a program, and test solar sails have been deployed from satellites or rockets, but no one has ever gotten as far as trying to sail them anywhere.

Dr. Friedman, who cut his teeth on the Halley's Comet proposal, has long sought to weigh anchor in space. An effort by the Planetary Society and the Russian Academy of Sciences to launch a sail about 100 feet on a side, known as Cosmos-1, from a Russian missile submarine in June 2005 ended with what Ms. Druyan called "our beautiful spacecraft" at the bottom of the Barents Sea.

Ms. Druyan and Dr. Friedman were beating the bushes for money for a Cosmos-2, when NASA asked if the society wanted to take over a smaller project known as the Nanosail. These are only 18 feet on a side and designed to increase atmospheric drag and thus help satellites out of orbit.

And so LightSail was born. Its sail, adapted from the Nanosail project, is made of aluminized Mylar about one-quarter the thickness of a trash bag. The body of the spacecraft will consist of three miniature

satellites known as CubeSats, four inches on a side, which were first developed by students at Stanford and now can be bought on the Web, among other places. One of the cubes will hold electronics and the other two will carry folded-up sails, Dr. Friedman said.
Assembled like blocks, the whole thing weighs less than five kilograms, or about 11 pounds. “The hardware is the smallest part,” Dr. Friedman said. “You can’t spend a lot on a five-kilogram system.”
The next break came when Dr. Friedman was talking about the LightSail to a group of potential donors. A man — “a very modest dear person,” in Ms. Druyan’s words — asked about the cost of the missions and then committed to paying for two of them, and perhaps a third, if all went well.
After the talk, the man, who does not wish his identity to be known, according to the society, came up and asked for the society’s bank routing number. Within days the money was in its bank account. The LightSail missions will be spread about a year apart, starting around the end of 2010, with the exact timing depending on what rockets are available. The idea, Dr. Friedman said, is to piggyback on the launching of a regular satellite. Various American and Russian rockets are all possibilities for a ride, he said.
Dr. Friedman said the first flight, LightSail-1, would be a success if the sail could be controlled for even a small part of an orbit and it showed any sign of being accelerated by sunlight. “For the first flight, anything measurable is great,” he said. In addition there will be an outrigger camera to capture what Ms. Druyan called “the Kitty Hawk moment.”
The next flight will feature a larger sail and will last several days, building up enough velocity to raise its orbit by tens or hundreds of miles, Dr. Friedman said.
For the third flight, Dr. Friedman and his colleagues intend to set sail out of Earth orbit with a package of scientific instruments to monitor the output of the Sun and provide early warning of magnetic storms that can disrupt power grids and even damage spacecraft. The plan is to set up camp at a point where the gravity of the Earth and Sun balance each other — called L1, about 900,000 miles from the Earth — a popular place for conventional scientific satellites. That, he acknowledges, will require a small rocket, like the attitude control jets on the shuttle, to move out of Earth orbit, perhaps frustrating to a purist.
But then again, most sailboats do have a motor for tooling around in the harbor, which is how Dr. Friedman describes being in Earth orbit. Because the direction of the Sun keeps changing, he said, you keep “tacking around in the harbor when what you want to do is get out on the ocean.”
The ocean, he said, awaits.

http://www.nytimes.com/2009/11/10/science/space/10solar.html?ref=science

A Hunt for Seeds to Save Species, Perhaps by Helping Them Move
By ANNE RAVER

CHICAGO — Pitcher's thistle, whose fuzzy leaves and creamy pink puffs once thrived in the sand dunes along several of the Great Lakes, was driven by development, drought and weevils into virtual extinction from the shores of Lake Michigan decades ago. But in the 1990s, seeds collected from different parts of the thistle's range were grown at the Chicago Botanic Garden and planted with the help of the Morton Arboretum along the lake, in Illinois State Beach Park, north of Chicago near the Wisconsin state line. The plants from Indiana's dunes to the south are doing well; the plants that had come from the north are failing.With those mixed results in mind, scientists from the botanic garden are sending teams out across the Midwest and West to the Rocky Mountains and Great Basin to collect seeds from different populations of 1,500 prairie species by 2010, and from 3,000 species by 2020. The goal is to preserve the species and, depending on changes in climate, perhaps even help species that generally grow near one another to migrate to a new range.

"In 50 to 100 years, because habitats or climates are so altered, we might end up trying to move species in a restoration context, in assemblages of species," said Pati Vitt, a conservation scientist and curator of the Dixon National Tallgrass Prairie Seed Bank at the botanic garden.
The garden is seeking permits to test the concept with the thistle, by pushing it into new, colder territory along the shores of Lake Ontario. "It may be the best test case for moving an individual species outside its range," Dr. Vitt said.
But assisted migration, as it is called, is a hotly debated issue. On one side are those like the botanic garden scientists, who argue that the risks are better than doing nothing.
"We recognize that climate change is likely to be very rapid and that seeds only disperse a few hundred yards, half a mile at most, naturally," said Kayri Havens, the botanic garden's director of plant science and conservation. "They'll need our help if we want to keep those species alive."
Other scientists argue that tinkering with the complexity of habitats is courting disaster — and huge expense.
"Even given our best science, we're not good at predicting which species will be invasive," said Jason S. McLachlan, a biologist at the University of Notre Dame who has studied postglacial population spread. "And it's going to be especially complex as climates change."
The American beech, for example, was so rare during the ice age that it is rarely found in fossils. "It may have been one of those rare and unusual species we think about saving with approaches like assisted migration," Dr. McLachlan said. Now, the beech is so abundant in Eastern forests, he said, it is shading out "almost all other species."
Dr. McLachlan and other scientists have formed a working group on managed relocation, financed by the National Science Foundation and the Cedar Tree Foundation, to open up the discussion to citizens, economists, natural resource managers and policy makers.
While the debate proceeds, scientists at the botanic garden are building the seed collection and assessing the adaptability of different populations of species. Dr. Vitt and Dr. Havens recently showed off the new

Rice Science Center, which has laboratories and a 420-square-foot seed vault with floor-to-ceiling stainless steel shelves.
When temperatures in the giant humidity-controlled freezer stabilized at minus 4 degrees Fahrenheit at the end of September, they moved collections of 800 Midwestern species — some made up of 300,000 seeds — from their old home in four large freezers, hardly different from the kind a large family might use to store home-grown produce and a side of beef.
"The first time I walked in here, I started to cry," Dr. Vitt said. "I know what having this will allow us to do in the future. It's the most important conservation work the garden can be doing."
The prairie effort is part of a Bureau of Land Management project called Seeds of Success, which intends to collect seeds of the entire flora of the United States, except for species already under protection and recalcitrant species, or those that cannot survive long-term storage.
That is 14,000 native plant species.
Seeds of Success, started in 2001 in response to a Congressional mandate to plant native seed in restoring public lands destroyed by wildfire, began its far more ambitious initiative in June 2008.
A consortium of botanic gardens and other institutions have sent 65 teams across the country, which so far have collected groupings of 3,200 species.
"We hope to collect 20 populations across the species' range so we can get 95 percent of the genetic diversity of the species," said Peggy Olwell, the plant conservation program manager at the bureau. "Because frankly, we don't know what it is we're going to need when we're talking restoration in light of climate change. It's going to be one big experiment."
Seeds of Success sends one collection of every species to the Millennium Seed Bank Project, at the Royal Botanic Gardens, Kew, in Britain, which intends to collect 25 percent of the world's flora by 2020. Seeds are also stored at the National Center for Genetic Resource Preservation in Fort Collins, Colo., and the Western Regional Plant Introduction Station in Pullman, Wash.
The Dixon seed bank at the Chicago Botanic Garden houses not only species from the tallgrass prairie, but also natives of the bogs, dunes and other ecosystems in the prairie region. It also includes the working collections of species singled out for restoration.
"In the Midwest, we have about 200 that are going to be very important," Dr. Havens said. "These are the matrix species, the bread-and-butter species that can be used in restorations after disturbance to really stabilize the community."
Climate models all show temperatures rising, but they do not agree on the prairie's future climate.
"Some models show us with more Virginia-like ecosystem, some say more like Texas," Dr. Havens said.
In a paper to be published in the journal Biology Conservation and available now online, Dr. Vitt, Dr. Havens and three other scientists at the botanic garden outline a framework for assisted migration, calling first for a globally unified seed banking strategy, which involves collecting genetically diverse populations of each species, accompanied by provenance data like GPS coordinates, soil type and the structure of the surrounding plant community.
They also propose how to predict where species can be relocated. The scientists are just beginning to test their theories in seven climate change gardens planted this fall across the country. Each contains genetically identical clones of plants grown from seed collected in four hardiness zones (4, 5, 6 and 7). Three sites are in the Chicago area, with the others in Boston; Chapel Hill, N.C.; Seattle; and Washington. Students and volunteers will collect data on the species, and can compare their gardens with others through a webcam system. "If plants grown from seed collected in Zone 4, 5 or 6 can't withstand Texas conditions," Dr. Havens said, "that's a good sign they're going to become extinct here, if there's no way for them to migrate on their own or human-assisted." Collecting all the native species in the United States, as well as developing restoration techniques and growing huge amounts of seed will take about 10 years and cost about $500 million, Dr. Havens said — a cost that she argues is well worth it.
Dr. Vitt said: "I won't be around in 100 years, but if the research isn't there, we won't know how to do it on that scale. That's why the seed bank is so important.
"For now, we are trying to follow Aldo Leopold's maxim: 'The first rule of intelligent tinkering is to keep all the pieces.' "

http://www.nytimes.com/2009/11/10/science/earth/10plant.html?ref=science

Stateside Home Is Proposed for South Pole Dome

By HENRY FOUNTAIN

A geodesic dome that sheltered scientists and support workers at the South Pole for three decades is due to be demolished in the next few months, having outlived its usefulness at the bottom of the world.

But a small group of polar veterans is trying to preserve the dome, arguing it is a signature feature of the United States Antarctic program. They want the 55-foot-high aluminum structure taken apart the same way that Navy Seabees assembled it — bolt by bolt and panel by panel — for reassembly stateside.

"If you saw anything about the South Pole, that dome would always be the symbol that you saw," said Billy-Ace Baker, a former Navy radio operator in Antarctica and a founder of the Old Antarctic Explorers Association, who is involved in the effort.

Lee Mattis, who as a young engineer working for a California company came up with a way to erect the structure and served as project engineer during its construction over two Antarctic summers, said the dome "was a big part of the N.S.F. effort down there."

The National Science Foundation, or N.S.F., the federal agency that oversees polar programs, has agreed to disassemble the top three rings, or about 45 triangular panels, for eventual installation at a Seabee museum being built in Port Hueneme, Calif. The bulk of the dome, which has 904 panels and 1,448 struts in all, held together by about 60,000 bolts, would be cut apart.

Brian W. Stone, a deputy division director in the National Science Foundation's Office of Polar Programs, said the agency had been talking with the Seabees for two years about ways to preserve part of the dome. "The Seabees feel it has historical significance, as do we and others who have worked at the South Pole," Mr. Stone said.

But as part of a long-term modernization plan at the site, the agency had to have the dome removed by next March, he said.

The windowless dome, which is about 165 feet in diameter, was the main structure at the site, the Amundsen-Scott South Pole Station. Inside it were modular buildings for the station's residents — as many as 200 in summer, 50 or so through the harsh polar winter. It has been largely unused for the past few years, replaced by a two-story elevated building.

Mr. Mattis, who returned to the pole in 2005 to inspect the dome, estimated that disassembling the entire structure bolt by bolt and shipping it stateside would cost about $500,000 above the $150,000 the National Science Foundation has budgeted for the project.

Mr. Mattis said his group hoped to have demolition delayed for a year and to use the time to interest private groups or individuals in providing the additional money to bring the whole dome back, with the idea that museums or other institutions would be interested in displaying parts of it. "In that way, we'd preserve the memory of it in multiple locations," he said.

But Mr. Stone said the agency had made no secret of the project's timeline. "We're sensitive to the fact that it's been an iconic structure for a lot of people for a long time," he said. "But we are somewhat bound by the logistics and the need to wrap this up."

http://www.nytimes.com/2009/11/10/science/10dome.html?ref=science

Does Biased News Have a 'Time Bomb' Effect?

By: Melinda Burns

There's nobody more cynical about the media than your average European.

Only 12 percent of Europeans claim to trust the media, compared to 15 percent of North Americans, 29 percent of Pacific Asians and 48 percent of Africans, the BBC has found.

Yet new research out of the London School of Economics and Political Science suggests that even the most hardened Europeans may succumb to media manipulation and change their political views if they are bombarded long enough with biased news.

Michael Bruter, a senior lecturer in European politics at the school, fed a steady diet of slanted newsletters about Europe and the European Union — either all good news or all bad — to 1,200 citizens of six countries over two years.

Over time, Bruter found, and without exception, the readers subconsciously adopted the bias to varying degrees and changed their view of the EU and of themselves as Europeans, a few of them in the extreme. Surprisingly, they didn't register any change right after the newsletters stopped — not until full six months later, when they had obviously let down their guard.

Bruter calls this the "time bomb" effect of one-sided news. His study paints a blunt picture of how cynicism, far from inoculating citizens to resist political persuasion, merely delays the impact.

"We know that an increasing proportion of citizens distrust the media and that some explicitly claim to discount bias in the news that they receive," he wrote. "However, we show that despite this qualified reading strategy, the effect of news resounds over time.

Bruter did not study American media, but his research raises questions about the effects of long-term exposure to polarized television news on outlets such as the FOX and MSNBC networks — which are

currently first and second respectively in cable news ratings. The Obama administration recently called FOX News Channel a political opponent and not a legitimate news organization.

The "time bomb" effect calls into question whether the cynicism of modern-day citizens actually makes them more vulnerable to the very journalistic sources they distrust and feel immune to, Bruter said.

Thus, British citizens, the most cynical of all, may be alert to the anti-EU slant of their media, yet the study suggests they can be nonetheless be manipulated to feel significantly less European than others, Bruter said.

The media, he said — and particularly, the tabloids — should stop brushing aside accusations of bias with assertions that "their audiences are mature and sophisticated and can take what they say with a pinch of salt."

"By contrast, my findings suggest that even sophisticated audiences are indeed susceptible to manipulation," he said. "As such, the big lesson for the media is that it does have a responsibility."

Bruter became intrigued with the question of media and identity after the citizens of France and the Netherlands voted down a proposed constitution for the European Union in 2005. This setback, he said, made it imperative to figure out whether the media was influencing "why some citizens feel more European than others."

Bruter designed a two-year experiment in which he sent biweekly newsletters containing biased news about Europe and the EU to up to 200 each in the United Kingdom, France, Germany, Belgium, Portugal and Sweden. These countries represented both large and small, rich and poor, pro-European and "Euroskeptic" members of the EU.

Each four-page newsletter, compiled from daily and weekly European papers, included two pages of articles exclusively about Europe and the EU, either all positive or all negative.

Thus, for example, one group of participants would read about how European heads of state agreeing to jointly fight drug trafficking, Airbus overtaking Boeing as the world's No. 1 airplane manufacturer, and the value of the euro going up, while another group would read about the value of the euro going down, Airbus losing a large order in China to Boeing, and heads of state failing to agree on how to fight organized crime from the former Eastern bloc.

In addition, the "good news" newsletters contained three photographs or drawings of pro-European symbols such as maps of Europe and photographs of the EU flag (a circle of yellow centered on a blue background), while the "bad news" newsletters contained placebo photographs of people and landscapes.

Before the first newsletter was mailed out, participants filled out a questionnaire designed to measure their civic, cultural and European identity. They answered such questions (in different languages) as, "In general, are you in favor or against the efforts being made to unify Europe?" "In general, would you consider yourself a citizen of Europe?" "Would you say that you feel closer to fellow Europeans than, say, to Chinese, Australian or American people?"

Also, participants were asked to describe their reaction if they saw someone burning a European flag, and their reaction if they saw someone burning the flag of their own country.

They received essentially the same questionnaire twice more — right after the newsletters stopped and six months after that.

The findings showed that biased news had virtually no effect on whether citizens felt more or less European or more or less in favor of the EU, directly after the two-year experiment ended. But six months

after the last newsletter arrived, the results showed that they were unmistakably affected.

Consistent exposure to symbols of Europe and the EU — flags, maps and euro banknotes — worked immediately to make people feel more European, the study found. And six months after the experiment, participants who were regularly exposed to the symbols were increasingly aware of them in real life. In effect, they had been "primed" by the newsletters to notice them.

But the "time bomb" of biased news was more effective than the exposure to symbols in manipulating members of the "vastly cynical European public," Bruter said.

"It shows that even the most 'unbelievable' propaganda may have an effect over time and that the most fallacious and baseless rumors, for instance, may shape opinion to an extent," Bruter said.

Today, the European Union has grown to 27 member states, from the original six that first engaged in mutual economic cooperation in 1957. The Lisbon Treaty, a replacement for the failed 2005 European Constitution, is poised to go into effect this year: 26 of the 27 member countries have ratified it, including France and the Netherlands. The Czech Republic is the last holdout.

But regardless of what governments do, the question of why and how the citizens of different countries in Europe begin to feel less British or Danish or Portuguese, say, and more European at heart is still very much an open one. The media, Bruter said, can impede or encourage that feeling over time.

"The effect of news ultimately kicks in and so influences citizens' European identity with remarkable efficiency in the long term," he said.

"Time Bomb? The Dynamic Effect of News and Symbols on the Political Identity of European Citizens," appeared earlier this year in the journal *Comparative Political Studies*.

A Dream Interpretation: Tuneups for the Brain

By BENEDICT CAREY

It's snowing heavily, and everyone in the backyard is in a swimsuit, at some kind of party: Mom, Dad, the high school principal, there's even an ex-girlfriend. And is that Elvis, over by the piñata?

Uh-oh.

Dreams are so rich and have such an authentic feeling that scientists have long assumed they must have a crucial psychological purpose. To Freud, dreaming provided a playground for the unconscious mind; to Jung, it was a stage where the psyche's archetypes acted out primal themes. Newer theories hold that dreams help the brain to consolidate emotional memories or to work though current problems, like divorce and work frustrations.

Yet what if the primary purpose of dreaming isn't psychological at all?

In a paper published last month in the journal Nature Reviews Neuroscience, Dr. J. Allan Hobson, a psychiatrist and longtime sleep researcher at Harvard, argues that the main function of rapid-eye-movement sleep, or REM, when most dreaming occurs, is physiological. The brain is warming its circuits, anticipating the sights and sounds and emotions of waking.

"It helps explain a lot of things, like why people forget so many dreams," Dr. Hobson said in an interview. "It's like jogging; the body doesn't remember every step, but it knows it has exercised. It has been tuned up. It's the same idea here: dreams are tuning the mind for conscious awareness."

Drawing on work of his own and others, Dr. Hobson argues that dreaming is a parallel state of consciousness that is continually running but normally suppressed during waking. The idea is a prominent example of how neuroscience is altering assumptions about everyday (or every-night) brain functions.

"Most people who have studied dreams start out with some predetermined psychological ideas and try to make dreaming fit those," said Dr. Mark Mahowald, a neurologist who is director of the sleep disorders program at Hennepin County Medical Center, in Minneapolis. "What I like about this new paper is that he doesn't make any assumptions about what dreaming is doing."

The paper has already stirred controversy and discussion among Freudians, therapists and other researchers, including neuroscientists. Dr. Rodolfo Llinás, a neurologist and physiologist at New York University, called Dr. Hobson's reasoning impressive but said it was not the only physiological interpretation of dreams.

"I argue that dreaming is not a parallel state but that it is consciousness itself, in the absence of input from the senses," said Dr. Llinás, who makes the case in the book "I of the Vortex: From Neurons to Self" (M.I.T., 2001). Once people are awake, he argued, their brain essentially revises its dream images to match what it sees, hears and feels — the dreams are "corrected" by the senses.

These novel ideas about dreaming are based partly on basic findings about REM sleep. In evolutionary terms, REM appears to be a recent development; it is detectable in humans and other warm-blooded

mammals and birds. And studies suggest that REM makes its appearance very early in life — in the third trimester for humans, well before a developing child has experience or imagery to fill out a dream.
In studies, scientists have found evidence that REM activity helps the brain build neural connections, particularly in its visual areas. The developing fetus may be "seeing" something, in terms of brain activity, long before the eyes ever open — the developing brain drawing on innate, biological models of space and time, like an internal virtual-reality machine. Full-on dreams, in the usual sense of the word, come much later. Their content, in this view, is a kind of crude test run for what the coming day may hold.
None of this is to say that dreams are devoid of meaning. Anyone who can remember a vivid dream knows that at times the strange nighttime scenes reflect real hopes and anxieties: the young teacher who finds himself naked at the lectern; the new mother in front of an empty crib, frantic in her imagined loss. But people can read almost anything into the dreams that they remember, and they do exactly that. In a recent study of more than 1,000 people, researchers at Carnegie Mellon University and Harvard found strong biases in the interpretations of dreams. For instance, the participants tended to attach more significance to a negative dream if it was about someone they disliked, and more to a positive dream if it was about a friend.
In fact, research suggests that only about 20 percent of dreams contain people or places that the dreamer has encountered. Most images appear to be unique to a single dream.
Scientists know this because some people have the ability to watch their own dreams as observers, without waking up. This state of consciousness, called lucid dreaming, is itself something a mystery — and a staple of New Age and ancient mystics. But it is a real phenomenon, one in which Dr. Hobson finds strong support for his argument for dreams as a physiological warm-up before waking.
In dozens of studies, researchers have brought people into the laboratory and trained them to dream lucidly. They do this with a variety of techniques, including auto-suggestion as head meets pillow ("I will be aware when I dream; I will observe") and teaching telltale signs of dreaming (the light switches don't work; levitation is possible; it is often impossible to scream).
Lucid dreaming occurs during a mixed state of consciousness, sleep researchers say — a heavy dose of REM with a sprinkling of waking awareness. "This is just one kind of mixed state, but there are whole variety of them," Dr. Mahowald said. Sleepwalking and night terrors, he said, represent mixtures of muscle activation and non-REM sleep. Attacks of narcolepsy reflect an infringement of REM on normal daytime alertness.
In study published in September in the journal Sleep, Ursula Voss of J. W. Goethe-University in Frankfurt led a team that analyzed brain waves during REM sleep, waking and lucid dreaming. It found that lucid dreaming had elements of REM and of waking — most notably in the frontal areas of the brain, which are quiet during normal dreaming. Dr. Hobson was a co-author on the paper.
"You are seeing this split brain in action," he said. "This tells me that there are these two systems, and that in fact they can be running at the same time."
Researchers have a way to go before they can confirm or fill out this working hypothesis. But the payoffs could extend beyond a deeper understanding of the sleeping brain. People who struggle with schizophrenia suffer delusions of unknown origin. Dr. Hobson suggests that these flights of imagination may be related to an abnormal activation of a dreaming consciousness. "Let the dreamer awake, and you will see psychosis," Jung said.
For everyone else, the idea of dreams as a kind of sound check for the brain may bring some comfort, as well. That ominous dream of people gathered on the lawn for some strange party? Probably meaningless. No reason to scream, even if it were possible.

http://www.nytimes.com/2009/11/10/health/10mind.html?ref=science

Prognosis: Lingering Pain After Surgery for Breast Cancer

By RONI CARYN RABIN

Breast cancer patients often experience pain that persists long after surgery, and a new Danish study has found that the problem affects a large proportion of women. Almost half the patients reported chronic pain two to three years after treatment, and more than half reported discomfort.

The patients most likely to have these effects were those under 40, those who had undergone radiation treatment and those who had surgery to remove all of the lymph nodes in the armpit rather than a less invasive procedure called a sentinel node biopsy, which can be used to determine whether the cancer has spread.

The study, which appears in the Nov. 11 issue of The Journal of the American Medical Association, is one of the largest to assess persistent pain in breast cancer patients.

“This should alert clinicians who are caring for these patients to pay more attention to those who are in the high risk groups for pain,” said Dr. Loretta S. Loftus, a senior member of the breast program at the H. Lee Moffitt Cancer Center in Tampa, Fla., who wrote an editorial accompanying the study.

The researchers looked at questionnaires completed last year by 3,253 women who were breast cancer patients treated in 2005 and 2006. The women were identified through national databases in Denmark, where treatments are standardized.

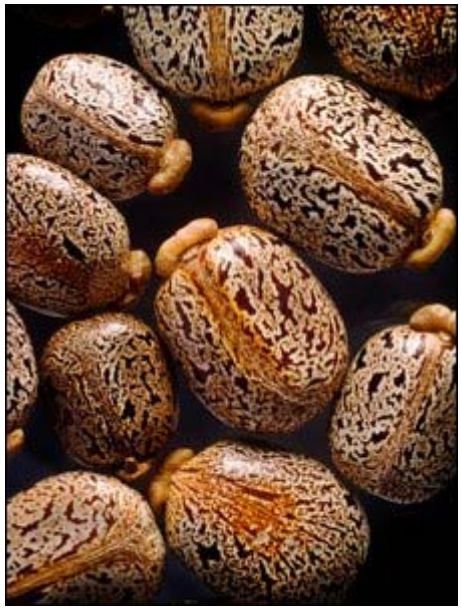
Forty-seven percent of the patients, 1,543 in all, reported pain in one or more areas, usually the breast, armpit and side; one-fifth of that group said they had recently consulted a doctor about their pain. Fifty-eight percent, or 1,882 women, reported “sensory disturbances” like burning sensations and numbness.

http://www.nytimes.com/2009/11/17/health/research/17prog.html?ref=research

Ricin 'antidote' to be produced

By Paul Rincon
Science reporter, BBC News

An anti-toxin that protects against ricin poisoning is to move into production for the first time.



It is the result of eight years of work by researchers at the Defence Science and Technology Laboratory based at Porton Down in Wiltshire.

The antidote can protect against death up to 24 hours after exposure, according to Dr Jane Holley from DSTL.

Security experts say ricin - roughly 1,000 times more toxic than cyanide - could be used in a bio-terror attack.

Dr Holley told BBC News: "In the past there has been lots of research carried out using different methods. But this is the first [anti-toxin] that has been moved into production.

The principal scientist in biomedical sciences at DSTL added: "It is anticipated that a product will be available for use in the next couple of years."

Ricin is extracted from castor beans, which are processed throughout the world to make castor oil. The toxin is part of the waste "mash" produced when castor oil is made.

It can cause harm if injected, swallowed or inhaled. A tiny quantity can be lethal, but the amount needed to kill depends on the route of administration.

A combination of pulmonary, liver, renal and immunological failure can lead to death, though people can recover from exposure.

In recent years, the perceived threat of bioterrorism has increased.

Although the anti-toxin developed at Porton Down was initially intended for use by the military, DSTL scientists are investigating its potential use in a civilian environment.

Production of the anti-toxin involves immunising sheep with an inactive form of ricin, which results in the production of antibodies. These are proteins used by the immune system to neutralise harmful substances.

The antibodies are then harvested from the sheep to produce a freeze-dried product. This is reconstituted with water for injection into the body.

Dr Holley said that although the anti-toxin is ready to be manufactured, full licensing is likely to take about five years.

Dissident murder

Professor Alastair Hay, a toxicologist at the University of Leeds described ricin as "a very potent poison".

"Having an anti-toxin in the armoury would be very helpful for anyone who has to deal with possible ricin poisoning," he told BBC News.

Ricin was the poison used for the infamous murder of Bulgarian dissident Georgi Markov in September 1978.

Mr Markov, who was an avowed critic of Bulgaria's communist regime, was waiting at a bus stop near Waterloo Bridge, London, when a stranger jabbed him in the leg with an umbrella.

The rigged umbrella injected a tiny ricin-filled pellet into Mr Markov's calf. He was admitted to hospital that evening but died three days later.

In 2005, an Algerian man, Kamel Bourgass, was convicted of plotting to use poisons - including ricin - to cause disruption, fear or injury.

He was arrested after anti-terrorist squad officers found a suspected poisons laboratory in a north London flat in January 2003, though the toxin itself was not found.

There have also been incidents in the US; in 2004, an alert was triggered after tests identified ricin in a Senate office building mailroom.

The development of the ricin anti-toxin follows on from work to develop an "antidote" for poisoning with botulinum toxin.

"Although there had been small-scale batches of anti-toxins for botulinum available in hospitals, for military use we needed a large capability in case it was used as a biological weapon. We developed an anti-toxin against all seven 'serotypes' of botulinum toxin," Dr Holley explained.

Serotypes are structurally distinct forms of the toxin.

Dr Holley added: "This has been available for several years now, has been made to good manufacturing practice and is undergoing full licensing studies at the moment."

Research has also been carried out into a vaccine against ricin poisoning. While an anti-toxin works by mopping up the poison once it is in the body, a vaccine would prime the body for exposure to the agent.

Its effectiveness would depend in part on the period of time between administration of the vaccine and exposure to the agent.

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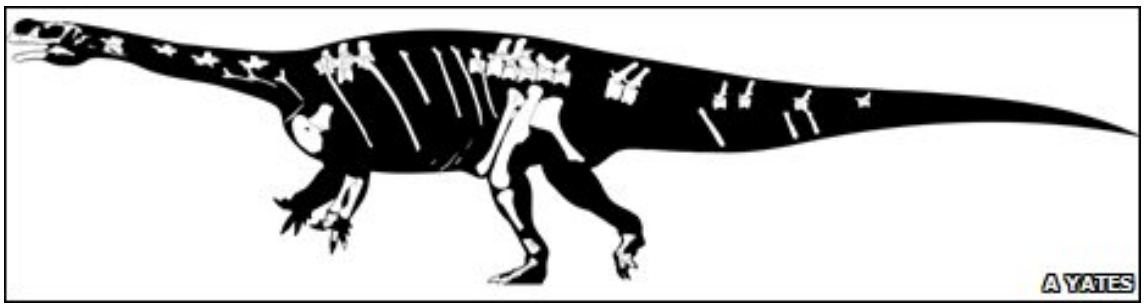
Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8351666.stm

Published: 2009/11/11 01:16:19 GMT

Missing link dinosaur discovered

Researchers have discovered a fossil skeleton that appears to link the earliest dinosaurs with the large plant-eating sauropods.



This could help to bridge an evolutionary gap between the two-legged common ancestors of dinosaurs and the four-legged giants, such as diplodocus.

The remarkably complete skeleton shows that the creature was bipedal but occasionally walked on all four legs.

The team reports its discovery in the Royal Society journal Proceedings B.

"What we have is a big, short-footed, barrel-chested, long-necked, small-headed dinosaur," explained Adam Yates, the scientist from the University of Witwatersrand in Johannesburg who led the research.

"The earliest ancestral dinosaur - the great grand-daddy of all dinosaurs - walked on two legs. This [one] is intermediate between those bipedal forms and the true gigantic sauropods."

The skeleton was discovered at a site in the Senekal district of South Africa.

Dr Yates explained that features of its feet and jaw, as well as its size, gave away its significance.

The dinosaur, *Aardonyx celestae* was a heavy, slow-moving animal.

"It had a lot of features we see on sauropods," explained Dr Yates. "Short, broad feet and a big, broad gut, so it was clearly a plant-eater that was bulk-feeding.

"And the anatomy of the jaw shows it had a wide gape - to stuff more food in."

It also had, he said, "sauropod-like front feet".

"Its toe bones were very robust and solid, so its weight was being born on the inside of the foot. It was still bipedal, but it may have been going down on to all fours to browse."

'Living fossil'

The dinosaur dates from the early Jurassic period - about 200 million years ago.

"Although structurally it's intermediate, it lived too late to be an actual ancestor, because true sauropods already existed [then].

"So, at the time, it was a living fossil - the transition must have happened much earlier."

Dr Yates stressed that the site where the fossil was discovered provided an abundance of valuable knowledge about dinosaur evolution.

"If you want to study how the dinosaurs became giants," he said. "You have to come to South Africa."

Dr Paul Barrett - a palaeontologist from the Natural History Museum in London said that the discovery of *Aardonyx* helped "fill a marked gap in our knowledge of sauropod evolution".

"[It shows] how a primarily two-legged animal could start to acquire the specific features necessary for a life spent on all fours.

"Evolution of this quadrapedal gait was key in allowing the late sauropods to adopt their enormous body sizes."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8353114.stm

Published: 2009/11/11 01:11:32 GMT

Koalas 'could face extinction'

Australia's koalas could be wiped out within 30 years unless urgent action is taken to halt a decline in population, according to researchers.

They say development, climate change and bushfires have all combined to send the numbers of wild koalas plummeting.

The Australian Koala Foundation said a recent survey showed the population could have dropped by more than half in the past six years.

Many have been killed by the sexually transmitted disease chlamydia.

Previous estimates put the number of koalas at more than 100,000 - but the latest calculations suggest there could now be as few as 43,000.

The foundation collected field data from 1,800 sites and 80,000 trees to calculate the numbers.

KOALAS UNDER THREAT
- Face 'extinction' within 30 years
- Numbers might have dropped by half
- Staple eucalyptus providing less nutrition
- Threatened by climate, development and sex diseases *Source: Australian Koala Foundation*

In one area in northern Queensland estimated to have 20,000 koalas a decade ago, a team of eight people could not find a single animal in four days of searching.

The foundation said as well as problems caused by deforestation, hotter, drier conditions attributed to global warming had reduced the nutritional value of their staple food, eucalyptus leaves, leading to malnutrition.

Koalas, which are confined to forests in Australia's east and south, are notoriously fussy about what types of the leaves they eat.

Foundation chief Deborah Tabart said: "The koalas are missing everywhere we look. It's really no tree, no me. If you keep cutting down trees you don't have any koalas."

Death adder

She is hoping the new figures will persuade the government's Threatened Species Steering Committee (TSSC) to list the koala as threatened.

But committee chairman Bob Beeton said a decision was not likely until mid-2010 - and the koala's status as one of the country's favourite animals would not be a factor.

"There's a number of species which are charismatic and emotionally charged. We don't consider that," Mr Beeton was reported as saying by the AFP agency.

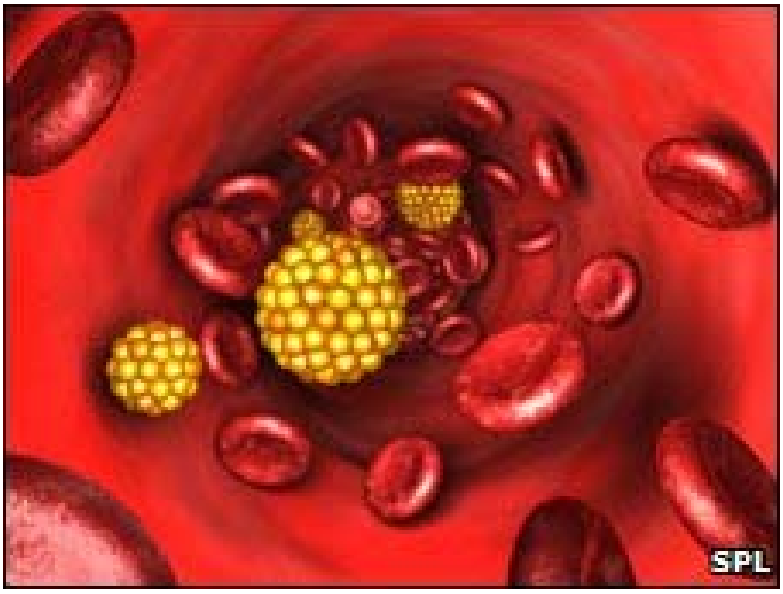
"We'd consider the koala with the same level of diligence and dedication as if it were the death adder."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/asia-pacific/8352107.stm

Published: 2009/11/10 11:34:05 GMT

'No fasting' for cholesterol test

Patients do not need to fast before having their cholesterol tested, a major report has found.



After analysing data from 300,000 people, Cambridge researchers found results were just as accurate if the patient had eaten before the test.

While a number of studies have pointed to this, the "no need to fast" message has not yet been absorbed, experts say.

It is hoped the review in the Journal of the American Medical Association will inform guidelines everywhere.

Cholesterol tests have long been a key part of assessing a patient's risk of cardiovascular problems.

Fasting was recommended as it had been thought the body needed enough time to digest food in the system and to clear any fatty particles from the blood. This was in order to produce an accurate reading of so-called "bad" cholesterol - or low-density lipoprotein (LDL).

Financial pressure

But data from 68 long-term surveys in 21 countries suggests this is not the case.

"For decades, people have been asked to fast overnight before their cholesterol tests," lead researcher Professor John Danesh said.

"These findings indicate that cholesterol measurements are at least as good - and probably somewhat better - when made without fasting."

The study also adds to the ongoing controversy over whether testing for blood proteins called apolipoproteins is a more reliable way of predicting heart risk than cholesterol testing.

The studies showed that analysing "good" cholesterol - or high-density lipoprotein (HDL) in conjunction with LDL was just as informative as testing for apolipoproteins AI and B.

Professor Peter Weissberg, medical director of the British Heart Foundation, which funded the study, said: "Given the financial pressure the NHS is under, it's good news that doctors don't need to spend money on setting up more sophisticated tests based on apolipoproteins.

"But the study underlines the importance of all GPs being able to measure HDL cholesterol as well as total cholesterol, in order to make the best predictions about heart disease risk."

Not all doctors currently use tests which differentiate between the two different forms of cholesterol.

Cardiovascular disease - CVD - is the leading form of death in the UK and many other parts of the world.

Dr Dermot Neely of charity Heart UK said the findings on fasting confirmed what many clinicians already knew.

"But it has been very slow to get through, particularly in primary care. There are still labs that will not take non-fasting specimens, so patients get sent home. Hopefully this analysis, which backs up current guidelines, will drive the message home."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8353510.stm

Published: 2009/11/11 02:07:38 GMT

New warning on 'perfect vaginas'

Women are undergoing surgery to create perfect genitalia amid a "shocking" lack of information on the potential risks of the procedure, a report says.

Research published in the British Journal of Obstetrics and Gynaecology also questions the very notion of aesthetically pleasing genitals.

Operations to improve the appearance of the sex organs for both psychological and physical reasons are on the rise.

But surgeons said the report overplayed the risks of an established procedure.

Researchers from University College London reviewed all the existing studies on cosmetic labial surgery - which generally involves reducing the amount of tissue that protrudes from the lips which cover the vagina. They found there had been little work to document any longer-term side effects.

Labioplasty, as it is known, costs about £3,000 privately and is offered for a variety of reasons: some women complain that wearing tight clothes or riding a bike is uncomfortable, while others say they are embarrassed in front of a sexual partner.

" **This is a procedure which we have been doing since the 1970s - any operation performed poorly carries risks, but when it's done properly there are very few issues at all** "
Angelica Kavouni Plastic surgeon

But consultant gynaecologist Sarah Creighton and psychologist Lih-Mei Liao challenged the ethics of offering women surgery to address such insecurities, suggesting it was adverts for a "homogenised, pre-pubescent genital appearance" which created these anxieties in the first place.

They also suggested that any pain apparently caused by protrusion may well have a psychological root - noting that male genitalia protrude far further without causing major discomfort.

Counselling and support could therefore be a preferable alternative to surgery, they argue.

Female circumcision

The number of women undergoing labioplasty nationwide is unknown as the majority of the operations are performed privately, but last year procedures on the NHS increased by 70% on the previous year to 1,118.

In studies dating back to 1950, examined by the researchers, dissatisfaction with the way the vagina looked was the primary reason for surgery, with patients also speaking of low self-esteem and sexual difficulties.

" **Advertisements promote labial surgery as easy answers to women's insecurities about their genital appearances - insecurities that are fuelled by the very advertisements that prescribe a homogenised, pre-pubescent genital appearance standard for all women** "
Lih-Mei Liao Report author

But rather than curing sexual problems, Dr Creighton suggested surgery might exacerbate them by damaging the nerve supply to the area, impairing sexual sensitivity and satisfaction.

She also suggests that women who undergo this procedure might experience similar problems in childbirth as those who have experienced female genital mutilation, in which parts of the vagina are ritualistically removed.

It is now well documented that women who have undergone such circumcision are more likely to experience significant tearing and bleeding after labour and even the death of their babies, problems which are overcome by Caesarean delivery.

"Labial surgery needs to be rigorously evaluated in future, and for longer term," said Dr Creighton.

"Furthermore, quality research is needed to improve our understanding of the psychological drivers behind women's decision to sacrifice sexually sensitive tissue that contributes to erotic experiences, for a certain genital appearance that used to be an obligation only for some glamour models."

'Terrorising' patients

Douglas McGeorge, past president of the the British Association of Aesthetic Plastic Surgeons, rejected the comparison with female circumcision, arguing it was a relatively minor operation with few possible complications.

"They've gone a bit over the top. Essentially this is just about removing a bit of loose flesh, leaving behind an elegant-looking labia with minimum scarring. The procedure won't interfere with sexual function.

"Women want this for a number of reasons - some find it uncomfortable to ride a bike for instance, but for the majority it is aesthetic, that's true.

"Lads' mags are looked at by girlfriends, and make them think more about the way they look. We live in times where we are much more open about our bodies - and changing them - and labioplasty is simply a part of this."

Angelica Kavouni, a cosmetic surgeon who carries out labioplasty, said it was wrong to "terrorise patients" with suggestions of long-term consequences.

"This is a procedure which we have been doing since the 1970s. Any operation performed poorly carries risks, but when it's done properly there are very few issues at all.

"I have seen women who I have sent away because I don't think they have a problem, but for women with serious hypertrophy - when the tissue is dark and hangs down - there is a simple way to deal with it. The feedback I receive is very positive indeed."

BJOG editor Professor Philip Steer said the study "underlines the need for multidisciplinary research to investigate the range of factors that affect women's sexual function and wellbeing.

"Reliable information on the risks and benefits of labial surgery, as well as alternative approaches, is vital to ensuring informed choice for women."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8352711.stm

Published: 2009/11/11 02:18:34 GMT

Drug 'shrinks lung cancer tumour'

Scientists have identified a drug which may offer hope to patients with a particularly lethal form of lung cancer.

The drug eliminated small cell lung cancer tumours in 50% of mice, and blocked the cells' ability to resist standard chemotherapy treatment.

The Imperial College London team now hope to test it in patients with an inoperable form of the disease.

Their study appears in the journal Cancer Research.

" **We hope to take this drug into clinical trials next year** "
Professor Michael Seckl Imperial College London

Lung cancer is a major killer, and the small cell version of the disease, which makes up 20% of total cases, has a particularly poor prognosis. Only around 3% of patients survive for five years.

The cancer spreads quickly, so surgery is not often an option.

Chemotherapy, sometimes supplemented with radiotherapy, often reduces the size of tumours, but they usually grow back rapidly, and become resistant to further treatment.

A growth hormone called FGF-2 appears to speed division of the cancer cells, and to trigger a survival mechanism which makes them resistant to chemotherapy.

PD173074 blocks FGF-2 from attaching to tumour cells. The researchers say it could potentially be taken as a pill, rather than fed into the body via a drip.

It was originally developed in 1998 to stop blood vessels from forming around tumours.

Further trials needed

Researcher Professor Michael Seckl said: "We urgently need to develop new treatments for this disease.

"We hope to take this drug, or a similar drug that also stops FGF-2 from working, into clinical trials next year to see if it is a successful treatment for lung cancer in humans."

Initially, the new drug was tested on cells taken from human tumours.

It stopped the cells proliferating, and neutralised their defences, allowing them to be killed off with standard chemotherapy.

Follow-up tests on mice showed the drug was effective against tumour cells, both in isolation, and in combination with the standard chemotherapy agent, cisplatin.

Dr Joanna Owens, of the charity Cancer Research UK, said: "It is encouraging to see potential new drugs for lung cancer in the initial stages of development.

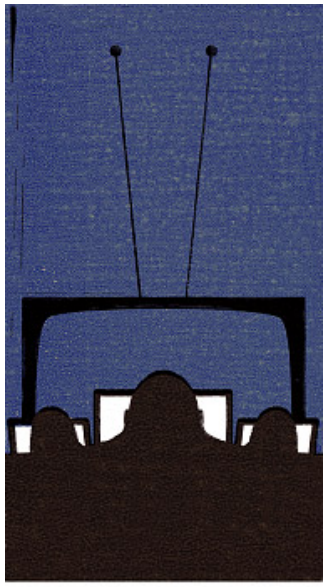
"The early results from this study are impressive but we will need to wait for the results of clinical trials before we will know if the drugs could work for patients."

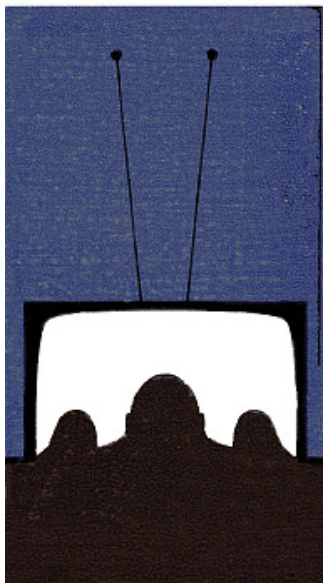
Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8350220.stm

Published: 2009/11/10 18:03:29 GMT

The Price of Free

By NICHOLAS CARR





When, in late September, rumors surfaced that Comcast was trying to buy NBC Universal from General Electric, Wall Street reacted with dismay. Grandiose attempts to combine media production and distribution — programming and plumbing — are nothing new in the entertainment business, but they almost always end in disappointment. Witness AOL Time Warner. So what in the world could be prompting the Comcast chief executive, Brian Roberts, to start down this accursed path?

I fear that I'm to blame.

A few months ago, while stalking the aisles of my local Best Buy, I gave in to techno-temptation. I bought a Blu-ray player. What I didn't realize until I unpacked the gadget was that it does a lot more than just spin high-definition discs. It is, as they say, Web-enabled. As soon as I plugged it into an outlet in my living room, its built-in WiFi antenna sniffed out my home network and logged on. The Blu-ray player became a gateway between the Internet and my television set.

Ever since, and much to my surprise, I've been using the device more to transmit Internet content than to play discs. I stream TV shows and movies from Netflix, music from Pandora and videos from YouTube. Beyond my existing $11-a-month Netflix subscription, I haven't forked out a penny for any of this programming. It comes flowing out of the Web, whenever I summon it, free.

My new viewing habits must make Brian Roberts very nervous. The more I play movies and TV shows from the Web, the less I use my cable TV service. I almost never order pay-per-view movies anymore. And I recently canceled my premium Showtime subscription. Most of Showtime's best programs, including "The Tudors," "Weeds" and "Dexter," are available to stream through Netflix, as are a lot of the movies currently playing on Showtime's Starz network. Why pay $23 a month when I can get the stuff for almost nothing?

I have a feeling that it won't be long before I and a whole lot of other people start asking similar questions about pay-TV subscriptions in general.

Until recently, the TV business was shielded from the turmoil that the Internet has visited upon other media industries, like music and publishing. The reason was largely a matter of network capacity. Sending high-quality video through the Web requires a lot more bandwidth than sending text or music, and until 2007 most Americans lacked high-speed Internet connections at home, according to the Pew Research Center. The Net simply wasn't a viable alternative for distributing the signals traditionally sent over cables or beamed down from satellites.

That's changing, and fast. With broadband becoming the norm and connection speeds continuing to quicken, what has happened to music companies and newspapers is beginning to happen to broadcast networks and cable companies. People like me are using the Net to bypass the customary providers of television programming, along with the ads they show and the fees they collect.

My Blu-ray player is just the tip of the iceberg that the TV business is about to hit. Today you can watch snippets of shows on YouTube or entire episodes on sites like Hulu or Yahoo TV. You can view news reports at CNN.com, sports events at ESPN360.com and documentaries at PBS.org. You can download shows, sometimes without charge, from Apple's iTunes store and watch them on your iPod, iPhone or PC. Or you can stream them through your Xbox or Wii.

Television is escaping the TV set and the cable box. We no longer watch the tube. We watch, to borrow ex-Senator Ted Stevens's memorable conceit, a series of tubes.

As the technology of television changes, so, too, does the experience of watching it. In the past, TVs often served as the focal points of communal gatherings. Families or groups of friends would collect around the set to watch the prime-time shows or the weekend games. They would laugh at the sitcom slapstick, cheer for their local teams, chat through commercials and, during the duller stretches, keep one another from nodding off. TV may have been a vast wasteland, as Newton Minow, the F.C.C. chairman in the Kennedy administration, said in a speech in 1961, but at least it was a wasteland we shared.

The communal mode of TV viewing isn't gone, but it's becoming less common. As screens proliferate and shrink, and as the Web allows us to view whatever we want whenever we want, we spend more time watching video alone. That's one funny thing about the Internet: it's an extraordinarily rich communications system, but as an information and entertainment medium, it encourages private consumption. The pictures and sounds served up through our PCs, iPods and smart phones absorb us deeply but in isolation. Even when we're together today, we're often apart, peering into our own screens.

Television companies, desperate to protect their sources of revenue, are trying to figure out ways to control or at least influence the shifts in our viewing practices. If a transmission company like Comcast — although it owns a few cable stations, Comcast's main business is providing cable TV, Internet and telephone service — were to own more of the programs it distributes, it could, at least theoretically, wield more power over how that content reaches viewers. In buying NBC Universal, for instance, Comcast would gain a stake in Hulu, which NBC owns with ABC and Fox. It could impose limits or even fees on the shows streamed through that popular Web site.

Such opportunities reveal the conflict of interest that's built into the TV business. The companies that supply us with pay-TV subscriptions — not just cable operators like Comcast but telephone companies like AT&T and Verizon — also tend to be the ones that provide us with Internet service. By blocking or slowing certain Net transmissions, they could shunt us toward their own programming and prevent us from viewing alternatives, particularly free ones. If my Internet provider degraded my Netflix signal, I would almost certainly go back to watching more cable programs.

That scenario is not as far-fetched as it may sound. In 2007, Comcast was caught throttling back its customers' links to BitTorrent, a file-sharing network often used to trade bootleg copies of TV shows and movies. Comcast argues that heavy BitTorrent users were taking up too much bandwidth, to the detriment of other services. Looked at another way, Comcast was using its Web-access franchise to protect its pay-TV franchise.

But, as the company soon found out, impinging on "net neutrality" — the principle that Internet providers should treat all data the same — is a good way to make enemies. Internet purists went ballistic. Consumer advocates denounced the move. The government began an investigation. In 2008, the F.C.C. decided that Comcast had broken its rules, and it ordered the company not to impede access to BitTorrent and other such services. Comcast is appealing the ruling.

Under its new chairman, the Obama-appointee Julius Genachowski, the F.C.C. is becoming even more aggressive in defending the openness of the Internet. Last month, it voted to begin preparing regulations aimed at giving net neutrality the force of law. Though controversial, the commission's move will be welcomed by most Web users. I know that I don't want my Internet provider to control the sites I visit or services I can use when I'm online. Unimpeded access to the Net has come to feel like a right.

In the end, and whether they gobble up content producers or not, network operators like Comcast may be fated to be in the plumbing business. They'll turn tidy profits by maintaining the pipes through which we get Internet service, even if we use those pipes to bypass their pay-TV offerings. We'll go on gorging ourselves on free Internet video. We, the viewers, will be the winners.

Or will we?

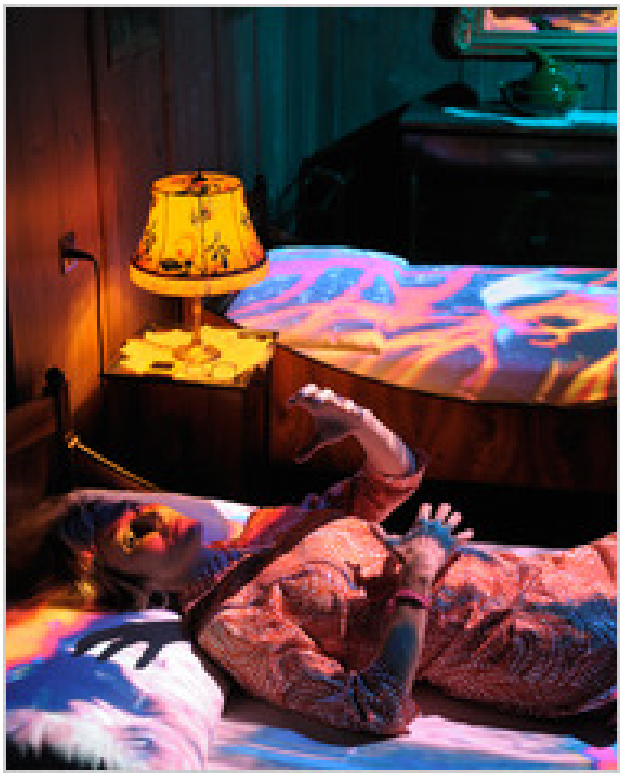
The smartest, most creative TV shows, from "Deadwood" to "Mad Men" to NBC's own "30 Rock," tend to be the most expensive to produce. They have large, talented casts, top-notch writers and directors, elaborate sets and generally high production values. If the changes in our viewing habits stanch the flow of money back to studios, producing those kinds of programs may no longer be possible. In their place, we'll get more junk: dopey reality shows, cookie-cutter police dramas, inane gab fests. The vast wasteland will become even vaster.

Even "free" has a price.

Nicholas Carr's new book, "The Shallows: What the Internet Is Doing to Our Brains," will be published next spring.

http://www.nytimes.com/2009/11/15/magazine/15FOB-Phenomenon-t.html?ref=magazine

The World's Most Colorful Video Artist
By RANDY KENNEDY



In a dark, silo-shaped room in the upscale Jardim Europa neighborhood of São Paulo, Brazil, last month, an impassioned aesthetic debate was underway, though it would have been tough for anyone walking into the room to tell. I was at a place called the Museum of Image and Sound, lying on my back with seven other people, all of us completely silent in brightly colored hammocks that had been hung around a circular scaffolding. Our feet angled together toward the center of the room and our heads radiated out like lotus petals. We were all staring up at the ceiling, where two video works were being projected, both featuring a pale, red-headed woman who looked like a Nereid sprung to life. In the first video, she navigates her way through a candy-colored world — a birch forest; a long airportlike corridor; a leaf-strewn sidewalk that the camera scuttles along low and fast, as if from the vantage point of a bug.

In the second video, pieces of which would have been instantly familiar to anyone who visited the atrium of the Museum of Modern Art in New York last winter, the same woman crawls naked through the grass, and super-zoomed-in images of her apple-stuffed mouth alternate with that of a fairly nasty-looking black pig's. The sequence ends as the woman rises from a body of water with menstrual blood dripping from the crotch of her white underwear, turning the water — and thus the whole screen and the room — a deep crimson.

Pipilotti Rist, the Swiss artist from whose overflowing mind and cameras these images came, finally got up and walked around, and so did everyone else on her creative team, a group that functions like a close-knit family, with Rist as the cool but fiercely involved mother. They had been in Brazil for almost two weeks at that point, installing what amounted to a mini-retrospective of Rist's career in two small contemporary art spaces in São Paulo, one of which was this small, scrappy museum housed in a handsome white Modernist building that was once a private house.

The disagreement that morning — one that had been building for days — was whether to leave the circular room with the single video installation originally planned for it, a piece from 2005 called "A Liberty Statue for Löndön"; or to add the second one, a newly conceived work that Rist had been editing at a furious pace from footage she first used in "Pour Your Body Out (7354 Cubic Meters)," her multi-projection installation that became a huge hit last year at MoMA. That work, a video-in-the-round immersion, transformed the museum's ungainly atrium into what one critic described variously as a

bordello, a pleasure dome and an opium den, a work that seemed to cause the masculine-feeling museum to (at least metaphorically) ovulate.

"Pour Your Body Out" was one of Rist's most ambitious pieces. And for many Americans it was an introduction to her signature methods: bringing the world right up to your nose, radically, uncomfortably close, in a boldly feminist way that upends conventions of beauty and body image, but doing so while inviting you to relax, stretch out, put your feet up and not feel preached to or even particularly confronted. Rist, who lives and works in Zurich, pursues this goal with a kind of missionary zeal and a stupendous work ethic born of her Swiss Protestant upbringing. After a few fallow years beginning in 2000 when she says she felt burned out as an artist and moved to Los Angeles to teach, she has roared back and, at 47, is an undisputed star, one of the most-sought-after artists of her generation. At the same time that she was mounting the MoMA exhibition, she was completing the editing of her first feature-length film, "Pepperminta," which made its debut in September at the Venice Film Festival and has been received so far with mostly positive, if perplexed, reviews. (Variety predicted that its commercial prospects would be "as flat as a stick of Doublemint gum.") When I first met her a couple of weeks after the debut, she gave me the beginner's summary of the hallucinatory plot, which she conveyed with all the gravity of someone synopsizing "Citizen Kane": "It is about a young woman and her friends on a quest to find the right color combinations and with these colors they can free other people from fear and make life better."

As corny as that might sound, it is more or less what Rist herself has been after for much of her 20-year career and what was driving the debate that morning in São Paulo at the Museum of Image and Sound. Rist felt strongly that she wouldn't be giving Brazil her all if she showed only older work in both her exhibitions. So on a Saturday evening, struck by what she called "my Saturday-night fever," she began to edit a new video, a painfully slow process using only the laptops she had brought with her. Her assistants — including Rachele Giudici, her studio manager; Davide Legittimo, her video specialist; and Markus Huber Recabarren, who helps design her installations — argued that adding the new video was, as a formal matter, pretty ragged and that it was also a disservice to the older work. "It's like saying it's not good enough," Giudici told me.

Rist emerged from the exhibition room with her arms crossed, a pained expression on her face. Nobody seemed to want to say anything. I asked her if she had made up her mind.

"Ja, we keep it," she pronounced. "Maybe it's not so clear, artistically," she added, "but it's O.K. I can be not clear, for São Paulo." Turning to Karin Seinsoth, a project coordinator from her Zurich gallery, Hauser & Wirth, she put a hand on her shoulder and told her: "Don't take it personally. It means a lot to me that you were all against it."

Then Rist strode over to where a man was at work painting the title of the piece on the wall and pointed to a blank space. "We will add it here," she said. "Now we must find out how in Portuguese you say 'Bonus track.' "

CRITICISM OF RIST'S work, to the degree that there has been much, has usually focused on the concern that it is too colorful and friendly, especially in the realm of video art, whose roots lie mostly in using television-like images as a cudgel to knock people out of the trance largely fostered by television itself. (Take, for example, "Think," Bruce Nauman's 1993 wickedly simple work, which consists of images of his head bouncing toward each other like basketballs on two stacked monitors as he shouts "Think!" over and over at the viewer.)

Some people complained that Rist's work, especially in its early days, was too close to the experimental end of the music-video world, the kind of thing you wouldn't have been surprised to find in the wee hours back on MTV's "120 Minutes." But in many ways this is what Rist, who speaks of her admiration for the work of music-video auteurs like Michel Gondry and Chris Cunningham, was after. She has always viewed art as a kind of bonus track, something that should openly seek to cause joy and that we should be happy to discover, like a gift, on the regular song list of life. In one of her often-repeated observations about video work, she compares it to the capaciousness of women's handbags — with "room in them for everything: painting, technology, language, music, lousy flowing pictures, poetry, commotion, premonitions of death, sex and friendliness" — a woman's canny update of Matisse's already canny statement about wanting his art to be like a comfortable armchair for the tired businessman.

Rist often speaks about her distress that over the last 40 years or so, at least since the rise of Conceptualism, the gulf between the world of contemporary art and the world in general seems to be widening, with art viewed by too many people as some kind of parochial game played among artists, institutions and collectors. "When I see a really good work of art, sometimes I could just cry because more people aren't going to know about it," she says.

During our first conversation in New York, where she had stopped off briefly on her way to Brazil, she told me: “The whole question of how to put art into regular life is what interests me the most. I treat art as a service. I think of myself as a service worker.”

Her own life is roughly coincident with the history of video art, which became possible with the production of the first consumer camera rig and video recorder by Sony in 1965. Rist has never engaged in any serious drawing or painting and, unlike many of her contemporaries, has made comparatively few sculptural pieces or other objects to satisfy collectors. I asked her why she is attracted to video work in a world already oversaturated with video images and screens, and she said it is precisely because of that fact. People spend an increasing portion of their waking hours now looking at moving images created by pixels; but most of that imagery is created under “commercial pressure,” as Rist calls it, to sell things or support advertising. Though she certainly strives to complicate this visual environment, it’s not one she judges with anything like straightforward anticonsumerism. “We’ve lived with this for a long time,” she says. “We have the power to know which pictures we want to keep and which pictures we want to excrete from our minds.” But she argues that we also need artists — she uses the wonderfully utopian term “free citizens,” which can encompass a whole lot of what’s being made for YouTube — to create a bank of other kinds of imagery as a counterbalance.

“Using moving images as much as possible for purely philosophical and poetical reasons and goals,” she says, “can work as a shield or exorcism of the over-image-reproduced world.” And the way to do this, in her opinion, is to borrow the language of television and movies that has become our visual lingua franca, with its color and speed and sensuality, then to reshape it profoundly — to let it wander off square screens and into the world, to heighten its color, to scramble the feeling of distance it gives us that simultaneously brings comfort and a kind of powerlessness. “I use the same ingredients, I think, but I am cooking a different meal,” she says.

Treating video images almost as a new form of organic life, she has installed monitors or projected images inside bathrooms, liquor bottles, seashells and, of course, handbags, as well as projecting them everywhere from a Venetian church ceiling to the plaza in front of the Pompidou Center, where she created, in effect, a television screen of Gulliverian proportions that people could congregate atop. “I wanted to get the stories out of the box and just spread them around,” she has said of her work.

A fundamental conviction almost since the beginning of her career has been that most representations of life in television and film fail to capture the way we really experience color, partly for technical reasons: bright colors are usually muted slightly to avoid giving pale human skin abnormal hues. Rist herself certainly has no fear of color. When I met her one morning at the Standard Hotel in the meatpacking district of Manhattan, people stopped to stare as she walked by, in bright blue-yellow-and-red plaid baggy pants (which, when the legs were pulled up, converted into a bubble skirt) and a matching jacket, over a canary yellow T-shirt emblazoned with the Chinese character for double happiness.

She is an almost unnervingly intense listener, who sometimes produces a pocket notebook while talking to illustrate her thoughts with charts and diagrams and seems to like talking about evolution and optics more than she does about art. Sitting there at breakfast, she pointed to a lemon wedge perched on the edge of her water glass and leaned down to peer at it through her thick black-framed glasses. “Look how yellow that is — it knocks you out — pow!” she said, mimicking a punch to the temple. “But if you filmed it or took pictures of it, it would always be a little less so. I’ve wanted to find a way for it not to be that way.”

It was the first time I’d met her, but I felt as if I’d been spending time with Rist for years at that point. Every time I visit P.S. 1, the contemporary art space in Queens, I make a point of stopping not far from the entrance where a 1994 work of hers, “Selfless in the Bath of Lava,” has long been installed. It is a video screen about the size of a matchbox, one you could easily miss, embedded in a hole in the floorboards, with hidden speakers. You try to figure out where the tiny voice is coming from and look down between your feet to see a tiny, naked Rist on the screen looking straight up at you from a sea of superimposed flame, reaching out, shouting ridiculously self-abasing things in several languages: “I am a worm and you are a flower. You would have done everything better.”

Often the titles she gives her work are almost worth the price of admission themselves, a kind of verbal equivalent of her visual imagination: “Sip My Ocean,” “Open My Glade (Flatten),” “Pimple Porno,” “When My Mother’s Brother Was Born It Smelled Like Wild Pear Blossom in Front of the Brown-Burnt Sill.” The video that most people who have a passing acquaintance with Rist’s work have seen is probably “Ever Is Over All,” a mesmerizing, looping fantasia with music by the composer Anders Guggisberg, who has long collaborated with her. In it, a woman in a sky blue dress and red pumps (not

Rist in this case, but a friend of hers, Silvana Ceschi) walks down a tidy Zurich street, gleefully smashing the side windows of cars with a metal replica of a sensuous kind of flower known as a red-hot poker.
Bice Curiger, a Swiss curator and a founder of the art magazine Parkett, who has followed Rist's career from the beginning, recalls the difficulty with which her exuberance was initially received: "In the context of the world of video at the time Pipilotti began, the question was: 'Is this serious work or not? Can you be so colorful and so playful and humorous?' But for me what she was doing was bringing in another temperature. A cold medium was being turned into a warm medium." She adds: "It's somehow feminist with a sensual knowledge that is completely different from the generations before her. It's not propagandistic."
For the first work of art Rist ever displayed publicly, on a bridge near Buchs, one of the tiny Rhine Valley villages where she was raised, she bought a pig's heart from a local butcher and plunked it atop a video monitor displaying an early work she made. The experience was instructive. "Nobody noticed the meat on the monitor," she recalled. "People were so concentrated on the image on the screen that they didn't even look two centimeters above."
Rist grew up in the rolling countryside of eastern Switzerland, the second-oldest child in a family of four girls and one boy, though she seems to have been the dominant personality around the house. Her given name is Elisabeth Charlotte; she created her current one, which she adopted in college, by combining her two childhood nicknames, Lotti and Pippi, the latter taken from Pippi Longstocking, Astrid Lindgren's plucky heroine, who could lift a horse with one hand. And there is more than a bit of Longstocking in Rist, who offsets the fine-boned features of a model with a tomboyish physicality. She shakes hands firmly and snorts when she laughs and falls to mechanical tasks with the easy confidence of a union plumber. She ends her e-mail messages with the exhortation "Stay Metal," a funny sign-off for someone who deals mostly in images of flowing water, flowers and the squishier parts of the body, often her own.
In grade school, she decided to move out of her house and took up residence for a couple of weeks in her family's emptied swimming pool, which had a cover that served as a roof. "My sisters would come out and visit me from time to time," she said, seeming a little embarrassed about the incident now. "I guess I just wanted to be independent." Her father, Walter, a doctor, probably had no idea that it was happening, she said, and her mother, Anna, a teacher and a strong-willed woman herself, "probably thought, Oh, she'll just live out in the pool for a while and then she'll come back. And I did."
Her family, while not exactly devout, found itself in church every Sunday, and Rist grew up reading the Bible daily throughout much of her youth. She describes herself as an atheist now. But the scaffolding of belief has clearly remained, not only in the sense that much of her work seems to be haunted by the concept of original sin and Christianity's discomfort with the body but also in the impression she gives of complete personal devotion. "I've always felt that I need to toil alone and hard to make art count," she told me. "To put enough of myself and honesty into a work that I open myself up to the possibility of pain, criticism and hurt."
She studied design and video production in Vienna and Basel and then, for six years beginning in 1988, she played several instruments and sang in an all-woman klezmer punk-pop band called Les Reines Prochaines (the Next Queens), but she was never at ease performing. Even before her time in the band, she was making Super 8 movies and found inspiration in the work of Yoko Ono and of the video pioneer Nam June Paik. Through them she came early on to the Fluxus movement's anti-elitist emphasis on involving the viewer in the artwork and eroding boundaries between art and everyday life, notions that go back to free spirits like Allan Kaprow, who coined the term "happenings." (In late September, Rist's gallery Hauser & Wirth opened its first outpost in New York by reinventing Kaprow's seminal 1961 installation "Yard," which consisted mostly of piles of tires to climb through. As I walked around the show with her, she paused in front of an old poster for the original exhibition and, pretending to wipe it with her sleeve, said, "We are only polishing their stars, the people from this time.")
Her first video work — she made it in 1986 while studying in Basel, but for all its art-school earnestness, it is still fresh today — was called "I'm Not the Girl Who Misses Much." It features her in a low-cut black dress dancing manically, the camera refusing to focus on her as she repeatedly warbles the words of the title, a riff on the first line of the Beatles' song "Happiness Is a Warm Gun." The piece owed clear debts to harder-edged video predecessors like Joan Jonas and Hannah Wilke and even to performance artists like Marina Abramovic. But even then Rist — who still remembers vividly when Swiss women were finally granted the right to vote in national elections, in 1971 — was forging her own kind of feminism.

It has taken shape in works like one from 2007 that was on display in São Paulo, called “Ginas Mobile.” A hanging sculpture that looks vaguely like something Brancusi might have made, it’s a horizontally suspended wooden branch with a copper globe hanging from one end and a teardrop-shaped screen hanging from the other. A projector in the globe casts glittery images on the screen of what at first seem to be diamonds on velvet or maybe a lava flow, but then you come to realize that what you’re seeing are extreme close-ups of vulvas. (They belong to Rist and four unnamed friends, who came over for a photo session: “I couldn’t ask them to do it and not do it myself,” she says, smiling.) The effect is much more beautiful than it is gynecological. And as such it is a clear next-generation riff on the more confrontational works of pioneers like Wilke, who was known for photographing herself with little vulva-shaped pieces of chewing gum stuck all over her naked torso, creating jarring portraits of what looked like scarification.

Very early on Rist began to define a visual world that has now become unmistakably her own — blaring color; immersive viewing environments; the body often filmed from just millimeters away to transform it into a near-abstract landscape of flesh, smooth and wrinkled, forested with hair (some of it pubic) and freckles; a point of view that soars, plunges and twirls — an effect Rist creates with a technique she has developed in which she films with a tiny video camera attached to a lightweight handheld boom. She describes this kind of shooting as a form of dance, and a result is footage that rarely provides the viewer with the sense of distance and perspective, even of up or down, that the conventions of television and movies have led us to expect. “I want the viewer and the image to be on the same power level,” she says. “I want you and the camera to feel more like one.” The visual comparison that sometimes comes to mind is that of medical documentaries, the kind that show deeply color-saturated shots taken by a probe camera navigating within the human body.

“I can imagine that for some people it’s too much, and we’re afraid of how close she wants to take us to things in the world,” says Ewelina Guzik, the lucent-skinned, red-headed woman crawling through the grass in the MoMA exhibition and the title character in “Pepperminta.” Guzik, who has become an on-screen alter ego for Rist over the last few years, says that the experience of the movie was “like being on a trip but you don’t need the drugs” and that working with Rist has taught her a lot about basic compassion. “She is so deeply concerned about everybody working around her — and probably also for everyone else in the world,” she added. “It’s a big part of what her work is about.”

The opening of the first of Rist’s two shows last month in São Paulo was held on a lovely spring evening at another small institution there called Paço das Artes, or the Palace of Arts. The thriving art community in the city — where people had immediately Brazilianized Rist’s first name, pronouncing it “Pipiloichi” — had embraced her, and the place was packed.

I couldn’t find Rist, whom I saw the night before at a party for this exhibition holed up in a bedroom on her hands and knees in front of her Macbook Pro laptop, desperately trying to finish editing the new piece for the Museum of Image and Sound. I asked Davide Legittimo, her affable video guru, where she was. “She’s probably hiding,” he said.

She was, but only from the adults. She was hanging out in a sunken children’s play area with her lanky 7-year-old son, Himalaya, who had just arrived from Zurich with his father, Rist’s partner, Balz Roth. With his mother’s help, he and the other kids were festooning the walls with chalk graffiti.

I asked her if she was happy with the show. She shrugged and smiled. “I am never completely happy — you always think that there should be more,” she said. But then she brightened as the kids reminded her of a new idea she had told me about excitedly, one that could serve to extend her radiant video world into the real one: playgrounds designed for adults as well as for children. “I want to build them, in cities,” she said. “Just because you grow up, why shouldn’t you still be able to play?”

Randy Kennedy is a culture reporter for The Times.

http://www.nytimes.com/2009/11/15/magazine/15rist-t.html?ref=magazine

Turtles Are Casualties of Warming in Costa Rica

By ELISABETH ROSENTHAL

PLAYA GRANDE, Costa Rica — This resort town was long known for Leatherback Sea Turtle National Park, nightly turtle beach tours and even a sea turtle museum. So Kaja Michelson, a Swedish tourist, arrived with high expectations. "Of course we're hoping to see turtles — that is part of the appeal," she said.

But haphazard development, in tandem with warmer temperatures and rising seas that many scientists link to global warming, have vastly diminished the Pacific turtle population.

On a beach where dozens of turtles used to nest on a given night, scientists spied only 32 leatherbacks all of last year. With leatherbacks threatened with extinction, Playa Grande's expansive turtle museum was abandoned three years ago and now sits amid a sea of weeds. And the beachside ticket booth for turtle tours was washed away by a high tide in September.

"We do not promote this as a turtle tourism destination anymore because we realize there are far too few turtles to please," said Álvaro Fonseca, a park ranger.

Even before scientists found temperatures creeping upward over the past decade, sea turtles were threatened by beach development, drift net fishing and Costa Ricans' penchant for eating turtle eggs, considered a delicacy here. But climate change may deal the fatal blow to an animal that has dwelled in the Pacific for 150 million years.

Sea turtles are sensitive to numerous effects of warming. They feed on reefs, which are dying in hotter, more acidic seas. They lay eggs on beaches that are being inundated by rising seas and more violent storm surges.

More uniquely, their gender is determined not by genes but by the egg's temperature during development. Small rises in beach temperatures can result in all-female populations, obviously problematic for survival.

"The turtles are very good storytellers about the effect of climate change on coastal habitats," said Carlos Drews, the regional marine species coordinator for the conservation group W.W.F. "The climate is changing so much faster than before, and these animals depend on so much for temperature."

If the sand around the eggs hits 30 degrees Celsius (86 degrees Fahrenheit), the gender balance shifts to females, Mr. Drews said, and at about 32 degrees (89.6 Fahrenheit) they are all female. Above 34 (93), "you get boiled eggs," he said.

On some nesting beaches, scientists are artificially cooling nests with shade or irrigation and trying to protect broader areas of coastal property from development to ensure that turtles have a place to nest as the seas rise.

In places like Playa Junquillal, an hour south of here, local youths are paid $2 a night to scoop up newly laid eggs and move them to a hatchery where they are shaded and irrigated to maintain a nest temperature of 29.7 degrees Celsius (85.4), which will yield both genders.

On a recent night, Dennis Gómez Jiménez, a 22-year-old in a red baseball cap and jeans, deftly excavated the nest of a three-foot-wide Olive Ridley, one of the smaller sea turtle species. The turtle had just finished the hourlong task of burying 100-plus eggs and then lumbered back into the water.

One by one, Mr. Jiménez placed what looked like table tennis balls into a plastic bag and transferred them to an ersatz nest he had dug in a shaded, fenced-off portion of sand that serves as a hatchery. Sandbags are positioned to protect against tides that could rip nests apart.

When the turtles hatch, in 40 to 60 days depending on the species, they are carried in wicker baskets to the ocean's edge and make a beeline for the water. Gabriel Francia, a biologist who oversees the youths, known locally as the "baula" or leatherback boys, likens their work to delivering an endangered infant by Caesarean section.

"In some ways we're playing God — this is a big experiment," he said. The long-term hope, he said, is to build a robust turtle population that will slowly adapt by shifting to cooler, more northern beaches or laying eggs at cooler times of the year.

Worldwide, there are seven sea turtle species, and all are considered threatened. (Turtle populations in the Atlantic have increased over the last 20 years because of measures like bans on trapping turtles and selling their parts.)

The leatherback is considered critically endangered on a global level. Populations are especially depleted in the Pacific, where only 2,000 to 3,000 are estimated to survive today, down from around 90,000 two decades ago. Cooler sands alone will not save them, given the scope of the threats they face. At Playa Junquillal, markers placed a decade ago to mark a point 55 yards above the high tide line are now frequently underwater.

"It's happened really fast — we have no rain, but water pouring in from the ocean," said Adriana Miranda, 30, the manager of a local hangout that serves beer and rice and beans.

Beachside tables have been removed because rising tides have destroyed the restaurant's concrete terrace and uprooted shading trees there. In different circumstances, the beaches could gradually extend backward as the sea level rose. But along much of Costa Rica's Pacific coast, the back of the beach is now filled with hotels, restaurants and planted trees, giving the sand no place to go. "The squeezing of the beaches where turtles nest is going to be a big problem," said Carl Safina, head of the Blue Ocean Institute, a conservation group.

In Playa Grande, the turtle issue has pitted environmentalists against developers and the national government. To ensure a future for the leatherbacks and the national park, biologists wanted a large section of land extending about 140 yards back from the current high-tide line protected from development. Beachfront property owners, many of them foreigners with vacation homes, demanded hefty compensation.

Arguing that the government cannot afford the payouts, President Óscar Arias has instead proposed protecting the first 55 yards, and allowing about 80 yards of somewhat regulated mixed-use development to the rear. But Costa Rica's leading scientists have protested that the new boundaries will lead to "certain extinction."

Turtles will not nest if there are lights behind the beach, Mr. Drews said, and those first 55 yards will be underwater by midcentury.

"Turtles will have to find their way between the tennis courts and swimming pools," he said dryly.

In a country where turtle eggs are traditionally slurped in bars from a shot glass, uncooked and mixed with salsa and lemon, biologists are also promoting cultural change.

"Of course 25 years ago, you went out with your friends or family and dug up the eggs," said Héctor García, 42, shopping at the Junquillal market. "It was a tradition. They are delicious, cooked or raw."

Today egg collecting is illegal in Costa Rica, but poaching is still common in many towns. It is frowned on at Playa Junquillal, where the five baula boys, with their piercings and baseball caps, patrol for poachers and are idolized by many younger children. Dr. Francia, the biologist, has also invited local families to watch the babies being released. "There were a lot of people who had eaten eggs but never seen a turtle," he said.

http://www.nytimes.com/2009/11/14/science/earth/14turtles.html?ref=science

Social Medicine

"Wash your hands regularly." "Cover your mouth when you sneeze." "Throw away your used tissues." These are some of the exhortations currently posted around London in an attempt to reduce the spread of flu. But one day, perhaps we'll have public health campaigns of a different kind. "Be jolly: it's catching." Or, "Eat less: do it for your friends."

Why? Because "traditional" infectious diseases — those, like flu and tuberculosis, that are caused by viruses or bacteria — are not the only aspects of health that can spread from one person to another. Taking up smoking is contagious; so is quitting. Obesity is contagious. So is happiness.

At least, these are the results coming in from long-term studies of social networks — the networks of friends and families, neighbors and colleagues that we all belong to. Such studies have found that one person's change in behavior ripples through his or her friends, family and acquaintances. If one of your friends becomes happy, for example, you're more likely to become happy too. If you're great friends with someone who becomes obese, you're much more likely to become obese as well.

And the effect doesn't stop there. If your friend's friend becomes happy, that increases the chance your friend will become happy — and that you will too. Conversely, if you become obese or depressed, you may inadvertently help your friends, and your friend's friends, to become fat or gloomy. (Intriguingly, happiness and obesity seem to spread in different ways. Obesity spreads most easily between friends of the same sex who are emotionally close. Happiness spreads most readily between friends who live near each other: a happy friend on the same block makes more difference than a happy friend three miles away.)

I should say that doing long-term studies of social networks is difficult — it means interviewing and measuring thousands of people repeatedly over many years. After all, if I want to know whether you and your friends will change weight over the next five years, I have to measure all of you now and again in five years' time. Moreover, I have to keep track of how friendships come and go, of who moves house and so on. In short, it's a massive task just to collect the data.

So, while there have been plenty of studies of how pairs of people, especially spouses, affect each others' health, there have been far fewer studies of how health reverberates through large social networks. The results I'm referring to here all come from the so-called "Framingham Heart Study," which began in Massachusetts in 1948 and has continued to the present day. (Up to now, the study has involved two cohorts of several thousand people each; a third cohort has just been enrolled.)

It's possible, therefore, that the results I'm talking about are specific to this group of people. However, I think that's unlikely. The details of how an attribute spreads may differ from one group to another: perhaps in some places, friends have less influence and siblings have more. But the general result — that healthy (or unhealthy) behaviors, habits and outlooks are infectious — is, I think, likely to prove robust.

But then, how does something like obesity get "caught"? That's not clear. One idea is that people judge their own weight by that of their friends — you think of yourself as thin if you are thinner than the people you know — and eat accordingly. Another is that friends mirror one another's eating habits. Many studies have found that people tend to eat less when they are eating with someone who is not eating much. Also, people tend to eat more when they eat with friends rather than with strangers. Perhaps, too, a habit of eating, say, dessert when you are with your friends makes you more likely to eat it when you are alone.

(And happiness? Again, it's not clear how it spreads, though there are plenty of ideas. For example, since we tend to unconsciously mimic the postures and facial expressions of those around us, perhaps we begin to take on the moods of others by adopting postures consistent with those moods. Or perhaps talking to people who are cheerful imbues us with cheerful thoughts.)

Whatever the mechanisms, the implications are profound. Obesity, smoking and happiness all have substantial effects on health. Obesity is associated with a host of troubles, from diabetes to many kinds of cancer.

Happiness, meanwhile, appears to improve health. Although this idea is still controversial, several recent studies have found that happy people tend to have more robust immune systems. For example, in one experiment volunteers were scored for happiness then had cold viruses squirted up their noses; those who were happier were much less likely to fall sick. (I'm not sure I'd be volunteering for that experiment, regardless of my emotional state — hats off to those who did.) In another, volunteers were vaccinated against the virus that causes hepatitis B; several months later, the happy volunteers showed a stronger response to the vaccine than the unhappy volunteers.

The discovery that the health of one person affects the health of those around them isn't new. Depressed mothers, for example, have a suite of unhappy effects on their children: their children are less likely to be vaccinated, less likely to do well at school and more likely to have emotional problems of their own. Nor is it news that social lives affect health: it's long been known that people with more friends tend to be healthier. But the finding that particular attributes of health — or lack of it — can ripple through social networks shows that one person's health can have far reaching effects.

I draw a couple of conclusions from this. The first is that unless you are a hermit living entirely alone, your choices and wellbeing do not affect just you. The second, and more important, conclusion is that medicine isn't simply about improving the health of an individual here and an individual there. It's about the health of the whole society.

http://judson.blogs.nytimes.com/2009/11/10/social-medicine/?ref=science

F.D.A. Says It May Ban Alcoholic Drinks With Caffeine

By GARDINER HARRIS

WASHINGTON — Top federal food regulators threatened on Friday to ban caffeinated alcoholic drinks unless their makers quickly proved that the beverages were safe.

In a statement, the Food and Drug Administration said it had told nearly 30 manufacturers of the drinks that unless they could provide clear evidence of safety, it would "take appropriate action to ensure that the products are removed from the marketplace." Officials did not say how long such a determination might take.

The drinks, which combine malt liquor or other spirits with caffeine and fruit juices at alcohol concentrations up to about 10 percent, have become increasingly popular among college students. In a news conference, Dr. Joshua M. Sharfstein, the agency's principal deputy commissioner, said their consumption was associated with increased risk of serious injury, drunken driving, sexual assault and other dangerous behavior.

The agency's action was prompted by a letter from 19 state attorneys general, who expressed concern about the products' safety.

Caffeine may lead people to underestimate how drunk they are, giving drinkers a false sense of confidence that they can perform tasks they are too impaired to undertake.

After pressure from the attorneys general, Anheuser-Busch last year eliminated caffeine and other additives from its flavored malt beverages, Tilt and Bud Extra. And MillerCoors agreed to stop selling its product Sparks.

The brands under scrutiny, which include Joose from United Brands, are being marketed to young people with social marketing tools. United Brands, for instance, has a Twitter site to market Joose.

A call to United Brands was not immediately returned.

Federal law requires makers of products that combine common ingredients to prove that the combinations are safe.

"F.D.A. is not aware of any basis that manufacturers have to conclude that the use of caffeine added to alcoholic beverages is generally recognized as safe," Dr. Sharfstein said.

The Center for Science in the Public Interest, an advocacy group whose lawsuit against MillerCoors over its marketing of Sparks preceded the company's decision to stop selling the product, praised the agency's action.

"For many years," the group said in a statement, "federal regulators have stood mutely by as these potentially dangerous products, which resemble nonalcoholic energy drinks in many ways, gained in popularity among young people.

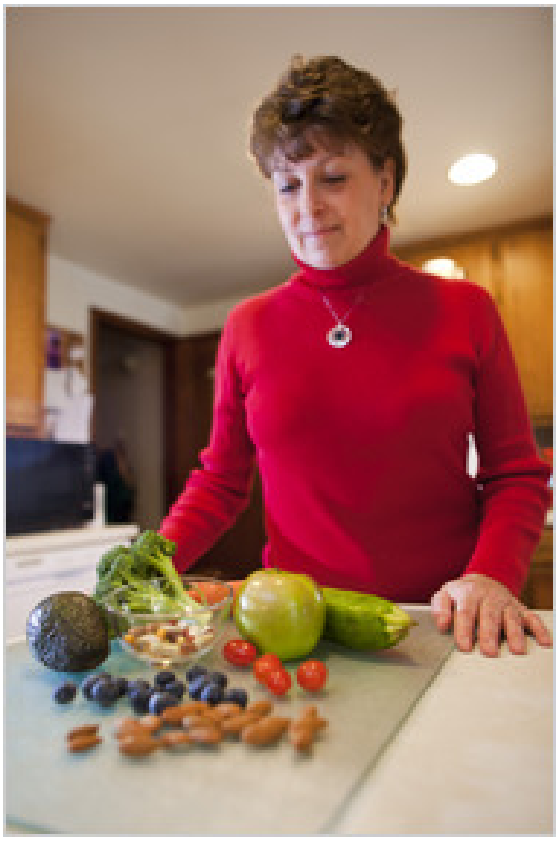
"In fact, emerging research suggests that the young consumers of these products are more likely to be the perpetrator or victim of sexual aggression, to ride with an intoxicated driver or to become otherwise injured."

Attorney General Richard Blumenthal of Connecticut, who co-wrote the letter to the F.D.A., said he was pleased. "Our battle against alcoholic energy drinks has stopped some products," Mr. Blumenthal said, "but others are insidiously exploiting the void."

http://www.nytimes.com/2009/11/14/health/policy/14fda.html?ref=science

Path to Alternative Therapies Is Littered With Obstacles

By WALECIA KONRAD



WHEN Diane Klenke was told five years ago that she had pancreatic cancer, she was given three months to live. “The doctor told me to go home and put my affairs in order and that was it,” Ms. Klenke, now 52, remembered.

Instead of taking that advice, Ms. Klenke, who lives in Green Bay, Wis., decided to fight. She researched other doctors and alternative therapies until she hit upon the Block Center for Integrative Cancer Care in Evanston, Ill., which uses an approach of traditional and holistic therapies to treat cancer patients.

After undergoing intense chemotherapy along with proper nutrition, nausea and stress management therapies at the Block Center, Ms. Klenke’s cancer went into remission and has stayed that way.

So where is this anecdote heading? Glad you asked.

Cancer and its treatment are so complicated and relatively unpredictable that this column is in no way meant to advocate Ms. Klenke’s approach to dealing with her disease.

As a Patient Money columnist, I don’t pretend to have that expertise.

Instead, my purpose here is to provide financial guidance for those who, like Ms. Klenke, choose to take the medical path less traveled.

Besides learning the ins and outs of complementary and alternative medicine, Ms. Klenke has also become something of an expert on how to pay for these treatments. With the help of the Block center and

her own research and persistence, she persuaded her insurance company to cover her entire course of treatment and the follow-up treatments that she continues to pursue, as she puts it, “to boost my immune system and keep me cancer-free.”

So-called complementary and alternative medicine — or CAM, as it is known by practitioners and adherents — is becoming more mainstream every day. In 2007, more than one in three adults and nearly one in eight children, according to a federal study sponsored by the National Center for Complementary and Alternative Medicine, a division of the National Institutes of Health, used some form of CAM — from self-prescribed nutritional substitutes to repeat visits to alternative health care practitioners. So commonplace are the alternative providers that chiropractors and acupuncturists, for example, are now licensed by most states. At the same time, many traditional medical doctors, recognizing patients’ demand for alternative therapies, have signed up for training in alternative therapies or added alternative professionals to their staffs.

Alternative medicine is also a big business. Americans spent nearly $40 billion out of pocket on alternative therapies, according to that same 2007 study, to pay for practitioners as well as vitamins and supplements. Often, the treatments aren’t cheap. A session at the acupuncturist can easily run $100. And as with pharmaceuticals, vitamins, herbal supplements and homeopathic remedies have a huge price range — from a $12 bottle of vitamins to supplements costing hundreds of dollars.

More insurance companies are now offering full or limited coverage, or arranging discounts, on these treatments. But, as Ms. Klenke learned, getting even limited coverage can be time-consuming and tricky.

And most people pursuing alternative therapies should expect to pay some, if not all, costs out of pocket, says Mark Stengler, a naturopathic doctor in the La Jolla area of San Diego who is licensed in California. He holds a doctorate from the National College of Naturopathic Medicine, now called the National College of Natural Medicine, in Portland, Ore. Naturopathic training is often similar to the training conventional doctors receive and includes holistic training. Dr. Stengler is the author of several books and the Bottom Line newsletter on natural healing. If you venture forth, here’s advice on how to make the most of your insurance coverage and find the best prices for the highest-quality alternative treatments and medicines.

INSURANCE INS AND OUTS Before you do anything, be sure to read your health insurance policy thoroughly. It may spell out some of the alternative practitioners and treatments it covers, for example, 50 percent of all acupuncture and chiropractor visits.

More often, says Linda Bourdosis, a patient advocate at the Block Center, coverage is more subtle. For instance, your insurer may pay for certain specific treatments — massage therapy for muscle strains, for instance, or fish oil supplements to reduce inflammation from arthritis — if they are prescribed by your primary physician for a diagnosed ailment and coded correctly. Many require preauthorization from the insurer.

Keep at it, Ms. Bourdosis says. Getting the insurer to pay “doesn’t always happen the first time,” she said. “It can take two, three or four claims. You’ve got to be persistent.”

Don’t be afraid to negotiate with your insurer and with your provider, particularly when treating serious illnesses. Ask to speak to the claims manager or your case manager. In Ms. Klenke’s case, the Block Center was willing to discount its rates 25 percent in return for being considered part of the network that Ms. Klenke belonged to through her husband’s group insurance plan. In her case, Ms. Bourdosis at the Block Center negotiated with her insurer, but sometimes the patient needs to be the middle man to get an insurer and health care provider to agree.

Or, you might want to try to find an alternative practitioner who is part of a larger group of traditional doctors, or vice versa, Dr. Stengler says. That way, if you need lab tests or other diagnostics, your primary physician can prescribe them and they will be covered — even if alternative treatments are not.

FIND AN ADVOCATE The insurance maze can be time-consuming and difficult, especially in the face of illness, Ms. Klenke acknowledges. But there is help.

Most large hospitals and clinics, especially those with integrative medicine programs, like Beth Israel in New York, have an advocate in the billing or coding department that can help with prequalifications, appeals and other paperwork.

If you have a major illness like cancer, your insurance company may have also assigned you a separate case manager. Ensure the advocate and insurance manager are talking to each other.

BUY ONLY WHAT YOU NEED If you swear by the chiropractor or acupuncturist but your insurance doesn't cover the treatment, you'll need to make some spending decisions.

One important caution from Dr. Stengler is this: Avoid paying upfront for a package of visits, say, 10 to 15. "If you're not seeing improvement in two to three visits," he said, "then that therapy probably isn't right for you."

Ask your practitioner if you can agree to only two or three visits, with the idea that you'll continue the therapy if you see results.

CARE WITH SUPPLEMENTS A big part of alternative medicine is herbal and vitamin supplements. These are not regulated by the Food and Drug Administration and, as a result, there are many cases of supplements being sold with high levels of toxic substances or even prescription drug ingredients not listed on the labels. What's more, many fraudulent brands sell high-priced supplements with minuscule dosages of the effective ingredient.

"Basically you pay top dollar for, say, a glucosamine supplement thinking you're getting 100 percent of the daily dose, when, the reality is, you're really getting a microscopic amount," said Dr. David Riley, a member of the faculty of the University of New Mexico medical school and editor of Alternative Therapies in Health and Medicine.

Your first step is to ask your doctor for recommended brands. (But see the caveat further on.) You should also do your own research on Consumerlab.com, a comprehensive independent site that does thorough testing of unregulated health products of all kinds. Without federal regulations, buyer beware prevails.

SHOP BIG BOX OR ONLINE Once you've found a brand you know you can trust, compare prices. Chances are your local health food store isn't going to have the best prices. Both Costco and Sam's Club have started selling supplements aggressively in recent years, and many times they have the best deals.

In addition, try Web sites like Vitacost.com, says Dr. Stengler, which can offer products for 40 to 50 percent less than bricks-and-mortar retailers.

Think twice before buying directly from your practitioner, says Dr. Riley. Many doctors, he said, "make huge margins by selling supplements right in the office."

http://www.nytimes.com/2009/11/14/health/14patient.html?ref=health

'VICTORIOUS ONES,' 'PEACEFUL CONQUERORS'
Compassionate Masters of the Universe
By HOLLAND COTTER

First, do no harm. That's the bottom-line rule of Jainism, one of the three major homegrown religions in India. To believers, all living things, from whales to humans to flu bugs, have souls and, karmically speaking, all souls are equal. If you go thrashing and stomping your way through the average day, as most of us do, you're bound to be injuring something. And if you injure something, you injure everything, including yourself. This is how karma works. So it pays to move with care.

Mohandas Gandhi, who used nonviolence as a political tool, learned a lot from the Jains. But in the West we still know little about them and even less about their art — brilliant little narrative paintings, sculptures of sleek nude saviors — which we tend to misidentify as Buddhist. Not that there's much around to see. The last major American survey was at the Los Angeles County Museum of Art in 1994, and it never came to the East Coast. Scant Jain material is on regular view in New York museums.
This fall, however, brings two Jain shows to New York: "Victorious Ones: Jain Images of Perfection" at the Rubin Museum of Art and "Peaceful Conquerors: Jain Manuscript Painting" at the Metropolitan Museum of Art. Neither show is as spectacular as the Los Angeles exhibition, although the Rubin Museum one approaches it. Together they provide an in-depth survey of a great art tradition and a complex faith that has nearly five million followers in India.
And I do mean complex. For all its clear-cut ethical thinking, Jainism has a highly contradictory view of the world. On the one hand, it envisions the cosmos as a precision machine, with balanced realms of heaven and hell sandwiching a thin slice of earth, and time measured out in regular and recurrent epochs of bloom and decay.
Yet creatures living in those epochs experience tremendous uncertainty. This is particularly true in periods of disintegration, one of which, by Jain reckoning, we are in now, with no end yet in sight. Violence will continue to grow. Beast will turn on beast. Hell will outweigh heaven. Is there any sound reality to rely on?
There is, in the form of the transcendent beings known as jinas, or victors, for whom Jainism is named. They appear, 24 in all, in every epoch. The enemy they've conquered, through eons of self-discipline, is themselves, or rather human passions: fear, aggression, love, what have you. As a result they've reached the end of the karmic line, where bloom and decay end, and truth — unvarying, imponderable, and probably as plain as the nose on your face — waits.
The jina nearest to our own time was named Mahavira. An older contemporary of the Buddha, he lived in northern India in the sixth century B.C. His life is the subject of several exquisite manuscript paintings at the Met, selected from the museum's permanent collection by John Guy, the curator of South and Southeast Asian art.
The story these works tell begins with a prenatal mix-up: the future jina, though expected to be of royal birth, has been conceived by a nonroyal Brahman couple. The error is soon finessed by the miraculous

transfer of the fetus to the womb of a Jain queen, an event depicted with wide-eyed, almost comical verve in a tiny 15th-century manuscript painting from western India, long a Jain stronghold.

In other illustrations we see the infant Mahavira born, bathed and coddled. Then, in a flash forward, he's a bejeweled young sovereign being carried in procession to the edge of a forest. There he strips off his princely gear, plucks out his hair by the roots and, naked or near naked, sets out on a final earthly journey. In a culminating image he stands on the moon, a kind of superman, preaching truth to the cosmos.

By this point he exists outside our sphere, as all jinas do. He's superhuman, beyond access, deaf to our appeals. Still, the paintings of his life, even this one of him on the moon, look almost warm to the touch, with their jazzy color combos of crimson, gold and ultramarine ground and their naturalistic details: transparent fabrics, pretty flowers and wasp-waisted bodies striking Ruth St. Denis poses.

There are more such paintings in the Rubin Museum show, and other kinds too: half-abstract geometric designs; elaborately plotted cosmograms; and pilgrimage road maps teeming with minute human and animal figures that move, like ants through the earth, toward gilded jinas glowing in shrines.

These images depicted are, presumably sculptures, and sculpture is, for me, the high point of Jain art. You'll find a handful of superb examples at the Met, including the big marble jina, snow white and ultraserene, that has become a kind of mascot for the South Asian galleries. But the Rubin show has many more: nearly three dozen carved and cast figures, from hand size to life size. Dating from the 5th to the 17th century, they add up to a primer of sculptural types.

The types seem, at a glance, fairly limited. Most sculptures made for temples or home altars were of single male figures seated in yogic meditation or standing attentively upright, legs straight, sapling-smooth arms hanging down at their sides, hands shaped like big, bizarre flowers and empty. Some of the jinas wear sheer robes; others are nude, in which case they are associated with the Jain sect called Digambara, or sky-clad, meaning dressed in nothing but air.

Digambara ascetics and teachers — though not ordinary worshipers — completely renounce possessions, including clothing. They are, you might say, career nudists, living out an extreme version of the injunction to exist as no-impact presences in the material world. As if in a defiant gesture of total disarmament, they render themselves as unprotected as the most vulnerable of organisms.

Nudity has an ethical downside: women are barred from practicing it and are spiritually considered second-class citizens. But visually it is the feature that most clearly distinguishes Jain from much other South Asian art, including Buddhist, with which it is often confused. The misidentification is understandable. Over the centuries the two faiths coexisted as more or less friendly rivals. The same artists made images for both; and those images shared period and regional styles.

The main differences are doctrinal. While the religions share the primary goal of helping individuals escape the trauma of repeated births and deaths, they take varying approaches to it: measured and moderate in the case of Buddhism, severe and self-punishing in the case of certain Jain practice. Also, Buddhists didn't believe in the existence of eternal souls, but Jains do, which gives their commitment to nonviolence — called ahmisa — a particularly ardent edge.

This is not to suggest that Jains were, or are, a population of renunciates. Historically adept at integrating into society, successful as merchants and traders, they often aligned themselves with the highest sources of political power and led luxurious lives. The jinas represented ideals of moral perfection, admirable, but basically inimitable. Thanks to art, you could see them — adamant in their simplicity, at once present and absent, almost innocent of charm — but you knew you could not be them.

What you can be is fully human and, in the karmic scheme of things, with so many souls in so many forms streaming through eternity, that's an achievement in itself, or possibly just the luck of the draw. In any case, it comes with pleasures — spicy, sprightly paintings among them — and with obligations: first, to make peace with both absolutism and uncertainty; next to see all your fellow creatures for the companion souls they are; and last, which is also first in that circling Jain plan, to do no harm, no harm.

"Victorious Ones: Jain Images of Perfection" runs through Feb. 15 at the Rubin Museum of Art, 150 West 17th Street, Manhattan; (212) 620-5000; rmanyc.org. "Peaceful Conquerors: Jain Manuscript Painting" runs through March 28 at the Metropolitan Museum of Art; (212) 535-7710, metmuseum.org.

http://www.nytimes.com/2009/11/13/arts/design/13jain.html?ref=design

'MODERNISM + ART20'
A One-Stop Eyeful of Mediums
By ROBERTA SMITH

Which is better: a mediocre work of art or an outstanding design object? This question buzzes about Modernism + Art20, the new two-in-one art and design fair at the Park Avenue Armory through Monday. An answer never emerges, possibly because there really isn't one, and therein lies some of the fun of this hybrid show.

As the title suggests, this event combines Modernism, the venerable design fair that has convened annually at the armory since 1985, with Art20, a fair of 20th-century art also held there since its inception in 2002. Their union reflects another contraction brought on by the changed economic climate.
This may be to our advantage. "Art Meets Design" is the tag line, and though art and design have had met regularly in all kinds of fairs for years now, they do so with a particular clarity here. For the most part, stands devoted to painting and sculpture alternate with others dominated by furniture and decorative objects. Although the resulting mashup includes some extremely vapid or simply inappropriate offerings (bad contemporary realism and vintage clothing, for example), this arrangement definitely staves off the monotony that can afflict any fair.
More important, it constantly contrasts different artistic goals, mediums and skills. All this can sharpen the eye for authenticity, which, in whatever form, is the first step toward originality. On the art side are two knockout paintings at Levis Fine Art. Alice Neel's portrait of Philip Bonosky from 1948 portrays its subject, the writer and labor organizer, as solid and thoughtful despite the enormity of what he's up against — as indicated by the hellacious factories outside the window. Long owned by Mr. Bonosky, now in his early 90s, this work is on public view here for the first time.
Next to it is the large and imposing "Night Still Life" (1940) by the versatile, grossly undersung American artist Marguerite Zorach. A profusion of flowers in a blue-and-white spatterware vase flanked by mustard-colored curtains, it combines everything from folk to trompe l'oeil realism and belongs in a museum. (Another Zorach, "The Golden Orb" from 1921, which depicts a young girl entranced by the moon, has pride of place at Bernard Goldberg.)
Across the way, design prevails at Peter Loughrey, with beautiful tables by Diego Giacometti and Don Johnson as well as an immense, sculpturally carved cabinet bar by Philip Lloyd Powell from 1968 that is more a curiosity than anything else.
Next door Didier Antiques has something like a Who's Who of modern art in jewelry form, with designs by Picasso, Gino Severini, André Derain, Jean Arp, Victor Vasarely and Wilfredo Lam, as well as more expected names like Salvador Dalí (a colorful watch-brooch), Alexander Calder, Harry Bertoia, Georg Jensen and the Finnish master of versatility Tapio Wirkkala. The range at Didier amounts to a kind of outline of the show. Down the aisle at Lost City Arts, for example, four of Bertoia's sculptures dominate

one corner. Three paintings by Lam are at Cernuda Arte, although they tend to be outshone by "Fruits of the Sea," a lusciously painted still life from 1942 by the Cuban artist Mario Carreño (1913-2000).
For a larger dose of Wirkkala's genius, stop by Mark McDonald's stand, where one wall is devoted to his glass vases from the 1960s, all made with wood casts. The combination of clear glass and intimations of bark, grain and trunk is quite amazing. Keep an eye out here too for the enamel vessels of June Schwarcz and the ceramic vases and reliefs of Kathy Erteman.
Other unfamiliar names can be found at Mondo Cane, which has devoted part of its stand to a dense display of small functional objects in brass, leather, horn and wood by the Austrian designers Carl Auböck (1900-57) and his son, Carl Jr. (1924-93). Ashtrays, large keys that disguise corkscrews, letter openers and two ingenious wall-hung coat racks (with movable brass hooks) are on view, with some modestly delicate pieces of furniture. The brass objects feel wonderful in the hand. Another find at Mono Cane is a four-panel screen by an anonymous Picasso devotee. In linoleum, eggshell and paint on wood, it credibly reprises Picasso's 1928 "Painter and Model" in the Museum of Modern Art.
Although postwar modern is in the majority, Art Deco holds sway at Moderne's stand, exemplified by a 1930 cabinet in burl elm with chunky ivory mountings by Louis Neiss. Leroux has an appealing pair of small cabinets, also Deco, partly covered in parchment. Brian Kish has a lavish stained oak and leather credenza from 1934 by Pier Luigi Colli. At J. Lohmann a tea set by Werner Gothein has the lines and mottled burnt orange glaze of postwar design though it is from 1927. Martin Cohen, a first-time participant, backs up a bit more with a marvelous display of chairs by Louis Comfort Tiffany, Lockwood de Forest and Herter Brothers.
The show's most interesting contemporary discovery is Antoine Schapira, an imaginative, stupendously skilled maker of exquisitely considered and finished wood furniture who is having his American exhibition debut at the Good Design stand. Mr. Schapira is French and trained in the refined cabinetmaking called ébénisterie, which emphasizes marquetry. Making brilliant use of Brazilian rosewood veneer, he creates a kind of flip-book effect across the front of a curving wall cabinet, and he emphasizes relatively restrained striping in a flamboyantly grained rosewood veneer on a floor cabinet. Two subtly asymmetrical side tables, also in rosewood, and a squat yet elegantly Deco-ish chest of drawers in palm wood and bronze leaf reveal further aspects of Mr. Schapira's talent, which should be closely watched.
Art and design meet at the Modernity stand, where a rare postwar chair by Gerrit Rietveld — which almost resembles a gray abstract sculpture — is prominently featured. An even more emphatic meeting is at the Jacksons stand in a table made by Olle Bonnier in 1957. Combining intersecting planes of glass and wood painted with irregular shapes of gray, black, white and yellow, it is a throwback, but a robust one. It could be the student work of the great early modern designer Eileen Grey — or a Cubist painting, carefully unfolded and pressed into table service.
Modernism + Art20 is at the Park Avenue Armory, 643 Park Avenue, at 67th Street, on Friday from noon to 8 p.m.; Saturday and Sunday from noon to 7 p.m.; and Monday from noon to 5 p.m. Admission is $20 a day or $30 for a two-day pass; (212) 777-5218 or sanfordsmith.com.

http://www.nytimes.com/2009/11/13/arts/design/13modernism.html?ref=design

'A SONG FOR THE HORSE NATION'
Brief, Productive Love Affair With 'Big Dog'
By KEN JOHNSON

When Christopher Columbus first came to America, there were no natives on horseback to greet him. That is not only because he landed on an island in the Bahamas. It's also because there were no horses in the New World. They originated here 40 million years ago and spread to other parts of the globe, but by 1492 horses had been extinct in the Western Hemisphere for 10,000 years. On his second trans-Atlantic voyage, in 1493, Columbus brought along 25 horses and reintroduced the species to America. Many more were brought later by French, English and Dutch colonizers.

This is just one remarkable piece of information to be gleaned from "A Song for the Horse Nation," an exhibition of 98 artifacts relating to native horse cultures, opening on Saturday at the Smithsonian National Museum of the American Indian in Lower Manhattan. Including saddles, riding blankets, clothing and beaded bags adorned with equine imagery and much more, the exhibition brings to light a fascinating and ultimately sad chapter in American history.

Organized by Emil Her Many Horses, a curator at the museum, the show presents most of the artifacts, all from the Smithsonian's collection, that were pictured in a small paperback of the same title published in 2006 (by the museum and Fulcrum Publishing). In his introduction the historian Herman J. Viola, a curator emeritus of the Smithsonian's National Museum of Natural History, tells of the rise and fall of American Indian horse culture, which thrived for only about 100 years.

As Mr. Viola explains, scholars now believe that horses began to proliferate among Indians in the West after Spaniards in Sante Fe fled a Pueblo uprising in 1680, leaving behind hundreds of horses and other animals. At first the Indians were frightened and mystified by the large and unfamiliar creatures. They called it names like Big Dog and Big Elk. But by the time of the French and Indian War (1754-63), Plains Indians were among the world's best horsemen. A century or so later, their horse culture was dead, a victim, as Mr. Viola put it, of "too many white people and too few buffalo."

As the exhibition's many different sorts of artifacts show, the horse was much more than just a beast of burden. It was a highly efficient form of transportation, and it enabled Plains Indians to hunt buffalo, a primary source of food and material for clothing and shelter. So Navajo, Crow, Comanche, Pawnee and other tribes were able to expand their territories and flourish.

Three rifles that belonged to prominent leaders — the Apache Geronimo, Chief Joseph of the Nez Perce and Chief Rain-in-the-Face of the Hunkpapa Lakota Sioux — illustrate a less fortunate development. Indians traded horses for guns with Europeans, allowing them to pursue war more effectively with rival tribes and white settlers.

But most of the materials are of a more peaceful kind, and many have a delicate beauty. Saddle blankets decorated with geometric beaded patterns around the edges are among the most visually captivating pieces. Objects like a wooden Hunkpapa Lakota dance club from about 1899, with one end carved in the shape of a horse head, have an extraordinary sculptural elegance. Others, like a horned mask for a horse, resembling a buffalo's head (Lakota, around 1860), exude a scary ferocity.

Also compelling are hides on which historical events were recorded. A mid-19th-century Piikuni Blackfoot robe made from an elk skin features painted red, yellow and blue horses; teepees; and battling tribesmen evenly distributed on an off-white field. It documents both a war with Indian enemies and a fight with bears.

In many of the works here, including a Cheyenne River Sioux leather shield cover from the 1890s depicting a lively Indian-on-Indian skirmish, the flattened and simplified abstraction and intense colors seem timeless and also, to 21st-century eyes accustomed to primitivist tendencies in modern art, oddly contemporary.

Some pieces have a historical significance beyond their aesthetic virtues. A black cloth coat decorated with beaded bison heads, horses and human figures from about 1895 represents a short-lived religious movement based on a vision of the Oto prophet William Faw Faw. He taught his followers to reject European influences and return to their traditional roots. Such movements were common among tribes at the end of the 19th century, when their ways of life were coming to a tragic end.

Captivating as the exhibition's contents are, hardly anything in it is spectacular in the sense that European art and artifacts produced with elaborate refinement and expensive materials can be. There is an exceptionally appealing modesty and subtlety to many of the objects. A late-19th-century Sioux pipe tamper with one end carved into a horse head is among the smallest and most affecting things in the show.

The exhibition's general ambience, however, is regrettably aggressive. With loud graphics, interactive videos, mural-scale reproductions of old photographs papering the walls and the sound of clip-clopping piped in throughout, it seems as if the designers didn't trust that the objects would be interesting enough by themselves. The show looks as if it were conceived with an audience of attention-challenged children in mind. The modern paraphernalia threatens to overwhelm the historical materials, inadvertently recreating the collision of worlds that ended traditional Indian ways more than a century ago.

In recent years American Indians have been working to revive their horse cultures. The exhibition includes some contemporary works, like Juanita Growing Thunder Fogarty's colorful re-creation of a Sioux horse mask made of porcupine quills, beads, brass buttons, feathers and hide. But in today's irretrievably industrialized world, returning to horse-based life is a dream unlikely ever to be completely realized.

"A Song for the Horse Nation" opens Saturday and runs through July 7, 2011, at the Smithsonian National Museum of the American Indian, George Gustav Heye Center, One Bowling Green, Lower Manhattan; (212) 514-3700, nmai.si.edu.

http://www.nytimes.com/2009/11/13/arts/design/13song.html?ref=design

Modern Lines for the Eternal City
By NICOLAI OUROUSSOFF

ROME — What would Pope Urban VIII have made of Maxxi, the new museum of contemporary art designed by Zaha Hadid on the outskirts of this city's historic quarter? My guess is that he would have been ecstatic.

This 17th-century pope, one of the most prominent cultural patrons in Roman history, understood that great cities are not frozen in time. He loved dreaming up lavish new projects over breakfast with his artistic soul mate, the Baroque sculptor and architect Gian Lorenzo Bernini. When Bernini needed bronze for the baldachin in St. Peter's, the pope simply ordered it torn out of the Pantheon. Neither was afraid to make his mark on the city.

Since then the architectural scene here has become a lot duller. True, Mussolini commissioned some impressive civic works, most notably for the fascist EUR district. But for most of the last half-century Romans have been content to gaze languidly toward the past. The handful of ambitious new cultural buildings that have appeared, like Renzo Piano's marvelous Parco della Musica, tend toward the dignified and respectable.

Maxxi, which opens to the public on Saturday for a two-day "architectural preview," jolts this city back to the present like a thunderclap. Its sensual lines seem to draw the energy of the city right up into its belly, making everything around it look timid. The galleries (which will remain empty of art until the spring, when the museum is scheduled to hold its first exhibition) would probably have sent a shiver of joy up the old pope's spine. Even Bernini, I suspect, would have appreciated their curves.

The completion of the museum is proof that this city is no longer allergic to the new and a rebuke to those who still see Rome as a catalog of architectural relics for scholars or tourists. It affirms the view that cities thrive when each generation attempts to rise to the challenges of the past while remaining true to contemporary values. That means that yes, we too — the living — have something to contribute.

The museum stands in a drowsy neighborhood of early-20th-century apartment buildings and former army barracks called Flaminio.

Set back from the street in the middle of a block and overlooking a gravel plaza, the building offers no big visual fireworks, and at first glance it looks surprisingly sedate. From the south, its smooth, almost silky, concrete forms are largely hidden behind an old factory building that has been transformed into a gallery for temporary exhibitions. From the north it is shielded by the long curved wall of the main galleries.

The energy builds as you walk toward it. The best route is along Via Luigi Poletti, which approaches the site at an angle from the northwest. As you get close, the road veers to the east, but you continue forward,

following a path along the convex exterior of the building as it curves toward the plaza. The path narrows as it approaches the main entry, creating a sense of acceleration.
At the entrance, a concrete box that houses an upper-level gallery projects out above your head, its front tilted forward menacingly.
Ms. Hadid has used similar ideas before, most notably in a factory she designed for BMW on the outskirts of Leipzig, Germany. The idea is to weave her buildings into the network of streets and sidewalks that surround them — into the infrastructure that binds us together. But it is also a way of making architecture — which is about static objects — more dynamic by capturing the energy of bodies charging through space.
In Rome this strategy reaches a crescendo in the museum's towering lobby. A bookstore, cafe and information counter are scattered informally around the hall; corridors snake off in different directions. A monumental black staircase climbs up through the space, one end disappearing into a narrow canyonlike crevice and hinting at more mysteries to come.
If a question remains about the building, it has to do with the galleries, which are arranged as a series of long intertwining bands, some 300 feet long, as if the ramps of Frank Lloyd Wright's Guggenheim had somehow come unraveled. The slight curves of the spaces lure you forward in anticipation of what's around the next bend.
The sense of forward momentum is reinforced by the lighting system: a glass skylight that is broken up by long, knifelike metal fins that run the entire length of the room. The fins protect the artworks from direct sunlight while allowing those inside the galleries to see an occasional patch of sky. A second system just above, of steel grids, blocks out the harshest southern light. I was there on an overcast afternoon, and the light was lively and warm without being distracting.
What we don't know, however, and won't know for a while, is whether the galleries strike the right balance between the need to move crowds and the stillness required for contemplating art. Ms. Hadid has created a flexible system of hanging partitions that can be used to divide the spaces into smaller galleries; and as you climb to the top, one of the bands breaks into several discrete spaces on different levels.
At the moment, though, the flow of spaces seems a bit relentless. And until partitions are installed, art is hung and rehung, and curators begin to get a feel for the spaces that only comes after several years of organizing exhibitions in them, we won't know for sure how well the galleries work. There are some, I expect, who will point to the decision to show off the museum while it is still empty — indeed, before its collection has even been put together — as yet more proof that contemporary architecture always overshadows the art it houses. More patient minds will wait to see for themselves.
Meanwhile, Rome's faith in Ms. Hadid, and in the new world she represents, has been fully rewarded. For years she has been steadily building up a body of work that demonstrates she is about more than glamour — she is one of architecture's most original and powerful voices — and Maxxi will only add to her legacy. A generation of Romans can now walk out their front doors knowing that the conversation with the past is not so one-sided.
If Pope Urban were alive today, I'm certain he and Ms. Hadid would be having breakfast right now, plotting the next move.

http://www.nytimes.com/2009/11/12/arts/design/12zaha.html?adxnnl=1&ref=design&adxnnlx=1258300832-HgM4t0w6MrZoQc7Sy8Xl+w

'EERO SAARINEN: SHAPING THE FUTURE'
Making the Face of Modernism Familiar
By NICOLAI OUROUSSOFF

The architect Eero Saarinen was often knocked for being the equivalent of a talented P.R. man. And on the surface at least, few architects did more to glamorize postwar corporate America. General Motors, I.B.M., CBS — all eventually came knocking at his door. His architecture offered them the veneer of a supremely confident, progressive America, with all the roughness smoothed away. It made it easier to forget about those Soviet warheads and mushroom clouds.

The curves and glossy surfaces are as seductive as ever in "Eero Saarinen: Shaping the Future," which opened at the Museum of the City of New York on Tuesday. But the story it tells is more conflicted. Organized by Donald Albrecht, the museum's curator of architecture and design, the show carefully peels back some of the gloss to reveal the anxieties and contradictions buried underneath. As Saarinen tinkers with his symbolic language, he also mines deeper architectural veins. Eventually even the hardened skeptic is forced to accept that his buildings can be both sophisticated works of propaganda and gorgeous — and humane — architectural creations.

The show begins by establishing Saarinen's cosmopolitan credentials: a cultivated childhood in Finland with forward-thinking artistic parents; classical training as a sculptor in Paris; a stint in the office of the industrial designer Norman Bel Geddes; the early partnership in suburban Detroit with his father, Eliel, a Modernist who had emigrated to America in 1923.

The younger Saarinen came to prominence just as the United States was emerging as a superpower and searching for ways to express its newfound economic prosperity. He was part of a generation of architects that sought to propel Modernism from the margins into the mainstream, making it acceptable to ordinary Americans.

Some of his early projects demonstrate the depth of that challenge. A model of a 1939 design for the proposed Smithsonian Gallery of Art in Washington, a composition of low marble forms arranged along a reflecting pool, oozes civic confidence. But the project was rejected by the public: Congress refused to finance it, with opponents contending that it was too modern and clashed with John Russell Pope's neo-Classical National Gallery of Art, which had just opened across the Mall.

By the time you enter the next gallery, and the 1950s, corporate America had come to realize that architecture could serve as a valuable public relations tool, and the work of Saarinen and his Modernist

allies had become part of popular culture. There's a picture of Saarinen on the cover of Time magazine and a spread in Vogue (written by his fashionable wife, Aline). In another room an advertisement shows a rosy-cheeked Santa sitting in a form-fitting Saarinen chair with a bottle of Coke — a benign picture of the McCarthy era. Such images reinforce Saarinen's image as a propagandist for establishment America. And many of his commissions — the corporate headquarters and suburban office parks — reinforced the sweeping shifts that reflected the dark side of the postwar era: the racial tensions and white flight, the excesses of the consumer culture, the suburban isolation.

Yet Saarinen cannot simply be dismissed as a capitalist cheerleader. His designs, which became increasingly flamboyant over the years, were an effort to tap into the technical innovation and visual freedom he found in American industrial design as well as an early break with the doctrine that form follows function. The crisp glass facades of his General Motors Technical Center in Warren, Mich., the first of a series of suburban office parks he completed in the 1950s, were held in place with an aluminum frame and neoprene seals that came straight from windshield design. And although Mies van der Rohe could have designed the taut facades of the I.B.M. Manufacturing and Training Facility in Rochester, Minn., he would have probably abhorred the sparkling blue panels of the exterior.

Similarly, the contoured forms of the furniture he created for the office of General Motors' chief designer, Harley Earl (shown here in a dreamy composition of sinuous lines that hints at the expressionism of his later work) resemble streamlined car dashboards.

That freedom eventually found its greatest expression in buildings that concerned mobility, like New York's TWA Terminal and the Dulles International Airport Terminal. The TWA Terminal, in particular, was seen as a betrayal of the belief that form should express structure. To the Modernist mind, its winglike concrete roof, supported by an invisible steel frame, was structurally dishonest. But its curved forms were a perfect metaphor for the American ideal of a mobile society.

When doubt surfaced, it tended to be about what symbolic form this emergent America should take. In the final section of the show we see Saarinen working through a gamut of possible designs for the American Embassy Chancery in London. The work ranged from classically modern to neo-fascist, sensual concave facades to rigid boxes. All of them struggle to fit into the context of the neighborhood. But it is as if Saarinen could not put his finger on a fixed image that America should portray to the world.

The endless searching momentarily pierces the armor of self-confidence and hints at what gave the best architecture of this period its depth: a sense that all was not as it appeared on the surface, that there were more troubled waters — political, social, psychological — bubbling somewhere underneath.

The difference between Saarinen's era and our own is that we no longer want to appear so naïve. The most serious architects today have not solved the contradictions at the core of Saarinen's work; they prefer to open them up to public scrutiny.

"Eero Saarinen: Shaping the Future" continues through Jan. 31 at the Museum of the City of New York, 1220 Fifth Avenue, at 103rd Street; (212) 534-1672; mcny.org.

http://www.nytimes.com/2009/11/11/arts/design/11saarinen.html?ref=design

Like a Plant, His Roots Are Showing
By RANDY KENNEDY

IN the rambling Upper West Side apartment where the photographer Bruce Davidson has lived for almost 40 years, he and his wife keep an extra little bedroom reserved for their grandchildren, done up with flowery bedspreads and dolls flopped on a dresser. Showing a visitor through the apartment recently, Mr. Davidson stopped in the room and eased the closet door open carefully, as if a Fibber McGee-type avalanche awaited. Inside was a small museum's worth of boxes of vintage prints from his storied career of more than half a century.

"The stuff is crowding us out," Mr. Davidson said. "I'm like a cancer that spreads."
He enjoys comparing himself to things, animate and inanimate. For most of his photographing life — which began at the age of 10 in Oak Park, Ill., after his mother built him a darkroom in the basement — he was, as he says, "a coyote, a wolf," prowling for the perfect picture in a succession of circumscribed worlds he found and entered: tent circuses, Brooklyn gangs, East Harlem tenements, Jewish cafeterias, the civil-rights-era South.
Mr. Davidson is 76 now, a vigorous, round-faced man given to wearing heavy work shirts and boots that lend him the appearance of a carpenter. And as contemplative landscape photography increasingly dominates his time, he describes himself these days as being more like a plant. "Plants kind of speak to me, and trees, particularly palm trees," he said, smiling as he listened to himself. "Birds less so, but I'm getting very interested in them too."
Another description, especially now, might be heavyweight. This month the German art-book publisher Steidl will issue a door-stopping three-volume retrospective of Mr. Davidson's work, books for which he painstakingly reprinted thousands of images from his archives, eventually choosing more than 800 pictures, some never seen before. The publication coincides with two Manhattan exhibitions. One, at the Howard Greenberg Gallery on East 57th Street, recreates a sequence of pictures chosen by the curator John Szarkowski for the 1970 Museum of Modern Art exhibition of Mr. Davidson's "East 100th Street" series, an unflinching — and hotly debated in the context of the times — examination of urban poverty and perseverance in the late '60s.
The other show, at Bryce Wolkowitz Gallery in Chelsea, surveys Mr. Davidson's career, but the gallery has decided to do so in an elliptical and unusual way: by blowing up a dozen or so of his images to contemporary-photography proportions, big 30-by-40-inch prints, some of which — like a 1958 picture of a circus dwarf named Jimmy Armstrong — take on a vaporous Seurat-like ethereality at that size.
"I wasn't sure about it at first," Mr. Davidson said one afternoon, watching an assistant with a paintbrush carefully touching up the poster-size circus print, which blanketed a big swath of his dining-room table. "I didn't want them blown up just for the sake of blowing them up, for size. But now I look at them as completely different pictures, accomplishing something that a smaller print doesn't do."
From almost the beginning of his career Mr. Davidson's pictures have accomplished a lot. He was among the leaders of a loose-knit new wave of photographers — including Lee Friedlander, Danny Lyon, Garry Winogrand and Diane Arbus — who emerged in the early 1960s with the desire to tell stories that didn't fit neatly, and often didn't fit at all, into the art world or into the magazine picture-essay tradition.
Mr. Davidson's work has always been marked by a quiet sympathy that balances even his more caustic visions — gaudy Los Angeles, waitresses in a topless restaurant, the dead-end members of a Brooklyn gang called the Jokers — and by a sophisticated, undramatic sense of form. The critic Michael Brenson, writing in 1982 in The New York Times about a highly regarded series of pictures taken in the subway, a

rare foray into color for Mr. Davidson, called his brand of realism “almost novelistic in its multilayered ambition.”

The artist’s life has not been easy. For most of his career, even after becoming a marquee member of the Magnum photo collective, Mr. Davidson paid the bills mostly by shooting for corporate annual reports or other business publications, work he liked better than magazine assignments “because it really kept me out in the world, seeing how things worked.” For a short time in the early 1960s he did fashion work for Vogue magazine, but it never kept his interest.

“All I cared about was, ‘Can I make enough money here to pay for my livelihood, so I can get back out on the streets and shoot what I want?’ ” he recalled.

But the life has also paid him back richly in experience. His first daughter was conceived (as his wife, her mother, smirkingly confirmed, sitting at their kitchen table) in Death Valley, Calif., while Mr. Davidson was taking pictures on the set of Antonioni’s “Zabriskie Point.” He can talk about shooting Marilyn Monroe in 1960, or about Richard Avedon and André Kertesz helping him teach workshops at his Greenwich Village loft. Or about when Arbus took him to Atlantic City for a burlesque show, or the time he kept Isaac Bashevis Singer’s parakeet. (Mr. Singer was a friend and a neighbor in the Belnord, Mr. Davidson’s building, and Mr. Davidson made a short film about him in 1972.)

The impetus for a book project encompassing his career came partly from Mr. Davidson’s daughters, Jenny and Anna, who told him once, surveying the mountains of his prints and film that his assistant, Amina Lakhaney, helps him keep in order, “ ‘You’re not going to leave all this for us to sort out, are you?’ ” Over the last three years, as Mr. Davidson printed in his home darkroom, Gerhard Steidl, the legendarily exacting founder of Steidl, would sometimes bring a box to the Belnord on his trips to New York and fill it with prints to take back to Steidl offices in Germany.

Mr. Davidson’s initial plan was to give the volumes a title commensurate with their weight and with his feelings about the importance of photography to the world and to himself: “Journey of Consciousness.” “Everybody gagged when they heard it,” he said.

So the title was changed to “Outside/Inside,” a good description of Mr. Davidson’s work approach, which often involves long, immersive dives into the lives of his subjects, some of whom, like Robert Powers, a former Brooklyn gang member known as Bengie, have stayed in touch. (Mr. Davidson’s wife, Emily Haas Davidson, is working on a book about Mr. Powers.)

“I always felt that my best way with the camera was to stay longer, to get to know things,” he said. “Not for a picture story, per se, but for a series of images that are kind of like charcoals that catch fire and burn into each other.”

In an essay accompanying a book of the subway pictures, the curator Henry Geldzahler described how he had once asked Mr. Davidson whether there was a message implicit in the photographs, a strangely beautiful collective portrait of a weary, graffitied, enduring city.

“ ‘Lift your head,’ he shot back, as quick as that,” Mr. Geldzahler wrote. “And that’s it.”

Over the last several months Mr. Davidson has been making frequent trips to Los Angeles to further his landscape interests, what he describes as a “lifelong urban rat’s” preoccupation with nature meeting the manufactured, which he has also pursued for many years in Central Park and in Paris. Though the work mostly requires waiting patiently for the right light, one recent trip to the West found him equipped with rappelling gear, navigating his way with a helper down a steep slope in the Hollywood Hills to shoot the back of the Hollywood sign, which looks like a strangely familiar minimalist sculpture in his pictures.

“It’s not that I’ve given up on photographing people,” he said of his turn to landscape. “But I guess I just need a break from it for a while.”

Mostly for himself, as a kind of therapy, he said, he has been photographing the same gnarled oak tree on Martha’s Vineyard, where he vacations, over a period of 40 years. Of his recent fascination with palm trees, he said he still can’t quite understand the attraction: “They’re absolutely useless. They don’t give shade or coconuts. They’re 100 feet tall, and there aren’t even enough leaves to do much in the way of photosynthesis.”

Mr. Davidson takes pains to emphasize that, retrospective or not, he has no intentions of winding down his career anytime soon. His mother is 98 and doing quite well, he said. Then he pointed to a long bank of shelves in his apartment filled with books of his contact sheets arranged by year, going back to 1954.

“I think I have space here for about another 10 to 20 years,” he said. “And then that’ll be it.”

http://www.nytimes.com/2009/11/08/arts/design/08kenn.html?ref=design

Nonprofit Laptops: A Dream Not Yet Over
By ALICE RAWSTHORN

LONDON — If you'd been told three years ago that someone was developing an educational laptop for the world's poorest countries to buy for less than $200 each and that, by now, some one million children in 31 countries would be using them, what would you have thought?

Wow — that's what I'd have thought. Wow again when I was told that up to one million more of those laptops were on order. The problem for One Laptop Per Child, the American nonprofit organization that has achieved all of the above, is that when its founder, the technologist Nicholas Negroponte, spelled out its objectives at the World Economic Forum's annual meeting in Davos in 2006, he promised to sell the laptop for $100 and to ship seven million of them.

Does he regret having promised so much? "When I started, I had to be knowingly hyperbolic, otherwise we could not have changed corporate strategy or swung governments into action," said Mr. Negroponte. "It attracted the kind of attention that made this happen. Had I just said that I would make two million laptops by 2010 for children, OLPC would have been just another start-up."

Perhaps, but by inflating expectations he has (unwittingly) helped his critics to attack one of the most ambitious design projects of our time. The sad, silly truth is that most designers still devote most of their efforts to the wealthiest 10 percent of the global population, rather than the "other 90 percent" who lack basic products and services. Designing a cheap, efficient educational laptop as part of a flexible learning system for kids in poor countries is a bold attempt to address that. It is also very risky and (thanks to Mr. Negroponte's flair for spin) so visible that, if OLPC fails, it will be even harder to mount similarly ambitious projects in future. "I'm personally in two minds about its success," said Cameron Sinclair, a co-founder of the Architecture for Humanity volunteer network, which uses OLPC laptops in a Kenyan school, adding that "it has certainly inspired designers to think bigger and on a grander scale."

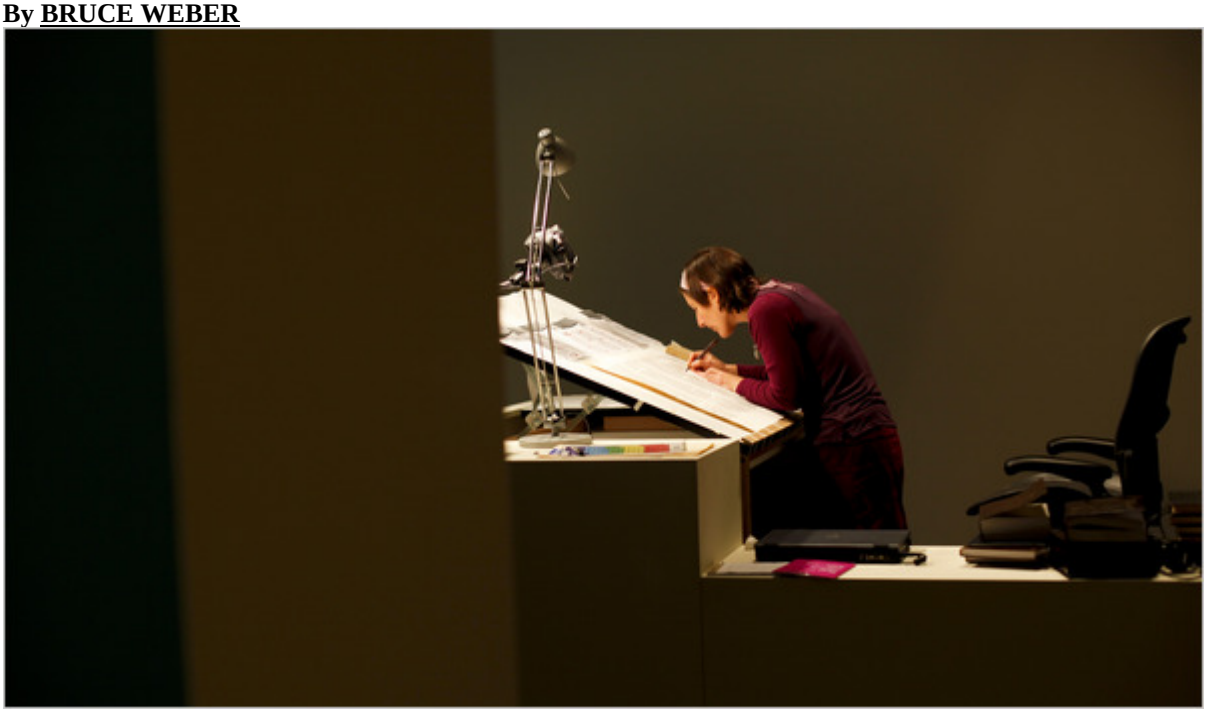
Yet lots of people seem to want OLPC to flop. The development lobby has dismissed it both for being a vanity project (no prizes for guessing whose) and for trying to apply first world solutions to third world problems. Teachers have criticized its educational methodology. Environmentalists have warned of toxic dumps of unwanted laptops. Techies have said it wouldn't work and raged when OLPC replaced its bespoke operating system with one of Microsoft's. And the tech industry has moaned about losing potential sales in new markets.

OLPC has undoubtedly suffered from straddling such ferociously political sectors as tech, development and education — and from launching at a time when high profile projects suddenly came under scrutiny from blogging and tweeting. Only two months ago, a Web site run by the United Nations (one of OLPC's

earliest champions) posted a blog entitled “One Laptop Per Child — The Dream is Over.” The one thing that OLPC’s critics — and supporters — agree on is that the XO1 laptop’s small, light tablet format, designed by fuseproject in San Francisco, has inspired other companies to launch similar models and created a fast-growing new product category. If Apple launches its long-rumored tablet computer, that category could become much, much bigger. Impressive, but not one of OLPC’s lofty objectives.
Despite everything, Mr. Negroponte claims that the tide is turning. Late last month the Uruguayan government completed the process of distributing an XO1 to each of its 415,000 elementary school children as the first phase of the Plan Ceibal initiative to provide a laptop for every student and teacher in the country.
Until now, OLPC has only had the evidence of small, isolated projects to rebuff its critics. What happens in Uruguay should demonstrate — one way or another — whether it can achieve its objective of improving educational standards on a sustainable basis. It should also help to establish what sort of support structure is needed, in terms of training, learning resources and tech back-up, to help students and teachers make the most of their laptops.
So far its experience in Uruguay has been far from perfect. OLPC blundered by sending the first 50,000 laptops with English rather than Spanish-language software. Plan Ceibal is still trying out different ways of running the program. “To give you an example, initially the tech support was centralized, kids had to mail their broken XOs and the wait was building up,” explained Yves Béhar, the founder of fuseproject. “Now they have outsourced repairs to different computer shops and kids can easily get them fixed locally.”
Yet there are encouraging signs. When “The Dream is Over” blog appeared on the United Nations Web site, teachers in Uruguay responded with personal examples of how OLPC’s laptops have helped to improve their students’ literacy and reduce truancy. Plan Ceibal is optimistic enough to be extending the program into secondary schools, and has set up a consulting agency to advise other countries on similar projects. OLPC will soon have equally substantial pilot projects in Rwanda and Peru, where it has shipped 120,000 and 294,000 laptops, respectively.
Another milestone will be the launch next month of the XO1’s successor, the OLPC 1.5, with double the speed and four times more memory. Fuseproject is now developing future models with double screens to enable several kids to work on each one. The progress of the new designs and OLPC’s experience in Uruguay, Rwanda, Peru and elsewhere will be scrutinized as intensely as ever, especially when it comes to the (inevitable) mishaps.
“It’s easy to be judgmental but some of the best humanitarian plans, set by more powerful organizations than OLPC, have had to adapt to the realities of supply, demand and distribution in order to reach the best part of their humanitarian goals,” said Paola Antonelli, senior curator of architecture and design at the Museum of Modern Art, New York. “Even worse, many have crashed and burned against the walls of deceit, corruption and greed. In comparison, OLPC is doing very well.”

http://www.nytimes.com/2009/11/09/arts/design/09iht-design9.html?ref=design

A Torah Scribe Pushes the Parchment Ceiling
By BRUCE WEBER



In Hebrew the word for Julie Seltzer's arcane profession is soferet; she's a scribe, a Hebrew calligrapher who writes sacred texts on parchment. A mere handful of women do what she does, and an even more select handful are practiced in the especially ritualistic craft of writing particularly holy scrolls, including the Torah, considered the foundation of Jewish life and thought.

Age-old Jewish law declares that only men be trained for such work, and that a Torah that has been created by a woman is unsuitable for use in worship, strictures that are still upheld in Orthodox communities and congregations. But Ms. Seltzer, who is 34, and a few others are widening an ancient tradition in a modern age. She estimated that perhaps 10 women in the world write the Torah and the other restricted documents containing quotations from Hebrew Scriptures, including those for the tefillin, small leather boxes housing Scriptural passages, and mezuzot, which are affixed to doorframes.
All of this makes Ms. Seltzer's performance — an admittedly odd word for what she's up to, and one she doesn't like — at the Contemporary Jewish Museum in San Francisco unique and compelling. As the central element of a new exhibition, "As It Is Written: Project 304,805," a simply and elegantly organized introduction to the fundamental role of the Torah in Jewish life, she is creating a new holy scroll.
Working in a gallery in full public view, amid displays that explore the Torah as both historical artifact and contemporary object of inspiration, Ms. Seltzer is painstakingly reproducing the ancient text — which consists of the Five Books of Moses, who is said to have received them whole as a divine message from God — on sheets of parchment made, as prescribed by law, from the skin of a kosher animal (in this case a cow). Her writing tools are black ink and quills she carves from turkey feathers.
Letter by letter (the exhibition is named for the precise number of Hebrew characters in the Torah), line by line (there are 42 lines in a column of text), column by column (four columns constitute a sheet of parchment) and sheet by sheet (62 sheets will be needed to complete the scroll), she is adhering to the complex laws, outlined in the Talmud, that were developed by early scribes and well established by the sixth century.
Among them: Every word should be spoken aloud before it is written, and no word may be written from memory. (Ms. Seltzer is working from a copy of the text known as a Tikkun.) When her scroll is complete, no letter may be touching another, a stricture that often requires corrections with a blade and chalk to restore the parchment color. Ill-formed letters must be corrected as well, with the offending ink scraped away and then re-inked; no letter may be made correct by an act of erasure. The different names for God must be treated with special care.

Ms. Seltzer began her work in early October. Writing six or seven hours a day for five days a week, she estimates that the project will take 14 months to complete. According to Connie Wolf, the museum's director and the curator of the exhibition, this will be the first time a Torah has ever been written from beginning to end in public, though synagogues that commission Torahs often have scribes demonstrate their work for the congregation.

"We wanted a woman for this project," Ms. Wolf said. "We're a contemporary institution, and women are making progress in this arena; we wanted to provide the opportunity."

Ms. Seltzer, a small, dark-haired woman with pale blue eyes and an easy smile, radiates calm not only in conversation but also within the fierce concentration her work requires. She began her training only two years ago — "I'm a newbie," she said — and continues to study. Her primary teacher is Jen Taylor Friedman, a New Yorker born in Britain who is just 30 but among the very few women to have completed an entire Torah. According to Ms. Wolf, she may indeed be the only one who has ever done so.

"I've never seen a source that says otherwise," Ms. Friedman said in a telephone interview. "But 'ever' is a big word, and Judaism has been around for a long time."

Ms. Seltzer said she had much to learn and that her work would only get better and more confident over time, but to an inexpert eye, at least, her calligraphy is lovely. The script style, developed in the 16th century, features staunch strokes and delicate flourishes; seven Hebrew letters are embellished with three-pronged antennaelike crowns.

The work is indisputably artful, but it's not intended to be expressive. The idea is to copy exactly; writing a Torah is less an act of creativity than of sublimation.

"I know the museum sees it that way, but if I thought this was a performance, I wouldn't be able to do it," Ms. Seltzer said.

And indeed, in that very denial lies the art in her performance. Watching her impossibly steady hand, the deft maneuvering of the quill (each of the 22 letters of the Hebrew alphabet requires its own separate technique) and the inexorable progress of the text across a column and down a page yields a palpable sense of ancient ritual that slows your breathing, and you can't help seeing that she is communing deeply with the text as she copies it. The writing is an act of faith.

"I was into the 'begets,' " she said during a break on a recent morning, recalling a moment of elation. She was referring to two segments of Genesis next to the story of Babel that trace the Biblical generations from Noah to Avram, later renamed Abraham by God.

"They go on for a while, so I smiled when I saw Avram," she said. "I was excited."

She pointed at the place in her written text.

"There he is!" she said, beaming.

"As It Is Written: Project 304,805" continues through fall 2010 at the Contemporary Jewish Museum, 736 Mission Street, San Francisco; (415) 655-7800, thecjm.org.

http://www.nytimes.com/2009/11/08/arts/design/08sfculture.html?ref=design

LONG ISLAND
With a Tranquil Air, a Respite From Fast-Paced Lives
By BENJAMIN GENOCCHIO

One virtue of the scaled-back plan for the new Parrish Art Museum by the architecture firm Herzog & de Meuron is that it is only slightly smaller than the previous version. Although the new design is less ambitious architecturally, it encompasses approximately 37,300 square feet (the earlier version had 44,000), nearly twice the size of the current museum. Around a third of that will consist of dedicated galleries, including a permanent display of works from the museum's collection, something the museum has not had before. The Parrish hopes to break ground early next year, according to museum officials.

In recent years, so little of the museum's collection has been shown that I'd almost forgotten it had one. "American Landscapes: Treasures From the Parrish Art Museum" offers a timely reminder of just how good the collection is, and how absolutely necessary the expansion plans are. A collection like this deserves to be on display permanently.
The Parrish has around 2,500 works in its collection, including about 700 paintings, with the rest mostly works on paper. The strength of the collection is 19th- and 20th-century American art, the core of which was assembled in the 1950s by Rebecca Bolling Littlejohn, a Southampton-based collector and former chairwoman of the museum board, who had the foresight to believe that American landscape painting was of value and importance and began to collect it years before it became fashionable. In 1961 she bequeathed her collection, hundreds of works, to the museum.
Mrs. Littlejohn was also taken with the idea of collecting American artists who had lived and worked on Long Island, including living contemporary artists like Larry Rivers and Fairfield Porter, an equally novel concept for the time. Among the approximately 50 paintings in the current show, about half are by artists who lived and worked on Long Island.
The exhibition, hung chronologically, traces the evolution of American landscape painting from the Hudson River School to the present. It begins with "Landscape" (circa 1836) by Asher B. Durand, a leading member of the Hudson River School. Against the backdrop of the Catskills, an American Indian looks out on a setting sun. The symbolism is obvious: his time has passed.
Subthemes pepper the arrangement, including a grouping of pictures by famous American artists working abroad, among them Edward Lamson Henry, William Lamb Picknell, Theodore Robinson, James Abbott McNeill Whistler and William Merritt Chase. It is worth lingering a little here, for the quality of painting is impressive. Among the works that stand out are Chase's "A Bit of Holland Meadows (A Bit of Green in Holland)" (1883), a quiet rural scene, and Robinson's "Moonlight, Giverny" (circa 1892). The latter, a gift to the museum from Mrs. Littlejohn, shows a farm building bathed in an eerie glow.

The show cycles through examples of late 19th-century and then early modern approaches to landscape, beginning with Impressionism and Post-Impressionism, as exemplified in the work of Childe Hassam, Ernest Lawson and John Marin, followed by several examples of Tonalism, a style emphasizing mood and atmosphere, by Martin Johnson Heade and others, and Symbolism, by William Trost Richards.
There are numerous East End scenes among these pictures, including Samuel Colman's "Farmyard, East Hampton, Long Island" (circa 1880), a masterpiece of Tonalism, a movement that emerged in the 1880s. The painting depicts a bucolic rural landscape, with animals grazing freely among farm buildings. The scene is devoid of people and machinery (with the exception of a weather vane atop a building to the right of the picture), creating an air of tranquillity. At the time, such paintings would have struck a chord with New York patrons nostalgic for a simpler, preindustrial past in the face of a changing and increasingly urban society.
There is a small section of paintings produced in art colonies in Connecticut and Massachusetts as well as on Long Island, including "Entrance to Peconic" (1902) by Edith Mitchill Prellwitz, painted on the North Fork. This is followed by a handful of early modernist pictures, probably the weakest group in the show and obviously an area in which the museum's collection needs to be strengthened. The contemporary art is much better, with the museum having acquired several important works by local artists in recent years. Paintings on display by Jane Freilicher, April Gornik, Jennifer Bartlett and Jane Wilson attest to the quality of landscape artists living and working on Long Island. But it also reminded me that many of them are women, in contrast to the male-dominated tradition of landscape painting in American art. Not even Mrs. Littlejohn could have anticipated that.
"American Landscapes: Treasures From the Parrish Art Museum," Parrish Art Museum, 25 Job's Lane, Southampton, through Nov. 29. Information: (631) 283-2118 or parrishart.org.

http://www.nytimes.com/2009/11/08/nyregion/08artsli.html?ref=design

'TRAVELING THE SILK ROAD'
Information Highway: Camel Speed but Exotic Links
By EDWARD ROTHSTEIN

"You are about to make an unusual journey," a wall label proclaims at the beginning of an exhibition that opens on Saturday at the American Museum of Natural History. Normally that promise would provide reason enough to be wary. But this is something different.

You are welcomed by life-size camels laden with worn canvas sacks, their bodies framed by sand dunes stretching into the distance. A while later, near a 17-foot-long wooden Chinese loom, you find bowls filled with mulberry leaves on which scores of white worms are gnawing. You see, too, what kind of cocoons they soon will weave, and how these sacs might then be boiled and unwound into silk threads. And later still, you seem to arrive in an outdoor market in evening as the sounds of footfalls and animal cries mix with the murmur of voices; stalls are piled with produce, furs and spices, including a leopard skin, a yak tail, pheasant feathers, lapis lazuli and barrels whose smell suggests that they are filled with rose petals, jasmine oil and patchouli.
Museum exhibitions often aspire to theater, but the stagecraft of this show, "Traveling the Silk Road: Ancient Pathway to the Modern World," succeeds with compelling vividness. Designed and produced by the museum, under the direction of David Harvey, vice president for exhibition, it is meant to suggest a journey over the Silk Road in its prime, covering "the entire distance from East to West — from Xian, the capital of China, to Baghdad, the heart of the Islamic world."
The Silk Road, which has now become part of folklore, was a loose network of Central Asian trade routes that made up the most dangerous, exotic and economically valuable overland passages in the ancient and medieval worlds. And while you never really believe that your own "unusual journey" is anything comparable, that is just as well. As the exhibition points out, the Silk Road trek was accomplished on foot or by stumbling camel train through unrelenting desert and over steep mountain passes. It is some 4,600 miles long and takes at least half a year to traverse. And it passes through regions whose temperatures range from minus 50 degrees Fahrenheit to more than 120. In ancient times (as in our own) weapon-wielding robbers ambushed travelers, and tribal armies clashed over shifting frontiers.
And the point of it all, particularly during the era focused on here — from the years 600 to 1200 — was to trade the products of human invention, cultivation and belief: the luxuries of spices and silk, the pleasures of music and image, the convictions of religion and science. "Traveling the Silk Road" really does give

you an idea of what was involved, how valued the cloth, manuscripts and pottery must have been, and how vital, too, the resulting cultural cross-fertilization must have seemed in a world of daunting obstacles.
I have intellectual reservations about this exhibition, even as I celebrate the remarkable pleasures and insights it offers. This is less a show of objects than of atmosphere and ideas, but it incorporates more than 90 rare artifacts, including a 7th-century Buddha; a 10th-century ceramic showing a Chinese official draped in silk; a stunning silver drinking horn made for 7th-century Tibetan rulers; a 13th-century Koran written on the pioneering medium of paper. You can press buttons to select which traditional Chinese instruments you want to hear in an ensemble and watch videos of folk stories that spread along these trading routes with their resonant tales of misguided greed or triumphant trickery. You can also manipulate the nested wheels of an astrolabe and learn to tell time from the locations of stars.
The exhibition's curator, Mark A. Norell, chairman of the division of paleontology at the museum (who also worked with the guest co-curator, William Honeychurch, an assistant professor in the department of anthropology at Yale University, and with Denise Leidy, curator of the department of Asian art at the Metropolitan Museum of Art), structured this journey by focusing on four particular cities, as well as on a series of crafts and technologies.
You begin with Xian, which in the seventh century, the museum suggests, may have been the largest city in the world, a million people living within its walls, another million just outside them. Silk making holds sway here, a process that becomes more amazing as the exhibition teaches how silk is woven from the cocoons of the worms nibbling away in the covered bowls. A single cocoon can unwind into a filament about 3,000 feet long, but it takes about 2,500 cocoons to create a single silk robe.
But silk (and its once state-kept secrets) was just one reason for the development of the trade route. The China scholar Frances Wood has pointed out that the "romantic name" the Silk Road was coined in 1877 by a German explorer. Silk was actually accompanied by all manner of goods for trade. They encompassed paper ("of all the treasures that moved along the Silk Road," the exhibition points out, "none was more powerful than paper"), glassware and pottery work, and the accomplishments of Baghdad's scholars (whose studies of math and astronomy, the exhibition notes, "helped form the foundation for science in the West").
These technologies spread along paths like the ones the show maps out, touching down in Turfan, a Central Asian oasis (now in China and officially Turpan) between the Gobi and Taklimakan Deserts, where plentiful produce was made possible by a sophisticated system of underground irrigation tunnels, one of which is modeled here.
Another stopping point was Samarkand, once a cosmopolitan city of merchants at the heart of the Sogdian empire (in present-day Uzbekistan). But the most compelling exhibits come at the road's beginning, in China, and at its end, in Baghdad. Throughout the show, though, the theme of cross-cultural fertilization recurs: we see ninth-century Chinese silk patterns influenced by Persian designs, and a stone pillar erected in Xian in 781 displaying both Chinese characters and Christian iconography.
Paper, "Traveling the Silk Road" argues, moved in the opposite direction; it may have been invented in China around 50 B.C., made its way into the Islamic world and ultimately migrated to Spain in the 12th and 13th centuries. A final gallery with a wall-size video screen challenges viewers to see parallels between the camel-driven trails of a thousand years ago and contemporary information highways with links provided by cellphones and the Internet.
Joining this message of cultural confluence, there is also a spirit of sentimental multiculturalism, which must have helped the exhibition's international appeal: beginning in 2011 it will travel to Rome and to Canberra, Australia, and to Taipei and Taichung, in Taiwan. Supplementary programming here will include regular Sunday performances organized by the Silk Road Project, founded by Yo-Yo Ma in 1998.
Harmony is the focus: the show presents an almost pastoral perspective with its amiable portrait of cultural transmission and trade. Yet Christopher I. Beckwith, professor of Central Eurasian studies at Indiana University, suggests in his recent book, "Empires of the Silk Road" (Princeton University Press), that "the most crucial element" of societies all through Central Eurasia — including the ones analyzed by this exhibition — was the "sociopolitical-religious ideal of the heroic lord" and of a "war band of his friends" that was attached to him and "sworn to defend him to the death."
This idea, he suggests, affected the organization of early Islam as well as the structure of Tibetan Buddhist devotion. In fact, this "shared political ideology across Eurasia," Mr. Beckwith suggests, "ensured nearly constant warfare." The region's history is a history of competing empires; trade became part of what was later called the Great Game.

If this is so, then the Silk Road explanation for cultural influence is seriously limited. Strangely, too, the exhibition also seems to treat the golden age of Baghdad almost as if it sprang up there fully formed, while Mr. Beckwith suggests that "virtually all of the greatest philosophers and scientists of classical Islamic civilization were either from Central Asia or of Central Asian origin."
This is something that historians will puzzle out. In the meantime, though, the critical intellectual shortcoming of the exhibition is that with Baghdad, the Silk Road seems to come to a prematurely celebratory end. Why, instead of dealing with the development of Arab shipping in a final gallery, didn't the show follow a narrative, visible on one of its maps, leading past Baghdad and to the port of Venice? By extending the history another few centuries, we would have seen how the Silk Road led to a fertilization of Western thinking, not just with the discoveries of Islamic scientists but also with a variety of philosophical and religious perspectives that proved influential over the course of centuries. We know how deeply affected Marco Polo was by the Silk Road in the 13th century: he passed that enthusiasm on. This would have helped the exhibition make a more cogent contribution to Western cultural self-understanding. It would have also helped explain why, once European shipping and exploration took off in the late Renaissance, the overland Silk Road route became more and more a commercial backwater, leading to centuries of cultural and political decline, whose effects are still being felt.
The exhibition "Traveling the Silk Road" opens on Saturday and continues through Aug. 15 at the American Museum of Natural History, Central Park West and 79th Street; (212) 769-5100 or (212) 769-5200, amnh.org.

http://www.nytimes.com/2009/11/13/arts/design/13silk.html?ref=design

Rethink for calorie eating levels

The calorie counts used as the foundation for diet plans and healthy-eating guidance for the past 18 years may be wrong, a report suggests.

The recommended daily intake of calories could be increased by up to 16%, a draft report by the Scientific Advisory Committee on Nutrition said.

Intake levels are currently 2,000 calories for women and 2,500 for men.

But the panel stresses that people should only eat more if they exercise more, given rising levels of obesity.

The committee says its report provides a much more accurate assessment of how energy can be burnt off through physical activity.

A 16% increase would mean that adults could safely consume an extra 400 calories a day, equivalent to an average sized cheeseburger.

The proposals, seen by The Times and The Grocer magazine, are due to go out for a 14-week consultation period.

Final recommendations will then be made after that time.

Health campaigners say the Department of Health and the Food Standards Agency could seek to "sweep this report under the carpet" in a bid to avoid sending out mixed messages in the middle of an obesity epidemic.

Tam Fry, of the National Obesity Forum, said it was a "dangerous assumption" to say that adults could safely consume an extra 400 calories a day.

"This is not a green light to eat yourself silly," he said.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/uk_news/8360136.stm

Published: 2009/11/15 00:29:18 GMT

Teeth grinders are in for a shock

Patients complaining of grinding their teeth in their sleep are being given mild electric shock treatment.

A chain of private dental practices in Hull is trialling a device which delivers a tiny electrical impulse when it detects grinding is about to begin.

Teeth grinding - or bruxism - is a common and usually harmless habit induced by stress.

It can, however, cause headaches and stiff necks, as well as irritating a sleeping partner.

" **We are hoping that this biofeedback device will help to break the loop of fitful sleeping, and the psychological and physical problems which grinding can create** "
Dr David Vivian

Traditional treatments involve wearing a plastic device at night which prevents the top and bottom teeth from meeting.

With this new device, Grindcare , developed in Denmark, a small electrode is placed on the temple which then monitors the movement of facial muscles. When it detects tension mounting, it delivers a tiny electrical impulse - or biofeedback.

This is not consciously detected by the sleeping patient but still serves to relax the muscles.

Painkillers

The device is said to reduce grinding by as much as 80% within two months.

Other ways of tackling bruxism include counselling and relaxation therapies to resolve the initial source of stress and tension.

But Dr David Vivian, the dentist trialling the device, said that grinding could worsen existing anxieties.

"The broken sleep pattern caused by grinding can exacerbate any stresses or worries already being felt by the patient, and add an extra layer of anxiety to their lives.

"They may also be resorting to over-the-counter painkillers to treat side effects, such as headaches, and finding that they are having to increase the dosage all the time.

Results 'promising'

"We are hoping that this biofeedback device will help to break the loop of fitful sleeping, and the psychological and physical problems which grinding can create."

Professor Damien Walmsley, scientific adviser to the British Dental Association, said: "Teeth grinding is a problem that affects a significant minority of individuals. It is often caused by stress.

"Patients who are affected by the problem should consult their dentist.

"This study, which was carried out on a small sample of patients, shows promising results.

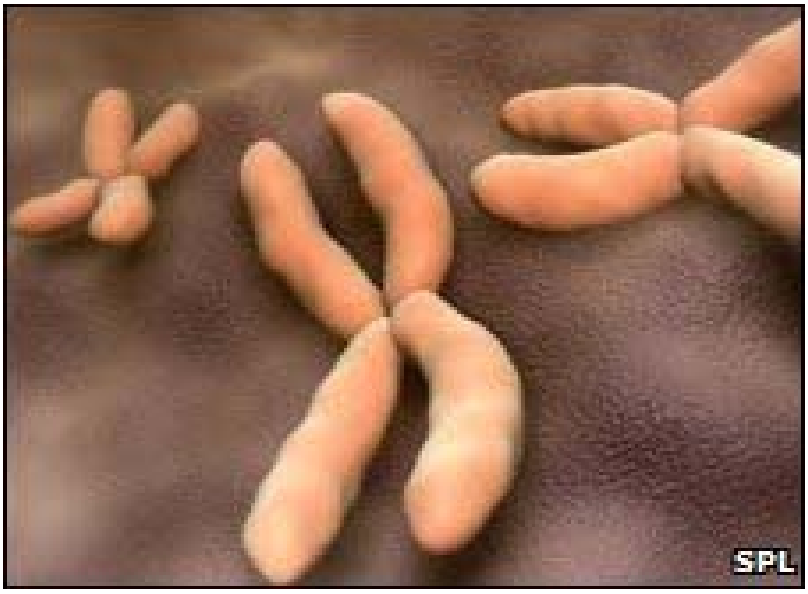
"Further research will be necessary to establish the technology's true potential."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8355737.stm

Published: 2009/11/14 00:01:46 GMT

Mutant genes 'key to long life'

There is a clear link between living to 100 and inheriting a hyperactive version of an enzyme that prevents cells from ageing, researchers say.



Scientists from the Albert Einstein College of Medicine in the US say centenarian Ashkenazi Jews have this mutant gene.

They found that 86 very old people and their children had higher levels of telomerase which protects the DNA.

They say it may be possible to produce drugs that stimulate the enzyme.

" **There may be a downside to the plan of boosting the repair processes of DNA because giving the cells more chances to divide may increase the chances of damaging mutations developing and causing cancer.** "
Professor Tim Spector, King's College

Writing in the Proceedings of the National Academy of Sciences, the team say they studied the Ashkenazi Jewish community because they are closely related so it is easier to identify disease causing genetic differences.

They took blood samples from 86 very old, but generally healthy, people with an average age of 97; 175 of their offspring; and 93 other people who were the offspring of parents who had lived a normal lifespan and could therefore make up a control group, with which the results could be compared.

Role of telomeres

Telomeres are relatively short sections of specialized DNA that sit at the ends of all our chromosomes.

They have been compared to the plastic tips at the ends of shoelaces that prevent the laces from unravelling.

Each time a cell divides, its telomeres shorten and the cell becomes more susceptible to dying.

The importance of telomeres was recognised last month when three scientists received the 2009 Nobel Prize in Physiology and Medicine for determining the structure of telomeres and discovering how they protect chromosomes from degrading.

Telomerase can repair the telomeres, preventing them from shrinking.

'Strongly heritable'

The team at Einstein found that the centenarians and their offspring had higher levels of telomerase and significantly longer telomeres than the unrelated people in the control group and that the trait was strongly heritable.

The scientists had previously shown that individuals in Ashkenazi families with exceptional longevity have generally been spared major age-related diseases, like heart disease and diabetes.

The centenarians in this study had a lower average body mass index than the controls and higher levels of good (HDL) cholesterol.

Yousin Suh, associate professor of medicine and genetics at Einstein and a lead author on the paper, said: "Our findings suggest that telomere length and variants of telomerase genes combine to help people live very long lives, perhaps by protecting them from the diseases of old age.

"We're now trying to understand the mechanism by which these genetic variants of telomerase maintain telomere length in centenarians.

"It may be possible to develop drugs that mimic the telomerase that our centenarians have been blessed with."

'Downside'

Professor Tim Spector, from King's College London, who has been researching telomeres and ageing, said it was an interesting finding but it may not apply to other populations and further research was needed.

He said: "There may be a downside to the plan of boosting the repair processes of DNA because giving the cells more chances to divide may increase the chances of damaging mutations developing and causing cancer.

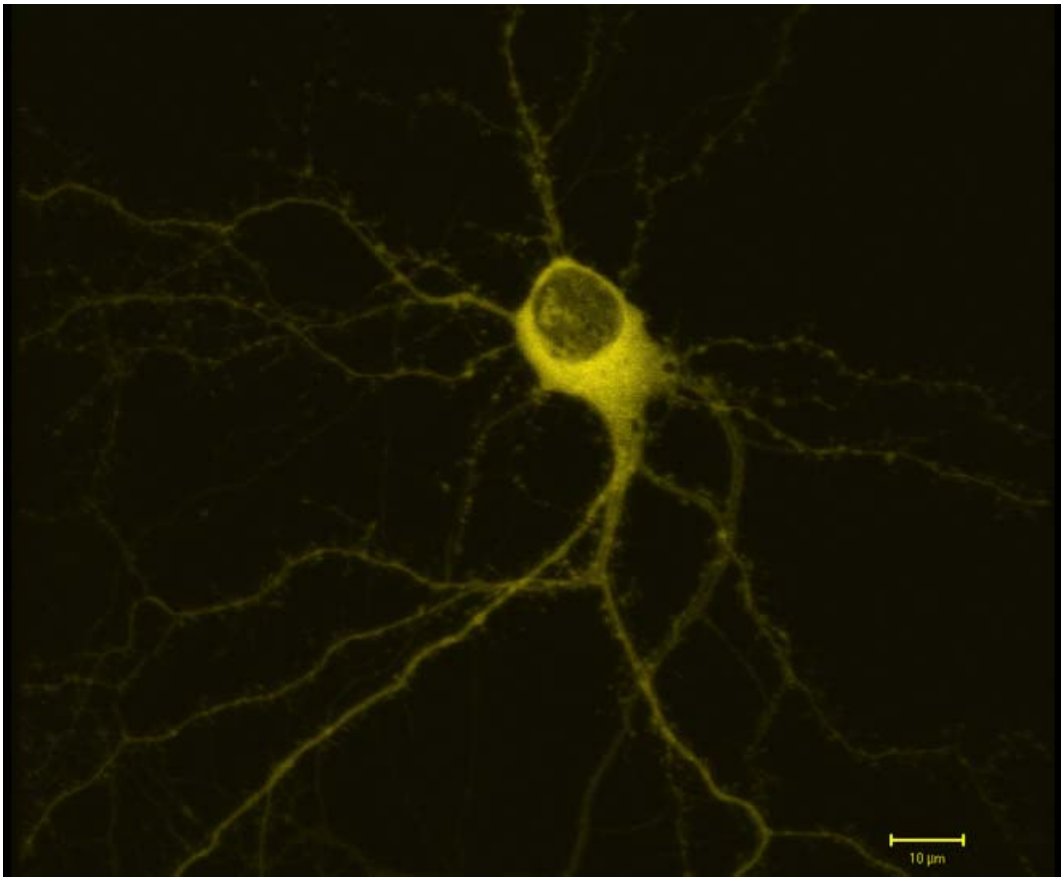
"Most scientists agree that there is evidence that people with long telomeres have less age-related diseases and this study does suggest that could be one reason why they are living longer."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8359735.stm

Published: 2009/11/15 00:15:29 GMT

New Brain Cells May Knock Out Old Memories

- By Tina Hesman Saey, Science News



Old memories may get the boot from new brain cells.

A new rodent study shows that newborn neurons destabilize established connections among existing brain cells in the hippocampus, a part of the brain involved in learning and memory. Clearing old memories from the hippocampus makes way for new learning, researchers from Japan suggest in the November 13 *Cell*.

Other researchers had proposed the idea that neurogenesis, the birth of new neurons, could disrupt existing memories, but the *Cell* paper is the first to show evidence supporting the idea, says Paul Frankland, a neuroscientist at the Hospital for Sick Children in Toronto.

Scientists have known that memories first form in the hippocampus and are later transferred to long-term storage in other parts of the brain. For some amount of time the memory resides both in the hippocampus and elsewhere in the brain. What's not been known is how, after a few months or years, the memory is gradually cleared from the hippocampus.

Researchers have also debated the role of neurogenesis in learning and memory. The hippocampus is one of only two places in the adult brain where scientists know that new neurons form. On the basis of previous studies, many researchers think new neurons stabilize memory circuits or are somehow otherwise necessary to form new memories.

The new study suggests the opposite: Newborn neurons weaken or disrupt connections that encode old memories in the hippocampus.

Kaoru Inokuchi, a neuroscientist at the University of Toyama in Japan, and his colleagues used radiation and some genetic tricks to block neurogenesis in rats and mice that had been trained to fear getting a mild electric shock when placed in a particular cage. Control animals, with normal neurogenesis, eventually were able to bypass their hippocampi and retrieve the fear memory directly from long-term storage. But animals in which neurogenesis had been blocked still depended on the hippocampus to recall the fear memory, the researchers found.

Running on an exercise wheel, which boosts neurogenesis, also sped the rate at which old memories were cleared from the hippocampus.

But that doesn't mean new neurons aren't necessary to teach old brains new tricks, says Inokuchi.

"Our findings do not necessarily deny the important role of neurogenesis in memory acquisition," Inokuchi says. "Hippocampal neurogenesis could have both of these roles, in erasing old memories and acquiring new memories."

Essentially, the new neurons may aid formation of new memories by keeping the hippocampus from filling up with old ones.

Frankland adds, "This is about as novel as it gets in the field of neurogenesis and memory. It pretty much represents an entirely new framework that other researchers will chip away at for years to come."

Image: Hippocampal neuron/NIH

http://www.wired.com/wiredscience/2009/11/new-brain-cells-may-knock-out-old-memories/?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+wired%2Findex+%28Wired%3A+Index+3+%28Top+Stories+2%29%29&utm_content=Google+Reader

Comet Hunter's Last Look at Earth Is Haunting

By Alexis Madrigal

This gorgeous image of a blue arc of the Earth against the blackness of space was captured by the Rosetta spacecraft as it swung by our planet.

The European Space Agency mission is on its way to intercept the comet, 67P/Churyumov-Gerasimenko. The ship will deploy a lander onto the comet's surface, the first such attempt to be made.

To gather up the necessary energy to reach the comet out past Mars' orbit, Rosetta needed three swings past Earth. This is its third and final flyby. It will reach the comet in early 2014.

Unlike the most famous pictures of Earth, which show most of the blue marble, this photo presents a planet in darkness, just the South Pole awash in light.

Image: ESA. High-resolution image of planet Earth from Rosetta.

http://www.wired.com/wiredscience/2009/11/earth-arc-from-space/

The Abacus Proves Its Might

- By Priya Ganapati

1946: The United States Army holds a contest pitting a Japanese abacus user against a soldier using an electric calculator. In four out of five rounds, the abacus wins.

The *soroban* or Japanese abacus is a handy calculating tool that hasn't changed since the 19th century. Despite the ubiquity of digital calculators, the soroban is still used in Japanese schools and banks today, and many users are faster on it than on calculators.

One of the secrets behind the soroban's popularity: It proved itself in an epic battle against a calculator. How could that happen?

A soroban has a rectangular frame with an odd number of vertical rods. Each column has five beads. The frame is traversed with one horizontal bar, which splits the beads into a set of four and a single bead below the horizontal fold. The single bead is called a heavenly bead and is valued at 5, and the other four called earth beads are valued at 1.

A standard-size soroban has 13 rods, though never less than nine. Having more rods allows for calculation of more digits or representations of several different numbers at a time. Most Japanese sorobans are made of wood and have metal or bamboo rods for the beads to slide on. What also sets the soroban apart from its Chinese progenitor, the *suanpan*, is a dot marking every third rod.

The soroban's biggest moment was in its face-off against an electric calculator. At the Ernie Pyle Theater in Tokyo in 1946, Pvt. Thomas Nathan Wood of the U.S. Army sat with an electric calculator against Kiyoshi Matsuzaki from Japan's postal ministry.

Scoring in the contest was based on speed and accuracy of results in four basic arithmetic operations — addition, subtraction, multiplication and division — and problems that combined all four.

The abacus scored 4 points against 1 point for the electric calculator. The soroban has an advantage when it comes to addition and subtraction, says Takashi Kojima in his book The Japanese Abacus, Its Use and Theory.

Ultimately, the soroban is not as much about mental dexterity as it is about mechanical skill, says soroban user Yannic Piché. Once you master the basics, the soroban becomes a "skill-acquisition process, not a learning adventure anymore," says Piche.

But in that also lies the soroban's success. With so little thought required for skilled users, is there any difference left between pushing the soroban's beads to find the right answer and tapping on a digital calculator?

Source: Various

Image: Jeremy Brooks/Flickr

http://www.wired.com/thisdayintech/2009/11/1112abacus-beats-calculator

10 Geeky Laws That Should Exist, But Don't

- By Matt Blum

There are many, many laws having nothing to do with government that are useful to know because they tell you something about how the universe works. There are Newton's laws of motion, the laws of thermodynamics, Boyle's Law, Heisenberg's Uncertainty Principle, among many. Most of these laws have been known for a long time, but it wasn't until a mere 19 years ago that Godwin's Law was written.

If you've ever been involved in a discussion on Usenet, or have been following politics in the past decade or so, you've probably encountered Godwin's Law. While Godwin's Law is, alas, as true today as it was then, it seems unfortunate that there aren't more widely accepted axioms to help us geeks define the characteristics of our world.

To that end, then, here are 10 geeky laws (axioms) that should exist, but don't … at least, they didn't until now:

1. Munroe's Law: A person in a geeky argument who can quote xkcd to support his position automatically wins the argument. This law supersedes Godwin, so that even if the quote is about Hitler, the quoter still wins.

2. Lucas's Law: There is no movie so beloved that a "special edition," prequel or sequel cannot trample and forever stain its memory.

3. Tolkien and Rowling's Law: No reasonably faithful movie adaptation of a book will ever be quite as good as the book it adapts. Thus great movie adaptations can only be made out of truly amazing books.

4. Somers and McCarthy's Law: There is no dangerous unscientific theory so preposterous that no celebrity will espouse and advocate it.

5. Jobs's Law: No matter how well last year's cool tech gadget still works, it will seem utterly inadequate the moment the new version comes out.

6. Savage and Hyneman's Law: Blowing stuff up is fun. Blowing stuff up in the name of science is AWESOME.

7. Starbucks' and Peet's Law: $C_8H_{10}N_4O_2$, better known as caffeine, is the most wonderful chemical compound known to humankind. If the field of chemistry had never identified or produced a single other useful compound, caffeine alone would be justification enough for its existence.

8. Wilbur's Law: Bacon makes everything better.

9. Comic Book Guy's Law: There is no detail of a movie too brief or inconsequential to become the subject of an hours-long diatribe.

10. The Unified Geek Theory: At present, the President of the United States, the wealthiest person in the United States, and the most trusted newscaster in the United States are all geeks. At the same time, movies based on comic book characters are routinely taking in hundreds of millions of dollars. The only reasonable conclusion is: We've won!

Got any good ones we missed? Please list them in the comments.

Cocaine and pepper spray – a lethal mix?

- 13 November 2009 by **Shanta Barley**

Magazine issue 2734.

Could be fatal (Image: Miguel Villagran/Getty)
DEATHS in US police custody during the early 1990s may have been the result of an interaction between capsaicin, the key ingredient in pepper sprays, and psychostimulant drugs, an experiment in mice suggests.

If the two have a fatal interaction in people then police forces might have to rethink their use of pepper spray as a non-lethal weapon, says John Mendelson of the Addiction and Pharmacology Research Laboratory at St Luke's Hospital in San Francisco, who led the mouse research.

In the early nineties, anecdotal reports emerged in the US of people dying after being sprayed by police. "They seemed to die very quickly," says Mendelson. At post-mortem, many of these people showed signs of having taken cocaine, so Mendelson wondered if capsaicin and cocaine could interact fatally in the body.

To investigate, his team injected cocaine, capsaicin or both at once into the abdomens of several groups of about 30 mice. Injections allowed them to control the dose of capsaicin the mice received, which wouldn't have been possible if the mice were simply sprayed, says Mendelson.

In one group of mice, cocaine was injected at a dose of 60 milligrams per kilogram of mouse weight, which killed just a few of them. But when the researchers injected a group with the same dose of cocaine plus capsaicin, the death toll was about half. "The presence of capsaicin in mice makes smaller amounts of cocaine more lethal," Mendelson says. When the team gave another group of mice capsaicin along with a higher dose of cocaine - enough to kill half of the mice on its own - the death toll rose to 90 per cent (*Forensic Toxicology*, DOI: 10.1007/s11419-009-0079-9). "We don't actually know how capsaicin reacts with cocaine to produce a lethal effect," admits Mendelson.

However, his team also reviewed 26 autopsy reports and Californian police reports between 1993 and 1995 of people who died shortly after being subdued with pepper spray. They noted that 19 of them

had evidence of psychostimulants in their blood and nine had cocaine. Mendelson suspects that a fatal interaction takes place in the brain between capsaicin and psychostimulants.

Toxicologists are intrigued, but say further evidence is needed. "In real-life situations, humans inhale pepper spray, whereas these mice had the substance injected directly into their abdominal cavities," says Andy Smith of the Medical Research Council in Cambridge, UK. Kathryn Cunningham of the Department of Pharmacology and Toxicology at the University of Texas in Galveston says we don't know how much of the capsaicin that is sprayed in someone's face makes it into their bloodstream.

Peter Bibring, an attorney at the American Civil Liberties Union in Los Angeles, says the study adds weight to the ACLU's concern that pepper spray could be fatal. "Police departments need to make adjustments to minimise the chance it will be used on those under the influence of cocaine."

Norm Leong, a sergeant at the Sacramento Police Department in California says this could be a tough call: "It's impossible to know if someone is under the influence of cocaine, some other drug", has mental issues, or is just resisting arrest.

http://www.newscientist.com/article/mg20427345.300-cocaine-and-pepper-spray--a-lethal-mix.html

Common cold may hold off swine flu

- 12 November 2009 by **Debora MacKenzie**

Magazine issue 2734.

Keeping swine flu at bay (Image: Leander Baerenz/Getty)

1 more image

A VIRUS that causes the common cold may be saving people from swine flu. If this intriguing idea turns out to be true, it would explain why swine flu's autumn wave has been slow to take off in some countries and point to new ways to fight flu.

"It is really surprising that there has not been more pandemic flu activity in many European countries," says Arnold Monto, an epidemiologist at the University of Michigan, Ann Arbor.

It is really surprising that there has not been more pandemic flu activity in many European countries
In France, flu cases rose in early September, then stayed at about 160 per 100,000 people until late October, when numbers started rising again. The delayed rise was puzzling, says Jean-Sebastien Casalegno of the French national flu lab at the University of Lyon.

He reports that the percentage of throat swabs from French respiratory illnesses that tested positive for swine flu fell in September, while at the same time rhinovirus, which causes colds, rose (*Eurosurveillance*, vol 14, p 19390). He told *New Scientist* that in late October, rhinovirus fell - at the same time as flu rose. He suspects rhinovirus may have blocked the spread of swine flu via a process called viral interference.

This is thought to occur when one virus blocks another. "We think that when you get one infection, it turns on your antiviral defences, and excludes the other viruses," says Ab Osterhaus at the University of Rotterdam in the Netherlands.

How important such interference is in viral epidemics is unclear, however: there are also cases in which there is no interference, and people catch two viruses at the same time. Normally, we don't get a chance to see how rhinovirus affects flu, as flu epidemics usually strike in winter, whereas rhinovirus hits when schools start (late summer in the northern hemisphere).

But this year the pandemic meant flu came early - and France isn't the only country in which rhinovirus seems to have held it at bay. In *Eurosurveillance* last month, Mia Brytting of the Swedish Institute for Infectious Disease Control in Solna reported a rise in rhinovirus coupled with a swine flu lull just after school resumed in Sweden at the end of August (see graph). She too says rhinovirus has

now fallen, as flu has climbed. Researchers in Norway report rhinovirus rose there as flu fell in August, while Ian Mackay at the University of Queensland found the same trend in Australia.

What's more, in March, Mackay reported that people with rhinovirus are less likely to be infected with a second virus than people with other viruses, and are just one-third as likely to have simultaneous seasonal flu (*Journal of Clinical Virology*, DOI: 10.1016/j.jcv.2009.03.008).

So why hasn't the US, for example, seen a dip in pandemic cases during a back-to-school rhinovirus outbreak? Mackay speculates that interference from rhinovirus may not be enough to fend off flu if someone is exposed repeatedly. There were far more cases of swine flu in the US in September than in Europe.

The effects of rhinovirus, often dismissed as "only" a cold, are too poorly understood, say all the researchers. Its seeming ability to block swine flu may already have saved lives in France by buying the nation time before the vaccine arrived. It may even lead to a drug that induces the antiviral state, but without the sniffles.

http://www.newscientist.com/article/mg20427345.100-common-cold-may-hold-off-swine-flu.html

Alcohol and sports sponsorship don't mix

- 11:49 11 November 2009 by **Jessica Hamzelou**

Alcohol and sport make unhappy bedfellows and sports sponsorship by drinks companies should be banned, say a group of public health researchers.

In the latest issue of *Addiction* (DOI: 10.1111/j.1360-0443.2009.02711.x), Kerry O'Brien at the University of Manchester, UK, and his colleagues claim that alcohol sponsorship tarnishes the image of sport and harms athletes' health. They have previously found that such sponsorship – which often includes free drinks – is linked to alcohol problems in athletes.

Instead, O'Brien suggests that governments increase tax on booze and use the proceeds to generate a general sports fund.

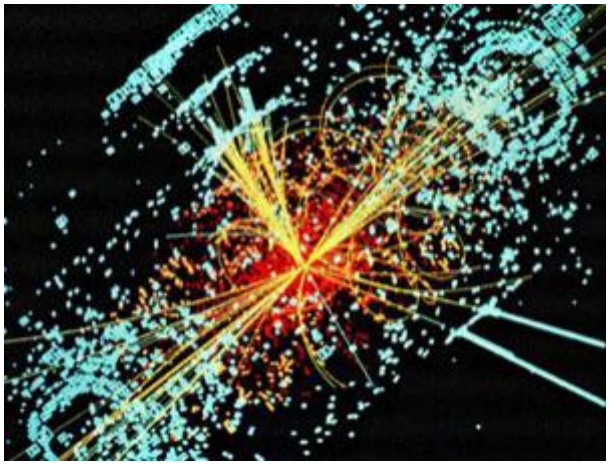
The alcohol industry has dismissed his team's research, O'Brien says. The onus should be on the industry to show its sponsorship does not harm health, he adds.

http://www.newscientist.com/article/dn18136-alcohol-and-sports-sponsorship-dont-mix.html

In SUSY we trust: What the LHC is really looking for

- 11 November 2009 by **Anil Ananthaswamy**

Magazine issue 2734.



This simulation depicts the decay of a Higgs particle following a collision of two protons in the CMS experiment (Image: CMS)

4 more images

AS DAMP squibs go, it was quite a spectacular one. Amid great pomp and ceremony - not to mention dark offstage rumblings that the end of the world was nigh - the Large Hadron Collider (LHC), the world's mightiest particle smasher, fired up in September last year. Nine days later a short circuit and a catastrophic leak of liquid helium ignominiously shut the machine down.

Now for take two. Any day now, if all goes to plan, proton beams will start racing all the way round the ring deep beneath CERN, the LHC's home on the outskirts of Geneva, Switzerland.

Nobel laureate Steven Weinberg is worried. It's not that he thinks the LHC will create a black hole that will engulf the planet, or even that the restart will end in a technical debacle like last year's. No: he's actually worried that the LHC will find what some call the "God particle", the popular and embarrassingly grandiose moniker for the hitherto undetected Higgs boson.

"I'm terrified," he says. "Discovering just the Higgs would really be a crisis."

Why so? Evidence for the Higgs would be the capstone of an edifice that particle physicists have been building for half a century - the phenomenally successful theory known simply as the standard model. It describes all known particles, as well as three of the four forces that act on them: electromagnetism and the weak and strong nuclear forces.

It is also manifestly incomplete. We know from what the theory doesn't explain that it must be just part of something much bigger. So if the LHC finds the Higgs and nothing but the Higgs, the standard model will be sewn up. But then particle physics will be at a dead end, with no clues where to turn next.

Hence Weinberg's fears. However, if the theorists are right, before it ever finds the Higgs, the LHC will see the first outline of something far bigger: the grand, overarching theory known as supersymmetry. SUSY, as it is endearingly called, is a daring theory that doubles the number of particles needed to explain the world. And it could be just what particle physicists need to set them on the path to fresh enlightenment.

So what's so wrong with the standard model? First off, there are some obvious sins of omission. It has nothing whatsoever to say about the fourth fundamental force of nature, gravity, and it is also silent on the nature of dark matter. Dark matter is no trivial matter: if our interpretation of certain astronomical observations is correct, the stuff outweighs conventional matter in the cosmos by more than 4 to 1.

Ironically enough, though, the real trouble begins with the Higgs. The Higgs came about to solve a truly massive problem: the fact that the basic building blocks of ordinary matter (things such as electrons and quarks, collectively known as fermions) and the particles that carry forces (collectively called bosons) all have a property we call mass. Theories could see no rhyme or reason in particles' masses and could not predict them; they had to be measured in experiments and added into the theory by hand.

These "free parameters" were embarrassing loose threads in the theories that were being woven together to form what eventually became the standard model. In 1964,Peter Higgs of the University of Edinburgh, UK, and François Englert and Robert Brout of the Free University of Brussels (ULB) in Belgium independently hit upon a way to tie them up.

That mechanism was an unseen quantum field that suffuses the entire cosmos. Later dubbed the Higgs field, it imparts mass to all particles. The mass an elementary particle such as an electron or quark acquires depends on the strength of its interactions with the Higgs field, whose "quanta" are Higgs bosons.

Fields like this are key to the standard model as they describe how the electromagnetic and the weak and strong nuclear forces act on particles through the exchange of various bosons - the W and Z particles, gluons and photons. But the Higgs theory, though elegant, comes with a nasty sting in its tail: what is the mass of the Higgs itself? It should consist of a core mass plus contributions from its interactions with all the other elementary particles. When you tot up those contributions, the Higgs mass balloons out of control.

The experimental clues we already have suggest that the Higgs's mass should lie somewhere between 114 and 180 gigaelectronvolts - between 120 and 190 times the mass of a proton or neutron, and easily the sort of energy the LHC can reach. Theory, however, comes up with values 17 or 18 orders of magnitude greater - a catastrophic discrepancy dubbed "the hierarchy problem". The only way to get rid of it in the standard model is to fine-tune certain parameters with an accuracy of 1 part in 10^{34}, something that physicists find unnatural and abhorrent.

Three into one

The hierarchy problem is not the only defect in the standard model. There is also the problem of how to reunite all the forces. In today's universe, the three forces dealt with by the standard model have very different strengths and ranges. At a subatomic level, the strong force is the strongest, the weak the weakest and the electromagnetic force somewhere in between.

Towards the end of the 1960s, though, Weinberg, then at Harvard University, showed with Abdus Salam and Sheldon Glashow that this hadn't always been the case. At the kind of high energies prevalent in the early universe, the weak and electromagnetic forces have one and the same strength; in fact they unify into one force. The expectation was that if you extrapolated back far enough towards the big bang, the strong force would also succumb, and be unified with the electromagnetic and weak force in one single super-force (see graph).

In 1974 Weinberg and his colleagues Helen Quinn and Howard Georgi showed that the standard model could indeed make that happen - but only approximately. Hailed initially as a great success, this not-so-exact reunification soon began to bug physicists working on "grand unified theories" of nature's interactions.

It was around this time that supersymmetry made its appearance, debuting in the work of Soviet physicists Yuri Golfand and Evgeny Likhtman that never quite made it to the west. It was left to Julius Wess of Karlsruhe University in Germany and Bruno Zumino of the University of California, Berkeley, to bring its radical prescriptions to wider attention a few years later.

Wess and Zumino were trying to apply physicists' favourite simplifying principle, symmetry, to the zoo of subatomic particles. Their aim was to show that the division of the particle domain into fermions and bosons is the result of a lost symmetry that existed in the early universe.

According to supersymmetry, each fermion is paired with a more massive supersymmetric boson, and each boson with a fermionic super-sibling. For example, the electron has the selectron (a boson) as its supersymmetric partner, while the photon is partnered with the photino (a fermion). In essence, the particles we know now are merely the runts of a litter double the size (see diagram).

The key to the theory is that in the high-energy soup of the early universe, particles and their super-partners were indistinguishable. Each pair co-existed as single massless entities. As the universe expanded and cooled, though, this supersymmetry broke down. Partners and super-partners went their separate ways, becoming individual particles with a distinctive mass all their own.

Supersymmetry was a bold idea, but one with seemingly little to commend it other than its appeal to the symmetry fetishists. Until, that is, you apply it to the hierarchy problem. It turned out that supersymmetry could tame all the pesky contributions from the Higgs's interactions with elementary particles, the ones that cause its mass to run out of control. They are simply cancelled out by contributions from their supersymmetric partners. "Supersymmetry makes the cancellation very natural," says Nathan Seiberg of Princeton University.

That wasn't all. In 1981 Georgi, together with Savas Dimopoulos of Stanford University, redid the force reunification calculations that he had done with Weinberg and Quinn, but with supersymmetry added to the mix. They found that the curves representing the strengths of all three forces could be made to come together with stunning accuracy in the early universe. "If you have two curves, it's not surprising that they intersect somewhere," says Weinberg. "But if you have three curves that intersect at the same point, then that's not trivial."

This second strike for supersymmetry was enough to convert many physicists into true believers. But it was when they began studying some of the questions raised by the new theory that things became really interesting.

One pressing question concerned the present-day whereabouts of supersymmetric particles. Electrons, photons and the like are all around us, but of selectrons and photinos there is no sign, either in nature or in any high-energy accelerator experiments so far. If such particles exist, they must be extremely massive indeed, requiring huge amounts of energy to fabricate.

Such huge particles would long since have decayed into a residue of the lightest, stable supersymmetric particles, dubbed neutralinos. Still massive, the neutralino has no electric charge and interacts with normal matter extremely timorously by means of the weak nuclear force. No surprise then that it is has eluded detection so far.

When physicists calculated exactly how much of the neutralino residue there should be, they were taken aback. It was a huge amount - far more than all the normal matter in the universe.

Beginning to sound familiar? Yes, indeed: it seemed that neutralinos fulfilled all the requirements for the dark matter that astronomical observations persuade us must dominate the cosmos. A third strike for supersymmetry.

Each of the three questions that supersymmetry purports to solve - the hierarchy problem, the reunification problem and the dark-matter problem - might have its own unique answer. But physicists are always inclined to favour an all-purpose theory if they can find one. "It's really reassuring that there is one idea that solves these three logically independent things," says Seiberg.

Supersymmetry solves problems with the standard model, helps to unify nature's forces and explains the origin of dark matter

Supersymmetry's scope does not end there. As Seiberg and his Princeton colleague Edward Witten have shown, the theory can also explain why quarks are never seen on their own, but are always corralled together by the strong force into larger particles such as protons and neutrons. In the standard model, there is no mathematical indication why that should be; with supersymmetry, it drops out of the equations naturally. Similarly, mathematics derived from supersymmetry can tell you how many ways can you fold a four-dimensional surface, an otherwise intractable problem in topology.

All this seems to point to some fundamental truth locked up within the theory. "When something has applications beyond those that you designed it for, then you say, 'well this looks deep'," says Seiberg. "The beauty of supersymmetry is really overwhelming."

Sadly, neither mathematical beauty nor promise are enough on their own. You also need experimental evidence. "It is embarrassing," says Michael Dine of the University of California, Santa Cruz. "It is a lot of paper expended on something that is holding on by these threads."

Circumstantial evidence for supersymmetry might be found in various experiments designed to find and characterise dark matter in cosmic rays passing through Earth. These include the Cryogenic Dark Matter Search experiment inside the Soudan Mine in northern Minnesota and the Xenon experiment beneath the Gran Sasso mountain in central Italy. Space probes like NASA's Fermi satellite are also scouring the Milky Way for the telltale signs expected to be produced when two neutralinos meet and annihilate.

The best proof would come, however, if we could produce neutralinos directly through collisions in an accelerator. The trouble is that we are not entirely sure how muscular that accelerator would need to be. The mass of the super-partners depends on precisely when supersymmetry broke apart as the universe cooled and the standard particles and their super-partners parted company. Various versions of the theory have not come up with a consistent timing. Some variants even suggest that certain super-partners are light enough to have already turned up in accelerators such as the Large Electron-Positron collider - the LHC's predecessor at CERN - or the Tevatron collider in Batavia, Illinois. Yet neither accelerator found anything.

The reason physicists are so excited about the LHC, though, is that the kind of supersymmetry that best solves the hierarchy problem will become visible at the higher energies the LHC will explore. Similarly, if neutralinos have the right mass to make up dark matter, they should be produced in great numbers at the LHC.

Since the accident during the accelerator's commissioning last year, CERN has adopted a softly-softly approach to the LHC's restart. For the first year it will smash together two beams of protons with a total energy of 7 teraelectronvolts (TeV), half its design energy. Even that is quite a step up from the 1.96 TeV that the Tevatron, the previous record holder, could manage. "If the heaviest supersymmetric particles weigh less than a teraelectronvolt, then they could be produced quite copiously in the early stages of LHC's running," says CERN theorist John Ellis.

If that is so, events after the accelerator is fired up again could take a paradoxical turn. The protons that the LHC smashes together are composite particles made up of quarks and gluons, and produce extremely messy debris. It could take rather a long time to dig the Higgs out of the rubble, says Ellis.

Any supersymmetric particles, on the other hand, will decay in as little as 10^{-16}seconds into a slew of secondary particles, culminating in a cascade of neutralinos. Because neutralinos barely interact with other particles, they will evade the LHC's detectors. Paradoxically, this may make them relatively easy to find as the energy and momentum they carry will appear to be missing. "This, in principle, is something quite distinctive," says Ellis.

So if evidence for supersymmetry does exist in the form most theorists expect, it could be discovered well before the Higgs particle, whose problems SUSY purports to solve. Any sighting of something that looks like a neutralino would be very big news indeed. At the very least it would be the best sighting yet of a dark-matter particle. Even better, it would tell us that nature is fundamentally supersymmetric.

There is a palpable sense of excitement about what the LHC might find in the coming years. "I'll be delighted if it is supersymmetry," says Seiberg. "But I'll also be delighted if it is something else. We need more clues from nature. The LHC will give us these clues."

Blood brothers?

String theory and supersymmetry are two as-yet unproved theories about the make-up of the universe. But they are not necessarily related.

It is true that most popular variants of string theory take a supersymmetric universe as their starting point. String theorists, who have taken considerable flak for advocating a theory that has consistently struggled to make testable predictions, will breathe a huge sigh of relief if supersymmetry is found.

That might be premature: the universe could still be supersymmetric without string theory being correct. Conversely, at the kind of energies probed by the LHC, it is not clear that supersymmetry is a precondition for string theory. "It is easier to understand string theory if there is supersymmetry at the LHC," says Edward Witten, a theorist at Princeton University, "but it is not clear that it is a logical requirement."

If supersymmetry does smooth the way for string theory, however, that could be a decisive step towards a theory that solves the greatest unsolved problem of physics: why gravity seems so different to all the rest of the forces in nature. If so, supersymmetry really could have all the answers.

Anil Ananthaswamy is a consulting editor for New Scientist

http://www.newscientist.com/article/mg20427341.200-in-susy-we-trust-what-the-lhc-is-really-looking-for.html

Mini ice age took hold of Europe in months

- 11 November 2009 by **Kate Ravilious**

Magazine issue 2734.

Big freezes can happen fast (Image: Tancrediphoto.com/Stone/Getty)
JUST months - that's how long it took for Europe to be engulfed by an ice age. The scenario, which comes straight out of Hollywood blockbuster *The Day After Tomorrow*, was revealed by the most precise record of the climate from palaeohistory ever generated.

Around 12,800 years ago the northern hemisphere was hit by the Younger Dryas mini ice age, or "Big Freeze". It was triggered by the slowdown of the Gulf Stream, led to the decline of the Clovis culture in North America, and lasted around 1300 years.

Until now, it was thought that the mini ice age took a decade or so to take hold, on the evidence provided by Greenland ice cores. Not so, say William Patterson of the University of Saskatchewan in Saskatoon, Canada, and his colleagues.

The group studied a mud core from an ancient lake, Lough Monreagh, in western Ireland. Using a scalpel they sliced off layers 0.5 to 1 millimetre thick, each representing up to three months of time. No other measurements from the period have approached this level of detail.

Carbon isotopes in each slice revealed how productive the lake was and oxygen isotopes gave a picture of temperature and rainfall. They show that at the start of the Big Freeze, temperatures plummeted and lake productivity stopped within months, or a year at most. "It would be like taking Ireland today and moving it up to Svalbard" in the Arctic, says Patterson, who presented the findings at the BOREAS conference in Rovaniemi, Finland, on 31 October.

"This is significantly shorter than what has been suggested before, but it is plausible," says Derek Vance of the University of Bristol, UK. Hans Renssen, a climate researcher at Vrije University in Amsterdam, the Netherlands, says recent findings from Greenland ice cores indicate the Younger Dryas event may have happened in one to three years. Patterson's results confirm this was a very sudden change, he says.

The mud slices from the end of the Big Freeze show that it took around two centuries for the lake and climate to recover.

Patterson says that sudden climate switches like the Big Freeze are far from unusual in the geological record. The Younger Dryas was brought about when a glacial lake covering most of north-west Canada burst its banks and poured into the North Atlantic and Arctic Oceans. The huge flood diluted the salinity-driven North Atlantic Ocean mega-currents, including the Gulf Stream, and stalled it. Two studies published in 2006 show that the same thing happened again 8200 years ago, when the Northern hemisphere went through another cold spell.

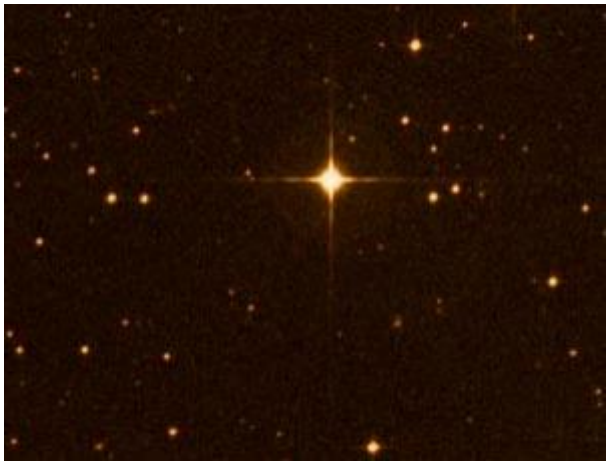
Some climate scientists have suggested that the Greenland ice sheet could have the same effect if it suddenly melts through climate change, but the 2007 report of the Intergovernmental Panel on Climate Change concluded this was unlikely to happen this century.

Patterson's team have now set their sights on even more precise records of historical climate. They have built a robot able to shave 0.05 micrometre slivers along the growth lines of fossilised clam shells, giving a resolution of less than a day. "We can get you mid-July temperatures from 400 million years ago," he says.

http://www.newscientist.com/article/mg20427344.800-mini-ice-age-took-hold-of-europe-in-months.html

Backward star ain't from around here

- 12:51 11 November 2009 by **Ken Croswell**



Kapteyn's Star is part of a 'Moving group' in the constellation of Pictor (Image: ESO Online Digitized Sky Survey)

Here's an apple that landed far from the tree. A dim star just 13 light years from Earth was born in a cluster 17,000 light years away.

Discovered in 1897, Kapteyn's Star is the 25th nearest star system to our sun, but it is no local, says Elizabeth Wylie-de Boer of Mount Stromlo Observatory in Canberra.

The cool star's composition is tricky to study, but astronomers can look at 16 other stars in the same "moving group", all of which orbit the galaxy backwards and are very old. The odd motion marks them as members of the Milky Way's ancient population of halo stars.

Of the stars, 14 had the same abundance of elements – such as sodium, magnesium, zirconium, barium – as Omega Centauri, the galaxy's most luminous globular cluster. The cluster emits a million times more light than the sun.

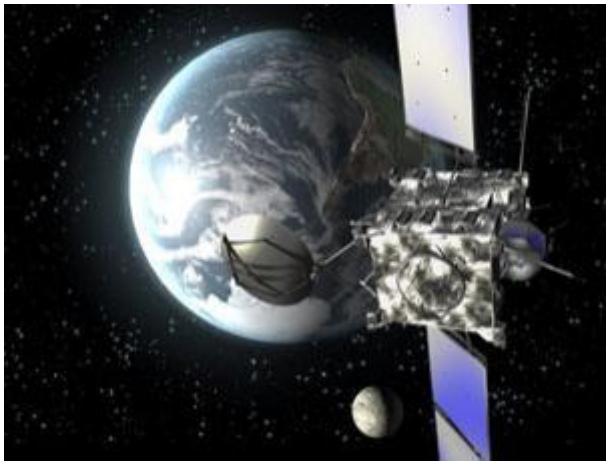
"It's long been thought that Omega Centauri is the left-over nucleus of a dwarf galaxy that merged with the Milky Way," says Wylie-de Boer, whose paper will appear in the *Astronomical Journal*. "During the merger, the outer regions of this dwarf galaxy were stripped."

Some of the cast-off stars ended up near the Sun, with one landing a mere 13 light years from Earth.

http://www.newscientist.com/article/dn18138-backward-star-aint-from-around-here.html

Will probe's upcoming fly-by unlock exotic physics?

- 18:17 10 November 2009 by **David Shiga**



The Rosetta probe will fly by Earth on Friday (Illustration: ESA/C. Carreau)
What's causing spacecraft to mysteriously accelerate? The Rosetta comet chaser's fly-by of Earth on 13 November is a perfect opportunity to get to the bottom of it.

The anomaly emerged in 1990, when NASA's Galileo spacecraft whizzed by Earth to get a boost from our planet's gravity and gained 3.9 millimetres per second more than expected. And the European Space Agency's Rosetta spacecraft had an unexpected increase of about 1.8 millimetres per second during a previous fly-by of Earth in 2005. Scientists have ruled out various mundane explanations like atmospheric drag or the effect of deviations in Earth's shape. This has led some to propose that exotic new physics is involved, such as modifications of Einstein's general relativity, the currently accepted theory of gravity.

Comet-chaser clue

All eyes are now on Rosetta, which is set to swing by Earth again at 0745 GMT on 13 November. It is en route to a comet, and will travel around 2500 kilometres above our planet's surface at over 13 kilometres per second. If it gains an extra 1.1 millimetres per second relative to Earth, it would vindicate a formula that reproduces the anomalies seen so far. The formula, published in 2008 by ex-NASA scientist John Anderson and his team, hints that Earth's rotation may be distorting space-time more than expected and thus influencing nearby spacecraft, though no one can explain how. General relativity predicts that spinning bodies distort the fabric of surrounding space, but the expected amount is far too small to explain the observed anomalies.

"I am definitely looking forward to this one," says Anderson, who is working with members of the Rosetta team to watch for an anomaly.

However, any anomaly will not be immediately obvious because the expected change is tiny. "I anticipate a few days or weeks before we know if an anomaly occurred," he says.

Curiously, Rosetta's 2007 flyby of Earth produced no anomaly. That might be because of its much higher altitude, about 5300 kilometres above Earth's surface, Anderson says. He suggests the effect may get weaker with distance from Earth: "There is most likely some dependence on distance – we just do not know what it is."

http://www.newscientist.com/article/dn18135-will-probes-upcoming-flyby-unlock-exotic-physics.html

How reputation could save the Earth

- 15 November 2009 by **David Rand** and **Martin Nowak**

Magazine issue 2734

Motivated to care (Image: Andrzej Krauze)

HAVE you ever noticed a friend or neighbour driving a new hybrid car and felt pressure to trade in your gas guzzler? Or worried about what people might think when you drive up to the office in an SUV? If so, then you have experienced the power of reputation for encouraging good public behaviour. In fact, reputation is such an effective motivator that it could help us solve the most pressing issue we face - protecting our planet.

Environmental problems are difficult to solve because Earth is a "public good". Even though we would all be better off if everyone reduced their environmental impact, it is not in anyone's individual interest to do so. This leads to the famous "tragedy of the commons", in which public resources are overexploited and everyone suffers.

Public goods situations crop up all over the place, including decisions on maintaining roads, funding the police and whether or not to shirk at work. This leads us to an important question: is it possible to make people care enough about such problems to do their bit? To help answer this, researchers have developed a representation of such situations called the public goods game. The results give cause to believe that the tragedy of the commons can be overcome.

In the public goods game, each player is given a sum of money, say $10. They then choose how much to keep and how much to anonymously contribute to a common pool. Contributions are multiplied by some factor (less than the number of players) and then split equally among all players. If everyone contributes, the payout is higher. But making a contribution is costly, and causes you to end up worse off than if you did not contribute.

Imagine, for example, four people playing a game in which contributions are doubled. If everyone contributes their $10, they all end up with $20. But a player who refuses to contribute while the others put in the full amount ends up with $25 while the rest get $15 each. If only one player contributes their $10, they end up with just $5 and everybody else $15. The self-interested thing to do, therefore, is never to contribute.

When the public goods game is played in the lab, most people usually begin by contributing a large amount, trying to do their part towards maximising the group's earnings. Some people, however, decide to take a slice of the profits without contributing. Over time this free-riding undermines the others' willingness to pay and the average contribution decreases. This results in significantly lower earnings all round, recreating the tragedy of the commons.

The public goods game gives us an opportunity to explore interventions that encourage cooperation. Experiments have shown, for example, that making each player's contribution public can sustain

contributions at a high level. It appears that the benefit of earning a good name outweighs the costs of doing your part for the greater good, and even selfish people can be motivated to care. It is worth contributing in order to protect your standing in the community.

Out in the real world, these experiments suggest a way to help make people reduce their impact on the environment. If information about each of our environmental footprints was made public, concern for maintaining a good reputation could impact behaviour. Would you want your neighbours, friends, or colleagues to think of you as a free rider, harming the environment while benefiting from the restraint of others?

The power of reputation is already being harnessed to protect the environment. Hybrid cars such as the Toyota Prius have recognisable designs, advertising their driver's commitment to cleaner energy for all to see. Some energy companies give green flags to customers who choose to pay extra for energy from a more environmentally friendly source, allowing people to openly display their green credentials. Similarly, individuals who volunteer in environmental clean-up days receive T-shirts advertising their participation.

Tokens such as these serve a dual purpose. First, they allow those who contribute to reap benefits through reputation, helping to compensate them for the costs they incur. Secondly, when people display their commitment to conservation, it reinforces the norm of participation and increases the pressure on free riders. If you know that all of your neighbours are paying extra for green energy or volunteering on a conservation project, that makes you all the more inclined to do so yourself.

When people display their commitment to conservation, it ups the pressure on free riders
Even better than voluntary displays would be laws enforcing disclosure. For example, governments could require energy companies to publish the amount of electricity used by each home and business in a searchable database. Likewise, gasoline use could be calculated if, at yearly inspections, mechanics were required to report the number of kilometres driven. Cars could be forced to display large stickers indicating average distance travelled, with inefficient cars labelled similarly to cigarettes: "Environmentalist's warning: this car is highly inefficient. Its emissions contribute to climate change and cause lung cancer and other diseases." Judging from our laboratory research, such policies would motivate people to reduce their carbon footprint.

Although laws of this kind raise possible privacy issues, the potential gains could be great. In a world where each of us was accountable to everybody else for the environmental damage we cause, there would be strong incentives to reduce the energy we use, the carbon dioxide we emit and the pollution we create. In such a world, we might be able to avert a global tragedy of the commons.

David Rand is a postdoctoral fellow in mathematical biology at Harvard University.

Martin Nowak is professor of biology and mathematics at Harvard University.

http://www.newscientist.com/article/mg20427347.100-how-reputation-could-save-the-earth.html

Piezoelectronics gets green makeover

- 18:05 12 November 2009 by **MacGregor Campbell**
- For similar stories, visit the **Nanotechnology** Topic Guide

A new generation of lead-free piezoelectric materials could lead to greener actuators, sensors and even ultra-dense data storage. The new materials, which generate an electric field when squeezed, copy the crystal structure of conventional piezoelectric materials but use bismuth instead of lead.

Since the EU banned lead (see *Uncovering the hazards in our electronic gadgets*) from electrical devices in 2006, scientists and manufacturers have been scrambling to find alternatives to key materials that depend on the toxic metal for their function. In particular, piezoelectrics – materials that can convert mechanical stress into an electric field and vice versa – have proved challenging to replace. Now a new design, based on clever crystal geometry, could soon deliver comparable performance with less environmental impact.

The best-performing piezoelectric materials are currently made from lead zirconium titanate (PZT). This has a crystal structure consisting of atoms arranged in the shapes of squares and diamonds. An electric field causes the diamonds to flip into square shapes, changing the structure of the crystal and altering its overall length by up to 10 per cent.

Robert Zeches, Ramamoorthy Ramesh and colleagues at University of California, Berkeley have developed a way to reproduce this behaviour using layers of non-toxic bismuth ferrite, which naturally forms into a square crystal structure. They start with an electrically charged grid of squares that are slightly smaller than those usually formed by bismuth ferrite. They then deposit the bismuth ferrite onto the grid using an ultraviolet laser. As the film builds up, some of the squares maintain their shape, while others get skewed as they attempt to form the natural, larger crystal structure.

The result is a mixture of box and diamond shapes, which behave in similar way to those in PZT. In the presence of the electric field, the new material can change its length by around 1.5 per cent – not as much as PZT, but enough for many practical purposes. The team says these could include making ultra-dense data storage in which a bit is stored in a region of the crystal that is extended. The data would be written and read using an atomic force microscope tip.

"One of the drivers of this research is trying to find ferroelectric materials that perform on a par with lead-based compounds but that don't have lead in them," says Zeches.

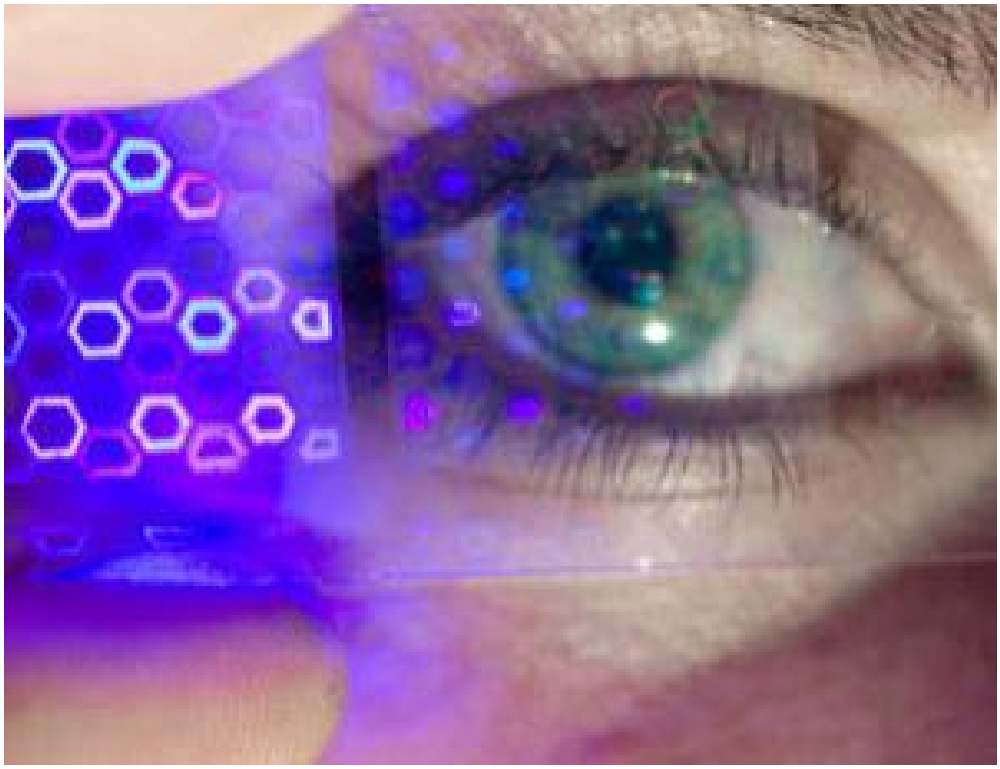
"We want something that could be a viable replacement for what's in the field."

The team still needs to improve the material's piezoelectric response, says Muhtar Arhart, a materials researcher at the Carnegie/Doe Alliance Center in Washington DC, not involved with the research. "If it doesn't have lead but still has huge piezo properties, that would be very nice. Lead has all kinds of hazardous properties."

http://www.newscientist.com/article/dn18149-piezoelectronics-gets-green-makeover.html

Contact lenses to get built-in virtual graphics

- 11:47 12 November 2009 by **Vijaysree Venkatraman**



Future Vision (Image: U. Bellhaeuser/ScienceFoto/Getty)

2 more images

A contact lens that harvests radio waves to power an LED is paving the way for a new kind of display. The lens is a prototype of a device that could display information beamed from a mobile device.

Realising that display size is increasingly a constraint in mobile devices, Babak Parviz at the University of Washington, in Seattle, hit on the idea of projecting images into the eye from a contact lens.

One of the limitations of current head-up displays is their limited field of view. A contact lens display can have a much wider field of view. "Our hope is to create images that effectively float in front of the user perhaps 50 cm to 1 m away," says Parviz.

His research involves embedding nanoscale and microscale electronic devices in substrates like paper or plastic. He also wears contact lenses. "It was a matter of putting the two together," he says.

Fitting a contact lens with circuitry is challenging. The polymer cannot withstand the temperatures or chemicals used in large-scale microfabrication, Parviz explains. So, some components – the power-harvesting circuitry and the micro light-emitting diode – had to be made separately, encased in a biocompatible material and then placed into crevices carved into the lens.

One obvious problem is powering such a device. The circuitry requires 330 microwatts but doesn't need a battery. Instead, a loop antenna picks up power beamed from a nearby radio source. The team has tested the lens by fitting it to a rabbit.

Parviz says that future versions will be able to harvest power from a user's cell phone, perhaps as it beams information to the lens. They will also have more pixels and an array of microlenses to focus the image so that it appears suspended in front of the wearer's eyes.

Despite the limited space available, each component can be integrated into the lens without obscuring the wearer's view, the researchers claim. As to what kinds of images can be viewed on this screen, the possibilities seem endless. Examples include subtitles when conversing with a foreign-language speaker, directions in unfamiliar territory and captioned photographs. The lens could also serve as a head-up display for pilots or gamers.

Mark Billinghurst, director of the Human Interface Technology Laboratory, in Christchurch, New Zealand, is impressed with the work. "A contact lens that allows virtual graphics to be seamlessly overlaid on the real world could provide a compelling augmented reality experience," he says. This prototype is an important first step in that direction, though it may be years before the lens becomes commercially available, he adds.

The University of Washington team will present their prototype at the Biomedical Circuits and Systems (BioCas 2009) conference at Beijing later this month.

http://www.newscientist.com/article/dn18146-contact-lenses-to-get-builtin-virtual-graphics.html

Ink breakthrough puts the shine into printed images

- 15:02 10 November 2009 by **Colin Barras**

A Christmas card printed with the new technology, which can print a wide range of matt and reflective inks (Image: Matusik et al. and ACM Siggraph)

The difference between a matt and a glossy painted surface shows that there's more to the appearance of real-world objects than colour alone. But reproducing that variation in printed images has been beyond the capabilities of even the best colour printers. Now an international team of computer scientists says that could soon change thanks to a printer that can reproduce sheen as well as colour.

Spot the difference

Some modern printers can use matt, glossy or metallic inks to change the reflectivity of an image, but the inks are always used on their own, as so-called spot colours. But by carefully mixing a range of such metallic inks, Fabio Pellacini at Adobe Systems and Dartmouth College in Hanover, New Hampshire, says it's possible to reproduce subtle differences in reflectivity in the same way that mixing cyan, magenta and yellow can reproduce a range of colours.

Pellacini worked with colleagues including Wojciech Matusik and Szymon Rusinkiewicz at Adobe Systems. The team used a colour thermal printer, which is versatile enough to print many metallic inks and foils as well as standard inks.

Mixing the inks

The printer they used can accept up to seven ink cartridges at one time, but to produce a full range of reflectivity the team needed 12 inks: cyan, metallic cyan, magenta, metallic magenta, yellow, metallic gold, black, metallic silver, gold foil, silver foil, finish and primer.

They swapped individual cartridges and printed over images several times to produce the final product. By overlaying up to six inks, the team worked out how to represent a spectrum of colours with a wide range of reflectivities.

But being able to control the reflectivity of a printed image solves only half the problem. To reproduce real-world objects on the printed page, the team first had to assess the reflectivity of the

original object. For this, they used an automated process that takes several pictures of an object from different angles and lit from different positions.

The team then used this information to determine the ratio between the amounts of incoming and reflected light, says Pellacini. "[The process] captures not only the matt colour of a surface but its highlights, allowing us to represent a wide range of materials like plastics, metals and paints."

3D printing

The first prints using the new technique (see image, above right) are relatively poor quality because the measurement technique has limited resolution, Pellacini says. But future developments should improve the technique. The goal is to combine the technique with 3D printing to create 3D objects that look more realistic, he says.

Roger Hersch at the Swiss Federal Institute of Technology in Lausanne, who was not involved in the study, says there is a trend towards adding more than pure colour to prints. "It provides an additional dimension which may be used by designers to create new effects," he says.

A job for the specialists

But he doubts that the new technology will appeal to home computer users yet. "It's mainly graphic art professionals who will be interested in the technology," he says.

Pellacini agrees. "There is still the issue of the 'input' to our printer," he says – very few labs have the equipment to measure the reflectivity of an object, and without that information it's not possible to reproduce an object's surface texture in print.

Pellacini's team will present their work at the Siggraph Asia conference in Yokohama, Japan, in December.

http://www.newscientist.com/article/dn18129-ink-breakthrough-puts-the-shine-into-printed-images.html

Clever fools: Why a high IQ doesn't mean you're smart

- 02 November 2009 by **Michael Bond**

Magazine issue 2732.

There's more to intelligence than just IQ. (Image: David C Ellis/Getty)
Editorial: *A rational alternative to testing IQ*

IS GEORGE W. BUSH stupid? It's a question that occupied a good many minds of all political persuasions during his turbulent eight-year presidency. The strict answer is no. Bush's IQ score is estimated to be above 120, which suggests an intelligence in the top 10 per cent of the population. But this, surely, does not tell the whole story. Even those sympathetic to the former president have acknowledged that as a thinker and decision-maker he is not all there. Even his loyal speechwriter David Frum called him glib, incurious and "as a result ill-informed". The political pundit and former Republican congressman Joe Scarborough accused him of lacking intellectual depth, claiming that compared with other US presidents whose intellect had been questioned, Bush junior was "in a league by himself". Bush himself has described his thinking style as "not very analytical".

How can someone with a high IQ have these kinds of intellectual deficiencies? Put another way, how can a "smart" person act foolishly? Keith Stanovich, professor of human development and applied psychology at the University of Toronto, Canada, has grappled with this apparent incongruity for 15 years. He says it applies to more people than you might think. To Stanovich, however, there is nothing incongruous about it. IQ tests are very good at measuring certain mental faculties, he says, including logic, abstract reasoning, learning ability and working-memory capacity - how much information you can hold in mind. But the tests fall down when it comes to measuring those abilities crucial to making good judgements in real-life situations. That's because they are unable to assess things such as a person's ability to critically weigh up information, or whether an individual can override the intuitive cognitive biases that can lead us astray.

This is the kind of rational thinking we are compelled to do every day, whether deciding which foods to eat, where to invest money, or how to deal with a difficult client at work. We need to be good at rational thinking to navigate our way around an increasingly complex world. And yet, says Stanovich, IQ tests - still the predominant measure of people's cognitive abilities - do not effectively tap into it. "IQ tests measure an important domain of cognitive functioning and they are moderately good at predicting academic and work success. But they are incomplete. They fall short of the full panoply of skills that would come under the rubric of 'good thinking'."

IQ isn't everything

"A high IQ is like height in a basketball player," says David Perkins, who studies thinking and reasoning skills at Harvard Graduate School of Education in Cambridge, Massachusetts. "It is very important, all other things being equal. But all other things aren't equal. There's a lot more to being a good basketball player than being tall, and there's a lot more to being a good thinker than having a high IQ."

IQ tests and their proxies, which are designed to measure a factor known as general intelligence, are used by many businesses and colleges to help select the "best" candidates, and also play a role in

schools and universities, in the form of SAT tests in the US and CATs in the UK. "IQ tests determine, to an important degree, the academic and professional careers of millions of people in the US," Stanovich says in his book, *What Intelligence Tests Miss* (Yale University Press, 2008). He challenges the "lavish attention" society bestows on such tests, which he claims measure only a limited part of cognitive functioning. "IQ tests are overvalued, and I think most psychologists would agree with that," says Jonathan Evans, a cognitive psychologist at the University of Plymouth, UK.

Indeed, IQ scores have long been criticised as poor indicators of an individual's all-round intelligence, as well as for their inability to predict how good a person will be in a particular profession. The palaeontologist Stephen Jay Gould claimed in *The Mismeasure of Man* in 1981 that general intelligence was simply a mathematical artefact and that its use was unscientific and culturally and socially discriminatory. Howard Gardner at the Harvard Graduate School of Education has been arguing - controversially - for more than 25 years that cognitive capacity is best understood in terms of multiple intelligences, covering mathematical, verbal, visual-spatial, physiological, naturalistic, self-reflective, social and musical aptitudes. Yet unlike many critics of IQ testing, Stanovich and other researchers into rational thinking are not trying to redefine intelligence, which they are happy to characterise as those mental abilities that can be measured by IQ tests. Rather, they are trying to focus attention on cognitive faculties that go beyond intelligence - what they describe as the essential tools of rational thinking. These, they claim, are just as important as intelligence to judgement and decision-making. "IQ is only part of what it means to be smart," says Evans.

As an illustration of how rational-thinking ability differs from intelligence, consider this puzzle: if it takes five machines 5 minutes to make five widgets, how long would it take 100 machines to make 100 widgets? Most people instinctively jump to the wrong answer that "feels" right - 100 - even if they later amend it. When Shane Frederick at the Yale School of Management in New Haven, Connecticut, put this and two similarly counter-intuitive questions to about 3400 students at various colleges and universities in the US - Harvard and Princeton among them - only 17 per cent got all three right (see "Test your thinking"). A third of the students failed to give any correct answers (*Journal of Economic Perspectives*, vol 19, p 25).

We encounter problems like these in various guises every day. Without careful reasoning we often get them wrong, probably because our brains use two different systems to process information (see *New Scientist*, 30 August 2008, p 34). One is intuitive and spontaneous; the other is deliberative and reasoned. Intuitive processing can serve us well in some areas - choosing a potential partner, for example, or in situations where you've had a lot of experience. It can trip us up in others, though, such as when we overvalue our own egocentric perspective. Deliberative processing, on the other hand, is key to conscious problem-solving and can help us override our intuitive tendencies if they look like leading us astray.

The problem with IQ tests is that while they are effective at assessing our deliberative skills, which involve reason and the use of working memory, they are unable to assess our inclination to use them when the situation demands. This is a crucial distinction: as Daniel Kahneman at Princeton University puts it, intelligence is about brain power whereas rational thinking is about control. "Some people who are intellectually able do not bother to engage very much in analytical thinking and are inclined to rely on their intuitions," explains Evans. "Other people will check out their gut feeling and reason it through and make sure they have a justification for what they're doing." An IQ test cannot predict which of these paths someone will follow, hence the George W. Bush incongruity of people who are supposedly smart acting foolishly.

The idea that Bush is just one foolish smart person among many, and that intelligence is a poor predictor of "good thinking", comes from a series of recent experiments that compared the performances of people of a range of intellectual abilities on rational-thinking tasks. In a study published last year, Stanovich and Richard West of James Madison University in Harrisonburg, Virginia, found there was no correlation between intelligence and a person's ability to avoid some common traps of intuitive-thinking (*Journal of Personality and Social Psychology*, vol 94, p 672).

On certain types of thinking tasks, such as those involving number ratios, probabilities, deductive reasoning and the use of hindsight, intelligent people do perform better, Stanovich and others have found. This is particularly true when any intuitive pitfalls are obvious, especially if a correct answer depends on logic or abstract reasoning - abilities that IQ tests measure well. But most researchers agree that, overall, the correlation between intelligence and successful decision-making is weak. The exception is when people are warned that they might be vulnerable to a thinking bias, in which case those with high IQs tend to do better. This, says Evans, is because while smart people don't always reason more than others, "when they do reason, they reason better".

For example, consider the following problem. Jack is looking at Anne, and Anne is looking at George; Jack is married, George is not. Is a married person looking at an unmarried person? If asked to choose between yes, no, or cannot be determined, the vast majority of people go for the third option - incorrectly. If told to reason through all the options, though, those of high IQ are more likely to arrive at the right answer (which is "yes": we don't know Anne's marital status, but either way a married person would be looking at an unmarried one). What this means, says Stanovich, is that "intelligent people perform better only when you tell them what to do".

Perkins explains this as follows: "IQ indicates a greater capacity for complex cognition for problems new to you. But what we apply that capability to is another question. Think of our minds as searchlights. IQ measures the brightness of the searchlight, but where we point it also matters. Some people don't point their searchlights at the other side of the case much, for many reasons - entrenched ideas, avoidance of what might be disturbing, simple haste. A higher wattage searchlight in itself is no protection against such follies." Indeed, it seems even the super-intelligent are not immune. A survey of members of Mensa (the High IQ Society) in Canada in the mid-1980s found that 44 per cent of them believed in astrology, 51 per cent believed in biorhythms and 56 per cent believed in aliens (*Skeptical Inquirer*, vol 13, p 216). Think of our minds as searchlights. IQ measures the brightness of the searchlight, but where we point it also matters

The idea that IQ is a poor measure of rationality is not without its critics, though. Christopher Ferguson, who studies the genetic and environmental factors behind human behaviour at Texas A&M International University in Laredo, says that since those with high IQ tend to live longer and earn more, we should assume that intelligent people are more rational. "They tend to have more knowledge with which to make better decisions," he says.

Yet Wändi Bruine de Bruin at Carnegie Mellon University in Pittsburgh, Pennsylvania, has shown that intelligence cannot be the only factor that dictates whether someone is a good thinker and decision-maker. In a study of 360 Pittsburgh residents aged between 18 and 88, her team found that, regardless of differences in intelligence, those who displayed better rational-thinking skills suffered significantly fewer negative events in their lives, such as being in serious credit card debt, having an unplanned pregnancy or being suspended from school (*Journal of Personality and Social Psychology*, vol 92, p 938). Andrew Parker, now with the Rand Corporation in Pittsburgh, and Baruch Fischhoff at Carnegie Mellon found a similar association among adolescents. Those who scored higher on a test of decision-making competence drank less, took fewer drugs and engaged in less risky behaviour overall (*Journal of Behavioral Decision Making*, vol 18, p 1). This suggests that rational thinking may be more important than intelligence for positive life experiences, Fischhoff says.

A potent criticism of Stanovich's theory is the lack of a proven test of rational thinking skills that could be used alongside IQ tests. "It is not enough to say what intelligence is not measuring, you have to propose alternative ways of measuring rationality," says Kahneman. Stanovich maintains that while developing a universal "rationality-quotient (RQ) test" would require a multimillion-dollar research programme, there is no technical or conceptual reason why it could not be done. There are already several contenders, such as the measure of decision-making competence used by Bruine de Bruin and Fischhoff.

Would a valid RQ test be useful? "Hypothetically, yes, because it would cover skills that are more directly related to what people will be doing in their jobs," says Bruine de Bruin. Kahneman maintains that IQ tests, as measures of brain power, work well for academic selection. "But I would very seriously consider RQ tests as a way of selecting managers or leaders, particularly if I wanted a style of leadership that is thorough and not overly impulsive," he says.

There is a drawback, however: unlike with IQ, it would be relatively easy to train people to do well on RQ tests. "They measure the extent to which people are inclined to use what capacity they have," says Evans. "You could train people to ignore intuition and engage reasoning for the sake of the test, even if this was not their normal inclination."

The flip side of this is that everyone can improve their rational thinking and decision-making skills. Richard Nisbett at the University of Michigan in Ann Arbor and others discovered that just half an hour's training in statistical reasoning can improve a person's ability to use rational thinking in everyday situations. And we don't need formal training to improve: there are many tricks we can teach ourselves, says Perkins (see "How to avoid making foolish decisions").

We might also be better equipped to elect leaders that did the same. Bush's successor is intellectually engaged, shows cognitive flexibility, can question beliefs, is sensitive to inconsistency and engages in counterfactual thinking, says Stanovich. "They could not be more different in their rational thinking profiles." President Obama's IQ, incidentally, is well above average - but then so was Bush's.

Test your thinking

When researchers put the following three problems to 3400 students in the US, only 17 per cent got all three right. Can you do any better?

1) A bat and a ball cost $1.10 in total. The bat costs $1 more than the ball. How much does the ball cost?

2) If it takes five machines 5 minutes to make five widgets, how long would it take 100 machines to make 100 widgets?

3) In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of it?

[For answers, see below]

Source: Shane Frederick, 2005

Answers: 1) 5 cents, 2) 5 minutes, 3) 47 days

http://www.newscientist.com/article/mg20427321.000-clever-fools-why-a-high-iq-doesnt-mean-youre-smart.html

Quantum 'trampoline' to test gravity

- 17:42 12 November 2009 by **Anil Ananthaswamy**

IT'S the world's smallest trampoline. Bouncing atoms with lasers could make ultra-precise measurements of gravity.

To test theories such as general relativity, the strength of gravity is measured precisely using ensembles of supercold atoms falling in a vacuum chamber. These ensembles are called "Bose-Einstein condensates".

BECs act in a quantum-mechanical wave-like fashion and interfere with each other. The interference pattern depends on the paths the atoms take, so gravity's effect on how fast they fall can be calculated by analysing the pattern with an interferometer. The longer the fall, the more precise the measurement – but the harder it is to keep the ensemble intact.

"The longer your interferometer, the more precise is your measurement," says Thomas Bourdel of the Charles Fabry Institute of Optics in Palaiseau, France. "But you are limited by the size of your apparatus."

Quantum fall

Now Philippe Bouyer of the Institute of Optics in Palaiseau, France, along with Bourdel and colleagues have increased the fall time with a "quantum trampoline".

In a microscopic chamber, they fired a specially designed laser pulse at the falling BECs. The pulse affected the BECs in the same way that a crystal lattice can affect light: since the atoms exhibit wave-like behaviour, they can be diffracted in a similar way to light in a crystal.

By tuning the laser, the team were able to split up the wave, causing some of its components to bounce upwards. When the parts fell back down, the laser was pulsed so they split again, and so on. Eventually the parts recombined in an interference pattern.

The device is less precise than existing atom interferometers, but the team plan to improve precision markedly by, for instance, using lighter atoms. Lighter atoms like helium and lithium will levitate for longer after each bounce than heavier atoms. This has the same effect as creating a longer interferometer with heavier atoms.

Journal reference: arxiv.org/abs/0911.0203

http://www.newscientist.com/article/dn18148-quantum-trampoline-to-test-gravity.html

Big profit from nature protection
By Richard Black
Environment correspondent, BBC News website

Money invested in protecting nature can bring huge financial returns, according to a major investigation into the costs and benefits of the natural world.

It says money ploughed into protecting wetlands, coral reefs and forests can bring a hundredfold return on capital.

The Economics of Ecosystems and Biodiversity study (Teeb) is backed by the UN and countries including the UK.

The project's leader says governments should act on its findings at next month's UN climate summit.

Teeb is the first attempt to evaluate the economic value of "ecosystem services" - things that parts of the natural world do for free, such as purifying drinking water or protecting coasts from storms - on a systematic and global basis.

" **We can say quite confidently that there is a solid benefit from investing in protected areas** "
Pavan Sukhdev

"We have now evaluated 1,100 studies ranging across different countries and different ecosystem services," said study leader Pavan Sukhdev, a Deutsche Bank economist.

"And we find that with protected areas, for example, no matter how you slice the figures up you come up with a ratio of benefits to costs that's between 25-to-one and 100-to-one.

"Now we can say quite confidently that there is a solid benefit from investing in protected areas," he told BBC News.

Watery world

The project's initial tranche of work focussed on forests, finding that the ongoing loss of forest comes with an annual pricetag of US $2-5 trillion, dwarfing the banking crisis.

The new analysis takes the economists to the undersea realms of fisheries and coral reefs.

Conservation groups have repeatedly called for a vast expansion in protection for marine ecosystems, both to conserve biodiversity and as a longer-term boost to fisheries yields.

Mr Sukhdev said there was a powerful economic case for this as well.

"If we were to expand marine protection from less than 1% to 30%, say, what would that cost?

"Establishing reserves, policing them and so on, would cost about $40-50bn per year - and the annual benefit would be about $4-5 trillion."

The benefits would come from increasing fish catches and tourism revenue and - in the case of reefs - protecting shorelines from the destructive force of storms.

"The Teeb report is hugely significant in showing that [loss of nature] is inextricably linked with a sustainable worldwide economy, and we warmly welcome the call upon policymakers to accelerate, scale-up and embed investments in the management and restoration of ecosystems," commented Stephen Hopper, director of the Royal Botanic Gardens at Kew.

The study says protected areas need to be chosen carefully, as they are on land, and concentrated in areas of ecological and economic importance.

Other examples given in the report include:

- a Costa Rican study showing that areas of intact forest increase the yield of coffee farms by 20% because they shelter pollinating insects
- a grassland conservation area in New Zealand that supplies the Otago region with free water that would cost $100m per year to bring in from elsewhere
- in Vietnam, planting and protecting nearly 12,000 hectares of mangroves cost the government $1.1m but saved annual expenditures on dyke maintenance of $7.3m

Forest call

Although individual economists have made these arguments before, Teeb aims to draw all the evidence together and present it to policymakers, hoping it can persuade governments to invest in nature protection just as the Stern Review made the economic case for tackling climate change.

"We show that the failure of markets to adequately consider the value of ecosystem services is of concern not only to environment, development and climate change ministries but also to finance, economics and business ministries," says the report.

"Evidence presented here shows pro-conservation choices to be a matter of economic common sense in the vast majority of cases."

Some governments are on board already: Germany - which initiated the project in 2007 - Norway, and the UK.

"This report really highlights the need to understand the part nature plays in sustaining our economy as we go into the International Year of Biodiversity," said UK Environment Secretary Hilary Benn.

"By showing how we can place an economic value on biodiversity, it will help us to do the right thing nationally and internationally - not just to respond to the growing crisis of biodiversity loss, but also to deal with climate change."

At next month's UN climate summit in Copenhagen, governments are likely to finalise a process for financing forest protection as a cheap way of curbing carbon emissions.

Teeb's conclusions give economic backing to calls from conservation and indigenous peoples' groups for this process - Reducing Emissions from Deforestation and forest Degradation (REDD) - to encourage ecologically sound forest management, rather than simply aiming to absorb carbon dioxide.

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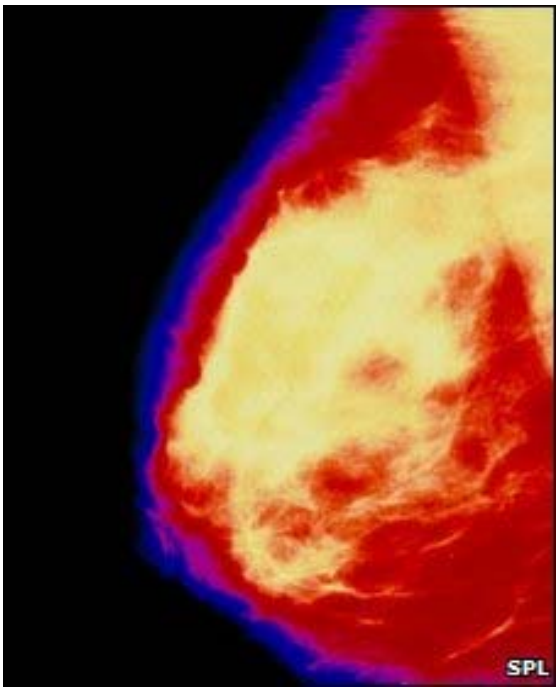
Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8357723.stm

Published: 2009/11/13 11:12:38 GMT

Breast 'regrowth' trial planned

Researchers in Australia plan to test a medical "scaffold" designed to stimulate natural breast tissue to regrow following surgery.



Doctors from the Bernard O'Brien Institute of Microsurgery in Melbourne, will test the technique next year in a trial involving six patients.

The team say that the permanent fat found in breasts can be grown inside this contoured scaffold.

They claim to have successfully tested the device in pigs.

The results of that experiment were presented at a plastic surgery conference in Sydney.

The researchers recently announced on the institute's website that they had received funding from the Australian government to carry out the human trial.

If this is successful, they hope to develop it into a breast reconstruction technique that avoids using silicone.

Breast scaffold

The teams says that when the "empty chamber" is implanted, fat tissue will naturally fill it to form a new breast.

" **It's at such an early stage, it is not yet clear whether it will work in people** "
Dr Lesley Walker Cancer Research UK

This chamber will also contain a gel made using the patients' muscle cells to "induce fat tissue production".

Professor Anthony Hollander, an expert in tissue engineering from the University of Bristol in the UK, said the attractions of this approach were its simplicity and the fact that the tissue growth occurred inside the body.

"At the time of implanting the cells the surgeon redirects the vasculature of the body which keeps a good blood supply to the implant. That is in itself nothing new, but combining it with a cell implant is an interesting step," he said.

He said that the technological advance was the use of a biomaterial cage used to trap the cells in the right place.

In future, the team plan to make this cage biodegradable so it does not have to be removed.

"If it's tried and it works that will be a really nice approach," Professor Hollander said.

But he cautioned that there was "still some way to go".

"This procedure is first likely to be used on cancer patients," he said.

"[The team will] have to be able to demonstrate a technique that guarantees that all the cancerous cells are removed and none are grown up in the process, so there is still some way to go."

Dr Lesley Walker, director of cancer information at Cancer Research UK, said: "We know that having a mastectomy can be a very difficult experience for many women and so research to try to improve breast reconstruction after surgery is important.

"[But] it's at such an early stage, it is not yet clear whether it will work in people. Even if this surgery proves to be effective, it will be a number of years before it can be used in the clinic."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8357195.stm

Published: 2009/11/12 18:33:01 GMT

Noise 'worse for dyslexic pupils'

Children with dyslexia find it harder to hear in noisy classrooms than those without the condition, a US study says.

Pupils with poor reading skills were also more likely to struggle to retain information when there was background noise, researchers reported in Neuron.

They said the findings, based on tests on 30 children, might help to develop new ways to diagnose the condition.

The team from Northwestern University, in Chicago, said pupils with dyslexia might also need extra support in class.

Wireless technology

They said placing children with dyslexia in front of the teacher could make a big difference.

And they suggested other steps, such as providing such pupils with wireless technologies and noise-reducing headphones to pick up information better.

Dyslexia is a neurological disorder which affects reading and spelling skills in between 5% to 10% of children.

" **I think it shows that extra support is needed, especially one-to-one support** "
Dr John Rack, of Dyslexia Action

Recent research has suggested that children with the condition may struggle to process voices when there is competing noise.

The researchers set about testing the theory by getting children to watch a video with background noise, the journal Neuron reported.

At the same time, they were asked to repeat sentences they heard.

Lead researcher Professor Nina Kraus said the study was important in understanding the difficulties children with dyslexia face.

"The ability to sharpen or fine-tune repeating elements is crucial to hearing speech in noise because it allows for superior tagging of the voice pitch," he said.

She said further research was now needed into the issue.

Dr John Rack, of Dyslexia Action, said the findings were "interesting".

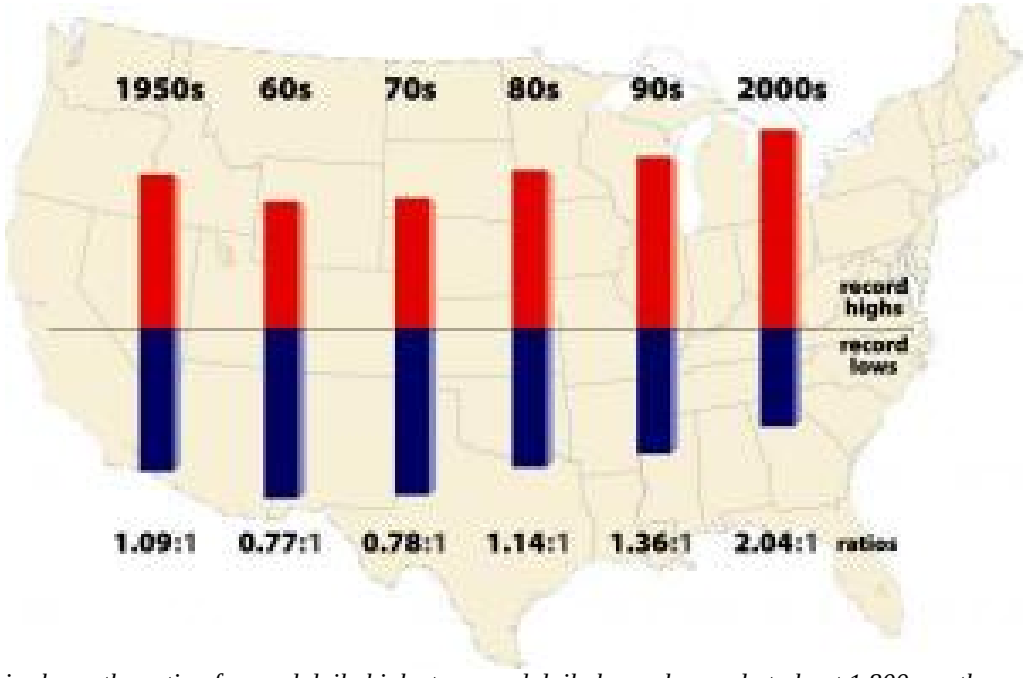
"This builds on what we already know. I think it shows that extra support is needed, especially one-to-one support.

"Busy, vibrant classrooms are a good thing and I would not want to see children with dyslexia taken out of them though."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8355262.stm

Published: 2009/11/13 06:03:20 GMT

Record High Temperatures Far Outpace Record Lows Across US



This graphic shows the ratio of record daily highs to record daily lows observed at about 1,800 weather stations in the 48 contiguous United States from January 1950 through September 2009. Each bar shows the proportion of record highs (red) to record lows (blue) for each decade. The 1960s and 1970s saw slightly more record daily lows than highs, but in the last 30 years record highs have increasingly predominated, with the ratio now about two-to-one for the 48 states as a whole. (Credit: Copyright UCAR, graphic by Mike Shibao)

ScienceDaily (Nov. 13, 2009) — Spurred by a warming climate, daily record high temperatures occurred twice as often as record lows over the last decade across the continental United States, new research shows. The ratio of record highs to lows is likely to increase dramatically in coming decades if emissions of greenhouse gases continue to climb.

"Climate change is making itself felt in terms of day-to-day weather in the United States," says Gerald Meehl, the lead author and a senior scientist at the National Center for Atmospheric Research (NCAR). "The ways these records are being broken show how our climate is already shifting."

The study, by authors at NCAR, Climate Central, The Weather Channel, and the National Oceanic and Atmospheric Administration (NOAA), has been accepted for publication in Geophysical Research Letters. It was funded by the National Science Foundation, NCAR's sponsor, the Department of Energy, and Climate Central.

If temperatures were not warming, the number of record daily highs and lows being set each year would be approximately even. Instead, for the period from January 1, 2000, to September 30, 2009, the continental United States set 291,237 record highs and 142,420 record lows, as the country experienced unusually mild winter weather and intense summer heat waves.

A record daily high means that temperatures were warmer on a given day than on that same date throughout a weather station's history. The authors used a quality control process to ensure the reliability of data from thousands of weather stations across the country, while looking at data over the past six decades to capture longer-term trends.

This decade's warming was more pronounced in the western United States, where the ratio was more than two to one, than in the eastern United States, where the ratio was about one-and-a-half to one.

The study also found that the two-to-one ratio across the country as a whole could be attributed more to a comparatively small number of record lows than to a large number of record highs. This indicates that much of the nation's warming is occurring at night, when temperatures are dipping less often to record lows. This finding is consistent with years of climate model research showing that higher overnight lows should be expected with climate change.

More records ahead

In addition to surveying actual temperatures in recent decades, Meehl and his co-authors turned to a sophisticated computer model of global climate to determine how record high and low temperatures are likely to change during the course of this century.

The modeling results indicate that if nations continue to increase their emissions of greenhouse gases in a "business as usual" scenario, the U.S. ratio of daily record high to record low temperatures would increase to about 20-to-1 by mid-century and 50-to-1 by 2100. The mid-century ratio could be much higher if emissions rose at an even greater pace, or it could be about 8-to-1 if emissions were reduced significantly, the model showed.

The authors caution that such predictions are, by their nature, inexact. Climate models are not designed to capture record daily highs and lows with precision, and it remains impossible to know future human actions that will determine the level of future greenhouse gas emissions. The model used for the study, the NCAR-based Community Climate System Model, correctly captured the trend toward warmer average temperatures and the greater warming in the West, but overstated the ratio of record highs to record lows in recent years.

However, the model results are important because they show that, in all likely scenarios of future greenhouse gas emissions, record daily highs should increasingly outpace record lows over time.

"If the climate weren't changing, you would expect the number of temperature records to diminish significantly over time," says Claudia Tebaldi, a statistician with Climate Central who is one of the paper's co-authors. "As you measure the high and low daily temperatures each year, it normally becomes more difficult to break a record after a number of years. But as the average temperatures continue to rise this century, we will keep setting more record highs."

An expanding ratio

The study team focused on weather stations that have been operating since 1950. They found that the ratio of record daily high to record daily low temperatures slightly exceeded one to one in the 1950s, dipped below that level in the 1960s and 1970s, and has risen since the 1980s. The results reflect changes in U.S. average temperatures, which rose in the 1950s, stabilized in the 1960s, and then began a warming trend in the late 1970s.

Even in the first nine months of this year, when the United States cooled somewhat after a string of unusually warm years, the ratio of record daily high to record daily low temperatures was more than three to two.

Despite the increasing number of record highs, there will still be occasional periods of record cold, Meehl notes.

"One of the messages of this study is that you still get cold days," Meehl says. "Winter still comes. Even in a much warmer climate, we're setting record low minimum temperatures on a few days each year. But the odds are shifting so there's a much better chance of daily record highs instead of lows."

Millions of readings from weather stations across the country

The study team analyzed several million daily high and low temperature readings taken over the span of six decades at about 1,800 weather stations across the country, thereby ensuring ample data for statistically significant results. The readings, collected at the National Oceanic and Atmospheric Administration's National Climatic Data Center, undergo a quality control process at the data center that looks for such potential problems as missing data as well as inconsistent readings caused by changes in thermometers, station locations, or other factors.

Meehl and his colleagues then used temperature simulations from the Community Climate System Model to compute daily record highs and lows under current and future atmospheric concentrations of greenhouse gases.

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Story Source:

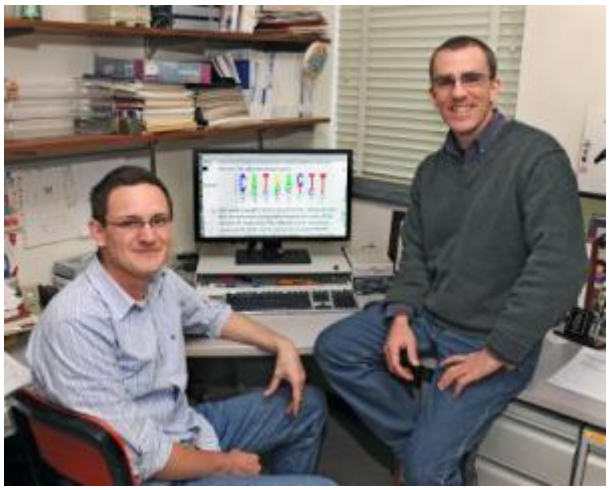
Adapted from materials provided by National Center for Atmospheric Research/University Corporation for Atmospheric Research.

Journal Reference:

1. Gerald A. Meehl, Claudia Tebaldi, Guy Walton, David Easterling, and Larry McDaniel. **The relative increase of record high maximum temperatures compared to record low minimum temperatures in the U.S.**. *Geophysical Research Letters*, (in press)

http://www.sciencedaily.com/releases/2009/11/091112121611.htm

Researcher Discovers Key To Vital DNA, Protein Interaction



Adam Bogdanove, associate professor in plant pathology, was researching the molecular basis of bacterial diseases of rice when he and Matthew Moscou, a student in the bioinformatics and computation biology graduate program, discovered that the so-called TAL effector proteins injected into plant cells by strains of the bacterium Xanthomonas attach at specific locations to host DNA molecules. (Credit: ISU photo by Bob Elbert)

ScienceDaily (Nov. 13, 2009) — A researcher at Iowa State University has discovered how a group of proteins from plant pathogenic bacteria interact with DNA in the plant cell, opening up the possibility for what the scientist calls a "cascade of advances."

Adam Bogdanove, associate professor in plant pathology, was researching the molecular basis of bacterial diseases of rice when he and Matthew Moscou, a student in the bioinformatics and computation biology graduate program, discovered that the so-called TAL effector proteins injected into plant cells by strains of the bacterium *Xanthomonas* attach at specific locations to host DNA molecules.

They found that different proteins of this class bind to different DNA locations, and particular amino acids in each protein determine those locations, called binding sites, in a very straightforward way.

"When we hit on it, we thought, 'Wow, this is so simple, it's ridiculous,'" Bogdanove said. Bogdanove's research will be published in an upcoming issue of the journal *Science* and is highlighted in last week's *Science Express*, an early online edition for research the *Science* editors feel is particularly timely and important. The paper is being published alongside a study from another research team that arrived at the same conclusions independently.

In his research, Bogdanove was examining how *Xanthomonas* uses TAL effectors to manipulate gene function in plants in ways that benefit the pathogen. Bogdanove was specifically interested in how different TAL effector proteins are able to activate different corresponding plant genes.

Over the past decade, understanding of this unique class of proteins has grown in leaps and bounds, according to Bogdanove.

Researchers in Germany, at Kansas State University, Manhattan; and here at Iowa State (Bing Yang, assistant professor in genetics development and cell biology) had previously shown that these proteins bind host DNA and activate genes important for disease, or in some cases defense against the bacteria. But no one yet understood how different TAL effectors recognized different parts of the DNA in order to attach and turn on the different genes at those locations.

Through computer analyses, Bogdanove and Moscou discovered that pairs of amino acids distributed throughout a TAL effector protein each specify a particular nucleotide, one of the bases in DNA abbreviated as the letters G, A, T, or C. The complete set of these pairs directs the protein to a matching string of Gs, As, Ts, and Cs in the DNA.

"This simple relationship allows us to predict where a TAL effector will bind, and what genes it will activate. It also makes it likely that we can custom engineer TAL effectors to bind to virtually any DNA sequence," says Bogdanove.

According to Bogdanove, being able to predict TAL effector binding sites will lead quickly to the identification of plant genes that are important in disease. Natural variants that lack these binding sites are a potential source of disease resistance.

Another potential application is adding TAL effector binding sites to defense-related genes so they are activated upon infection.

The possibilities for this new technology extend beyond plant disease control, according to Bogdanove.

"We might be able to use TAL effectors to activate genes in non-plant cells, possibly even in human stem cells for gene therapy. Or we might be able to use them to modify DNA at specific locations and help us study gene function. This could apply in many areas, including cancer research, for example," he said.

Bogdanove said the simplicity of the results surprised the research team.

"A predictable and potentially customizable kind of protein-DNA binding has been hard to find in nature. As Matt and I talked about the possibilities, we got excited and one of us said -- I don't remember who -- 'We've got to submit this to Science, dude,'" said Bogdanove.

Moscou investigated TAL effector DNA binding with Bogdanove through his participation in the Bioinformatics and Computation Biology (BCB) Lab, a student-run organization that provides assistance with computational analyses for life science researchers on campus. Moscou is a founding member of the BCB Lab, which is supported by a training grant to the BCB graduate program from the National Science Foundation. Moscou is doing his dissertation research on a plant pathogenic fungus under Roger Wise, professor in plant pathology.

Research in the Bogdanove laboratory is supported by funding from the NSF Plant Genome Research Program and from the United Stated Department of Agriculture -- Agricultural and Food Research Initiative program.

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

http://www.sciencedaily.com/releases/2009/11/091110171654.htm

Cellular Source Of Most Common Type Of Abnormal Heart Beat Described

Cardiac melanocyte-like cells in the mouse heart, identified by transgenic expression of a marker gene, are located in the region of the atria and the pulmonary veins and may serve as triggers for atrial arrhythmias. (Credit: Jon Epstein, MD, Vickas Patel, MD, PhD, University of Pennsylvania School of Medicine)

ScienceDaily (Nov. 13, 2009) — While studying how the heart is formed, scientists at the University of Pennsylvania School of Medicine serendipitously found a novel cellular source of atrial fibrillation (AF), the most common type of abnormal heart beat. Jonathan Epstein, MD, William Wikoff Smith Professor, and Chair, Department of Cell and Developmental Biology, and Vickas Patel, MD, PhD, Assistant Professor of Medicine, have identified a population of cells in the atria of the heart and pulmonary veins of humans and mice that appear to be the seat of AF. The finding may lead to a more precise way to treat AF, with reduced side effects.

This group of cells expresses the protein DCT, which is also involved in making the skin pigment melanin and in the detoxification of free radicals. The researchers also showed that the DCT-expressing cells in the mouse heart were a distinct cell type from heart-muscle cells and pigment-producing cells, although they conduct electrical currents important for coordinated contraction of the heart. The location of these cells in the pulmonary veins suggested their possible role in AF because AF can arise in these blood vessels. Atrial fibrillation is a very common and debilitating disease that greatly affects quality of life.

Knowing the location of these cells may help develop better treatments for AF. "We already target the pulmonary veins for radiofrequency ablation, a nonsurgical procedure using radiofrequency energy similar to microwaves, to treat some types of rapid heart beating as a relatively new treatment, and sometimes cure, for AF," notes Epstein.

"For the most part, current drug therapy for atrial fibrillation has been disappointingly ineffective and drug therapy is often associated with burdensome side-effects," notes Patel."

"If these cells are truly the source of AF in some patients, and we can figure out a way to identify them, then our ablation can be far more precise and targeted, thus limiting potential side effects, making the procedure potentially more simple and rapid, and hence more cost effective," explains Epstein.

But the investigators caution more research is needed to get to the point where these ideas can be validated in patients. "The findings hold out promise for a more precise cellular target for treating this common disorder," adds Epstein.

Their findings appear online in the *Journal of Clinical Investigation.* This research was funded by grants from the NIH, the Cotswold Foundation, the WW Smith Endowed Professorship, the W.W. Smith Chartiable Trust, and the Gunther Fund for Cardiovascular Research.

Story Source:

Adapted from materials provided by University of Pennsylvania School of Medicine.

http://www.sciencedaily.com/releases/2009/11/091104132817.htm

Chemists Declare War On 'Ice-Plugs' In Oil Pipelines

At the core of this project are experiments that demonstrate how water droplets behave on different surfaces - suspended in various type of oil. (Credit: Image courtesy of SINTEF)

ScienceDaily (Nov. 13, 2009) — Operators of subsea fields on the continental shelf spend vast amounts of money on keeping harmful ice-like crystals under control. SINTEF scientists are now looking for a cheaper solution to the problem.

The researchers are trying to solve the mystery of what happens when hydrates are formed. These ice-like crystals can accumulate in the pipelines that carry oil and gas ashore from subsea fields on the continental shelf.

Senior scientist Sylvi Høiland of SINTEF Petroleum Research is the leader of the hydrate project called "Hyades," which is supported by the Research Council of Norway. The University of Bergen, StatoilHydro's research centre in Bergen and the US oil company Chevron are also members of the research team.

"Our final goal is that it will become possible to take a sample of oil into a laboratory, where simple analyses of the composition of the oil can produce results such as that: the hydrates found in oil A are very likely to block the pipeline, while oil B will not be a problem at all," says Sylvi Høiland.

Høiland emphasises that the Hyades project on its own will not be enough to bring us to that point, but that it should take the offshore industry an important step further towards the goal.

In any case, the international petroleum industry has long been aware of the project. Shell recently announced at a conference that the company regards the method for characterising different types of oil as promising.

Long distances

The background for this project is oil and gas recovery from subsea fields, from which the well flow is carried in pipelines either to neighbouring platforms or directly to shore, in the latter case over increasingly long distances, which is not always a simple matter.

This is because it is not often that a flow of pure oil or pure gas emerges from the well. The product flow is nearly always a mixture of oil, natural gas and water.

In the pipelines that carry mixtures of this sort across the seabed, the gas and water will form hydrates if the temperature inside the pipeline falls far enough, which is what happens when pipeline transportation takes place over long distances, because the cold seawater outside the pipe gradually cools the oil and gas on the inside.

Similarly, when maintenance work or other circumstances make it necessary to shut down production on a field for some time, the pipeline temperature may fall so low that it creates ideal conditions for the formation of hydrates.

Large plugs

The scientists' hope is due to the fact that certain types of oil possess properties that prevent hydrates from becoming sticky "snowballs." When such oils are present, the hydrates stay in the form of a fine powder that can easily be carried along the pipeline.

But which components of the "unproblematic" oil actually make it unproblematic? That is the key question being studied by the Hyades scientists.

Some types of hydrate crystals are worse than others. Certain hydrates have properties that make the crystals resemble a sticky slush. These are capable of growing into large plugs that can completely block the pipeline.

In order to prevent hydrate formation, the oil companies pump large volumes of methanol or glycol into many of their wells, pipelines and process systems.

Similarly, during both planned and unforeseen production shutdowns, large amounts of chemicals are added to production systems to keep hydrates from forming, all of which is expensive.

Not only are the chemicals themselves dear. When shutdowns are ordered, production losses are prolonged by the time needed to pump large volumes of chemicals down the pipelines, and on the shelf, lost time means lost income.

But for now, the SINTEF scientists have raised a hope that the use of chemicals in pipelines can be reduced in the future.

Story Source:

Adapted from materials provided by SINTEF, via AlphaGalileo.

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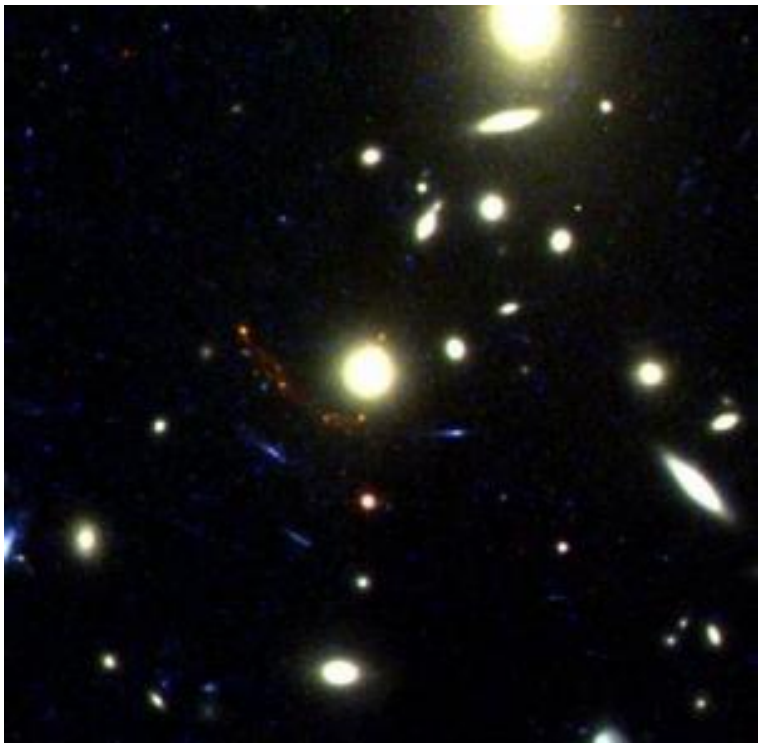
http://www.sciencedaily.com/releases/2009/11/091111122318.htm

Rapid Star Formation Spotted In 'Stellar Nurseries' Of Infant Galaxies



This is a Hubble Space Telescope observation showing the red 'arc' of the rapid star forming galaxy MS1358arc -- seen as it was 12.5 billion years ago. The galaxy is magnified by a factor of 10 by the younger foreground galaxies. (Credit: Dr Johan Richard, Durham University.)

ScienceDaily (Nov. 12, 2009) — The Universe's infant galaxies enjoyed rapid growth spurts forming stars like our sun at a rate of up to 50 stars a year, according to scientists at Durham University.

The findings show that "stellar nurseries" within the first galaxies gave birth to stars at a much more rapid rate than previously expected, the researchers from Durham's Institute for Computational Cosmology revealed.

The research looked back 12.5 billion years to one of the most distant known galaxies, about one billion years after the Big Bang.

Using a technique called gravitational lensing -- where distant galaxies are magnified using the gravity of a nearby galaxy cluster -- the scientists observed the rapid bursts of star formation in the galaxy called MS1358arc.

Within the star-forming regions, new stars were being created at a rate of about 50 stars per year -- around 100 times faster than had been previously thought.

The researchers, who say their work represents the most detailed study of a galaxy at such a young age, believe the observed galaxy is typical of others in the early Universe.

They say the galaxy, which measures 6,000 light years across, also has all the characteristics that would allow it to eventually evolve into a galaxy such as our Milky Way, giving an insight into how our sun and galaxy formed.

The Durham researchers based their findings on observations from the Gemini North telescope, based in Hawaii, and NASA's Hubble and Spitzer Space Telescopes. The research appears in the *Monthly Notices of the Royal Astronomical Society*. The research was funded by the Royal Astronomical Society.

Lead author Dr Mark Swinbank, in the Institute for Computational Cosmology, at Durham University, said: "The runaway effect in this galaxy suggests it is growing much faster than expected.

"Given the size of the star forming regions, we would expect it to be forming stars at the rate of about one sun per year, but it seems to be much more active than that.

"We think this galaxy is fairly typical of galaxies at this time and we expect that the Milky Way once looked like this as it formed its first stars.

"In effect we are seeing the first generation of stars being born in a galaxy like the Milky Way. This gives unique insight into the birth of our own galaxy."

The researchers say most of the observed stars eventually exploded as supernovae, spewing debris back into space where it formed into new stars

Dr Swinbank added: "In this respect these stars are the seeds of future star formation in the Universe."

Royal Astronomical Society President Professor Andy Fabian said: "It is exciting to see such a detailed picture of a very distant galaxy.

"This pioneering work shows what our own galaxy might have looked like when it was

Story Source:

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

http://www.sciencedaily.com/releases/2009/11/091110202849.htm

Mouse Study Sheds Light On Hearing Loss In Older Adults

Hearing aid. Becoming "hard of hearing" is a standard but unfortunate part of aging: A syndrome called age-related hearing loss affects about 40 percent of people over 65 in the United States, and will afflict an estimated 28 million Americans by 2030. (Credit: iStockphoto/Donald Erickson)

ScienceDaily (Nov. 12, 2009) — Becoming "hard of hearing" is a standard but unfortunate part of aging: A syndrome called age-related hearing loss affects about 40 percent of people over 65 in the United States, and will afflict an estimated 28 million Americans by 2030.

"Age-related hearing loss is a very common symptom of aging in humans, and also is universal among mammal species, and it's one of the earliest detectable sensory changes in aging," says Tomas Prolla, a professor of genetics and medical genetics at the University of Wisconsin-Madison.

Prolla is senior author of a paper in the Nov. 9 edition of *PNAS* that looks at the genetic roots of this type of hearing loss, which is not due to noise exposure.

The study has identified a gene that is essential to age-related hearing loss, a condition marked by deaths of sensory hair cells and spiral ganglion neurons in the inner ear. These cells are at the heart of the conversion of vibrations into nerve impulses that the brain can decipher, and yet these cells cannot be regenerated.

In mice, the new study shows that the damage starts with free radicals, which are key suspects in many harmful changes of aging. Free radicals trigger a process called apoptosis, or programmed cell death, by which damaged cells "commit suicide." Apoptosis is often beneficial, as it eliminates cells that may be destined for cancer.

Before the study, it was already clear that "aging was associated with a major loss of hair cells and ganglion cells, so it was plausible that programmed cell death was playing a role in hearing loss," says Prolla. "We also thought that oxidative stress -- the presence of free radicals -- contributes to age-related hearing loss, so we put two and two together and showed that oxidative stress does indeed induce age-related hearing loss."

In mice, Prolla and the study's first author, Shinichi Someya, a postdoctoral researcher at UW-Madison, found that the suicide program was operating in hair cells and spiral ganglion neurons, and that the suicide program relied on activity in a suicide gene called bak.

Activity of the bak gene "is required for the development of age-related hearing loss," says Someya. "The strongest evidence for this was the fact that a strain of mice that did not have the bak gene did not show the expected hearing loss at 15 months of age."

In one way, the new results are a bit unusual, Prolla admits. "In most genetic diseases, it's a mutation that causes the disease. In our study, a mutation in the gene prevents the disease."

Someya says he measured mouse hearing with an instrument like that used to test hearing in newborns. "It's a standard test for infants. We place electrodes on the skin above the brain, and when they respond to a sound an electric current is generated from the brainstem, and we detect that current."

The new results, obtained with collaboration from the universities of Florida, Washington and Tokyo, hint that the oxidative stress and hearing loss may be preventable. Although antioxidants have been widely used, with generally disappointing results, to prevent free-radical damage in aging, Someya and Prolla found that two oral antioxidants were effective. "One of the most surprising findings was that these two -- alpha lipoic acid and coenzyme Q10 -- were very specific in their protection against apoptosis and hearing loss," says Prolla.

Programmed cell death is triggered by mitochondria, small units inside cells that process energy for the cell. But when the mitochondria receive signals indicating that the cell is damaged, they break up and begin the process of apoptosis.

Confirming the importance of mitochondria in hearing loss, both of the helpful antioxidants are known to make mitochondria less responsive to oxidative stress.The study provides strong evidence linking free radicals, the bak gene and hearing loss, Prolla says. "We wanted to know how oxidative stress leads to deaths of these critical cells, and when we looked at mice without bak, they were entirely protected from age-related hearing loss. One of our major findings is that free-radical damage does not kill the cell directly, but rather induces the pathway to programmed cell death. Mice without bak still accumulated oxidative damage, but did not undergo programmed cell death, did not lose hair cells or these neurons, and their hearing was fine."

Bak may play a role in other age-related conditions, Prolla adds. "This study focused on hearing loss, but there is evidence that other diseases associated with the loss of neurons, like Parkinson's or Alzheimer's, are associated with oxidative stress, and it's possible that the bak protein plays a role in apoptosis in those diseases as well. We are very intrigued by the possibility that blocking bak may have broader utility against neurodegeneration.""This paper clearly shows us that oxidative stress causes hearing loss," said Jinze Xu, a postdoctoral fellow in Leeuwenburgh's group, and second author of the paper.So if oxidative stress triggers damage and death of hearing-related cells, enhancing the antioxidant defenses of the mitochondria should reduce such damage. The researchers found that both in animals that had excess amounts of an enzyme that scavenges reactive oxygen species, as well as in those who were fed certain antioxidants orally, onset of age-related hearing loss was delayed."It looks like a viable biological target that may be applicable to drug use," Leeuwenburgh said. "The issue is always timing — when to start antioxidant interventions at what combination and what dose."

Caloric restriction, another way to reduce oxidative damage, has previously been shown to extend life and prevent age-related hearing loss in the type of mice used in the study. With the new findings, the investigators propose that one of the ways that restriction of calories acts is by reducing the level of cell death that is induced by the protein Bak."This extends research into life extension by caloric restriction into a whole new area that hasn't been looked at before," said Huber Warner, Ph.D., associate dean for research a University of Minnesota College of Biological Sciences and former director of the biology of aging program at the National Institute on Aging, who was not involved in the study. "The work shows that rather than caloric restriction just having an overall effect on metabolism of nutrients, bak modulation can have segmental effects on particular physical systems that have age-related problems in humans."

Story Source:

Adapted from materials provided by University of Wisconsin-Madison.

http://www.sciencedaily.com/releases/2009/11/091109173606.htm

Can A Plant Be Altruistic?

Yellow jewelweed (impatiens pallida) appears to have the ability to recognize 'relatives' from 'strangers' and then shift resources for growth to benefit relatives. (Credit: Wikimedia commons. Public domain image)

ScienceDaily (Nov. 12, 2009) — Although plants have the ability to sense and respond to other plants, their ability to recognize kin and act altruistically has been the subject of few studies. The authors explored kin recognition in Impatiens pallida (yellow jewelweed). By moving their resources into leaves, these plants not only positively affected their own growth, but also negatively affected their competitors' growth. This is the first instance where researchers demonstrated that a plant's response to an aboveground cue is dependent upon the presence of a belowground cue.

The concept of altruism has long been debated in philosophical circles, and more recently, evolutionary biologists have joined the debate. From the perspective of natural selection, altruism may have evolved because any action that improves the likelihood of a relative's survival and reproduction increases the chance of an individual's DNA being passed on.

Social behavior, kin recognition, and altruism are well known in the animal kingdom; however, although plants have the ability to sense and respond to other plants, their ability to recognize kin and act altruistically has been the subject of few studies.

In a paper published in the November issue of the *American Journal of Botany*, Ph.D. candidate Guillermo Murphy and Dr. Susan Dudley explore kin recognition in *Impatiens pallida*, commonly known as yellow jewelweed. Yellow jewelweed individuals are often found growing in close proximity to related individuals and are known to respond strongly to aboveground competition, making this species a likely candidate for kin recognition.

Murphy and Dudley measured plants' responses to two potential cues for competition -- changes in light quality (an aboveground cue) and the presence of root neighbors (an underground cue) -- for plants grown with strangers and with relatives. The researchers found that the response of Impatiens plants differed depending on whether the plants grew with relatives or with strangers. This demonstrates that jewelweed is capable of recognizing kin from non-kin and shows an interesting degree of complexity since both types of responses differed from plants growing with no neighbors at all.

Among close relatives, plants did not increase resource allocation to roots or leaves. Rather, they altered their aboveground morphology by increasing stem elongation and branching. This may be an example of the plants cooperating with kin by attempting to acquire needed resources without shading nearby relatives. Yellow jewelweed is found in the understory of forests, where light may be scarce but the soil is usually nutrient-rich. Because light is the limiting factor for plant growth in this environment, a plant competing with its neighbors would be most likely to allocate resources to leaves.

For Impatiens plants grown with strangers, the plants increased their resource allocation to their leaves relative to allocation to stems and roots, an indication of a competitive response. By moving their resources into leaves, these plants not only positively affected their own growth by enhancing their ability to acquire a limited resource but also negatively affected their competitors' growth by shading nearby plants and decreasing the competitor's light acquisition abilities.

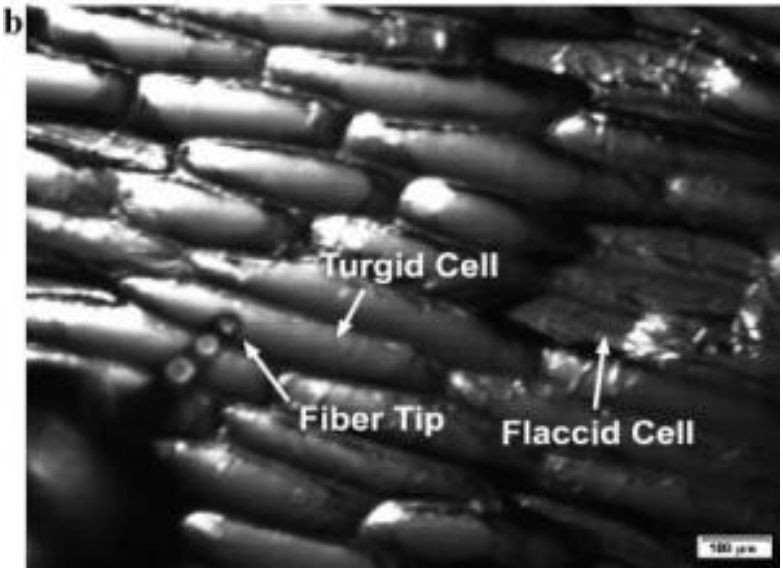
However, these differences in response based on the presence of kin or strangers were only observed in those plants grown with root neighbors, indicating that communication among roots may be necessary for plants to recognize kin. Also, changes in allocation of resources toward roots in response to light quality only occurred in plants grown with root neighbors. This is the first instance where researchers demonstrated that a plant's response to an aboveground cue is dependent upon the presence of a belowground cue. This study demonstrates that plants are social organisms. It shows that altruism is possible among plants and that response to both kin and strangers depend on the ecology of the plant species.

Story Source:

Adapted from materials provided by American Journal of Botany, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/11/091111092047.htm

Exploration By Explosion: Studying The Inner Realm Of Living Cells



A tiny glass fiber is used to vaporize contents of cells to study the cell contents. (Credit: American Chemical Society)

ScienceDaily (Nov. 12, 2009) — Scientists in Washington, DC, are reporting development and successful tests of a new way for exploring the insides of living cells, the microscopic building blocks of all known plants and animals. They explode the cell while it is still living inside a plant or animal, vaporize its contents, and sniff. The study appears in online in ACS' journal *Analytical Chemistry*.

Akos Vertes and Bindesh Shrestha note that knowing the contents of cells is the key to understanding how healthy cells differ from those in disease. Until now, however, the only way to "look" inside an individual cell was to remove it from its natural environment in an animal or plant, or change its environment. But doing so changed the cell. Scientists never knew whether one cell differed from another because of the disease, or because they had removed it to a new environment.

The new report describes development of a new technique that uses laser pulses focused through a tiny glass fiber to explode a cell and turn its contents into vapor. Scientists then use a laboratory instrument to analyze the vapor and get a profile of the chemicals inside. It can reveal differences between diseased and healthy cells, even between adjacent cells in the same tissue. The scientists used this new technique to analyze the contents of living plant and animal cells and show that it quickly and accurately identified important chemical details that would have been overlooked using conventional techniques.

Journal Reference:

1. Shrestha et al. **In Situ Metabolic Profiling of Single Cells by Laser Ablation Electrospray Ionization Mass Spectrometry**. *Analytical Chemistry*, 2009; 81 (20): 8265 DOI: 10.1021/ac901525g

Adapted from materials provided by American Chemical Society.

http://www.sciencedaily.com/releases/2009/11/091111123618.htm

New Evidence That Dark Chocolate Helps Ease Emotional Stress

Pieces of dark chocolate. The "chocolate cure" for emotional stress is getting new support from a clinical trial. (Credit: iStockphoto)

ScienceDaily (Nov. 12, 2009) — The "chocolate cure" for emotional stress is getting new support from a clinical trial published online in ACS' *Journal of Proteome Research.* It found that eating about an ounce and a half of dark chocolate a day for two weeks reduced levels of stress hormones in the bodies of people feeling highly stressed. Everyone's favorite treat also partially corrected other stress-related biochemical imbalances.

Sunil Kochhar and colleagues note growing scientific evidence that antioxidants and other beneficial substances in dark chocolate may reduce risk factors for heart disease and other physical conditions. Studies also suggest that chocolate may ease emotional stress. Until now, however, there was little evidence from research in humans on exactly how chocolate might have those stress-busting effects.

In the study, scientists identified reductions in stress hormones and other stress-related biochemical changes in volunteers who rated themselves as highly stressed and ate dark chocolate for two weeks. "The study provides strong evidence that a daily consumption of 40 grams [1.4 ounces] during a period of 2 weeks is sufficient to modify the metabolism of healthy human volunteers," the scientists say.

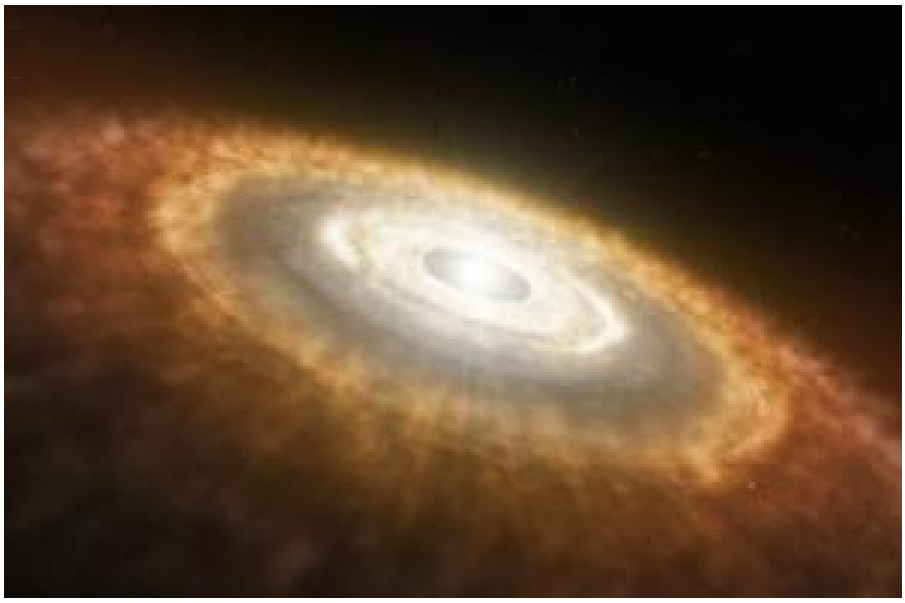
Adapted from materials provided by American Chemical Society.

Journal Reference:

1. Martin et al. **Metabolic Effects of Dark Chocolate Consumption on Energy, Gut Microbiota, and Stress-Related Metabolism in Free-Living Subjects**. *Journal of Proteome Research*, 2009; 091007113151065 DOI: 10.1021/pr900607v

http://www.sciencedaily.com/releases/2009/11/091111123612.htm

Exoplanets Clue To Sun's Curious Chemistry



Artist's impression of a baby star still surrounded by a protoplanetary disc in which planets are forming. Using ESO's very successful HARPS spectrograph, a team of astronomers has found that Sun-like stars which host planets have destroyed their lithium much more efficiently than planet-free stars. This finding does not only shed light on the low levels of this chemical element in the Sun, solving a long-standing mystery, but also provides astronomers with a very efficient way to pick out the stars most likely to host planets. It is not clear what causes the lithium to be destroyed. The general idea is that the planets or the presence of the protoplanetary disc disturb the interior of the star, bringing the lithium deeper down into the star than usual, into regions where the temperature is so hot that it is destroyed. (Credit: ESO/L. Calçada)

ScienceDaily (Nov. 12, 2009) — A ground-breaking census of 500 stars, 70 of which are known to host planets, has successfully linked the long-standing "lithium mystery" observed in the Sun to the presence of planetary systems. Using ESO's successful HARPS spectrograph, a team of astronomers has found that sun-like stars that host planets have destroyed their lithium much more efficiently than "planet-free" stars.

"For almost 10 years we have tried to find out what distinguishes stars with planetary systems from their barren cousins," says Garik Israelian, lead author of a paper appearing this week in the journal *Nature*. "We have now found that the amount of lithium in Sun-like stars depends on whether or not they have planets."

Low levels of this chemical element have been noticed for decades in the Sun, as compared to other solar-like stars, and astronomers have been unable to explain the anomaly. The discovery of a trend among planet-bearing stars provides a natural explanation to this long-standing mystery. "The explanation of this 60 year-long puzzle is for us rather simple," adds Israelian. "The Sun lacks lithium because it has planets."

This conclusion is based on the analysis of 500 stars, including 70 planet-hosting stars. Most of these stars were monitored for several years with ESO's High Accuracy Radial Velocity Planet Searcher. This spectrograph, better known as HARPS, is attached to ESO's 3.6-metre telescope and is the world's foremost exoplanet hunter. "This is the best possible sample available to date to understand what makes planet-bearing stars unique," says co-author Michel Mayor.

The astronomers looked in particular at Sun-like stars, almost a quarter of the whole sample. They found that the majority of stars hosting planets possess less than 1% of the amount of lithium shown by most of the other stars. "Like our Sun, these stars have been very efficient at destroying the lithium they inherited at birth," says team member Nuno Santos. "Using our unique, large sample, we can also prove that the reason for this lithium reduction is not related to any other property of the star, such as its age."

Unlike most other elements lighter than iron, the light nuclei of lithium, beryllium and boron are not produced in significant amounts in stars. Instead, it is thought that lithium, composed of just three protons and four neutrons, was mainly produced just after the Big Bang, 13.7 billion years ago. Most stars will thus have the same amount of lithium, unless this element has been destroyed inside the star.

This result also provides the astronomers with a new, cost-effective way to search for planetary systems: by checking the amount of lithium present in a star astronomers can decide which stars are worthy of further significant observing efforts.

Now that a link between the presence of planets and curiously low levels of lithium has been established, the physical mechanism behind it has to be investigated. "There are several ways in which a planet can disturb the internal motions of matter in its host star, thereby rearrange the distribution of the various chemical elements and possibly cause the destruction of lithium. It is now up to the theoreticians to figure out which one is the most likely to happen," concludes Mayor.

The team is composed of Garik Israelian, Elisa Delgado Mena, Carolina Domínguez Cerdeña, and Rafael Rebolo (Instituto de Astrofisíca de Canarias, La Laguna, Tenerife, Spain), Nuno Santos and Sergio Sousa (Centro de Astrofisica, Universidade de Porto, Portugal), Michel Mayor and Stéphane Udry (Observatoire de Genève, Switzerland), and Sofia Randich (INAF, Osservatorio di Arcetri, Firenze, Italy).

Adapted from materials provided by ESO.

Journal Reference:

1. G. Israelian et al. **Enhanced lithium depletion in Sun-like stars with orbiting planets**. *Nature*, November 12, 2009

http://www.sciencedaily.com/releases/2009/11/091111130944.htm

Quantum Gas Microscope Offers Glimpse Of Quirky Ultracold Atoms

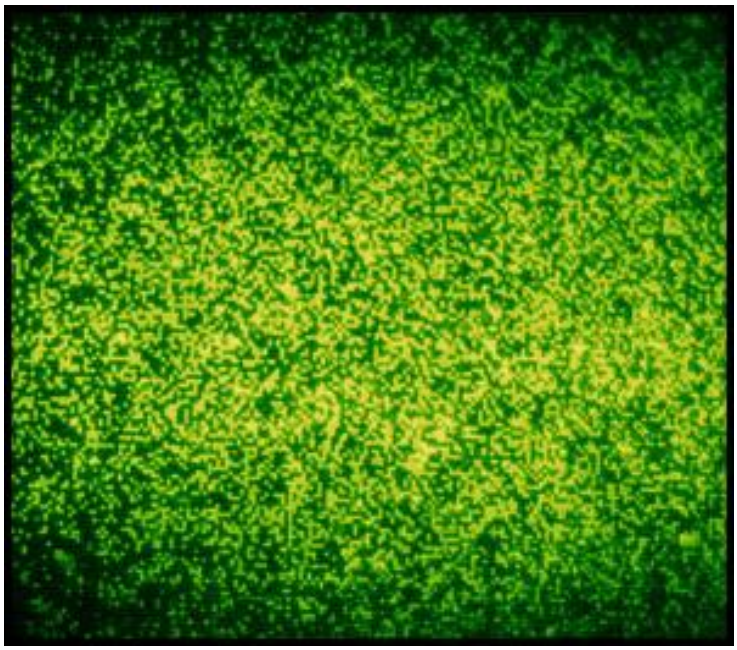


Image of individual atoms in an optical lattice. Markus Greiner, Harvard University. (Credit: Image courtesy of Markus Greiner/Department of Physics)

ScienceDaily (Nov. 12, 2009) — Physicists at Harvard University have created a quantum gas microscope that can be used to observe single atoms at temperatures so low the particles follow the rules of quantum mechanics, behaving in bizarre ways.

The work, published November 5 in the journal *Nature*, represents the first time scientists have detected single atoms in a crystalline structure made solely of light, called a Bose Hubbard optical lattice. It's part of scientists' efforts to use ultracold quantum gases to understand and develop novel quantum materials.

"Ultracold atoms in optical lattices can be used as a model to help understand the physics behind superconductivity or quantum magnetism, for example," says senior author Markus Greiner, an assistant professor of physics at Harvard and an affiliate of the Harvard-MIT Center for Ultracold Atoms. "We expect that our technique, which bridges the gap between earlier microscopic and macroscopic approaches to the study of quantum systems, will help in quantum simulations of condensed matter systems, and also find applications in quantum information processing."

The quantum gas microscope developed by Greiner and his colleagues is a high-resolution device capable of viewing single atoms -- in this case, atoms of rubidium -- occupying individual, closely spaced lattice sites. The rubidium atoms are cooled to just 5 billionths of a degree above absolute zero (-273 degrees Celsius).

"At such low temperatures, atoms follow the rules of quantum mechanics, causing them to behave in very unexpected ways," explains first author Waseem S. Bakr, a graduate student in Harvard's Department of Physics. "Quantum mechanics allows atoms to quickly tunnel around within the lattice, move around with no resistance, and even be 'delocalized' over the entire lattice. With our microscope we can individually observe tens of thousands of atoms working together to perform these amazing feats."

In their paper, Bakr, Greiner, and colleagues present images of single rubidium atoms confined to an optical lattice created through projections of a laser-generated holographic pattern. The neighboring

rubidium atoms are just 640 nanometers apart, allowing them to quickly tunnel their way through the lattice.

Confining a quantum gas -- such as a Bose-Einstein condensate -- in such an optically generated lattice creates a system that can be used to model complex phenomena in condensed-matter physics, such as superfluidity. Until now, only the bulk properties of such systems could be studied, but the new microscope's ability to detect arrays of thousands of single atoms gives scientists what amounts to a new workshop for tinkering with the fundamental properties of matter, making it possible to study these simulated systems in much more detail, and possibly also forming the basis of a single-site readout system for quantum computation.

"There are many unsolved questions regarding quantum materials, such as high-temperature superconductors that lose all electrical resistance if they are cooled to moderate temperatures," Greiner says. "We hope this ultracold atom model system can provide answers to some of these important questions, paving the way for creating novel quantum materials with as-yet unknown properties."

Greiner's co-authors on the Nature paper are Waseem S. Bakr, Jonathon I. Gillen, Amy Peng, and Simon Foelling, all of Harvard's Department of Physics and the Harvard-MIT Center for Ultracold Atoms. Their work was supported by the National Science Foundation, the Air Force Office of Scientific Research, the Army Research Office, the Defense Advanced Research Projects Agency, and the Alfred P. Sloan Foundation.

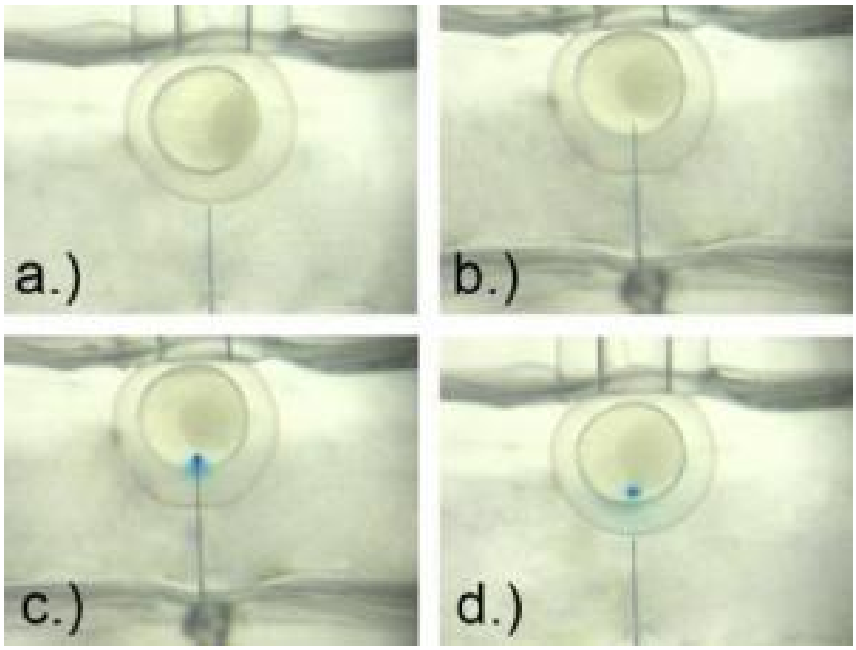
Adapted from materials provided by Harvard University.

Journal Reference:

1. Waseem S. Bakr, Jonathon I. Gillen, Amy Peng, Simon Fölling & Markus Greiner. **A quantum gas microscope for detecting single atoms in a Hubbard-regime optical lattice**. *Nature*, 2009; 462 (7269): 74 DOI: 10.1038/nature08482

http://www.sciencedaily.com/releases/2009/11/091104140812.htm

Tiny Injector To Speed Development Of New, Safer, Cheaper Drugs



(a) Zebrafish embryo immobilized by suction capillary. (b) Needle inserted into yolk sack. (c) Electroosmotic pumping of methylene blue solution into the embryo by the application of 25 V for 10 s. (d) Needle retracted from the embryo. (Credit: McMaster Engineering)

ScienceDaily (Nov. 12, 2009) — It's no bigger than a stamp packet but it has the potential to allow rapid development of a new generation of drugs and genetic engineering organisms, and to better control in-vitro fertilization.

Engineering researchers at McMaster University have fabricated a palm-sized, automated, micro-injector that can insert proteins, DNA and other biomolecules into individual cells at volumes exponentially higher than current procedures, and at a fraction of the cost. This will allow scientists to vastly increase preclinical trials for drug development and genetic engineering, and provide greater control of the process.

In a paper published in the current issue of *Lab on a Chip* journal, researchers describe the construction and operation of a microfluidic micro-injector, which achieved an almost 80 per cent success rate in injecting Zebrafish embryos.

"This device is to drug discovery what the assembly line was to the automobile or the silicon chip to information technology," explains Ravi Selvaganapathy, assistant professor of mechanical engineering at McMaster and lead author of the research. "It turns what was a complex, resource-intensive process available to a few into an automated, predictable, reliable, and low-cost system accessible to almost anyone."

The micro-injector has a cell-wide channel cast on a silicon chip that guides cells and embryos to the injection site. A similar channel guides the injection reagent to a needle as thin as 10 micrometers (one-tenth the diameter of a human hair). The researchers have developed a buckling method to drive the needle through a cell's pliable outer membrane accurately and to the proper depth. The injection dosage is controlled electrically, as is monitoring of the needle's position. The researchers have also developed methods to sharpen the needle, ensuring minimal injection damage or interference to the cell.

Notably absent is the need for a microscope or optical magnification to conduct the process, which is required for manual injection and to monitor transfection methods. The microfluidic device also allows easy integration of post-processing operations including cell sorting and the testing of cell viability on the same chip.

"Almost every researcher would be able to have this device at their disposal in their own labs," said Selvaganapathy. "The micro-injectors can easily be run in parallel and allow for scientists to test far greater combinations of materials in a much shorter time than current processes. It also makes it more feasible to pursue drug discovery for many so-called neglected diseases."

The micro-injector also holds great promise for in-vitro fertilization as it provides far greater accuracy and control than current manual injections procedures, which have high rates of failure, require trained expertise and can be time intensive.

The micro-injector has achieved numerous firsts for cell transfection procedures:

- Buckling based actuation of injection needle providing low cost but precise actuation with uniform injection depth and consistent alignment;
- Injection format that could allow needles as small as 100 nanometres, half the size of current injectors, virtually eliminating cell damage and interference with cell functions;
- Electro-osmotic injection which provides electrical control of reagent injected into cell for accurate and uniform dosage;
- Elimination of expensive optical magnification needed for manual injection or to monitor quality control.

Story Source:

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

http://www.sciencedaily.com/releases/2009/11/091104123029.htm

'Earth Claw': New Species of Vegetarian Dinosaur Close to Common Ancestor of Gigantic Sauropods

The right premaxilla, a bone from the tip of the snout. The two prongs partly enclose the giant nostril characteristic of this species. The tips of two teeth can be seen protruding from the bottom edge. (Credit: Image courtesy of University of the Witwatersrand)

ScienceDaily (Nov. 12, 2009) — The discovery of a new species of dinosaur from the early Jurassic period (approximately 195 million years old and seven metres long) has been announced and described by Dr Adam Yates, the primary investigator and a palaeontologist from the Bernard Price Institute for Paleontological Research (BPI) from the University of the Witwatersrand, Johannesburg, South Africa.

The vegetarian dinosaur, one of three discovered at the same site, was named *Aardonyx celestae* -- the genus name (Aardonyx) means "Earth Claw," (Aard -- Afrikaans for Earth) and (Onyx -- Greek for claw) an appropriate name, given that the large, earth-encrusted foot claws were some of the first bones to be discovered in the town of Senekal, near Bethlehem in the Northern Free State, in South Africa. The species name (*celestae*) is given to acknowledge the work of Celeste Yates who prepared much of the fossil.

"This species is important as the *Aardonyx* was an animal close to the common ancestor of the gigantic sauropod dinosaurs," explains Yates. "Sauropods, known popularly as "brontosaurs," were the largest backboned animals to walk on land with their long necks, tree-trunk legs and whip-like tails. Some were even longer and exceeded 100 feet (about 30 metres) in length. *Aardonyx* gives us a glimpse into what the first steps towards becoming a sauropod involved."

The discovery was made by a Wits postgraduate palaeontology student, Mr Marc Blackbeard, who began excavating two sites in the Northern Free State, five years ago, under the leadership of Yates. "We knew that there was likely to be some fossils in these 'bone beds' discovered by James Kitching about 20 years ago, but we did not expect to find anything of this magnitude," says Yates.

Yates elaborates on the anatomy of *Aardonyx celestae*: "The dinosaur had a wide-gaping mouth, bracing joints in the back vertebrae that made the backbone rigid enough to support great weight and a forearm and hand capable of grasping and supporting weight. Growth rings in the rib and shoulder blade sections show that Aardonyx was not full grown -- it was probably less than 10 years old when it died near a river or stream."

He adds: "*Aardonyx* probably walked on its hind legs but could drop onto all fours as well. It had flattened feet with large claws that supported body weight on the inside of the foot and a robust thigh bone (femur) for supporting weight."

Dr Chinsamy-Turan a Wits graduate and a Vertebrate Paleohistologist at UCT concurs: "My analysis of the bone microstructure in the ribs and shoulder blades of *Aardonyx* suggests that while it had experienced at least seven spurts or cycles of growth, it was not a fully grown animal."

According to Dr Matthew Bonnan, a Vertebrate Paleobiologist, Department of Biological Sciences and an author of the paper, they already knew that the earliest sauropods and near-sauropods would be bipeds. "What *Aardonyx* shows us, however, is that walking quadrupedally and bearing weight on the inside of the foot is a trend that started very early in these dinosaurs, much earlier than previously hypothesised. The bones of the forearm are shaped like those of sauropods -- this means that the forearm and hand could bear weight and that Aardonyx could drop onto all-fours as well as walk bipedally."

Dr Johann Neveling, a Geologist from the Council for Geosciences in Pretoria, also an author of the paper, says that geology suggests that *Aardonyx* lived near an oasis on the outskirts of a vast desert.

The discovery was published on 11 November 2009 in the *Proceedings of the Royal Society B*. The lead author is Dr Adam Yates and the other authors of the paper, in order of precedence, are: Dr Matthew F Bonnan (Vertebrate Paleobiologist, Department of Biological Sciences, Western Illinois University, USA); Dr Johann Neveling (Geologist, Council for Geosciences, Pretoria); Dr Anusuya Chinsamy (a Wits graduate and a Vertebrate Paleohistologist at UCT) and Mr Marc Blackbeard (Graduate Student, BPI, Wits).

The Bernard Price Institute for Palaeontological Research is part of the School of Geosciences in the Faculty of Science of the University of the Witwatersrand, Johannesburg, South Africa. Its mission is to collect, conserve, study and interpret the rich fossil heritage of South and southern Africa, and to make its findings known through its research, teaching and public engagement activities both in South Africa and beyond.

Story Source:

Adapted from materials provided by University of the Witwatersrand.

Journal Reference:

1. Adam M. Yates, Matthew F. Bonnan, Johann Neveling, Anusuya Chinsamy, and Marc G. Blackbeard. **A new transitional sauropodomorph dinosaur from the Early Jurassic of South Africa and the evolution of sauropod feeding and quadrupedalism**. *Proceedings of the Royal Society B*, 2009; DOI: 10.1098/rspb.2009.1440

http://www.sciencedaily.com/releases/2009/11/091111151237.htm

Hypnosis has 'real' brain effect

Hypnosis has a "very real" effect that can be picked up on brain scans, say Hull University researchers.

An imaging study of hypnotised participants showed decreased activity in the parts of the brain linked with daydreaming or letting the mind wander.

The same brain patterns were absent in people who had the tests but who were not susceptible to being hypnotised.

One psychologist said the study backed the theory that hypnosis "primes" the brain to be open to suggestion.

Hypnosis is increasingly being used to help people stop smoking or lose weight and advisers recently recommended its use on the NHS to treat irritable bowel syndrome.

" **This shows that the changes were due to hypnosis and not just simple relaxation** "
Dr William McGeown, study leader

It is not the first time researchers have tried to use imaging studies to monitor brain activity in people under hypnosis.

But the Hull team said these had been done while people had been asked to carry out tasks, so it was not clear whether the changes in the brain were due to the act of doing the task or an effect of hypnosis.

In the latest study, the team first tested how people responded to hypnosis and selected 10 individuals who were "highly suggestible" and seven people who did not really respond to the technique other than becoming more relaxed.

The participants were asked to do a task under hypnosis, such as listening to non-existent music, but unknown to them the brain activity was being monitored in the rest periods in between tasks, the team reported in the journal Consciousness and Cognition.

Default mode

In the "highly suggestible" group there was decreased activity in the part of the brain involved in daydreaming or letting the mind wander - also known as the "default mode" network.

One suggestion of how hypnosis works, supported by the results, is that shutting off this activity leaves the brain free to concentrate on other tasks.

Study leader Dr William McGeown, a lecturer in the department of psychology, said the results were unequivocal because they only occurred in the highly suggestible subjects.

"This shows that the changes were due to hypnosis and not just simple relaxation. "Our study shows hypnosis is real."

Dr Michael Heap, a clinical forensic psychologist based in Sheffield, said the experiment was unique in showing brain patterns supporting the theory that hypnosis works by "priming" the subject to respond more effectively to suggestions.

"Importantly the data confirm that relaxation is not a critical factor.

"The limited data from this experiment suggest that this pattern of activity then dissipates (at least to some extent) once the subjects start to engage in the suggestions that follow."

But he said the small study, which needed repeating in other populations, did not prove that people being hypnotised were in an actual "trance".

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8359170.stm

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Gut disorder 'blamed on leaks'

Genetic defects leading to a leaky gut are a key cause of the inflammatory disorder ulcerative colitis, UK research suggests.

The disorder causes ulceration of the rectum and the colon, but its exact cause has yet to be pinned down.

The latest study links the condition to four genes which all play a role in keeping the intestine lining healthy.

The Nature Genetics study is based on an analysis of the genes of 12,700 people.

It is twice as large as any previous study - giving the results far greater robustness.

ULCERATIVE COLITIS
Symptoms are intermittent
Symptoms of mild attacks include diarrhoea, tiredness, nausea, abdominal pain and poor appetite
Symptoms of severe attacks include severe diarrhoea many times a day, passing of blood and mucus, fever, abdominal pain and swelling, and weight loss

Ulcerative colitis is a life-long, incurable condition, which can cause diarrhoea, fever, abdominal pain and swelling and weight loss. It affects approximately one in 1,000 people.

The researchers, from the UK IBD Genetics Consortium and the Wellcome Trust Case Control Consortium, compared the genomes of 4,700 people with the condition, with those of 8,000 healthy people.

Their work highlighted variants in three regions of the genome which appeared to increase the risk of the condition.

In particular, they zeroed in on four genes - LAMB1, CDH1, CDH3 and HNF4A - which keep the epithelium - the lining of the intestine - working.

The genes affect the seals at the junctions between the cells of the epithelium.

The gut contains a huge number of bacteria which play a key role in the digestive process, and in keeping the gut healthy.

However, defects in the epithelium can allow these bacteria to leak into the wall of the intestine, where they can trigger an immune reaction, leading to prolonged inflammation.

Many experts believe this is one of the causes of ulcerative colitis - and the latest research provides hard evidence of a genetic basis to the theory.

Robust evidence

Researcher Dr Miles Parkes, Consultant Gastroenterologist at Addenbrooke's Hospital, Cambridge, said: "We have long suspected that genetic defects in the epithelial barrier are important in ulcerative colitis.

"This large scale genetic study provides the first robust genetic evidence that this is the case."

Professor Chris Mathew, from King's College London, who also worked on the study, said: "This is very significant as most treatments to date are based on damping down immune response.

"In fact, our data suggests there may be mileage in trying to tighten up the mucosal barrier as well."

One of the genes highlighted by the research, CDH1, has also been implicated in the spread of colon cancer, suggesting their may be a genetic link between the two conditions.

Sir Mark Walport, director of the Wellcome Trust, said the study strongly suggested genetic inheritance was to blame for some people's vulnerability to ulcerative colitis.

"Although it is a long way from this discovery to developing new treatments for inflammatory bowel disease, new approaches to the treatment and prevention of chronic diseases require new insights into their causes."

Richard Driscoll, Director of the National Association for Colitis and Crohn's Disease, welcomed the research.

He said: "Every increase in knowledge moves us closer to the time when identifying a person's genes may enable them and their doctor to make decisions on treatment with a more certain understanding of how their disease is likely to develop over time."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8358863.stm

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