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Arbo-architects Succesful: First Tower Made Of Living Trees

When the living structure is solid enough to carry the load of the three zinc-coated steel platforms and the working load, the scaffolding will be removed. (Credit: University of Stuttgart)

ScienceDaily (Aug. 26, 2009) — For the past several years, members of the Research Group Baubotanik at the Institute of Theory of Modern Architecture and Design (University of Stuttgart) have been focusing on the idea of living plant constructions. Recently the first "baubotanical" tower made of living trees has been completed. The prototypical building is located in the very south of Germany and offers the opportunity to carry out practical tests.

The group led by Prof. Gerd de Bruyn, the director of the institute, expects that the realisation will lead to scientific progress.

Nearly 9 meters high with a base area of approximately 8 square meters, the tower demonstrates the architectural and ecological potentials of living plant constructions: Trees with their metabolism contribute considerably to a healthy microclimate in cities and they enrich daily life with their appearance – but normally it takes decades until a tree is fully developed.

The aim of baubotanical research is to design and to build living plant constructions as architectural bearing structures in the dimension of fully grown trees. Thereby it is possible to create in short time green spaces that combine the aesthetic and ecologic qualities of trees with architectural usage and functionality.

One organism out of several hundred plants

Basically, the tower consists of a framework-like structure made of several hundred young, only two meters high plants (White Willow/salix alba). Only the plants at the ground are planted in the soil, all others are rooted in plant containers, plugged in a temporary steel scaffolding. Thereby the architects

make use of a quite old technique: Plants of the same species can be merged to one organism by methods similar to grafting.

After several growth periods, when the plants have joined and those at the bottom have developed a sufficient root system in the ground, the plant containers will be removed. As part of his PHD studies, Ferdinand Ludwig from the Research Group could show that and how this grafting method works.

In the current year, the plants will sprout out and form a green wall, and in the course of the following development the at the moment very delicate stems will become thicker and thicker by secondary growth. When the living structure is solid enough to carry the load of the three zinc-coated steel platforms and the working load, the scaffolding will be removed. How much time the whole process will take depends on many factors and will be investigated at this tower building – a time period between 8 and 10 years is estimated.

The living tower was realized as part of the PHD project of Ferdinand Ludwig, advised by Prof. Gerd de Bruyn (Igma, University of Stuttgart) and Prof. Thomas Speck (Plant Biomechanics Group Freiburg, University of Freiburg). The building was designed and build in collaboration with the sculptor Cornelius Hackenbracht (Neue Kunst am Ried, Wald-Ruhestetten) and is supported by the Deutsche Bundesstiftung Umwelt, several companies, engineering offices and further sponsors.

The tower will be opened to the public September 19, 2009. On the site (Neue Kunst am Ried“, Wald-Ruhestetten) there is the opportunity to visit a baubotanical catwalk, too.

Adapted from materials provided by University of Stuttgart, via AlphaGalileo.

http://www.sciencedaily.com/releases/2009/08/090825103227.htm

First Gene-encoded Amphibian Toxin Isolated

Tree frog Hyla annectans, from which the novel anntoxin was isolated. (Credit: Lai Ren)

ScienceDaily (Aug. 26, 2009) — Researchers in China have discovered the first protein-based toxin in an amphibian –a 60 amino acid neurotoxin found in the skin of a Chinese tree frog. This finding may help shed more light into both the evolution of amphibians and the evolution of poison.

While gene-encoded protein toxins have been identified in many vertebrate animals, including fish, reptiles and mammals, none have yet been found in amphibians or birds. In the case of poisonous amphibians, like the tropical poison dart frogs, their toxins are usually small chemicals like alkaloids that are extracted from insects and secreted onto the animal's skin.

Therefore, Ren Lai and colleagues were surprised to find a protein toxin while examining the secretions of the tree frog *Hyla annectans*. They then purified and characterized this new toxin, which they called anntoxin.

In protein sequence and structure, anntoxin was very similar to dendrotoxins (the venoms found in cobras and other mamba snakes) and cone snail toxins, though anntoxin only has two disulfide bridges (a strong link that helps keep proteins folded) compared to three in the other types. The slight differences may account for why anntoxin does not block potassium channels as the other venoms do, but rather sodium channels important for signaling in sensory nerves.

Like these other venoms, though, anntoxin is fast-acting and potent; the researchers found it could produce rapid convulsions, paralysis and respiratory distress in several would-be predators like snakes and birds.

The similarities and differences make anntoxin a very valuable protein for further study, considering amphibians' special niche as the animals bridging the evolutionary land-water gap.

Journal reference:

1. You et al. **The First Gene-encoded Amphibian Neurotoxin**. *Journal of Biological Chemistry*, 2009; 284 (33): 22079 DOI: 10.1074/jbc.M109.013276

Adapted from materials provided by American Society for Biochemistry and Molecular Biology, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/08/090817143554.htm

Unique Acacia Tree's Promise To Revive African Soils

With its nitrogen-fixing qualities, the tall, long-lived acacia tree, Faidherbia albida (Mgunga in Swahili) could limit the use of fertilizers; provide fodder for livestock, wood for construction and fuel wood, and medicine through its bark, as well as windbreaks and erosion control to farmers across sub-Saharan Africa. (Credit: Copyright World Agroforestry Centre (ICRAF))

ScienceDaily (Aug. 26, 2009) — Scientists said at the 2nd World Congress of Agroforestry that a type of acacia tree with an unusual growth habit-unlike virtually all other trees-holds particular promise for farmers in Africa as a free source of nitrogen for their soils that could last generations.

With its nitrogen-fixing qualities, the tall, long-lived acacia tree, Faidherbia albida (Mgunga in Swahili) could limit the use of fertilizers; provide fodder for livestock, wood for construction and fuel wood, and medicine through its bark, as well as windbreaks and erosion control to farmers across sub-Saharan Africa. The tree illustrates the benefits of growing trees on farms, said the scientists at today's meeting, and is adapted to an incredibly wide array of climates and soils from the deserts to the humid tropics.

"The future of trees is on farms," said Dennis Garrity, Director General of the World Agroforestry Centre, or ICRAF, one of 15 centers supported by the Consultative Group on International Agricultural Research (CGIAR). The Center is hosting the Congress, which has convened about 800 global experts to discuss the importance of growing trees on farms for humanity's survival.

"Growing the right tree in the right place on farms in sub-Saharan Africa-and worldwide- has the potential to slow climate change, feed more people, and protect the environment. This tree, as a source of free, organic nitrogen, is an example of that. There are many other examples of solutions to African farming that exist here already."

African farmland is severely degraded and African farmers, on average, apply only 10 percent of soil nutrients used in the rest of the world. Low-cost options are critical to reversing the continent's declining farm productivity, the scientists said, as sharply increasing fertilizer prices further limit the choices African farmers have to improve farm yields while protecting forests from further clearing.

The Faidherbia acacia tree has the quality of "reverse leaf phenology," which drives the tree to go dormant and shed its nitrogen-rich leaves during the early rainy season-when seeds are being planted and

need the nitrogen-and then to re-grow its leaves when the dry season begins and crops are dormant. This makes it highly compatible with food crops because it does not compete with them for light-only the bare branches of the tree's canopy spread overhead while crops grow to maturity. Their leaves and pods provide a crucial source of fodder in the dry season for livestock when other plants have dried up.

Research on the tree began over 60 years ago when scientists observed that farmers throughout the Sahelian region of Africa were retaining the trees in their sorghum and millet fields. It is a frequent component of farming systems of Senegal, Mali, Burkina Faso, Niger, Chad, Sudan, and Ethiopia, and in parts of northern Ghana, northern Nigeria, and northern Cameroon. The tree is growing on over 4.8 million hectares of land in Niger. Half a million farmers in Malawi and in the southern highlands of Tanzania grow the tree on their maize fields.

In Malawi, maize yields were increased up to 280 percent in the zone under the tree canopy compared with the zone outside the tree canopy. In Zambia, recent unpublished observations showed that unfertilized maize yields in the vicinity of the Faidherbia trees averaged 4.1 tonnes per hectare, compared to 1.3 tonnes nearby but beyond the tree canopy. Yield increases have also been documented in unfertilized millets grown under the tree in West Africa, for sorghum in Ethiopia, other parts of Africa, and in India, in addition to groundnuts and cotton. Often, millet and sorghum exhibit no further response to artificial fertilizers beyond that provided by the tree's leaf fall.

Currently, the Departments of Agriculture in both Malawi and Zambia are seeking to double maize production with the use of the tree. They recommend that farmers establish 100 Faidherbia trees on each hectare of maize that is planted.

Scientists at the conference noted some 700 published references to the tree's history, ecology, and growing habits. "Knowledge of this tree is farmer-driven," said Garrity. "We are now combining the scientific knowledge base with the farmer knowledge base. There is sufficient research on both sides to warrant dramatically scaling-up the planting of this tree on farms across Africa through extension programs. The risks to farmers are low; it requires very little labor, and delivers many benefits."

"Thus far we have failed to do enough to refine, adapt and extend the unique properties of these trees to the more than 50 million food crop farmers who desperately need home-grown solutions to their food production problems," he continued.

Adapted from materials provided by World Agroforestry Centre (ICRAF).

http://www.sciencedaily.com/releases/2009/08/090824182535.htm

World's Last Great Forest Under Threat: New Study

Canadian evergreen forest. (Credit: iStockphoto/Stacey Newman)

ScienceDaily (Aug. 25, 2009) — The world's last remaining "pristine" forest -- the boreal forest across large stretches of Russia, Canada and other northern countries -- is under increasing threat, a team of international researchers has found.

The researchers from the University of Adelaide in Australia, Memorial University of Newfoundland in Canada and the National University of Singapore have called for the urgent preservation of existing boreal forests in order to secure biodiversity and prevent the loss of this major global carbon sink.

The boreal forest comprises about one-third of the world's forested area and one-third of the world's stored carbon, covering a large proportion of Russia, Canada, Alaska and Scandinavia.

To date it has remained largely intact because of the typically sparse human populations in boreal regions. That is now changing says researchers and co-authors Associate Professor Corey Bradshaw, University of Adelaide, Associate Professor Ian Warkentin, Memorial University, and Professor Navjot Sodhi, National University of Singapore.

"Much world attention has focused on the loss and degradation of tropical forests over the past three decades, but now the boreal forest is poised to become the next Amazon," says Associate Professor Bradshaw, from the University of Adelaide's Environment Institute.

"Historically, fire and insects have driven the natural dynamics of boreal ecosystems," says Associate Professor Warkentin. "But with rising demand for resources, human disturbances caused by logging, mining and urban development have increased in these forests during recent years, with extensive forest loss for some regions and others facing heavy fragmentation and exploitation."

The findings have been published online in *Trends in Ecology and Evolution* in a paper called "Urgent preservation of boreal carbon stocks and biodiversity". The findings include:

- Fire is the main driver of change and increased human activity is leading to more fires. There is also evidence that climate change is increasing the frequency and possibly the extent of fires in the boreal zone.
- Few countries are reporting an overall change in the coverage by boreal forest but the degree of fragmentation is increasing with only about 40% of the total forested area remaining "intact".
- Russian boreal forest is the most degraded and least "intact" and has suffered the greatest decline in the last few decades.
- Countries with boreal forest are protecting less than 10% of their forests from timber exploitation, except for Sweden where the figure is about 20%.

Adapted from materials provided by University of Adelaide.

http://www.sciencedaily.com/releases/2009/08/090825090755.htm

Gaping Gila Monsters, Buzzing Insects, Clambering Ungulates: New Finds From Germany's Messel Pit

Rodent in a fur coat, Masillamys. (Credit: Copyright Senckenberg, Frankfurt (Germany))

ScienceDaily (Aug. 25, 2009) — Today, anyone who looks into the Messel Pit, about 20 kilometres southeast of Frankfurt, Germany, will see scattered groups of trees, bushes and grasses. Underlying the vegetation, however, are richly fossiliferous shales. Some astonishingly well-preserved fossil finds were recently recovered by scientists from these deposits, laid down in the former volcanic lake, and add exotic colour and diversity to the Eocene "Messel world" of 47 million years ago. Some representative finds of animals discovered in 2007 and 2008 were recently exhibited.

Not only the world-famous primeval horse browsed at the shores of the lake in the warm, wet climate prevailing at that time (average annual temperature, 25°C). Around Lake Messel, which emerged in a volcanic crater and was surrounded back then by dense primeval forest, lived early ungulates and rodents; the ancestors of today's birds flew over the cloudy water; insects buzzed through the air; and cold-blooded reptiles basked lazily in the sun. 47 million years ago, Messel was located at the present latitude of Siciliy.

In the annual digs that the Senckenberg Research Institute carries out in the Messel Pit, an average of 3,000 fossil remains are recovered from the shale in this UNESCO World Natural Heritage Site. Some particularly well-preserved fossils discovered in 2007 and 2008 were recently exhibited.

Bulldog of the lizard world

A reptile find about 80 centimetres long has been identified as an early representative of the beaded lizards and Gila monsters (Helodermatidae). This family, known to have existed since the Cretaceous, is

found today in the southwest of the USA and Central America. These lizards are renowned not only for a curious combination of strength, tenacity and deliberateness but also for being venomous. Although it is primitive in many ways, the skeleton found in Messel already shows incipient canals in its teeth which lead us to believe that this species was already producing venom.

"The warm climate of the Eocene may have allowed this lineage to migrate along high-latitude routes to Europe. From studies of the limbs and chemical analyses of the bones, we hope to learn more about evolutionary rates and the biology of primitive members of this unique group," explains Dr. Krister Smith. This young reptile expert from the USA developed a special interest in the pink-spotted descendants of these primeval-looking animals whilst still a schoolboy.

Beautiful beetles, weaver ants, leafcutter bees

A metallically gleaming jewel beetle belonging to the family Buprestidae and the genus Psiloptera still shows off its beautiful coloration, even after 47 million years. "The exquisite coloration is created by refraction at different layers of the chitin carapace," explains Dr. Sonja Wedmann. The living representatives of the genus can now only be found in the Tropics.

The insect finds of the last two years also include a queen weaver ant that fell into the former Messel Lake during her nuptial flight and drowned there. The living representatives of the Oecophylla genus occur today in the Tropics of Africa and Southeast Asia. Their nests are made of leaves which the female workers weave together with silk from their larvae. "Since we have not yet found any nests in Messel, it has not yet been possible to ascertain whether the weaver ants that lived 47 million years ago could already do that," says Dr. Sonja Wedmann.

The special fossil evidence of insects includes the discovery of a completely preserved leaf-cutting bee. However, morphological features show that the species found in Messel is not a true member of the leaf-cutter group. In contrast to "real" leafcutter bees, Friccomelissa schopowi apparently built its nest without using plant discs.

Rodent in a fur coat, archaic stars, clambering ungulates

The new find of a Masillamys has been recovered nearly whole and allows identification of the fossilised remains of its stomach contents. The extremely well-preserved outlines of the body reveal a shadow on the skin that leads us to the conclusion that this ancient rodent had a thick, short-haired coat of fur. "The key feature, the single pair of morphologically specialised chisel-shaped incisors, allow the 'real' rodent to be instantly recognised," explains scientist Dr. Thomas Lehmann, who is working on this animal. This individual, which was discovered just before the end of the digging season in September 2007, shows the short legs typical of the genus that lead one to assume that the rodent once lived on the floor of the primeval forest surrounding Messel.

As has happened before, the new find of a Leptictidium auderiense in September 2008 created a certain amount of excitement. Thanks to the BBC documentary "Walking with Beasts," this archaic mammal became a star among the Messel fossils. Last year's new find is the first juvenile animal of this genus, which died out at the end of the Eocene. In contrast to its still-primitive teeth, Leptictidium had a highly specialised locomotor system. Its extraordinarily long tail with 40 vertebrae, long back legs and reduced front ones point to a bipedal gait. "However, since features of the lumbar vertebrae might also indicate a hopping gait, we are looking forward to new findings from the fossil discovered in 2008," explains Thomas Lehmann; he hopes that a new imaging technique will reveal details that cannot yet be discerned.

The new finds also include a Kopidodon macrognathus. Distinct shadows show the long tail to have been bushy, which is typical of the species. The marked bony crest on its skull and the developing permanent tooth in the area of the right canine of the upper jaw indicate that it is an infant male. Although the long canines suggest a predator, the molars indicate that this was a plant-eating ungulate. "We do not yet know

enough about the animal's lifestyle. Some features of the locomotor system, such as the very versatile shoulder, elbow and hip joints as well as the gripping ability of the front limbs indicate a tree-dwelling fruit-eater," explains Thomas Lehmann. It is an open question whether this species lived in trees or simply moved among the branches. This mammal expert is awaiting further findings from the well-preserved stomach contents of the new find. He remarks that seeds, which are quite often found in the Messel shales, might even put them on the track of the Kopidodon's favourite fruit.

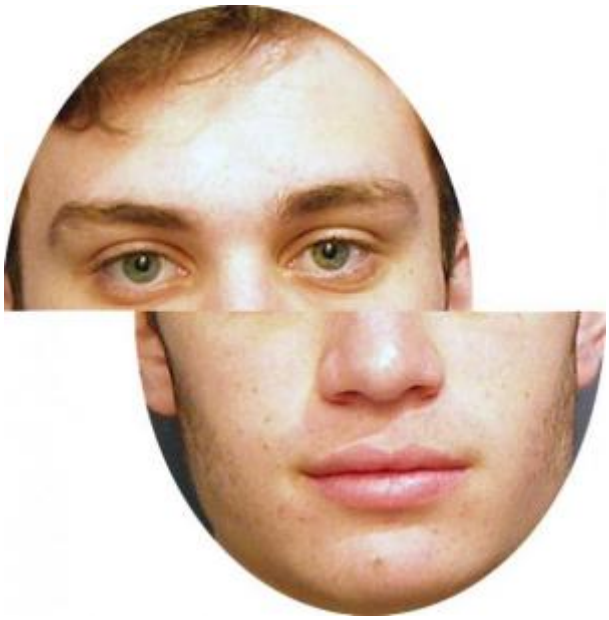
The missing pieces of the jigsaw are falling into place

Among the total of 6,773 finds that were recovered from the digs in the Messel Pit in 2007 and 2008, there were 1,929 fossilised remains of vertebrates, 1,403 insects and 3,441 plant remains. The information contained in the finds provide the scientists of the Senckenberg Research Institute data on the occurrence of individual species, their bodily structures and lifestyles, and the evolutionary history of animal groups. In addition, the research results help to reconstruct the Eocene environment and give clues to the relationship between climate and biodiversity.

Adapted from materials provided by Senckenberg Research Institute and Natural History Museum, via AlphaGalileo.

http://www.sciencedaily.com/releases/2009/08/090814101831.htm

What She Sees In You: Facial Attractiveness Explained



Split face photo used in evaluation of how women determine facial attractiveness by Robert G. Franklin, graduate student in psychology and Reginald Adams, assistant professor of psychology and neurology, Penn State. (Credit: Robert G. Franklin, Penn State)

ScienceDaily (Aug. 25, 2009) — When it comes to potential mates, women may be as complicated as men claim they are, according to psychologists.

"We have found that women evaluate facial attractiveness on two levels -- a sexual level, based on specific facial features like the jawbone, cheekbone and lips, and a nonsexual level based on overall aesthetics," said Robert G. Franklin, graduate student in psychology working with Reginald Adams, assistant professor of psychology and neurology, Penn State. "At the most basic sexual level, attractiveness represents a quality that should increase reproductive potential, like fertility or health."

On the nonsexual side, attractiveness can be perceived on the whole, where brains judge beauty based on the sum of the parts they see.

"But up until now, this (dual-process) concept had not been tested," Franklin explained. The researchers report the findings of their tests in the current issue of the *Journal of Experimental Social Psychology.*

To study how women use these methods of determining facial attractiveness, the psychologists showed fifty heterosexual female college students a variety of male and female faces. They asked the participants to rate what they saw as both hypothetical dates and hypothetical lab partners on a scale of one to seven. The first question was designed to invoke a sexual basis of determining attractiveness, while the second was geared to an aesthetic one. This part of the experiment served as a baseline for next phase.

The psychologists then presented the same faces to another set of fifty heterosexual female students. Some of these faces, however, were split horizontally, with the upper and lower halves shifted in opposite directions. The scientists asked these participants to rate the overall attractiveness of the split and whole faces on the same scale.

By dividing the faces in half and disrupting the test subjects' total facial processing, the researchers believed that women would rely more on specific facial features to determine attractiveness. They thought

that this sexual route would come into play particularly when the participants saw faces that were suited as hypothetical dates rather than lab partners. The study showed exactly that.

"The whole face ratings of the second group correlated better with the nonsexual 'lab partner' ratings of the first group." Franklin said. With the faces intact, the participants could evaluate them on an overall, nonsexual level.

"The split face ratings of the second group also correlated with the nonsexual ratings of the first group when the participants were looking at female faces," he added. "The only change occurred when we showed the second group split, male faces. These ratings correlated better with the 'hypothetical date' ratings of the first group."

The bottom line is that, at a statistically significant level, splitting the faces in half made the women rely on a purely sexual strategy of processing male faces. The study verifies that these two ways of assessing facial appeal exist and can be separated for women.

"We do not know whether attractiveness is a cultural effect or just how our brains process this information," Franklin admitted. "In the future, we plan to study how cultural differences in our participants play a role in how they rate these faces. We also want to see how hormonal changes women experience at different stages in the menstrual cycle affect how they evaluate attractiveness on these two levels."

Researchers have long known that women's biological routes of sexual attraction derive from an instinctive reproductive desire, relying on estrogen and related hormones to regulate them. The overall aesthetic approach is a less reward-based function, driven by progesterone.

How this complex network of hormones interacts and is channeled through the conscious brain and the human culture that shapes it is a mystery.

"It is a complicated picture," Franklin added. "We are trying to find what features in the brain are at play, here."

Adapted from materials provided by Penn State.

http://www.sciencedaily.com/releases/2009/08/090824115811.htm

Daylight Could Help Control Our Weight

New research suggests that daylight is a major factor in controlling the activity of brown adipose tissue, which is involved in obesity. (Credit: iStockphoto)

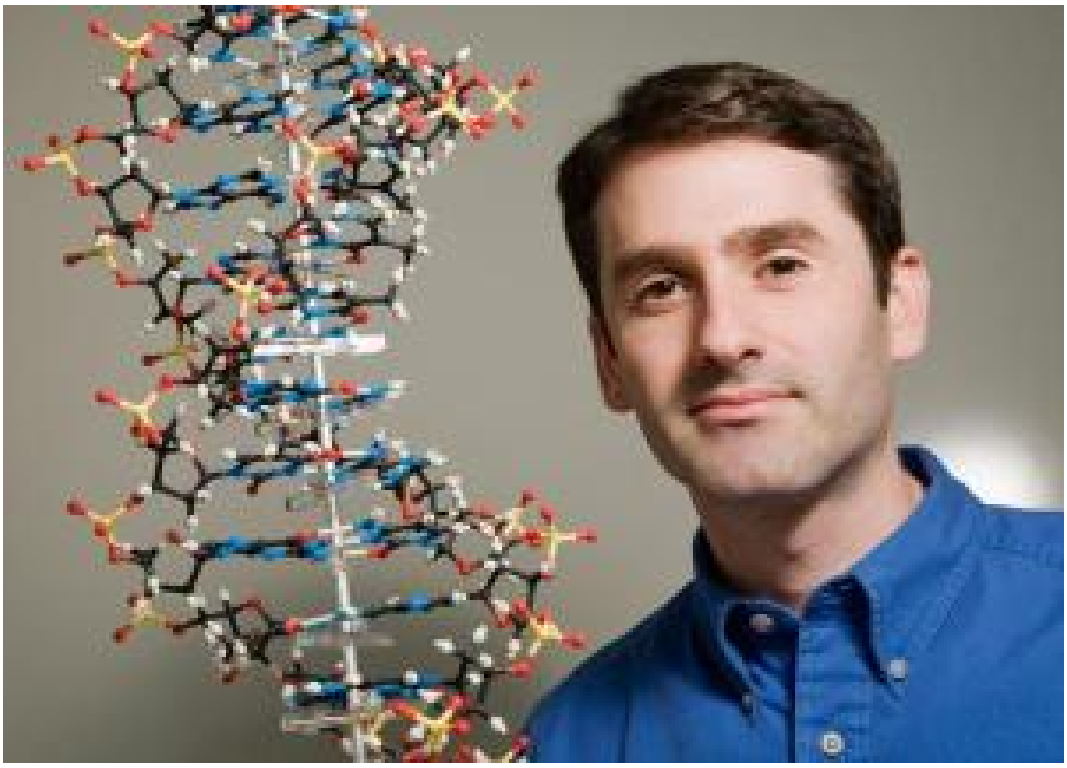
ScienceDaily (Aug. 25, 2009) — Exciting research into Brown adipose tissue (BAT) — brown fat, which is found in abundance in hibernating animals and newborn babies — could lead to new ways of preventing obesity.Studies have already shown that BAT activity in adults is reduced with obesity. Therefore, promoting BAT function could prevent or reduce obesity in some people.New research, led by Michael Symonds, Professor of Developmental Physiology in the School of Clincal Sciences at The University of Nottingham, has shown — for the first time — that daylight is a major factor in controlling BAT activity.Professor Symonds said: "Our research has suggested a previously unknown mechanism for controlling BAT function in humans and this could potentially lead to new treatments for the prevention or reversal of obesity."

Winter was traditionally a time of the year that was accompanied with increased thermal demands and thus energy expenditure, but the body's requirements for BAT has been reduced in recent times by central heating plus global warming. BAT is capable of producing up to 300 times more heat per unit mass compared with all other tissues.The research, published in the journal Diabetes, studied well over 3500 patients. The presence of BAT was documented and correlated with monthly changes in daylight and ambient temperature. Their results showed that BAT was more common in females and that changes in BAT activity were more closely associated with day light than ambient temperature.BAT is activated by the cold and is unique in being able to produce very large amounts of heat — but little is known about the main factors that regulate the amount of BAT in our bodies. Professor Symonds said: "Our research demonstrates a very strong seasonal variation in the presence of BAT. The study focused on the impact of daylight and ambient temperature as these are two key factors in determining BAT function in small mammals. Our exciting new findings may help us find novel interventions aimed at promoting BAT activity particularly in the winter."

Adapted from materials provided by University of Nottingham.

http://www.sciencedaily.com/releases/2009/08/090821135024.htm

Newly Found DNA Catalysts Cleave DNA With Water Molecule



Better tools for manipulating DNA in the laboratory may soon be possible with newly discovered deoxyribozymes (catalytic DNA) capable of cleaving single-stranded DNA, say Scott Silverman and other researchers at the University of Illinois. (Credit: Photo by L. Brian Stauffer)

ScienceDaily (Aug. 25, 2009) — Better tools for manipulating DNA in the laboratory may soon be possible with newly discovered deoxyribozymes (catalytic DNA) capable of cleaving single-stranded DNA, researchers at the University of Illinois say.

The deoxyribozymes accomplish the DNA cleavage with the sequence-selectivity and site-selectivity required for a practical catalyst, the researchers say.

"Our work suggests that deoxyribozymes have significant potential as sequence-specific DNA cleavage reagents," said chemistry professor Scott Silverman. "The hope is that we can take this fundamental advance and develop the ability to use DNA as a practical catalyst to cleave double-stranded DNA."

Silverman, postdoctoral research associate Madhavaiah Chandra and graduate student Amit Sachdeva report their discovery in a paper accepted for publication in *Nature Chemical Biology*.

The researchers discovered the new deoxyribozymes while searching for artificial sequences of DNA that could cleave proteins. The newly found catalysts function in a fashion similar to restriction enzymes, although to date by cleaving only single-stranded DNA.

Restriction enzymes, which allow scientists to cut and paste portions of double-stranded DNA, are the fundamental catalysts of molecular biology.

Each restriction enzyme, however, has a limited number of DNA sequences it can cut. Consequently, only a few percent of arbitrarily chosen DNA sequences can be cut by commercially available restriction enzymes.

Like natural restriction enzymes, the new catalysts are both sequence-specific and site-specific. "This means we can target a particular sequence, and we know we will cut at only one site within that sequence," Silverman said. "By appropriately picking the recognition and enzyme regions of the catalyst, we should be able to cut many more DNA sequences than is possible with current restriction enzymes."

The new DNA catalysts require two metal ions – manganese and zinc – to carry out their catalysis, "which is intriguing, because many natural protein-based nucleases (which cleave DNA) similarly require two metal ions," Silverman said. "One or both of the metals are presumably involved in the chemical mechanism by which our DNA catalyst achieves hydrolysis of the DNA backbone."

DNA hydrolysis is a very challenging chemical reaction, much more difficult to perform than the cleavage of a strand of RNA, Silverman said. In cleaving DNA, a water molecule must be brought in for the breaking reaction to occur. Also, both the DNA and the catalyst must be arranged appropriately in three-dimensional space.

How all of this happens with the DNA catalysts is not yet clear. Silverman's research group continues to probe the structure and mechanism of the catalysts, along with identifying and characterizing catalysts with different recognition sites.

"So far, we have achieved cleavage of single-stranded DNA targets," Silverman said. "The next big step is to cleave double-stranded DNA targets."

The National Institutes of Health, the Defense Threat Reduction Agency, and the David and Lucile Packard Foundation funded the work.

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

http://www.sciencedaily.com/releases/2009/08/090816170925.htm

Eco-friendly Self-cleaning Material Tough On Stains, Light On Effort

Scientists have developed a new coating for glass, plastics, and a range of other materials that would enable consumers to wipe away those pesky oils with plain water. (Credit: iStockphoto/Don Bayley)

ScienceDaily (Aug. 25, 2009) — Cleaning oily smears from kitchen countertops, mirrors, garage floors, and other surfaces with plain water — rather than strong detergents or smelly solvents — may seem like pure fantasy. But scientists in Indiana have described what they believe to be a simple and effective state-of-the-art oil stain remover. They have developed a new coating for glass, plastics, and a range of other materials that would enable consumers to wipe away those pesky oils with plain water.

Their report at the 238th National Meeting of the American Chemical Society (ACS) points out that the same coatings can be added to common window cleaning sprays and used to prevent bathroom mirrors, automobile windshields and other surfaces from fogging up.

"You add water, and the oil just comes right off like magic," said Jeffrey Youngblood, Ph.D., lead researcher on the project. "These are eco-friendly coatings — environmentally 'green' in the sense that they eliminate the need for harsh detergents and solvents in settings ranging from home kitchens to industrial machine shops that must contend with heavy oil spills."

The materials could be used in a range of consumer and industrial products, Youngblood said. They include household cleaners, easy-to-clean paints, water filters that separate water from oil, sealants for concrete floors and walls that repel oil in home garages and auto repair shops. In addition, anti-fog coatings could be used on windshields or eyewear, including everyday lenses and fog-free scuba masks.

The eco-friendly plastics could reduce the need for detergents containing phosphates. "We put out tons of detergents and phosphates each year," said Youngblood, adding that the polymer materials also could reduce the use of detergents for laundering clothes. This would cut down on the release of phosphates, which wash into lakes and streams and stimulate growth of algae, depleting oxygen supplies in ways that cause fish kills in waterways and make swimming unsafe for humans.

"The idea is to use these polymers to clean in situations where it's inconvenient to apply soap or anywhere you would need to have oil cleaned off easily," said Youngblood, a materials engineer at Purdue University in West Lafayette, Ind. "Oil fouling is always a problem. A lot of people overlook the fact that pure water will generally not remove oil from a surface, but using this product transforms water into a super detergent."

Youngblood's group spent years in an effort to develop substances with the goal of making a surface that would repel oil more than water. Once successful, their framework for self-cleaning plastics was in place. "With these materials, if you stuck an oil droplet on them you could completely remove it with water. You could basically do soap-free rinsing."

These polymer coatings — about 20,000 times thinner than the width of a human hair — were highly sensitive to water and would break to the touch. Youngblood has built upon these materials to make a new family of ready-to-use polymers that can be easily applied to a variety of surfaces.

They have a bottom layer of polyethylene glycol, which attracts water, and an upper layer of a Teflon-like molecule that prevents the passage of oil. The result is a surface that holds a film of water while repelling oil. "Our work is a big step forward toward useable materials as either additives or coatings," he said, "and few others are working in this area. Most research on self-cleaning is done with different surfaces."

Youngblood is currently evaluating self-cleaning and anti-fog capabilities for polymers on different kinds of metals and ceramics. Preliminary tests on the lifetime of anti-fog coatings are especially encouraging. "We have stored these on shelves and use it months afterwards, and we haven't noticed a decrease in performance," he said. "We feel that we can make all our self-cleaning plastics commercially available within a few years."

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

http://www.sciencedaily.com/releases/2009/08/090816170915.htm

Lower-cost Solar Cells To Be Printed Like Newspaper, Painted On Rooftops

Researchers apply the nanoparticle "inks" as a spray on the solar cells. (Credit: Image courtesy of University of Texas at Austin)

ScienceDaily (Aug. 25, 2009) — Solar cells could soon be produced more cheaply using nanoparticle "inks" that allow them to be printed like newspaper or painted onto the sides of buildings or rooftops to absorb electricity-producing sunlight.

Brian Korgel, a University of Texas at Austin chemical engineer, is hoping to cut costs to one-tenth of their current price by replacing the standard manufacturing process for solar cells – gas-phase deposition in a vacuum chamber, which requires high temperatures and is relatively expensive.

"That's essentially what's needed to make solar-cell technology and photovoltaics widely adopted," Korgel said. "The sun provides a nearly unlimited energy resource, but existing solar energy harvesting technologies are prohibitively expensive and cannot compete with fossil fuels."

For the past two years, Korgel and his team have been working on this low-cost, nanomaterials solution to photovoltaics – or solar cell – manufacturing. Korgel is collaborating with professors Al Bard and Paul Barbara, both of the Department of Chemistry and Biochemistry, and Professor Ananth Dodabalapur of the Electrical and Computer Engineering Department. They recently showed proof-of-concept in a recent issue of *Journal of the American Chemical Society.*

The inks could be printed on a roll-to-roll printing process on a plastic substrate or stainless steel. And the prospect of being able to paint the "inks" onto a rooftop or building is not far-fetched.

"You'd have to paint the light-absorbing material and a few other layers as well," Korgel said. "This is one step in the direction towards paintable solar cells."

Korgel uses the light-absorbing nanomaterials, which are 10,000 times thinner than a strand of hair, because their microscopic size allows for new physical properties that can help enable higher-efficiency devices.

In 2002, he co-founded a company called Innovalight, based in California, which is producing inks using silicon as the basis. This time, Korgel and his team are using copper indium gallium selenide or CIGS, which is both cheaper and benign in terms of environmental impact.

"CIGS has some potential advantages over silicon," Korgel said. "It's a direct band gap semiconductor, which means that you need much less material to make a solar cell, and that's one of the biggest potential advantages."

His team has developed solar-cell prototypes with efficiencies at one percent; however, they need to be about 10 percent.

"If we get to 10 percent, then there's real potential for commercialization," Korgel said. "If it works, I think you could see it being used in three to five years."

He also said that the inks, which are semi-transparent, could help realize the prospect of having windows that double as solar cells. Korgel said his work has attracted the interest of industrial partners.

Funding for the research comes from the National Science Foundation, the Welch Foundation and the Air Force Research Laboratory.

Adapted from materials provided by University of Texas at Austin.
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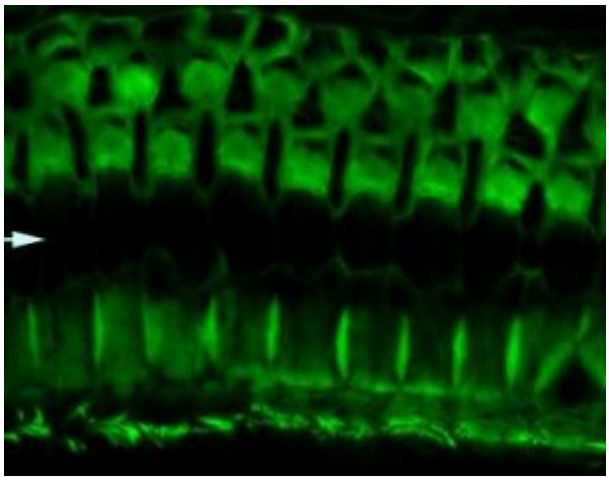
http://www.sciencedaily.com/releases/2009/08/090824115907.htm

Gene Discovery Reveals Critical Protein's Function In Hearing



When claudin-9 is mutated, potassium floods the wrong part of the ear's sensory cells, killing a layer of them, as indicated by the arrow in this image. (Credit: University of Iowa/PLoS Genetics)

ScienceDaily (Aug. 25, 2009) — Discovery of a deafness-causing gene defect in mice has helped identify a new protein that protects sensory cells in the ear, according to a study led by University of Iowa researchers. The findings, which also involved Kansas State University, appear in the Aug. 21 issue of the open-access journal *PLoS Genetics*. In humans, hereditary deafness is one of the most common birth defects, yet most genes involved in hearing are unidentified. Mice are used as research models because mouse and human auditory genetics are very similar.

Using a deaf mouse model generated at The Jackson Laboratory, the team identified the deafness-causing defect in the claudin-9 gene. The mutated gene fails to produce normal claudin-9 protein, which, the University of Iowa team showed, is needed to maintain the proper distribution of potassium in the inner ear.

"Genes in the claudin family number at least 24 and produce proteins that prevent ions, including potassium, from moving between cells," said the paper's senior author Botond Banfi, M.D., Ph.D., assistant professor of anatomy and cell biology in the University of Iowa Carver College of Medicine. "Sensory cells in the hearing organ are bathed in a high potassium solution on one side and in a low potassium solution on the other side. We found that claudin-9 is very important in keeping the amount of potassium on the two sides separate. This separation protects sensory cells from potassium intoxication."

When claudin-9 is mutated, potassium floods the wrong part of the sensory cells, killing most and leaving the remaining ones functionally defective.

In follow-up efforts, Banfi and colleagues, including the study's first author Yoko Nakano, Ph.D., University of Iowa assistant research scientist in anatomy and cell biology, are screening people with hearing impairment to see if some of them have a mutation in claudin-9.

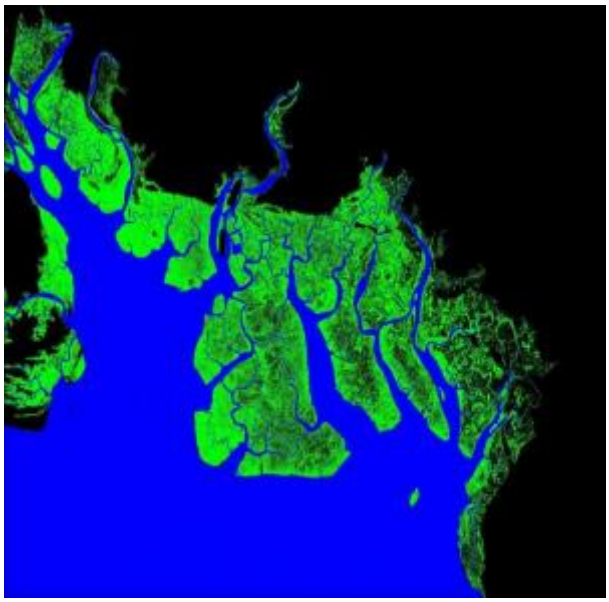
Journal reference:

1. Nakano et al. **A Claudin-9-Based Ion Permeability Barrier Is Essential for Hearing**. *PLoS Genetics*, 2009; 5 (8): e1000610 DOI: 10.1371/journal.pgen.1000610

Adapted from materials provided by University of Iowa.

http://www.sciencedaily.com/releases/2009/08/090821135100.htm

First Measure Of Africa's Coastal Forests: Swampy Mangrove Destruction Threatens Shrimp Farming



Fatoyinbo used a remote sensing software-based classification method that separates the different types of land cover like forest, urban area, and soil, differentiating by colors or reflectance. Here, mangrove forest cover is shown in green along the coast of northern Cameroon on a Landsat-derived map (with ocean shown in blue and other land cover types in black). (Credit: NASA/Temilola Fatoyinbo)

ScienceDaily (Aug. 25, 2009) — Impoverished fishermen along the coast of tropical African countries like Mozambique and Madagascar may have only a few more years to eke out a profit from one of their nations' biggest agricultural exports. Within a few decades, they may no longer have a livelihood at all.

That's because swampy mangrove forests – essential breeding grounds for fish and shellfish in these countries – are being destroyed by worsening pollution, encroaching real estate development, and deforestation necessary to sustain large-scale commercial shrimp farming.

The decline of these forests threatens much of Africa's coastal food supply and economy. The destruction of mangroves -- one of Earth's richest natural resources – also has implications for everything from climate change to biodiversity to the quality of life on Earth.

Growing up in Cotonou, Benin, environmental scientist Lola Fatoyinbo of NASA's Jet Propulsion Laboratory (JPL) passed polluted mangroves daily. Inspired to help save the forests, she began a mission as a graduate student in the United States to gain more insight about African mangroves.

Her studies have brought her back to Africa, where she has journeyed along the coastlines to test a new satellite technique for measuring the area, height, and biomass of mangrove forests. She developed and employed a method that can be used across the continent, overcoming expensive, ad hoc, and inconsistent modes of ground-based measurement. Fatoyinbo's approach recently produced what she believes is the first full assessment of the continent's mangrove forests.

"We've lost more than 50 percent of the world's mangrove forests in a little over half a century; a third of them have disappeared in the last 20 years alone," said Fatoyinbo, whose earlier study of Mozambique's coastal forests laid the groundwork for the continent-wide study. "Hopefully this technique will offer scientists and officials a method of estimating change in this special type of forest."

An Ecosystem Apart

Mangroves are the most common ecosystem in coastal areas of the tropics and sub-tropics. The swampy forests are essential -- especially in densely-populated developing countries -- for rice farming, fishing and aquaculture (freshwater and saltwater farming), timber, and firewood. Some governments also increasingly depend on them for eco-tourism.

The large, dense root systems are a natural obstacle that helps protect shorelines against debris and erosion. Mangroves are often the first line of defense against severe storms, tempering the impact of strong winds and floods.

These coastal woodlands also have a direct link to climate, sequestering carbon from the atmosphere at a rate of about 100 pounds per acre per day – comparable to the per acre intake by tropical rainforests (though rainforests cover more of Earth's surface).

"To my knowledge, this study is the first complete mapping of Africa's mangroves, a comprehensive, historic baseline enabling us to truly begin monitoring the welfare of these forests," said Assaf Anyamba, a University of Maryland-Baltimore County expert on vegetation mapping, based at NASA's Goddard Space Flight Center in Greenbelt, Md.

Climbing the Right Tree

Fatoyinbo's research combines multiple satellite observations of tree height and land cover, mathematical formulas, and "ground-truthing" data from the field to measure the full expanse and makeup of the coastal forests.

Her measurements yielded three new kinds of maps of mangroves: continental maps of how much land the mangroves cover; a three-dimensional map of the height of forest canopies across the continent; and biomass maps that allow researchers to assess how much carbon the forests store.

"Beyond density or geographical size of the forests, the measurements get to the heart of the structure, or type, of mangroves," explained Fatoyinbo. "It's that trait – forest type – that drives which forests land managers target for agriculture, conservation, and habitat suitability for animals and people."

Fatoyinbo and colleague Marc Simard of JPL used satellite images from the NASA-built Landsat and a complex software-based color classification system to distinguish areas of coastal forests from other types of forests, urban areas or agricultural fields. They also integrated data from NASA's Shuttle Radar Topography Mission (SRTM) to create relief maps of the height of the forest canopy. Finally, they merged the broad radar maps with high-accuracy observations from a light detection and ranging (commonly called lidar) instrument aboard NASA's Ice, Cloud, and land Elevation Satellite (ICESat) to obtain accurate height estimates.

Fatoyinbo double-checked the accuracy of her satellite measurements at the ground level in the only way possible: She went to Africa to measure tree heights and trunk diameters in person. Using a hand-held instrument called a clinometer and a simple trigonometry formula, Fatoyinbo visited Mozambique, measured the trees, and found she indeed had very accurate measurements of the forests.

Preserving the Forest for the Trees

Mangroves are hardy and adaptable forests that can thrive under extreme heat, very high salt levels, and swampy soil. Rampant clearing for agriculture and construction, soil toxicity, and long-term oil and sewage pollution, however, are increasingly threatening their survival and more than 1,300 animal species in ways that nature cannot.

"The United States' largest mangrove forests, Florida's Everglades, are largely protected now and recognized as an endangered natural resource," explained Fatoyinbo. "But in many other places, resource

managers lack solid monitoring capabilities to counter mangrove exploitation. Better mangrove monitoring will, I hope, mean better management and preservation."

Free satellite data can help ease the problems of money, logistics, and political instability that can prevent mangrove preservation. For that reason, Anyamba and Fatoyinbo are working to convince the United Nations Environment Program and the UN Educational, Scientific and Cultural Organization to include the study's data in their environmental assessments.

The new technique also distinguishes itself, added Anyamba, "as an excellent example of how we can use different remote sensing technologies together to address science questions and global social issues."

Journal reference:

1. Fatoyinbo, T. E., M. Simard, R. A. Washington-Allen, and H. H. Shugart. **Landscape-scale extent, height, biomass, and carbon estimation of Mozambique's mangrove forests with Landsat ETM and Shuttle Radar Topography Mission elevation data**. *Journal of Geophysical Research*, 2008; 113 (g2): G02S06 [link]

Adapted from materials provided by NASA/Goddard Space Flight Center. Original article written by Gretchen Cook-Anderson, NASA Earth Science News Team.

http://www.sciencedaily.com/releases/2009/08/090820161142.htm

Blossoms Of Maturity: Newly Discovered Signaling Pathway Ensures That Plants Remember To Flower

Electron micrograph of the common wallcress, Arabidopsis thaliana. (Credit: Image by Jürgen Berger)

ScienceDaily (Aug. 25, 2009) — Why do some plants blossom even when days are short and gray?

Scientists at the Max Planck Institute for Developmental Biology have found the answer to this question: An endogenous mechanism allows them to flower in the absence of external influences such as long days. A small piece of RNA, a so-called microRNA, has a central role in this process, as a decline of its concentration in the shoot apex triggers flowering.

MicroRNAs are very short RNA snippets that have emerged in recent years as essential regulators of gene function in both plants and animals. By binding to complementary motifs in a messenger RNA, they inhibit its translation into protein. This process thus blunts the activity of the corresponding gene.

In Tübingen, developmental biologists have discovered that the common wallcress, Arabidopsis, uses this regulatory mechanism to switch from vegetative to reproductive development. A group of related regulators, the SPL proteins, play an important role in promoting the onset of flowering. In young plants, production of SPL proteins is prevented by high levels of microRNA156.

Jia-Wei Wang and colleagues demonstrate that independent of external cues, the concentration of the microRNA declines over time, like sand running through an hourglass. When the microRNA concentration falls below a certain level, enough SPL proteins are produced to activate the flowering process even in the absence of other regulators that measure day length or external temperature. This in turns allows a sufficiently old plant to flower, even in an unfavorable environment.

Interestingly, the SPLs do double duty, since they have supporting roles when plants flower in response to long days. Furthermore, both the SPLs and other regulators eventually converge on a similar set of targets crucial for flowering.

"Flowering is crucial for the long-term survival of plants. The redundancy of environment-dependent and –independent mechanisms ensures that plants do not wait forever until flowering. Better flower once, then never," explains Detlef Weigel, director at the Max Planck Institute for Developmental Biology.

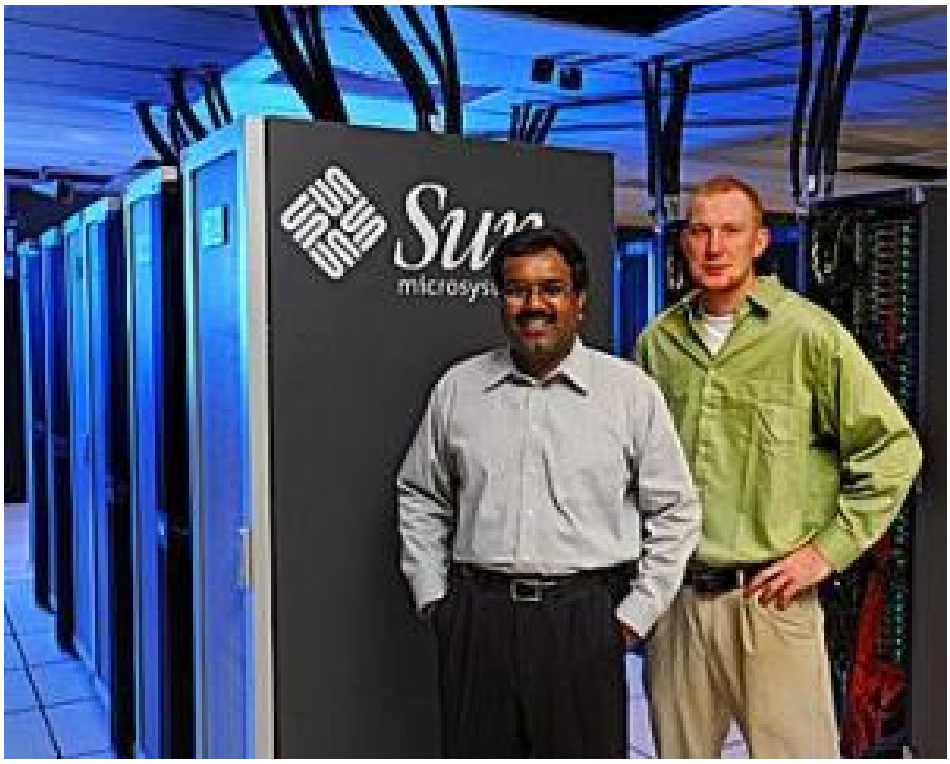
Journal reference:

1. Jia-Wei Wang, Benjamin Czech, Detlef Weigel. **miR156-regulated SPL transcription factors define an endogenous flowering pathway in Arabidopsis thaliana**. *Cell*, August 21, 2009 DOI: 10.1016/j.cell.2009.06.014

Adapted from materials provided by Max-Planck-Gesellschaft.

http://www.sciencedaily.com/releases/2009/08/090820123931.htm

New Supercomputer -- Cystorm -- Unleashes 28.16 Trillion Calculations Per Second



Srinivas Aluru, left, and Steve Nystrom have worked for months to connect cables and cooling hoses and otherwise get Iowa State University's second supercomputer up to speed. (Credit: Photo by Bob Elbert)

ScienceDaily (Aug. 25, 2009) — Srinivas Aluru recently stepped between the two rows of six tall metal racks, opened up the silver doors and showed off the 3,200 computer processor cores that power Cystorm, Iowa State University's second supercomputer.

And there's a lot of raw power in those racks.

Cystorm, a Sun Microsystems machine, boasts a peak performance of 28.16 trillion calculations per second. That's five times the peak of CyBlue, an IBM Blue Gene/L supercomputer that's been on campus since early 2006 and uses 2,048 processors to do 5.7 trillion calculations per second.

Aluru, the Ross Martin Mehl and Marylyne Munas Mehl Professor of Computer Engineering and the leader of the Cystorm project, said the new machine also scores high on a more realistic test of a supercomputer's actual performance: 15.44 trillion calculations per second compared to CyBlue's 4.7 trillion per second. That measure makes Cystorm 3.3 times more powerful than CyBlue.

Those performance numbers, however, do not earn Cystorm a spot on the TOP500 list of the world's fastest supercomputers. (When CyBlue went online three years ago, it was the 99th most powerful supercomputer on the list.)

"Cystorm is going to be very good for data-intensive research projects," Aluru said. "The capabilities of Cystorm will help Iowa State researchers do new, pioneering research in their fields."

The supercomputer is targeted for work in materials science, power systems and systems biology.

Aluru said materials scientists will use the supercomputer to analyze data from the university's Local Electrode Atom Probe microscope, an instrument that can gather data and produce images at the atomic scale of billionths of a meter. Systems biologists will use the supercomputer to build gene networks that will help researchers understand how thousands of genes interact with each other. Power systems researchers will use the supercomputer to study the security, reliability and efficiency of the country's energy infrastructure. And computer engineers will use the supercomputer to build a software infrastructure that helps users make decisions by identifying relevant information sources.

"These research efforts will lead to significant advances in the penetration of high performance computing technology," says a summary of the Cystorm project. "The project will bring together multiple departments and research centers at Iowa State University and further enrich interdisciplinary culture and training opportunities."

Joining Aluru on the Cystorm project are five Iowa State researchers: Maneesha Aluru, an associate scientist in electrical and computer engineering and genetics, development and cell biology; Baskar Ganapathysubramanian, an assistant professor and William March Scholar in Mechanical Engineering; James McCalley, the Harpole Professor in Electrical Engineering; Krishna Rajan, a professor of materials science and engineering; and Arun Somani, Anson Marston Distinguished Professor in Engineering and Jerry R. Junkins Endowed Chair of electrical and computer engineering. Steve Nystrom, a systems support specialist for the department of electrical and computer engineering, is the system administrator for Cystorm.

The researchers purchased the computer with a $719,000 grant from the National Science Foundation, $400,000 from Iowa State colleges, departments and researchers, and a $200,000 equipment donation from Sun Microsystems.

Because of Cystorm, the computer company will designate Iowa State a Sun Microsystems Center of Excellence for Engineering Informatics and Systems Biology.

While Cystorm is much more powerful than CyBlue, Aluru said Iowa State's first supercomputer will still be used by researchers across campus.

"CyBlue will still be around," Aluru said. "Researchers will use both systems to solve problems. Both systems enhance the research capabilities of Iowa State."

Adapted from materials provided by Iowa State University.

http://www.sciencedaily.com/releases/2009/08/090821135030.htm

Obesity drug fears investigated

US authorities are investigating concerns an anti-obesity drug widely available over the counter at chemists may cause liver damage.

Orlistat went on sale under the brand name Alli without the need for a prescription in the UK in April.

The US Food and Drug Administration has received more than 30 reports linking the drug to serious liver injury.

However, manufacturer GlaxoSmithKline said there was no evidence the drug caused liver damage.

LIVER DAMAGE SYMPTOMS
- Weakness
- Fatigue
- Fever
- Jaundice
- Brown urine

In six of the cases reported to the FDA patients went on to develop organ failure.

The pill, which works by blocking the absorption of fat in the body, is aimed at adults with a Body Mass Index (BMI) of 28 or more. It is also available on prescription as Xenical.

Clinical trials suggest adding orlistat to a reduced-calorie, lower-fat diet, can help people lose 50% more weight than dieting alone.

Big sales

Since going on sale at UK pharmacies around 200,000 people have bought the drug.

Diarrhoea and gas problems are to be expected if users persist in eating fat while taking the drug.

However, concerns have been raised over the medication's other possible side-effects.

The FDA said the most commonly reported adverse reactions included the yellowing of skin or whites of the eyes, weakness and stomach pain.

Between 1999 and 2008, the agency received 32 reports of liver damage, 30 of which occurred outside the US. Of these 27 resulted in hospitalisation.

The agency said it was now conducting a review of the safety of the drug, but stressed no definite association with liver damage had been established at this stage.

" **There is no obvious biological mechanism to suggest liver damage can occur with Alli.**" "
GlaxoSmithKline

It advised people who used orlistat to seek medical advice if they experience possible symptoms of liver injury, in particular weakness or fatigue, fever, jaundice, or brown urine.

Other symptoms may include abdominal pain, nausea, vomiting, light-colored stools, itching, or loss of appetite.

However, the number of reports of liver damage is very small when compared with the many thousands of people who have used the drug.

Experts also stressed that it is possible that many obese people have underlying physical problems which could increase their risk of liver damage.

Safety a priority

In the UK, the Medicines and Healthcare products Regulatory Agency (MHRA) said it had received a total of 1,295 suspected adverse drug reaction reports associated with orlistat, including 137 involving suspected liver damage, since it was licensed in 1998.

The European Medicines Agency said there was no plan to change the product information at present - but the situation was under review.

In a statement, GlaxoSmithKline (GSK) said patient safety was its top priority, and reports of side effects were constantly monitored.

The statement went on to say the drug had been extensively tested in clinical trials involving 30,000 patients.

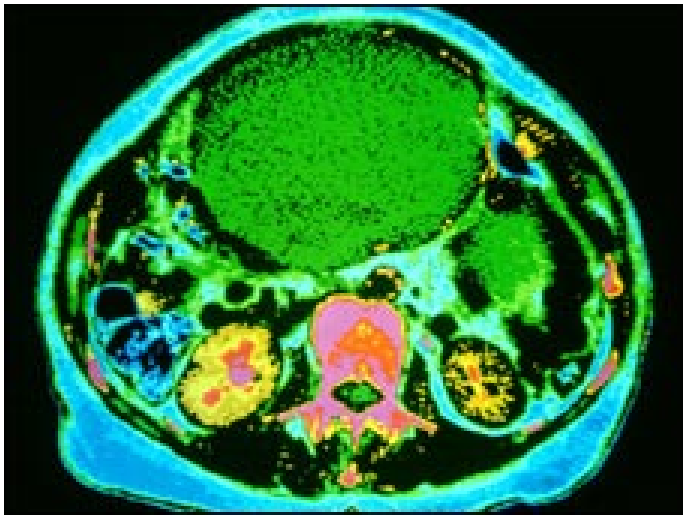
"Alli is a 'non-systemically' acting medicine - it is minimally absorbed in the blood and works locally in the gastro-intestinal tract. "There is therefore no obvious biological mechanism to suggest liver damage can occur with Alli."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8221313.stm

Published: 2009/08/25 18:34:02 GMT

Ovarian cancer 'is being missed'

Women with ovarian cancer may not be diagnosed as early as they could be because their symptoms are not being recognised, a study suggests.



Writing in the BMJ, Bristol researchers said the cancer was not a "silent killer" as it is frequently dubbed, but was associated with specific symptoms.

They looked at the case notes of more than 200 women with a cancer diagnosis.

Ovarian cancer is one of the less common cancers but survival rates are relatively low.

Separate research has however shown that cases of the cancer are falling: data from Cancer Research UK indicates numbers are down 20% from a decade ago.

The drop is being attributed in large part to use of the contraceptive pill, which is thought to have a protective effect.

But when it does develop, it is frequently diagnosed in the later stages when the disease has progressed and treatment is harder.

It has been described as silent because it was historically thought to have few symptoms.

However in recent years a number of symptoms have been noted, and it is now recommended that abnormal vaginal bleeding and "palpable masses" be urgently investigated.

“ **Ovarian cancer is not silent, rather its sound is going unheard** ”
Dr William Hamilton

But the team from the University of Bristol said investigation was not mandatory, and that there were in fact seven symptoms associated with this form of cancer.

Most of the symptoms had a relatively low "predictive value" of less than 1%, meaning fewer than one in 100 patients with the complaint actually go on to receive a cancer diagnosis.

But abdominal distension - being permanently bloated - was more frequently associated with a diagnosis and was a symptom present even in the earlier stages of disease.

However , bloating it is not currently on the list of symptoms warranting further investigation.

"If it were, some women could have their diagnosis speeded up by many months," wrote the team, led by Dr William Hamilton.

"Symptoms are common and often reported, even in early - and potentially curable - cancers.

"In that respect our results are encouraging - there is some chance of identifying early ovarian cancer by using symptoms.

"Ovarian cancer is not silent, rather its sound is going unheard."

In some cases in the study - which involved 212 women from across 39 general practices in Devon - women had visited their GPs with symptoms six months prior to diagnosis, but most symptoms were reported in the three months before.

Confused picture

Research released earlier this year found widespread confusion among both doctors and women, both about the symptoms of the disease and when they became apparent.

Around 6,800 women are diagnosed with the cancer each year and only 30% are alive five years after diagnosis.

The charity Target Ovarian Cancer says the survival rate has not improved in 30 years.

"The UK's high rates of late diagnosis have played an important part in keeping five year survival rates low, at just 30% - amongst the lowest in the Western World," said charity chief executive Annwen Jones,

"In the last 12 months there has been progress with the Department of Health and charities agreeing key messages on symptoms of ovarian cancer for both health professionals and the public, but knowledge of these messages is woefully low.

"Change is long over-due and ovarian cancer needs to become a priority."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8221059.stm

Published: 2009/08/25 22:59:59 GMT

How flesh bug fools immune system

Scientists have shown how flesh-eating parasites responsible for the disfiguring tropical disease leishmaniasis dupe the immune system.

The parasites produce a gel which the latest study shows can fool specialised immune cells into feeding rather than killing them.

It is hoped the findings could aid development of a vaccine for a disease which affects 12m people a year.

The study, led by Imperial College London, appears in PLoS Pathogens.

" **This study may well prove to be of significant benefit** "
Dr Tim Paget Medway School of Pharmacy

Leishmaniasis is a serious problem in tropical and sub-tropical countries.

Symptoms include disfiguring and painful skin ulcers, and in severe cases the infection can also spread to the internal organs.

Patients with the infection often suffer from social exclusion because of their disfigurement.

There is currently no vaccine against the disease and, although treatments are available, they are not always effective and access is limited in many areas.

Leishmania parasites are carried in the guts of sandflies.

The parasites produce a gel which turns into a plug which effectively blocks up the fly's digestive system.

When an infected fly bites a human it regurgitates this gel plug, which enters the skin alongside the parasites.

The latest study - carried out on mice - shows that the plug acts to entice immune cells called macrophages to the bite site.

Macrophages usually kill invading pathogens by eating and digesting them.

But the gel persuades macrophages to engulf the parasites, and feed them rather than digest them.

This happens within the first few days following infection, enabling the parasites to establish themselves and infect the skin.

Lead researcher Dr Matthew Rogers said previous studies might have failed to explain leishmaniasis infection because they injected parasites directly into tissue without including the gel plug.

He said: "Our research shows that leishmania parasites are very cunning - they make their own gel to control the human immune system so they can establish a skin infection."

Synthetic version

Dr Rogers said work suggested a synthetic version of the gel might offer protection against infection.

The researchers found that the gel attracted 108 times more macrophages to the bite site than a saline solution.

They also showed that the number of parasites that survived the first 48 hours following infection, and the number of host cells that were infected, were both eight times higher when the gel was present.

Dr Tim Paget, an expert in microbiology at Medway School of Pharmacy, said there had been several clinical trials of potential vaccines, but they had generated mixed results.

He said: "This study may well prove to be of significant benefit.

"It is known that vaccines raised against proteins from the saliva from the sandfly can give protection to infection.

"Thus it is very likely that this gel could be used a target for the development of a novel vaccine.

"However, like all new findings, the benefits from this work are likely to be long term."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8219634.stm

Published: 2009/08/25 23:00:08 GMT

'Stress' is shrinking polar bears

By Victoria Gill
Science reporter, BBC News

Polar bears have shrunk over the last century, according to research.

Scientists compared bear skulls from the early 20th Century with those from the latter half of the century.

Their study, in the Journal of Zoology, describes changes in size and shape that could be linked an increase in pollution and the reduction in sea ice.

Physical "stress" caused by pollutants in the bears' bodies, and the increased effort needed to find food, could limit the animals' growth, the team said.

The researchers used the skulls as indicators of body size. The skulls from the later period were between two and 9% smaller.

" **Polar bears are one of the most polluted mammals on the globe** "
Christian Sonne, University of Aarhus

"Because the ice is melting, the bears have to use much more energy to hunt their prey," explained Cino Pertoldi, professor of biology from Aarhus University and the Polish Academy of Science, and lead scientist in this study.

"Imagine you have two twins - one is well fed during its growth and one is starving. (The starving) one will be much smaller, because it will not have enough energy to allocate to growth."

The team, which included colleagues from Aarhus University's Department of Arctic Environment, also found shape differences between the skulls from the different periods.

This development was slightly more mysterious, said Dr Pertoldi.

He explained that it was not possible to determine the cause, but that the changes could be linked to the environment - more specifically to pollutants that have built up in the Arctic, and in the polar bears' bodies.

The aim of the study was to compare two groups of animals that lived during periods when sea ice extent and pollution levels were very different.

The pollutants that the scientists focused on were compounds containing carbon and halogens - fluorine, chlorine, bromine or iodine.

Some of these compounds have already been phased out, but many still have important uses in industry. These include solvents, pesticides, refrigerants, adhesives and coatings.

Genetic brink

The changes, the team says, could also be related to a reduction in the genetic diversity of the species.

Hunting over the last century, said Dr Pertoldi, could have depleted the gene pool, leaving polar bears to suffer the effects of inbreeding.

"We also know from previous studies that some chlorinated chemical pollutants have affected the fertility of the females," he continued.

Rune Dietz from Aarhus University was another member of the research team.

He explained that he and his colleagues had already determined a link between man-made "persistent organic pollutants" and reduced bone mineral density in polar bears - which could leave the animals vulnerable to injury and to the bone disease osteoporosis.

Skull collection

The collection of almost 300 polar bear skulls was provided by the Zoological Museum of Copenhagen in Denmark.

Christian Sonne, a veterinary scientist from Aarhus University who worked with the team, said that this provided a unique and "fantastic sample", providing a window into the bears' development over a whole century.

During that time, he said, concentrations of many man-made pollutants in the Arctic have significantly increased.

He said: "Polar bears are one of the most polluted mammals on the globe."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8214673.stm

Published: 2009/08/25 12:42:45 GMT

Mining the Web for Feelings, Not Facts

By ALEX WRIGHT

Computers may be good at crunching numbers, but can they crunch feelings?

The rise of blogs and social networks has fueled a bull market in personal opinion: reviews, ratings, recommendations and other forms of online expression. For computer scientists, this fast-growing mountain of data is opening a tantalizing window onto the collective consciousness of Internet users. An emerging field known as sentiment analysis is taking shape around one of the computer world's unexplored frontiers: translating the vagaries of human emotion into hard data.

This is more than just an interesting programming exercise. For many businesses, online opinion has turned into a kind of virtual currency that can make or break a product in the marketplace.

Yet many companies struggle to make sense of the caterwaul of complaints and compliments that now swirl around their products online. As sentiment analysis tools begin to take shape, they could not only help businesses improve their bottom lines, but also eventually transform the experience of searching for information online.

Several new sentiment analysis companies are trying to tap into the growing business interest in what is being said online.

"Social media used to be this cute project for 25-year-old consultants," said Margaret Francis, vice president for product at Scout Labs in San Francisco. Now, she said, top executives "are recognizing it as an incredibly rich vein of market intelligence."

Scout Labs, which is backed by the venture capital firm started by the CNet founder Halsey Minor, recently introduced a subscription service that allows customers to monitor blogs, news articles, online forums and social networking sites for trends in opinions about products, services or topics in the news.

In early May, the ticket marketplace StubHub used Scout Labs' monitoring tool to identify a sudden surge of negative blog sentiment after rain delayed a Yankees-Red Sox game.

Stadium officials mistakenly told hundreds of fans that the game had been canceled, and StubHub denied fans' requests for refunds, on the grounds that the game had actually been played. But after spotting trouble brewing online, the company offered discounts and credits to the affected fans. It is now re-evaluating its bad weather policy.

"This is a canary in a coal mine for us," said John Whelan, StubHub's director of customer service.

Jodange, based in Yonkers, offers a service geared toward online publishers that lets them incorporate opinion data drawn from over 450,000 sources, including mainstream news sources, blogs and Twitter.

Based on research by Claire Cardie, a Cornell computer science professor, and Jan Wiebe of the University of Pittsburgh, the service uses a sophisticated algorithm that not only evaluates sentiments about particular topics, but also identifies the most influential opinion holders.

Jodange, which received an innovation research grant from the National Science Foundation last year, is currently working on a new algorithm that could use opinion data to predict future developments, like forecasting the impact of newspaper editorials on a company's stock price.

In a similar vein, The Financial Times recently introduced Newssift, an experimental program that tracks sentiments about business topics in the news, coupled with a specialized search engine that allows users to organize their queries by topic, organization, place, person and theme.
Using Newssift, a search for Wal-Mart reveals that recent sentiment about the company is running positive by a ratio of slightly better than two to one. When that search is refined with the suggested term "Labor Force and Unions," however, the ratio of positive to negative sentiments drops closer to one to one.
Such tools could help companies pinpoint the effect of specific issues on customer perceptions, helping them respond with appropriate marketing and public relations strategies.
For casual Web surfers, simpler incarnations of sentiment analysis are sprouting up in the form of lightweight tools like Tweetfeel, Twendz and Twitrratr. These sites allow users to take the pulse of Twitter users about particular topics.
A quick search on Tweetfeel, for example, reveals that 77 percent of recent tweeters liked the movie "Julie & Julia." But the same search on Twitrratr reveals a few misfires. The site assigned a negative score to a tweet reading "julie and julia was truly delightful!!" That same message ended with "we all felt very hungry afterwards" — and the system took the word "hungry" to indicate a negative sentiment.
While the more advanced algorithms used by Scout Labs, Jodange and Newssift employ advanced analytics to avoid such pitfalls, none of these services works perfectly. "Our algorithm is about 70 to 80 percent accurate," said Ms. Francis, who added that its users can reclassify inaccurate results so the system learns from its mistakes.
Translating the slippery stuff of human language into binary values will always be an imperfect science, however. "Sentiments are very different from conventional facts," said Seth Grimes, the founder of the suburban Maryland consulting firm Alta Plana, who points to the many cultural factors and linguistic nuances that make it difficult to turn a string of written text into a simple pro or con sentiment. " 'Sinful' is a good thing when applied to chocolate cake," he said.
The simplest algorithms work by scanning keywords to categorize a statement as positive or negative, based on a simple binary analysis ("love" is good, "hate" is bad). But that approach fails to capture the subtleties that bring human language to life: irony, sarcasm, slang and other idiomatic expressions. Reliable sentiment analysis requires parsing many linguistic shades of gray.
"We are dealing with sentiment that can be expressed in subtle ways," said Bo Pang, a researcher at Yahoo who co-wrote "Opinion Mining and Sentiment Analysis," one of the first academic books on sentiment analysis.
To get at the true intent of a statement, Ms. Pang developed software that looks at several different filters, including polarity (is the statement positive or negative?), intensity (what is the degree of emotion being expressed?) and subjectivity (how partial or impartial is the source?).
For example, a preponderance of adjectives often signals a high degree of subjectivity, while noun- and verb-heavy statements tend toward a more neutral point of view.
As sentiment analysis algorithms grow more sophisticated, they should begin to yield more accurate results that may eventually point the way to more sophisticated filtering mechanisms. They could become a part of everyday Web use.
"I see sentiment analysis becoming a standard feature of search engines," said Mr. Grimes, who suggests that such algorithms could begin to influence both general-purpose Web searching and more specialized searches in areas like e-commerce, travel reservations and movie reviews.
Ms. Pang envisions a search engine that fine-tunes results for users based on sentiment. For example, it might influence the ordering of search results for certain kinds of queries like "best hotel in San Antonio."
As search engines begin to incorporate more and more opinion data into their results, the distinction between fact and opinion may start blurring to the point where, as David Byrne once put it, "facts all come with points of view."

http://www.nytimes.com/2009/08/24/technology/internet/24emotion.html?_r=1

A Wireless Touch-Screen Reader From Sony

By Motoko Rich

Sony The Daily Edition is Sony's first wireless touch-screen reading device.

As expected, Sony Electronics unveiled a wireless touch-screen electronic reading device on Tuesday, dubbed the Daily Edition, which it plans to sell starting in December in time for the holiday season.

The $399 device, which will have a seven-inch screen, will help the company catch up with Amazon.com's Kindle, which has been wireless since its first version was introduced in 2007. The Kindle, which does not have a touch screen, is priced at $299. A larger edition, the Kindle DX, has a 9.7-inch screen that is better suited for reading newspapers and magazines and costs $489.

Steve Haber, president of Sony's Digital Reading Business Division, said that there would be newspapers and magazines available on the Daily Edition when it went on sale in December, but declined to discuss current negotiations.

The company also announced a partnership with the New York Public Library to make the library's 29,000 electronic titles available on all Sony Readers, which now include the Reader Pocket Edition and Reader Touch Edition. Borrowers will be able to download a digital library book onto their readers. The electronic titles, which are protected from easy copying, would expire in 21 days from the device or computer. Sony users may also download copies of public domain books scanned from the New York Public Library by Google.

Paul LeClerc, president of the New York Public Library, said the library was slowly expanding its digital collection. Of the 29,000 electronic titles, he said the bulk were new, popular releases.

http://artsbeat.blogs.nytimes.com/2009/08/25/a-wireless-touch-screen-reader-from-sony/

Low-carb diets 'damage arteries'

Low-carb slimming diets may clog arteries and increase the risk of heart attacks and strokes, a study suggests.

Diets based on eating lots of meat, fish and cheese, while restricting carbohydrates have grown in popularity in recent years.

But the Beth Israel Deaconess Medical Center in the US found such habits caused artery damage in tests on mice.

The researchers and independent experts both agreed a balanced diet was the best option.

Low-carb diets have attracted a lot of attention and controversy after a surge in interest in them in the 1990s.

" **It appears that a moderate and balanced diet, coupled with regular exercise, is probably best for most people** "
Anthony Rosenzweig, lead researcher

The researchers at the Beth Israel institute, which is part of Harvard Medical School, decided to investigate their impact on the cardiovascular system after hearing of reports of people on the diets suffering heart attacks.

They fed the mice three different diets - a standard mouse type, a western diet which was high in fat, and a low-carb, high-protein version, the journal Proceedings of the National Academy of Sciences reported.

The low-carb diet did not affect cholesterol levels, but there was a significant difference on the impact on atherosclerosis - the build-up of fatty plaque deposits in the arteries that can lead to heart attacks or strokes.

After 12 weeks, the mice eating the low-carb diet had gained less weight, but developed 15% more atherosclerosis than those on the standard mice food. For the western diet group there was 9% more atherosclerosis.

The team could not be certain why the effect was seen, but thought low-carb diets may affect the way bone marrow cells effectively clean arteries of fatty deposits.

Adverse effects

Lead researcher Anthony Rosenzweig said the findings were so concerning to him that he decided to come off the low-carb diet he was following.

He added: "Our research suggests that, at least in animals, these diets could be having adverse cardiovascular effects.

"It appears that a moderate and balanced diet, coupled with regular exercise, is probably best for most people."

Joanne Murphy, from the Stroke Association, agreed following a balanced diet was the best advice.

"We know that foods such as red meat and dairy products, which are high in protein, also contain high levels of saturated fat. These fats then cause the build up in the arteries."

But she added the research was still at an early stage and she wanted to see more work done on the subject.

Ellen Mason, from the British Heart Foundation, said it was difficult to apply the findings to humans.

But she added: "Low-carb, high-protein diets are not considered as healthy as eating a balanced diet, which is good for health because we get the different nutrients our body needs by eating from the different food groups every day."

Professor Alan Maryon-Davis, president, UK Faculty of Public Health, said: "This research helps to back up the basic message that our diet should contain more starchy carbohydrate, not less.

"For long-term health at least one-third of what we eat should be bread, rice, potatoes, pasta or other starchy food."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8218780.stm

Published: 2009/08/24 23:03:53 GMT

Apple-shaped women's asthma risk

A study suggests apple-shaped women with a waist bigger than 88cm (35in) have a higher risk of developing asthma - even if their body weight is normal.

Being overweight is well known to raise the risk of asthma.

But the latest study suggests that the amount of weight women carry around the abdomen might be particularly important.

The study, by the Northern California Cancer Center at Berkeley, appears in the journal Thorax.

The researchers analysed data on 88,304 female teachers and school administrators.

BODY MASS INDEX
Calculated by dividing weight in kilograms by height in metres squared
- **Normal:** 18.5 - 24.9
- **Overweight:** 25 - 29.9
- **Obese:** Above 30

The results showed that overweight women were 40% more likely to have asthma than women of a normal weight.

Asthma was more than twice as likely in obese women, and more than three times as likely in extremely obese women than in those of normal body weight.

But perhaps more surprisingly, the researchers also found that women of normal body weight, but with a waist circumference of more than 88cm were also at increased risk - around a third higher than those with a smaller waist.

Overall, 5.4m people in the UK have asthma, and rates have been rising in recent years.

Body mass index (BMI) has been widely used as a standard measure of obesity.

But some researchers argue that waist circumference may be a more useful measure because it more closely reflects levels of visceral fat deposits found around the body's organs.

Visceral fat is metabolically different from other types of fat found in the body, and may have different - and more profound - effects on health.

Researcher Julie Von Behren said: "Visceral fat is metabolically more active - it can produce compounds that may cause inflammation. Inflammation may then be related to asthma."

Healthy lifestyle

Leanne Metcalf, director of research at the charity Asthma UK, said the researchers had not taken into account other factors which might have influenced the development of asthma, such as a family history of the condition.

However, she said: "As this study involves such a large number of women, the results are likely to have some significance.

"It is important that people with asthma eat a healthy, balanced diet, which is low in fat and sugar, and take regular exercise.

"Taking these steps can aid weight loss, improve lung function and help get asthma symptoms under control, especially given the established links between high levels of abdominal fat and other long-term health conditions."

Dr Noemi Eiser, of the British Lung Foundation, agreed that the study reinforced the need for women to lead a healthy lifestyle and for them to be more aware of the health risks of having a large waist size.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8217935.stm

Published: 2009/08/24 23:03:57 GMT

DNA clue to honey bee deaths

By Judith Burns
Science and Environment reporter, BBC News

Scientists say that mass bee deaths may be caused by viruses that disrupt gene expression.

The team analysed which genes were turned on and which were turned off in healthy bees and those from hives with colony collapse disorder (CCD).

Since 2006, CCD has caused the catastrophic loss of US bee hives and is implicated in bee deaths elsewhere.

Writing in PNAS journal, the team say they used "whole genome microarrays" to compare cells from bees' guts.

Lead scientist May Berenbaum from the University of Illinois told BBC News that the research was made possible by publication of the bee genome in 2006.

" **We talk about a smoking gun. We have the bullet hole!** "
Professor May Berenbaum

"It's an incredibly useful repository of information which allowed the construction of the microarray - a slide which has all 10,000 bee genes on it," she said.

"We used it to compare colony collapse disorder bees with healthy ones and looked at the differences. There are of course 10,000 genes. So there were a whole lot of differences but we could rule out many of them."

Gut feeling

The team concentrated on analysing gene expression from cells in the bees' guts because this is the primary site of pesticide detoxification and immune defence.

Previous theories for CCD have included pesticide poisoning as well as infection and mite infestation.

But the team's genetic analysis of the bees' guts failed to reveal elevated expression of pesticide response genes.

In addition, genes involved in immune response showed no clear expression pattern despite the increased prevalence of viruses and other pathogens in CCD colonies.

What did show up in the guts of the CCD bees was an abundance of fragments from the ribosome, a structure which is the cell's protein making factory.

According to the researchers, this finding suggests that protein production is likely to be compromised in bees from CCD hives.

Previous research shows that the viruses that bees carry all attack the ribosome.

Little problem

The microbes in question are known as "picorna-like" viruses. The word derives from pico, which means little, and RNA (ribonucleic acid).

"These picorna-like viruses all attack at the same spot," said Professor Berenbaum.

"What they do is to work their way into the ribosome and instead of making honey bee protein they make virus proteins.

"So maybe what's happening is basically the ribosome wears out. So we looked to see if the CCD bees have more of these viruses than healthy bees. And they do.

The viruses in question include "deformed wing virus" and "Israeli acute paralysis virus".

The scientists believe that if a number of similar picorna-like viruses attack simultaneously, they may be able to overwhelm the ribosome.

"We talk about a smoking gun. We have the bullet hole!" said May Berenbaum.

"We now need to look for how multiple viruses might interact on the ribosome."

The honey bee is the US's key agricultural pollinator. As such it is worth $14bn to the country's economy.

CCD was first identified in 2006. In the winter of 2007-8 more than a third of US bees were lost.

Similar losses have been reported in Europe, giving rise to fears that CCD is a global problem.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8219202.stm

Published: 2009/08/24 20:57:45 GMT

Broken hearts mend with 'patch'

By Sudeep Chand
Science reporter, BBC News

A team of Israeli scientists has developed a potential way to fix the damage from heart attacks.

A "patch" has been made from heart muscle that can be used to fix scarring left over from a heart attack.

Writing in the journal PNAS, the scientists describe how the technique strengthened the hearts of rats that had suffered heart attacks.

The "patch" was grown in abdominal tissue first, then transplanted to damaged areas of the heart.

This experiment is the first to show that such patches can actually improve the health of a heart after it has been damaged.

The scientists measured an increase in the size of the muscle in damaged areas, and improved conduction of the electrical impulses needed for the heart to pump normally.

Heart failure

Heart attacks usually cause irreversible damage to heart muscle. If people survive, then the damaged muscle can cause another serious condition called heart failure.

It is hoped that the procedure may eventually lead to treatments in humans because of its "simplicity and safety", the authors - led by Tal Dvir from Ben-Gurion University of the Negev in Beer-Sheva - wrote in Proceedings of the National Academy of Sciences (PNAS).

However, they added that "because most patients with heart attacks are old, and multiple surgery can pose a large risk to them, our strategy is not currently an option".

Ellen Mason, senior cardiac nurse at the British Heart Foundation (BHF), told BBC News: "In the last decade there has been significant research into injecting cells, including stem cells, into the heart to try and repair the damaged area.

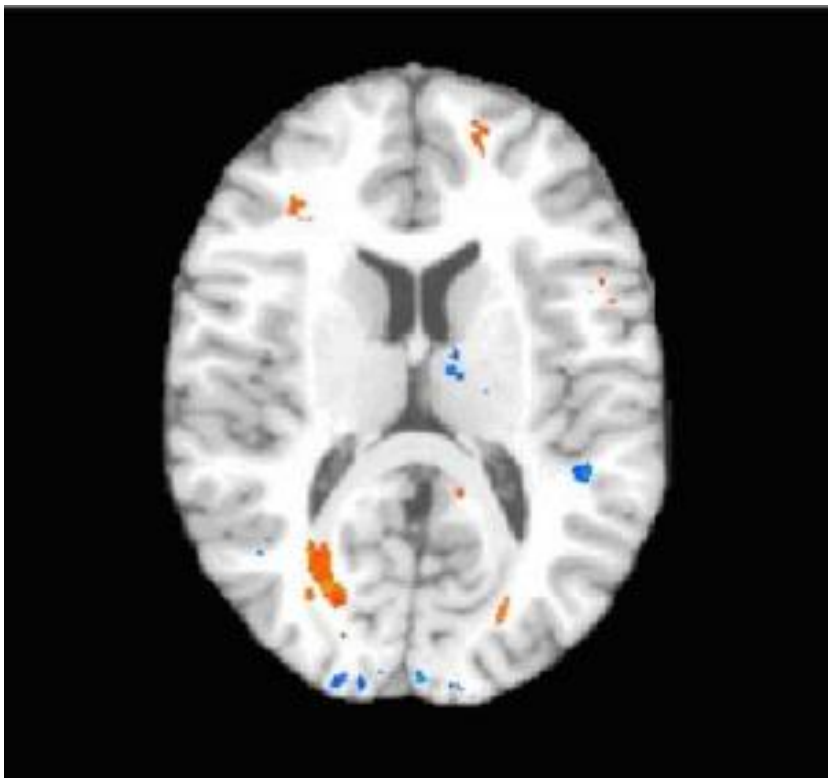
"This study was in animals, but may help scientists better understand how to repair damaged human hearts in the future."

The technique is also being developed for livers and bladders.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8218077.stm

Published: 2009/08/24 20:24:40 GMT

Strong Link Found Between Concussions And Brain Tissue Injury



Colored areas show locations of brain injury, including injury to the frontal lobe, in a patient with mild traumatic brain injury. (Credit: Albert Einstein College of Medicine)

ScienceDaily (Aug. 25, 2009) — Concussions, whether from an accident, sporting event, or combat, can lead to permanent loss of higher level mental processes. Scientists have debated for centuries whether concussions involve structural damage to brain tissue or whether physiological changes that merely impair the way brain cells function, explain this loss. Now, for the first time, researchers at Albert Einstein College of Medicine of Yeshiva University have linked areas of brain injury to specific altered mental processes caused by concussions.

The research, described in the August 26 edition of *Radiology,* provides compelling evidence that concussions involve brain damage. The findings suggest that diffusion tensor imaging (DTI), the brain scanning method used by the Einstein scientists, could help in diagnosing concussions and in assessing the effectiveness of treatments.

"DTI has been used to look at other brain disorders, but this is the first study to focus on concussions," said Michael Lipton, M.D., Ph.D., associate director of the Gruss Magnetic Resonance Research Center (MRRC) and associate professor of radiology, of psychiatry and behavioral sciences, and of neuroscience at Einstein and lead author of the study. "It proved to be a powerful tool for detecting the subtle brain damage that we found to be associated with concussions."

Each year, more than one million Americans sustain a concussion (technically referred to as mild traumatic brain injury). Concussions in adults result mainly from motor vehicle accidents or falls. While most people recover from concussions with no lasting ill effects, as many as 30 percent suffer permanent impairment — undergoing a personality change or being unable to plan an event. A 2003 federal study called concussions "a serious public health problem" that costs the U.S. an estimated $80 billion a year.

At present, diagnosis of concussions is based primarily on the patient's accident history and on clinical examinations that check for common concussion symptoms including headache, dizziness and behavioral abnormalities. There is no way of knowing from these exams who will suffer the most severe consequences and who will recover quickly. The results of the Einstein study indicates DTI scanning could provide a more objective way to diagnose concussions, determine whether brain injury has actually occurred following trauma, and possibly to predict the lasting loss of executive function. Executive function refers to the ability to make decisions, organize, set priorities and manage time.

The Einstein research involved 20 people known to have suffered concussions (18 from motor vehicle accidents and two from falls) and 20 healthy control subjects. The patients were recruited from one hospital emergency room; two of them had lost consciousness, but only for a few minutes. Both the patients and control subjects underwent conventional brain imaging with magnetic resonance (MR) and computed tomography (CT) scanning, plus a battery of neuropsychological tests to assess executive function, which is often impaired after a concussion. All concussion patients underwent brain imaging and testing within two weeks of their accidents.

Experienced reviewers who evaluated the conventional MR and CT images of patients and controls found no abnormalities in either group. However, the neuropsychological results showed that the patients performed significantly worse than the controls on tests of executive function.

Patients and controls also underwent diffusion tensor imaging (DTI), a recently developed MRI-based imaging technique that can detect subtle changes in the brain by measuring the diffusion of water in the brain's white matter. DTI revealed abnormal brain regions in 15 of the concussion patients, while no abnormal regions were found in controls. Most importantly, the presence of major areas of structural damage in concussion patients (as shown by large alterations in normal water diffusion using DTI) predicted low scores on their executive-function tests. These damaged areas were located mainly in the brain's prefrontal cortex, which is essential for normal executive function and is susceptible to injury in concussion.

Dr. Lipton notes that use of DTI could prompt doctors to begin treatment early, when it's likely to be most useful. "The problems in functioning caused by concussions often don't become evident until weeks or months after the injury, suggesting that the brain pathology may actually expand over time," he notes. "By detecting brain injury early with DTI and then initiating cognitive rehabilitation therapies for those patients, we may be able to limit the effects of concussions."

"We are really excited by these findings," indicates Craig Branch, Ph.D., a co-author of the study and director of the Gruss MRRC. "For the first time we appear to be able to identify the subtle pathology sometimes caused by concussion, providing researchers a 'pathology target' for the development of therapies to reduce or eliminate the damage identified by this novel imaging method." Dr. Lipton adds that DTI could help in evaluating the effectiveness of existing therapies for concussion.

Journal reference:

1. Michael Lipton et al. **Diffusion tensor imaging implicates prefrontal axonal injury in executive dysfunction following mild traumatic brain injury**. *Radiology*, August 26, 2009

Adapted from materials provided by Albert Einstein College of Medicine, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/08/090824115905.htm

Young Arctic Muskoxen Better At Keeping Warm Than Scientists Thought

Musk Oxen on Devon Island, Nunavut, Canadian Arctic. (Credit: iStockphoto/Richard Sidey)

ScienceDaily (Aug. 25, 2009) — A new study finds that young muskoxen conserve heat almost as well as adults, a finding that runs contrary to a longstanding assumption among scientists that young animals should be more vulnerable in extreme cold. The study, by biologist Adam Munn from the University of Sydney, Australia, will be published in the forthcoming issue of *Physiological and Biochemical Zoology.*

Surviving freezing winters is tough for any animal, but it is generally assumed to be tougher on the young. Young animals theoretically should have a harder time holding heat because they have larger ratios of surface area to body volume, meaning more of their body mass is directly exposed to the cold. That theory appeared to hold true for muskoxen—shaggy vegetarians that look a bit like buffalo, but are actually more closely related to sheep. Scientists have previously reported high death rates for muskox calves during especially cold winters in their arctic habitats.

But in measuring heat loss in adult and young muskoxen, Munn and his research team found that the cold itself might not be the culprit.

"To our surprise, we found that the smaller calves were not more thermally stressed than larger adults," said Munn said.

Munn and his team observed a population of muskoxen at the University of Alaska's R.G. White Large Animal Research Facility in Fairbanks. They used infrared sensing equipment to measure heat loss from the body surface of animals in contact with cold air and the frozen ground. Munn tested the muskoxen during winter foraging, when the animals were the most directly exposed to the cold.

The researchers found that both calves and adults sacrificed only two to six percent of their daily energy intake to heat loss during foraging bouts, even when temperatures dipped to minus 50 Celsius (minus 58 Fahrenheit).

"This suggests that any thermoregulatory constraints associated with a small body size may not be as important for calf survival as previously thought," Munn says. "This is important because calf mortality in

muskoxen and other large arctic herbivores has been variously linked with severe winters, which are expected to increase in number and severity with current climate trends.

"However, we present evidence that thermal costs per se may not be driving calf mortalities in muskoxen."

That doesn't mean climate change presents no risk to muskoxen or other large herbivores. They still face danger from food shortages and other ecological disturbances, Munn says.

Muskoxen have a variety of ways to fight heat loss. They are insulated by thick fur called qiviut, and they likely have the ability to direct blood away from their extremities in cold weather.

"Overall, our work shows that predicting a species' responses to climate change requires detailed understanding of all aspects of their physiological ecology, and particularly for how this changes throughout life," Munn says.

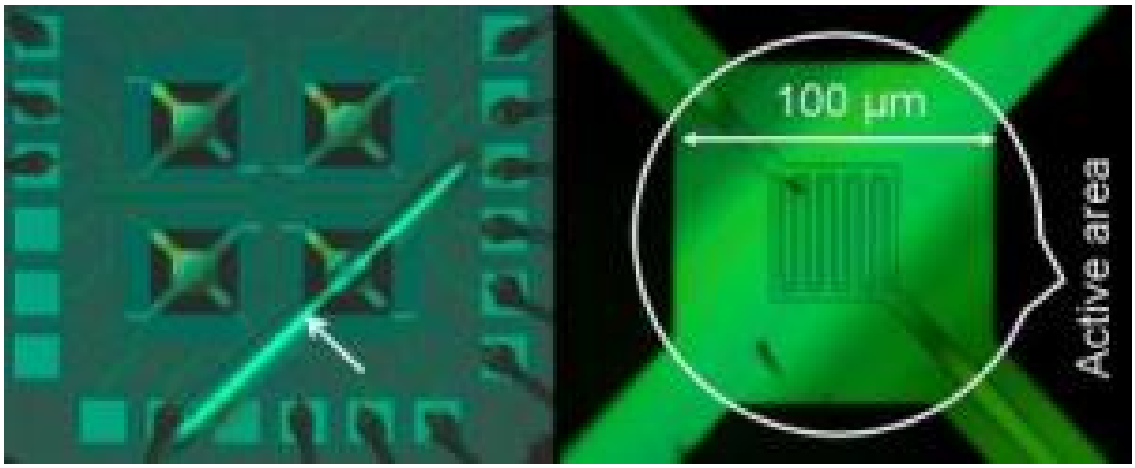
Journal reference:

1. Munn et al. **Sensible Heat Loss from Muskoxen (Ovibos moschatus) Feeding in Winter: Small Calves Are Not at a Thermal Disadvantage Compared with Adult Cows**. *Physiological and Biochemical Zoology*, 2009; 82 (5): 455 DOI: 10.1086/605400

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

http://www.sciencedaily.com/releases/2009/08/090820161146.htm

Novel Temperature Calibration Improves Microhotplate Technology



The NIST microhotplate uses its thermal efficiency in conjunction with a thermocouple to form a self-test temperature sensing system. Four microhotplates (left image) are seen with a strip of rhodium film (marked by an arrow) crossing the bottom right microhotplate. This strip makes contact with the platinum in the microhotplate structure (seen in the closeup image on the right) to form a stable thermocouple for measuring temperature. (Credit: M. Afridi, NIST)

ScienceDaily (Aug. 25, 2009) — Researchers at the National Institute of Standards and Technology (NIST) have developed a new calibration technique that will improve the reliability and stability of one of NIST's most versatile technologies, the microhotplate. The novel NIST device is being developed as the foundation for miniature yet highly accurate gas sensors that can detect chemical and biological agents, industrial leaks and even signs of extraterrestrial life from aboard a planetary probe.

The tiny microhotplates—no wider than a human hair—are programmed to cycle through a range of temperatures. They can be coated with metal oxide films tailored to detect specific gas species. Airborne chemicals attach to the surface of the detector depending on the type of film and the temperature of the surface, changing the flow of electricity through the device, which serves as the "signature" for identifying both the type and concentration of the gas in the ambient air.

Accurate microhotplate temperature measurements are crucial for the discrimination and quantification of gas species, while reliable, long-term operation demands that the microhotplate's temperature sensors be either highly stable or able to sense when they've drifted, a functionality known as a "built-in self test" (BIST). As demonstrated for the first time in a paper in an upcoming issue of *IEEE Electron Device Letters*, the new calibration method satisfies both requirements.

A portion of the polysilicon heater making up the microhotplate originally served as the device's temperature sensor. However, this sensor would slowly drift over time from its initial calibration. Within three months, the temperature readings were off by as much as 25 degrees Celsius at high temperatures.

The NIST engineers overcame this shortcoming by using data from two additional temperature sensors—a highly stable, thin-film platinum/rhodium thermocouple integrated in the microhotplate structure for one sensor and the thermal efficiency of the structure itself for the other. Comparing the temperatures reported by these two sensors provides the microhotplate with its internal monitoring system. As long as the absolute value of the difference between the reported temperatures remains below a specified threshold value, the average of the two readings is considered reliable. Should the difference exceed the threshold, the system reports an error.

The original polysilicon sensor still provides the microhotplate's initial temperature measurement, which is used to calibrate the other two sensors. With the complete "check and balance" system in place, temperature measurements are accurate to within 1.5 degrees Celsius.

Having successfully demonstrated the new temperature calibration system for their microhotplate, the NIST researchers are working on additional advancements for the technology. Next in line is the development of a built-in system for sensing contamination of the metal oxide films critical to the microhotplate's use in gas detection.

Journal reference:

1. M. Afridi, C. Montgomery, E. Cooper-Balis, S. Semancik, K.G. Kreider and J. Geist. **Analog BIST functionality for microhotplate temperature sensors**. *IEEE Electron Devices*, Volume 30, No. 9 (September 2009)

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

http://www.sciencedaily.com/releases/2009/08/090811191656.htm

Cell Reproduction Research May Point To 'Off Switch' For Cancer

Researcher Art Alberts, left, with doctoral candidate Aaron DeWard at the Van Andel Research Institute in Grand Rapids. (Credit: VAI photo by Dykehouse Photography)

ScienceDaily (Aug. 24, 2009) — New insight into how human cells reproduce, published by cancer researchers at Michigan State University and the Van Andel Research Institute in Grand Rapids, could help scientists move closer to finding an "off switch" for cancer.

Cancer cells divide uncontrollably and can move from one part of the body to another. They undergo dramatic shifts in shape when they do so, said Aaron DeWard, an MSU cell and molecular biology doctoral candidate who published his research recently in the *Journal of Biological Chemistry*. He's trying to figure out how certain proteins trigger cell movement and division and how cancer hijacks the system to create genomic instability.

DeWard and his academic adviser, VARI senior scientific investigator Art Alberts, investigated proteins called formins that help determine the shape of a cell during division and movement. They identified a new mechanism for regulation of formins during cell division.

"One of the cool things about these proteins is that they're tightly regulated – they will only do their jobs when they're told to do so," DeWard said, describing formins as the workers that put together the pieces that shape a cell.

"A lot of work has been done on how to get these proteins to work, but not when to stop working," he said. "We identified the way in which these proteins get flagged for destruction. This mechanism is pretty common for a lot of proteins, but had never been shown for this family of proteins before, and no one really knew how to shut them off completely."

The family of proteins DeWard and Alberts are studying could lend themselves well to pharmaceutical treatment, he added.

"Aaron's observation gives us a handle on the molecular machinery controlling cell division," Alberts said. "Our goal now is to exploit this information in the development of strategies to specifically stop the process of uncontrolled cell division that characterizes cancer."

"I don't think shutting them off will stop cancer, but by better understanding the mechanism of this we might find ways to manipulate the system," DeWard said.

The MSU-VARI connection constitutes a vibrant, research-oriented dimension to the university's growing presence in the western Michigan health care complex. Michigan State opens its new College of Human Medicine building, the Secchia Center, in downtown Grand Rapids near VARI parent Van Andel Institute, Spectrum Health and other health care organizations in 2010. It signed a research collaboration agreement with the VAI in 2006.

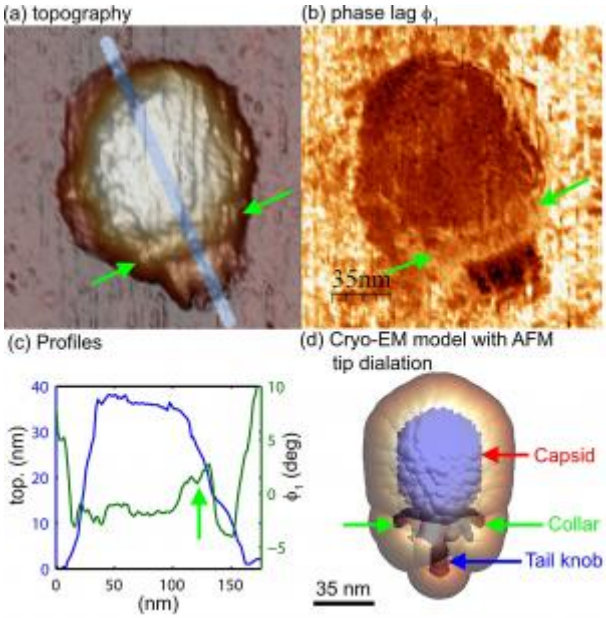
"Collaboration is essential to developing West Michigan as a center for life sciences," said Steve Heacock, VAI chief administrative officer and general counsel. "A solid connection and interaction between students, scientists, medical professionals and the entire life science community is vital. We have a strong collaboration. MSU students work in VAI laboratories, MSU and VAI researchers collaborate on studies and there will be a two-way connection between VAI and the new MSU College of Human Medicine."

A joint graduate school program allows graduate students in several medicine-related programs to take one of their laboratory "rotations" at VARI, and afterward to complete their thesis project there. Four VARI fellowships also are awarded to MSU first-year graduate students interested in cancer research or cell biology.

Adapted from materials provided by Michigan State University.

http://www.sciencedaily.com/releases/2009/08/090812163756.htm

Discovery To Aid Study Of Biological Structures, Molecules



Researchers in the United States and Spain have discovered that an atomic force microscope - a tool widely used in nanoscale imaging - works differently in watery environments, a step toward better using the instrument to study biological molecules and structures. The researchers demonstrated their new understanding of how the instrument works in water to show details of the mechanical properties of a virus called Phi29. The images in "a" and "c" show the topography, and the image in "b" shows the different stiffness properties of the balloonlike head, stiff collar and hollow tail of the Phi29 virus, called a bacteriophage because it infects bacteria. (Credit: C. Carrasco-Pulido, P. J. de Pablo, J. Gomez-Herrero, Universidad Autonoma de Madrid, Spain)

ScienceDaily (Aug. 24, 2009) — Researchers in the United States and Spain have discovered that a tool widely used in nanoscale imaging works differently in watery environments, a step toward better using the instrument to study biological molecules and structures.

The researchers demonstrated their new understanding of how the instrument - the atomic force microscope - works in water to show detailed properties of a bacterial membrane and a virus called Phi29, said Arvind Raman, a Purdue professor of mechanical engineering.

"People using this kind of instrument to study biological structures need to know how it works in the natural watery environments of molecules and how to interpret images," he said.

An atomic force microscope uses a tiny vibrating probe to yield information about materials and surfaces on the scale of nanometers, or billionths of a meter. Because the instrument enables scientists to "see" objects far smaller than possible using light microscopes, it could be ideal for studying molecules, cell membranes and other biological structures.

The best way to study such structures is in their wet, natural environments. However, the researchers have now discovered that in some respects the vibrating probe's tip behaves the opposite in water as it does in air, said Purdue mechanical engineering doctoral student John Melcher.

Purdue researchers collaborated with scientists at three institutions in Madrid, Spain: Universidad Autónoma de Madrid, Instituto de Ciencia de Materiales de Madrid and the Centro Nacional de Biotecnología.

Findings, which were detailed in a paper appearing online last week in the U.S. publication *Proceedings of the National Academy of Sciences*, are related to the subtle differences in how the instrument's probe vibrates. The probe is caused to oscillate by a vibrating source at its base. However, the tip of the probe oscillates slightly out of synch with the oscillations at the base. This difference in oscillation is referred to as a "phase contrast," and the tip is said to be out of phase with the base.

Although these differences in phase contrast reveal information about the composition of the material being studied, data can't be properly interpreted unless researchers understand precisely how the phase changes in water as well as in air, Raman said.

If the instrument is operating in air, the tip's phase lags slightly when interacting with a viscous material and advances slightly when scanning over a hard surface. Now researchers have learned the tip operates in the opposite manner when used in water: it lags while passing over a hard object and advances when scanning the gelatinous surface of a biological membrane.

Researchers deposited the membrane and viruses on a sheet of mica. Tests showed the differing properties of the inner and outer sides of the membrane and details about the latticelike protein structure of the membrane. Findings also showed the different properties of the balloonlike head, stiff collar and hollow tail of the Phi29 virus, called a bacteriophage because it infects bacteria.

"The findings suggest that phase contrast in liquids can be used to reveal rapidly the intrinsic variations in local stiffness with molecular resolution, for example, by showing that the head and the collar of an individual virus particle have different stiffness," Raman said.

The research was funded by the National Science Foundation and was conducted at the Birck Nanotechnology Center in Purdue's Discovery Park. The biological membrane images were taken at Purdue, and the virus studies were performed at the Universidad Autónoma de Madrid.

The paper was authored by Melcher; Carolina Carrasco, a postdoctoral researcher at Universidad Autónoma de Madrid and the Instituto de Ciencia de Materiales de Madrid; Purdue postdoctoral researcher Xin Xu; José L. Carrasco, a researcher at Departmento de Estructura de Macomoléculas, Centro Nacional de Biotecnología, Consejo Superior de Investigaciones Científicas; Julio Gómez-Herrero and Pedro José de Pablo, both researchers from Universidad Autónoma de Madrid; and Raman.

Adapted from materials provided by Purdue University.

http://www.sciencedaily.com/releases/2009/08/090811191654.htm

Rare Sheep Could Be Key To Better Diagnostic Tests In Developing World

The hair sheep, a less-hirsute version of the familiar woolly barnyard resident, may be the perfect blood donors for the microbiology tests necessary to diagnose infectious disease in the developing world. (Credit: Ellen Jo Baron)

ScienceDaily (Aug. 24, 2009) — The newest revolution in microbiology testing walks on four legs and says "baa."

It's the hair sheep, a less-hirsute version of the familiar woolly barnyard resident. A new study from the Stanford University School of Medicine, which is to be published July 3 in *PLoS ONE*, finds that not only are these ruminants low-maintenance and parasite-resistant, they're also perfect blood donors for the microbiology tests necessary to diagnose infectious disease in the developing world.

Identifying microbes from a patient's urine or sputum requires growing those microbes in culture dishes filled with gelatinous agar and a small amount of blood. The blood provides nutrients to the growing bugs and also provides clues as to the microbes' identities: Microbiologists can rule out or identify certain strains of bacteria based on how the organisms interact with the blood cells in culture.

In the developed world, microbiologists use sheep or horse blood. But in many parts of the developing world, horses are prohibitively expensive, and regular sheep, with their constant need for shearing and tendency to get infections, are difficult to keep alive. Importing animal blood isn't feasible either, as shipping is costly and often unreliable.

Many labs in the developing world use human blood, often donated by lab technicians themselves. But diagnostic tests aren't standardized for human blood, said Ellen Yeh, MD, a resident in pathology at Stanford and first author on the paper. "You don't get the same test results when you use human blood versus sheep blood," she said. In addition, the use of human donors increases technicians' risk of infection with blood-borne diseases.

Ellen Jo Baron, PhD, professor of pathology at the medical school and senior author on the paper, wanted to do better. She's a veteran of overseas microbiology, having trained lab technicians from Botswana to Cambodia for more than a decade.

"Up until the time I saw a hair sheep — which I first saw in Botswana — I had no idea there was even such a thing," said Baron, who is associate director of Stanford's clinical microbiology lab, interim director of the clinical virology lab, and associate chair of pathology for faculty development. She wasted

no time in learning about the animals, finding that they resist parasites, don't need to be sheared, and do well in the tropical climes prevalent in much of the developing world.

But no one had tested whether their blood was equivalent to horse or sheep blood. So, calling in a favor from a colleague with a hobby farm near Walnut Creek, Calif., Baron and her colleagues collected blood from hair sheep — the animals are remarkably mellow about the donations, she said — and created test cultures using the blood. Then, they ran a series of common diagnostic tests.

"It worked for every single thing," Baron said.

The researchers also found that they could collect the blood in donation bags, much like those human donors might see at the Red Cross. That's a big advantage over the defibrination process the developed world uses. To defibrinate blood, technicians must shake the samples in a glass jar filled with hundreds of tiny glass beads constantly during and after the donation. That's fine in a lab with machines to do the shaking and autoclaves to sterilize all of those beads, but it's an enormous burden in labs without that equipment. Fortunately, Baron found, hair sheep blood collected in donation bags performed the same as defibrinated blood.

"It's very important," said Bruce Hanna, PhD, professor of pathology and microbiology at the New York University School of Medicine, who was not involved in the study. "This paper found an alternative that is able to be produced in Africa and provides identical results to the standardized products that are used in this country." Michele Barry, MD, senior associate dean for global health at Stanford medical school, added: "Diagnosis of bacterial diseases and antibiotic sensitivity in low resource settings is often infeasible due to cost, access to diagnostics or manpower. Ellen Jo Baron and colleagues have uniquely decided to combine veterinary health science and human blood banking to develop a blood agar from hair sheep as medium to grow bacteria. This sheep is a low-maintenance animal adopted for hot climates. The technology, which they are modeling in Botswana, is an example of a practical 'can do' innovation in microbiology that will save lives in the tropics at low cost by quickly identifying bacteria to tailor cost-effective antibiotic use — a precious commodity overseas."

Now, said Baron and Yeh, the only hurdle is getting the sheep to the labs that need them. Two veterinary labs in Botswana already provide hair sheep blood to local labs based on Baron's initial results. Baron is now lobbying the charity Heifer International to add hair sheep to its catalogue so microbiologists can donate and send the animals to the developing world. After all, she said, the sheep can provide milk and meat — and that's on top of their role as donors of blood that, in her words, "works perfectly for every microbiology test that a laboratory would need to do."

Baron and Yeh's co-authors on the paper are Stanford pathologist Benjamin A. Pinsky, MD, PhD, and Niaz Banaei, MD, assistant professor of pathology and infectious diseases. The study was self-funded by Baron.

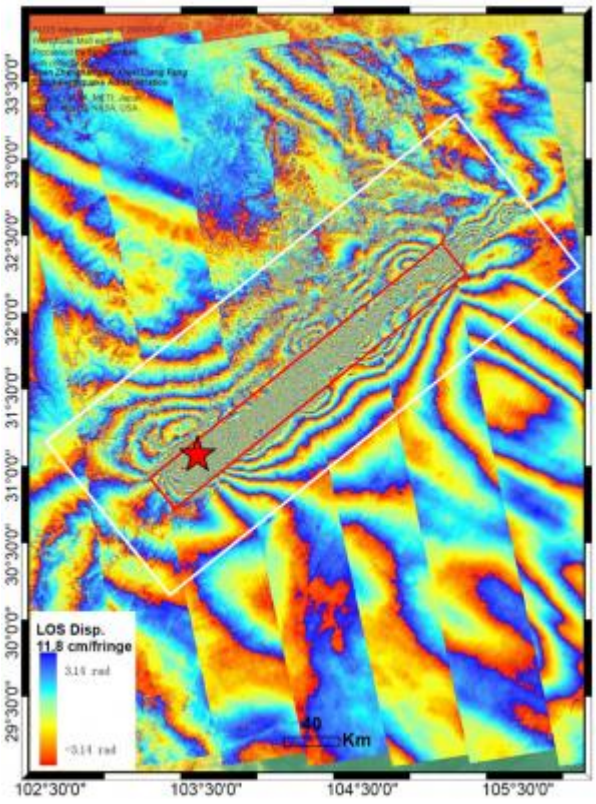
Journal reference:

1. Ellen Yeh, Benjamin A. Pinsky, Niaz Banaei, Ellen Jo Baron. **Hair Sheep Blood, Citrated or Defibrinated, Fulfills All Requirements of Blood Agar for Diagnostic Microbiology Laboratory Tests**. *PLoS ONE*, 2009; 4 (7): e6141 DOI: 10.1371/journal.pone.0006141

Adapted from materials provided by Stanford University Medical Center.

http://www.sciencedaily.com/releases/2009/07/090704064959.htm

Faults And Earthquakes In China Monitored From Space



An ALOS Phased Array type L-band Synthetic Aperture Radar (PALSAR) interferogram over the Wenchuan earthquake that occurred along the eastern margin of the Tibetan Plateau in May 2008. The white rectangle shows the main part of the deformation area, and the red rectangle shows the most heavily damaged area. (Credit: Jianbao Sun, IGCEA, Seismology and Geology, No. 3, 2008)

ScienceDaily (Aug. 24, 2009) — China is in a very seismically active area and has had many catastrophic earthquakes during its history. A joint European-Chinese team is using satellite radar data to monitor ground deformation across major continental faults in China to understand better the seismic cycle and how faults behave.

Using Synthetic Aperture Radar (SAR) satellite data and a technique known as SAR Interferometry (InSAR), along with GPS data, scientists participating in ESA's Dragon 2 Programme have been able to measure the ground deformation that occurred during the Wenchuan earthquake that struck China's Sichuan Province last May.

InSAR involves combining two or more radar images of the same ground location in such a way that very precise measurements – down to a scale of a few centimetres or even millimetres in some cases – can be made of any ground motion taking place between image acquisitions.

Using the InSAR technique on data acquired before and after the Wenchuan earthquake, Dr Sun Jianbao of the Institute of Geology, China Earthquake Administration (IGCEA), Prof. Shen Zhengkang of IGCEA and Peking University, and collaborators including Dr Cecile Lasserre from France's Laboratoire de Geophysique generated 'interferogram' images, which appear as rainbow-coloured fringe patterns, showing the ground displacement that occurred during and after the earthquake.

The Wenchuan earthquake occurred on the Longmen Shan fault, along the eastern margin of the Tibetan Plateau. Following major earthquakes, changes in stress along the faults in the region can lead to subsequent earthquakes. Using InSAR and GPS data, scientists are able to measure and monitor where and how this stress changes as well as how any associated deformation is distributed.

"Combining InSAR with GPS data, we have learned that some regions on the fault did not rupture that much during the earthquake. We must then ask ourselves if the energy is still partially locked and therefore continuously accumulating for the next 'big one', or perhaps there was not that much energy accumulated in the regions prior to the quake," Shen said. "By combining the co- and post-seismic study results, we are about to answer these questions.

"If the area is moving slowly after the quake, then we know it is not accumulating energy, so we believe it to be safe. If, however, one area on the fault is not slipping but there is creeping movement around it, then we know that is a bad sign and we have to watch it more carefully."

Earthquake monitoring is only one of numerous Dragon 2 Programme research themes, which range from agriculture and forests to flooding and landslide monitoring, assessing drought, air quality, oceanography and climate. Preliminary results of the 25 ongoing projects were presented at the Dragon Symposium in Barcelona last week.

The nearly 200 symposium participants also heard how effective the Chinese measures taken last year ahead of the Olympic Games to improve air quality were. The measures, in place from 20 July until 20 September, included taking 50 percent of Beijing's 3,5 million vehicles off the road and closing factories in and around Beijing.

Using the GOME-2, an atmospheric instrument on MetOp, Dr Ronald van der A of the Royal Netherlands Meteorological Institute (KNMI) and Prof. Pucai Wang of the Institute of Atmospheric Physics, the Chinese Academy of Sciences (IAP-CAS) evaluated the direct effect of these measures and found the levels of nitrogen dioxide (NO2) reduced by about 60% above Beijing. The team confirmed these findings using data from the Dutch-Finnish OMI satellite instrument.

By comparing MetOp's GOME-2 measurements available at KNMI with air-quality model results, the team was able to determine that although the air quality measures were especially effective in the Beijing area, they were also noticeable in the surrounding cities, with Tianjin experiencing a 30% NO2 reduction and Shijiazhuang a 20%.

"We could really see the effects of the measures taken by the government. There was a huge reduction in nitrogen dioxide, more than we expected at first," van der A said.

Also unveiled at the symposium was the first Envisat ASAR wide swath image of the Kuroshio Current inverted to radar Doppler velocity. The image reveals the structure of the Kuroshio Current off China's coast southwest of Japan with speeds up to 1,5 m per second.

The Kuroshio Current – equivalent to the Gulf Stream in the North Atlantic – is a warm current in the western Pacific Ocean. Its tropical waters transport heat northward along the east coast of Asia.

Prof. Johnny Johannessen of Nansen Environmental and Remote Sensing Centre, Dr Bertrand Chapron of IFREMER (the French Research Institute for Exploitation of the Sea) and Dr Fabrice Collard of France's CLS (formerly the BOOST Technologies Company) compared the ASAR image to a sea-surface temperature model, which clearly shows how the current moves warm water from the tropical Pacific towards the coast of Japan.

"The radial Doppler velocity map shows the strong southwest-to-northeast motion associated with the path shown in the sea-surface temperature model, so it confirms the velocity pattern associated with the Kuroshio Current," Johannessen said. "Since we removed the effects of wind and waves, what is shown is close to a picture of the pure surface current projected in the SAR-looking direction."

Adapted from materials provided by European Space Agency.

http://www.sciencedaily.com/releases/2009/07/090703091808.htm

NASA, Air Force Test Environmentally-friendly Rocket Propellant

The ALICE flight-vehicle accelerated to a speed of 205 mph and reached an altitude of nearly 1300 feet. (Credit: Dr. Steven F. Son, Purdue University)

ScienceDaily (Aug. 24, 2009) — NASA and the Air Force Office of Scientific Research, or AFOSR, have successfully launched a small rocket using an environmentally-friendly, safe propellant comprised of aluminum powder and water ice, called ALICE.

"This collaboration has been an opportunity for graduate students to work on an environmentally-friendly propellant that can be used for flight on Earth and used in long distance space missions," said NASA Chief Engineer Mike Ryschkewitsch at NASA Headquarters in Washington. "These sorts of university-led experimental projects encourage a new generation of aerospace engineers to think outside of the box and look at new ways for NASA to meet our exploration goals."

Using ALICE as fuel, a nine-foot rocket soared to a height of 1,300 feet over Purdue University's Scholer farms in Indiana earlier this month. ALICE is generating excitement among researchers because this energetic propellant has the potential to replace some liquid or solid propellants. When it is optimized, it could have a higher performance than conventional propellants.

"By funding this collaborative research with NASA, Purdue University and the Pennsylvania State University, AFOSR continues to promote basic research breakthroughs for the future of the Air Force," said Dr. Brendan Godfrey, director of AFOSR.

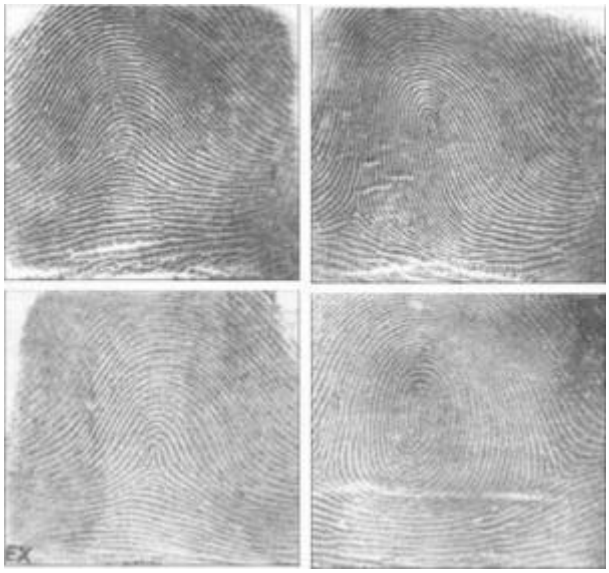
ALICE has the consistency of toothpaste when made. It can be fit into molds and then cooled to -30 C 24 hours before flight. The propellant has a high burn rate and achieved a maximum thrust of 650 pounds during this test.

"A sustained collaborative research effort on the fundamentals of the combustion of nanoscale aluminum and water over the last few years led to the success of this flight," said Dr. Steven F. Son, a research team member from Purdue. "ALICE can be improved with the addition of oxidizers and become a potential solid rocket propellant on Earth. Theoretically, ALICE can be manufactured in distant places like the moon or Mars, instead of being transported to distant locations at high cost."

Adapted from materials provided by Air Force Office of Scientific Research, via EurekAlert!, a service of AAAS

http://www.sciencedaily.com/releases/2009/08/090821163515.htm

An Inner 'Fingerprint' For Personalizing Medical Care



Scientists are reporting evidence that people have unique patterns of metabolism, or a "metabolic fingerprint," that may distinguish each of the 6.7 billion humans on Earth from one another almost as surely as the arches, loops, and whorls on their fingertips. (Credit: Wikimedia Commons)

ScienceDaily (Aug. 24, 2009) — Fingerprints move over. Scientists are reporting evidence that people have another defining trait that may distinguish each of the 6.7 billion humans on Earth from one another almost as surely as the arches, loops, and whorls on their fingertips. They report evidence from studies in humans for the existence of unique patterns in metabolism.

Metabolism is a whole caboodle of chemical processes. The body uses to turn food into energy, grow, repair damage from diseases and injuries, use medicines, and carry out other functions necessary to continue living. In the new study, Ivano Bertini and colleagues cite growing evidence that each individual has a unique metabolic profile. It's a biochemical counterpart to fingerprints that can be detected by analyzing the chemical whorls and grooves that result from metabolism and can be detected in the urine.

Doctors have dreamed of using such tests for the early diagnosis of disease and personalized medical care. They could pick drugs and treatments that are best for each individual, rather than today's one-size-fits all medicine. To do so, however, doctors need evidence that the metabolic fingerprint remains stable over a period of years, with changes due to disease or medications, for instance, but not advancing age or other factors. The new study provides that evidence, based on the analysis of over 1,800 urine samples from people monitored for 2-3 years. Researchers could identify individual patients from their metabolic profiles with an accuracy of over 99 percent. The study could pave the way for using metabolic profiling to apply personalized medical care, the researchers suggest.

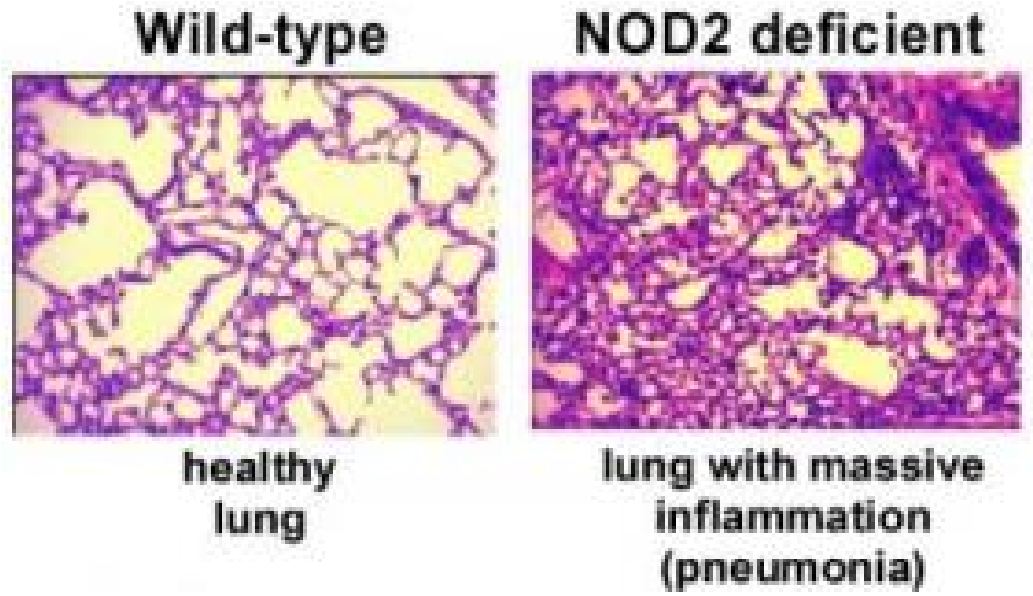
Journal reference:

1. Bernini et al. **Individual Human Phenotypes in Metabolic Space and Time**. *Journal of Proteome Research*, 2009; 090625075642001 DOI: 10.1021/pr900344m

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

http://www.sciencedaily.com/releases/2009/07/090722110859.htm

Microbiologists Find Defense Molecule That Senses Respiratory Viruses



These are side-by-side cross-sections of virus-infected mouse lungs illustrate the critical role of the cellular molecule NOD2 in host defense. The cross-section on the left is from a normal mouse with healthy lungs; the one on the right is from a NOD2-deficient mouse with pneumonia. (Credit: Figure courtesy Dr. Santanu Bose laboratory / Nature Immunology)

ScienceDaily (Aug. 24, 2009) — Research points toward potential immune therapies for individuals at high risk for RSV and flu, two common respiratory viruses. This could benefit infants, children, the elderly and persons with compromised immune systems.

A cellular molecule that not only can sense two common respiratory viruses but also can direct cells to mount a defense has been identified by microbiologists at The University of Texas Health Science Center at San Antonio.

The finding, published online on Aug. 23, by the journal *Nature Immunology*, could lead to new therapies for human respiratory syncytial virus (RSV) and influenza A (commonly known as flu), both of which are serious threats to people with weak immune systems, particularly infants up to age 1 and senior citizens age 65 and older.

"This molecule could be used to boost host immune defenses and stimulate vaccine efficacy against RSV and influenza A, especially among high-risk individuals," said senior author Santanu Bose, Ph.D., assistant professor of microbiology and immunology. Dr. Bose's laboratory team includes graduate student Ahmed Sabbath and research scientists Te-Hung Chang and Rosalinda Harnack.

Related to survival

The cellular molecule, called NOD2, recognizes these viruses and can instruct cells to defend against them. Researchers found that mice lacking the sensor survive for only 10 days after infection, compared with up to eight weeks for normal animals.

Identifying this sensor and understanding its key role could result in therapies that activate the NOD2 gene during or prior to infection, leading to enhanced protective immunity. The NOD2 sensor also has the potential to recognize other viruses, such as West Nile virus, yellow fever, Ebola and rabies.

Dr. Bose has multiple grants from the National Institutes of Health and the American Lung Association to continue this line of research. "In the future, studies will gear up to find out if NOD2 is a susceptibility gene for respiratory viruses, since frequent mutation of this gene has been found in humans," he said.

Possible clinical use

Once the study is designed and clinical partner affiliations are reached, the Bose team hopes to draw blood from severely infected, moderately infected and non-infected patients to test for levels of the sensor, which would allow predictions as to how individuals might respond to respiratory viral infections.

"This is a major breakthrough in understanding respiratory virus behavior and innate immune antiviral factors, and provides the basis for innovative therapies to improve host responses to infectious diseases," said Joel Baseman, Ph.D., professor and chairman of microbiology and immunology at the Health Science Center.

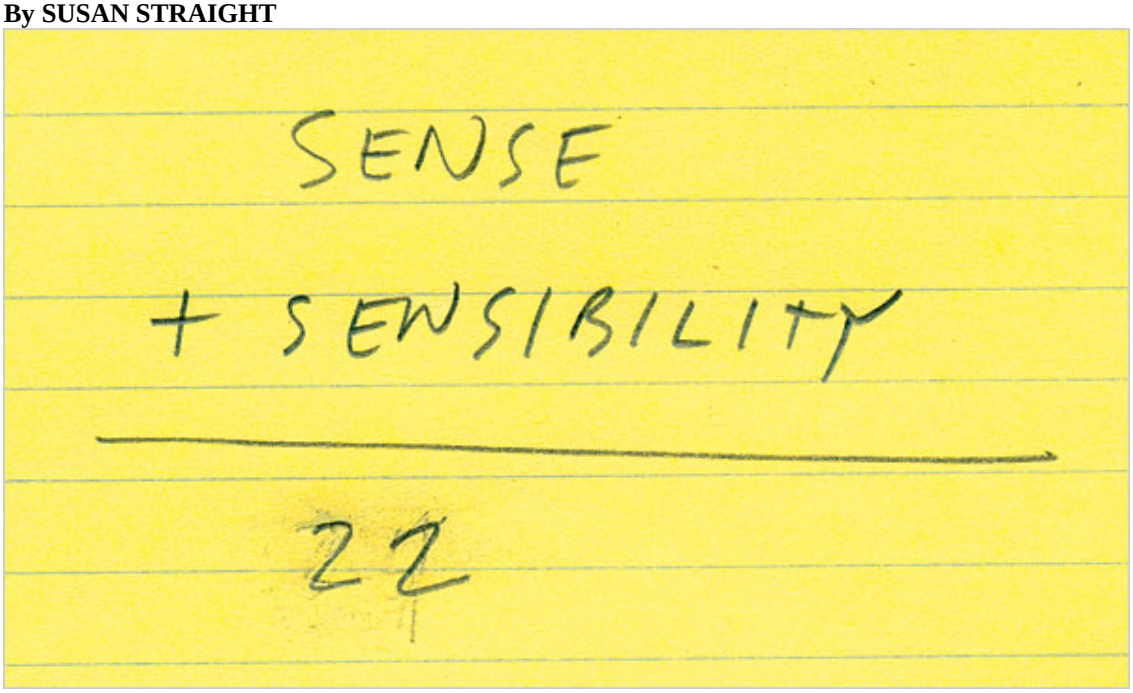
Dr. Baseman said microbiology and immunology faculty members in the university's Graduate School of Biomedical Sciences are doing fundamental and translational research that is the basis for the establishment of an airway disease research and vaccine center. The group includes Dr. Bose's co-authors on the NOD2 paper, Peter Dube, Ph.D., and Yan Xiang, Ph.D.

Adapted from materials provided by University of Texas Health Science Center at San Antonio, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/08/090823184355.htm

Reading by the Numbers

By SUSAN STRAIGHT



At back-to-school night last fall, I was prepared to ask my daughter's eighth-grade language arts teacher about something that had been bothering me immensely: the rise of Accelerated Reader, a "reading management" software system that helps teachers track student reading through computerized comprehension tests and awards students points for books they read based on length and difficulty, as measured by a scientifically researched readability rating. When the teacher announced during the class presentation that she refused to use the program, I almost ran up and hugged her.

Accelerated Reader, introduced in 1986, is currently used in more than 75,000 schools, from pre-kindergarten through 12th grade. The Web site for Renaissance Learning, which owns the program, describes it as a way to build "a lifelong love of reading and learning." As a novelist and mother of three passionate readers, I'm all for that. But when I looked closer at how the program helps "guide students to the right books," as the Web site puts it, I was disheartened.

Many classic novels that have helped readers fall in love with story, language and character are awarded very few points by Accelerated Reader. "My Antonia" is worth 14 points, and "Go Tell It on the Mountain" 13. The previous school year, my daughter had complained that some of her reading choices that I thought were pretty audacious — long, well-written historical novels like Libba Bray's "Great and Terrible Beauty" and Lisa Klein's "Ophelia," recommended by her college-age sister — were worth only 14 points each. "Sense and Sensibility" is worth 22.

"You have to read the Harry Potter books" she said, exasperated. "They have all the points."

She was right. "Harry Potter and the Order of the Phoenix" topped out at 44 points, while "Harry Potter and the Deathly Hallows" and "Harry Potter and the Goblet of Fire" were worth 34 and 32.

I puzzled over this system. Yes, I had to do the math. To reach her school's required 50 points of outside reading per trimester, my daughter could read "The Order of the Phoenix" and then "I Like It Like That," a Gossip Girl novel worth 8 points. (The Accelerated Reader synopsis: "Enter the world of Gossip Girl

and watch the girls drown in luxury while indulging in their favorite sports — jealousy, betrayal and late-night bar-hopping.")

Unfortunately, her other sister, then a high school senior in a rigorous Advanced Placement literature course, would be way behind. For the whole year, she was assigned "Frankenstein" (17 points), "The Remains of the Day" (13 points), "Heart of Darkness" (a measly 10 points), "The Dharma Bums" (not listed in the system) and "Hamlet" (7 points). Yes, "Hamlet" was worth fewer points than the fifth installment of the Gossip Girl series.

One day last spring, after my eighth-grade daughter finished reading "To Kill a Mockingbird" (assigned reading for class), she sat on the couch, thoughtful and silent for a long time. Then she looked over at me and said: "I think that was one of the best books I've ever read. And not everybody could understand it. But I do. Especially Tom Robinson."

Her father is 6-foot-4, 300 pounds and black. We talked about how American society has historically projected racial fear onto innocent men, and about how Harper Lee portrayed the town of Maycomb so vividly that you could see the streets and porches.

Curious, I asked, "What are your three favorite novels of all time?"

" 'Hoot,' 'Ophelia' and this one," she said. ("Hoot" was Carl Hiaasen's book, which she and I had both read and loved two years earlier.)

"To Kill a Mockingbird" is worth 15 points.

Librarians and teachers report that students will almost always refuse to read a book not on the Accelerated Reader list, because they won't receive points. They base their reading choices not on something they think looks interesting, but by how many points they will get. The passion and serendipity of choosing a book at the library based on the subject or the cover or the first page is nearly gone, as well as the excitement of reading a book simply for pleasure. This is not all the fault of Renaissance Learning, which I believe is trying to help schools encourage students to read. Defenders of the program say the problem isn't with Accelerated Reader itself, but with how it is often implemented, with the emphasis on point-gathering above all else. But when I looked at Renaissance Learning's Web site again this summer, I noticed the tag line under the company name: "Advanced Technology for Data-Driven Schools." That constant drive for data is all too typical in the age of No Child Left Behind, helping to replace a freely discovered love of language and story with a more rigid way of reading.

Not long ago, I went back and re-reread three of my own favorite books of all time, books that made me into a writer. They introduced me to my heroines, girls who grew up in real hardship in vibrantly rendered landscapes that I had never seen before. Anne, in "Anne of Green Gables," made me understand friendship and "kindred spirits" and imagination. Francie, in "A Tree Grows in Brooklyn," made me ache at the injustice of having a charming alcoholic father (his suit drying green after he falls into the bay while fishing) and a mother who cannot love her as much as she loves her more handsome brother. And Nel, the quieter half of the inimitable pair of friends in "Sula," made me feel the way girls love each other intensely in childhood, captured in the precise and lovely language of lines like this: "We were two throats and one eye and we had no price."

Total points for my three favorite books: 49.

Many teachers say Accelerated Reader has increased reading among students, who like the process of collecting points and the prizes schools sometimes give to students who collect the most. I have certainly seen the excitement at my daughter's former elementary school when winners were announced. But as a writer and mother of three girls who love novels, I find the idea that we can apply a numerical formula to reading a bit insulting to literature. I'm not against all quantifying. But as Renaissance Learning itself

emphasizes, Accelerated Reader's formula cannot measure "literary merit for individual readers." It cannot consider emotion and landscape and character, and certainly can't identify what makes even some of the simplest-seeming sentences so complex and lovely and painful.

How can we really measure this passage about Helen Burns, the companion in "Jane Eyre" who will shortly die of tuberculosis? ". . . a beauty neither of fine color, nor long eyelash, nor penciled brow, but of meaning, of movement, of radiance. Then her soul sat on her lips, and language flowed."

"Jane Eyre" is worth 33 points.

And nothing can measure how a young life can be changed by literature. It can be a small change — like understanding more about someone from a different race or period or culture — or a complete change, as happened to me when I read the stories of Anne, Francie and Sula and decided I could be a writer, so that people would know my own world.

Susan Straight's most recent novel is "A Million Nightingales."

http://www.nytimes.com/2009/08/30/books/review/Straight-t.html?_r=1&8bu&emc=bub1

The Price of Colonialism

By ELIZABETH HAWES

DESERT

By J. M. G. Le Clézio

Translated by C. Dickson

352 pp. Verba Mundi/David R. Godine. $25.95

Before he was awarded the Nobel Prize in Literature last October, J. M. G. Le Clézio had only the faintest of presences in America. Readers may or may not have remembered him as the handsome young Franco-Mauritian who in the early days of le nouveau roman had won the Prix Renaudot for his first novel, an aimless, intriguing experiment called "The Interrogation" ("Le Procès-Verbal"). By the late 1970s, Le Clézio, who has known many countries, had turned to his habit of travel for inspiration and was exploring distant landscapes and primitive cultures in books like "Desert" ("Désert"), which won another prestigious prize in France. "Desert," however, was never published in English. Before the Nobel, Le Clézio's early experimental novels had fallen out of print, and his latest works, drawn from his childhood and his concerns about the environment, had received passing notice. Le Clézio himself is said to be reclusive and keeps a low profile. His sudden eminence is understandably something of a wonder.

The American publication of "Desert" is therefore an event, bringing into closer range one of the leading writers in France. "Desert" is a rich, sprawling, searching, poetic, provocative, broadly historic and demanding novel, which in all those ways displays the essence of Le Clézio. As a reflection on colonization and its legacy, it is painfully relevant after 30 years. Weaving together two stories that span the 20th century, Le Clézio tells of the last days of the Tuareg, the desert warriors known as the blue men, who are being driven from their ancestral lands in North Africa by the French colonial army and "the new order," and in counterpoint, the travails of a later generation trapped in the projects and shantytowns of Tangier and Marseille. His central characters are the stalwart young boy Nour, who in 1909 is migrating north across the Western Sahara in a caravan of nomadic Berber tribes, and a dreamy, copper-skinned young orphan named Lalla, descended from the blue men, whose parentage helps her survive immigrant life in the 1970s. There are secondary characters, historical figures like the legendary sheik Ma al-Ainine, revered by his people and demonized as a fanatic by the French, and such fablelike creations as Lalla's two kindred spirits (the Hartani, a mute shepherd who can communicate with animals, and Naman, the old fisherman who tells her wise stories) or the pretty Gypsy boy Radicz, who is being trained as a thief

on the streets of Marseille. In an important way, however, the presiding force of "Desert" is the land itself. As the omission of the definite article in the title seems to suggest, the desert, the jagged rocks and blistering heat, the maze of dunes, the waves of open space, "timeless," "deep in their bodies," is not only a setting, but also a kingdom, a resource and a state of mind.

"Desert" moves slowly, its pace set in the beginning by the tortuous trek across the Sahara and by Le Clézio's way with language — the minutely detailed descriptions of the suffering, the recurring images of the sky, birds, the wind and light, the long waves of insistent prose designed to saturate and surround, like music. Repetitions are deliberate, rhythmic, metaphors are meant to enlighten and reflect. "Men go out into the desert, and they are like ships at sea; no one knows when they will return." Le Clézio is writing about people who are close to the earth and sea, whose stories come from there, and at the same time about the vast epic of nature and its sustaining force. The connection between the land and all its creatures, humans, plants, animals, insects, has been a passionate theme in Le Clézio's later work, and it is the lesson of Nour and more directly Lalla, who, to escape the harsh realities of her life, inhabits the mystical world of her ancestors, fed by visions of whirling winds and glistening sand and her communion with al-Ser, the spirit of the blue man warrior, "a dream that has come from afar." He has the light of the desert in his eyes, as Lalla does too, which helps account for her success as the international fashion model Hawa — a career she abandons to return to her old neighborhood in Tangier and give birth.

Le Clézio is an unusual storyteller, often called difficult or unclassifiable, which he says is only appropriate to a novelist and the brew of ideas called the novel. His work, more than 40 books of both fiction and nonfiction, has been shaped by his mixed roots and his own wanderings — born in France of a family who had lived for generations on the Indian Ocean island of Mauritius, he grew up thinking that there was a somewhere else that embodied his homeland — and he writes from experience, bearing witness but, as he says, without giving a message in the manner that Camus and Sartre did. Camus, a Nobel laureate a half-century ago, who grew up in French Algeria, comes to mind in reading "Desert," for his own lyric descriptions of the desert and sea and the invisibility of the poor, and for his own feelings about colonialism and the indigenous culture of Algeria. Camus, like Le Clézio, wrote directly about experience and also about what Le Clézio calls the contradiction of experience, referring in particular to Camus's dilemma during the Algerian war when he was unable to choose between the independence and his love of his native land. The tragedy of the Algerian war, like his memories of African chain gangs building a swimming pool in Nigeria or, later, his four years living with the Emberas Indians in the forests of Panama, lie behind Le Clézio's compassionate attitude toward the third world and his empathy for the blue men and other native cultures. He is the sum of images from everywhere, he has said in interviews. "My books are what resemble me most."

There is an element of the missionary in Le Clézio, just as there is still something of the rebel in him, in search of the new novel, trying to break loose from the traditional bonds of fiction and language to mirror a wider world — as the Nobel citation described, to explore "a humanity beyond and below the reigning civilization." Beneath his pantheism and ethnology, there is also a serious critic of contemporary Western civilization and its rationalism, pointing out the conflict between nature and cities, the disconnect between man and mythology. In "Desert," a powerful anger erupts in his portrayal of the underbelly of Marseille and the lost people that poverty has brought to France, people who "don't exist because they leave no trace of their passage." Le Clézio, who has dual passports from France and Mauritius and now spends part of the year in New Mexico, thinks of himself as an exile too, who finds his home in the French language.

Elizabeth Hawes's new book, the biography/memoir "Camus: A Romance," has just been published.

http://www.nytimes.com/2009/08/30/books/review/Hawes-t.html?8bu&emc=bua2

Against the Odds

By RON SUSKIND

STRENGTH IN WHAT REMAINS

By Tracy Kidder

277 pp. Random House. $26

That 63-year-old Tracy Kidder may have just written his finest work — indeed, one of the truly stunning books I've read this year — is proof that the secret to memorable nonfiction is so often the writer's readiness to be surprised.

Of course, most writers, from daily reporters to best-selling authors, get paid for something else: knowing what they want early on, getting the goods and then anxiously turning them into something worth reading. The reason this model tends to miss more than hit is that the most precious gems gathered in any journalistic journey are frequently those found around the edges of a story.

Kidder has become a high priest of the narrative arts by diving deep into an improbable subject or character with little more than a hunch as to what he might eventually find. Since 1981, when "The Soul of a New Machine" — the story of a team creating that era's cutting-edge computer — won him a Pulitzer and commercial success, he has worked relentlessly to carry on the tradition of John McPhee, sublimating ego in a tireless search for somewhere to hide, for a subject into which to vanish and live, sometimes for years. Few have been better at this than Kidder. He has followed a team of home builders ("House," 1985), a fifth-grade teacher ("Among Schoolchildren," 1989) and nursing home residents ("Old Friends," 1993), and in each case emerged — sooty, battered, blinking in the sunlight — to write books illuminated by a glowing humanism. This is a feat of increasing difficulty as an author's fame grows. The transaction between writer and subject can easily be stage-managed for marketplace effect — moments overplayed to guide readers to tears or elation or preordained insights — and prose often takes on the weight of sentimentality, the great enemy of good writing, as J. D. Salinger put it, giving something "more tenderness than God gives to it."

What happened in this case? While reporting his 2003 best seller, "Mountains Beyond Mountains," a fitfully earnest book about a character almost impossible to love too much — Dr. Paul Farmer, leader of a global campaign to eradicate preventable disease — Kidder stumbled across a spectral African refugee who had signed on with the doctor's organization, Partners in Health, as a bit player, a guy helping out,

answering e-mail, “performing any jobs that needed doing.” His name was Deogratias, or “thanks be to God” in Latin.

“Strength in What Remains” is Deo’s story. And what a tale it is, opening from a passenger seat in an airliner in war-torn Burundi, where Deo, then 24, is leaving behind what once seemed a promising life in Africa as a third-year medical student. It was 1994. Burundi and neighboring Rwanda were exploding in civil wars, in which Hutu and Tutsi were slaughtering one another in one of the 20th century’s most horrifying conflicts. With the help of the privileged family of one of his med-school friends, Deo is able to escape the carnage, bound for America.

Soon, with only $200 and no English, Deo is struggling to survive on the streets of New York. With remarkable acuity, Kidder puts the reader in the young man’s place, as he sleeps in an abandoned tenement in Harlem and gets a job for $15 a day (yes, you read that right) delivering groceries for Gristedes, the supermarket chain. Kidder lets the story unfold, staying out of the way, letting Deo’s reactions and insights carry each page. Though the reader is informed that Deo witnessed horrors in Burundi, and is haunted by them, snatches from his past are unearthed solely to show what he relies on to survive — backward glances that testify to his resilience.

With many thousands of Africans fleeing their continent’s widening nightmares for America, Deo’s experience can feel like this era’s version of the Ellis Island migration — a story, then and now, of trauma and forward motion. The reader is pulled along, feeling rage when the Gristedes manager pokes at him with a stick “sometimes, it seemed, just for fun”; shame when the young man goes tipless, day after day, delivering groceries to Park Avenue. “You had to get tips,” explained a friend at the store. “You lingered in doorways, you cleared your throat, sometimes you asked for a tip outright. But this was the same as begging, Deo thought.” A reader also feels a strange kind of relief when Deo enters Central Park, sees it through the eyes of someone who grew up in forests, and finds an ideally concealed patch of grass where he can sleep. He falls into a routine, working days and living nights in the park, a canopy of stars providing a link to the fields of Africa and anything he once knew.

The story seems to tell itself, but that’s never the way it really happens. Strategic decisions have to be made, and Kidder seems to make all the right ones, first taking readers for a flashback to Burundi, showing the rural landscape where Deo’s family farmed and tended cows, and the grandfather who told him he would get his first cow only “when you finish school” — all of it, surely, a world that would be washed away.

Then it’s the mid-’90s in New York, where a nun, Sharon McKenna, takes an interest in the homeless Deo. He is grateful, though he worries that he’s building up a debt to her — “borrowed salt,” he calls it — leaving him with a childlike neediness. One day, when she points out the birds and flowers in Central Park, he fumes, sotto voce: “I’m not 5 years old. I know what a bird is. Yes, I know that is a flower. And I know Central Park better than you do. I sleep here.” This is Kidder’s great feat, one that has eluded him in some of his later work: trusting the reader enough to present characters in the full splatter of unsettling complexity. This is not about presenting a holy man, a hero. His protagonist is bold, insecure, foolish, inspiring and, as the young man’s memories race to catch him, there are hints that even more shades of personality will soon be revealed.

After McKenna finds a place for Deo to live in Lower Manhattan with an older couple, a sociologist and his wife, an artist, the reader can’t help signing on to Deo’s cause. In an act of astonishing generosity, the couple eventually pay for him to enroll at Columbia University’s School of General Studies. Deo is propelled, so often, by pure will, and his victories — like acing his calculus entrance test for Columbia — summon a feeling of restored confidence in human nature and the American opportunity that Deo’s journey suggests. Here, midway through the book, Deo seems to grab hold of a promising future.

Then we plunge into hell. Having had only glimpses of Deo’s past, we suddenly get a full-blown portrait — generating an effect that is made even more powerful by the author’s earlier restraint. Kidder’s rendering of what Deo endured and survived just before he boarded that plane for New York is one of the

most powerful passages of modern nonfiction. Many readers may have indistinct images of what actually happened in Rwanda and Burundi, where around a million people died. Through Deo's eyes, we see how the all but indiscernible differences between Tutsi and Hutu make a harrowing mockery of the supposed distinctions of ethnicity. Hutu and Tutsi begin to slaughter one another, farm to farm, house to house, in hospitals like the one where Deo, a Tutsi, is doing his internship. He is saved and lost and saved again countless times, a skeletal figure lunging between burning buildings, glinting machetes and the bone-chilling chants of Hutu militiamen, making it seem "as if in the world there were only insanity and the silence of corpses."

"Moments were the only time he knew," Kidder writes. "He spent nearly every moment worrying about the next. Six months felt like a minute, and moments when it felt like there was no time in front of him felt like an eternity."

Running in the countryside among terrified refugees, he comes across a relief worker in a truck marked "Médecins Sans Frontières" — Doctors Without Borders. Deo whispers urgently that he's a medical student — "It is not safe for me. I'm afraid." It's impossible not to cry out — "Get him out of there!" But all the man can do is drive Deo to another refugee camp, so many of which are simply holding pens for Tutsis awaiting slaughter.

Deo knows to flee such places, but he's faced with spirit-crushing horrors. A baby, sitting on the lap of his dead mother in a banana grove, locks eyes with him. "It must be wondering where it is," Deo thinks, in Kidder's rendering. "It must be terrified like him. But he couldn't help the baby. He couldn't even help himself." Deo can only stagger away, overcome with despair, and collapse into a heavy sleep.

He's jostled awake, a day later, by a Hutu woman about his mother's age. She pulls Deo from the brush, discovers he's a Tutsi and then, at extraordinary risk, saves him from beheading by telling Hutu guards that he's her son. The scene suggests how, in the face of nightmares born of surface distinctions — of power exercising all of its destructive prerogatives — the seeds of mankind's survival lie in the unexpected acts of kinship and kindness.

Only in the book's last third does Kidder himself appear, showing how he and Deo met in Paul Farmer's orbit and then joining the young man on his return to Burundi. Deo dropped out of Dartmouth Medical School in 2006 to carry forward a long-held dream to build a medical clinic in Burundi — another adventure story — taking readers to the book's final pages.

It is fascinating to see the two men, writer and subject, together, Kidder allowing Deo to take the lead. Kidder's approach is a reminder of what can make American nonfiction so exceptional although, of late, it is rare. It's that bottom-up quality that defies big-budget marketing and calculation, the search from on high for a "sure thing." In this connected age, disruptive change — and transforming insights — bubble up furiously from the least likely places. Kidder saw that bottom-up flash of energy in the smile of a peripheral man. And we are lucky he did.

Ron Suskind is the author of "The Way of the World" and "A Hope in the Unseen," among other books.

http://www.nytimes.com/2009/08/30/books/review/Suskind-t.html?8bu&emc=bua2

Couples

By MIRANDA SEYMOUR

GILDED YOUTH

Three Lives in France's Belle Époque

By Kate Cambor

323 pp. Farrar, Straus & Giroux. $26

There's a touch of "Jules and Jim" — that seminal New Wave film about a femme fatale and the two best friends who fall for her — in Kate Cambor's dramatized study of the young heirs to three giants of 19th-century France. Léon Daudet loves Jean-Baptiste Charcot and Jeanne Hugo; Léon quarrels with Jean-Baptiste and marries Jeanne; Jeanne divorces Léon and marries Jean-Baptiste.

The difference is this: While Truffaut's film offers scope for three fictional lives to diverge and return, forever entwining to suit the design of their ingeniously manipulative creator, the personalities of Léon Daudet, Jean-Baptiste Charcot and Jeanne Hugo were sufficiently strong and distinct to ensure that the break between them, when it came, was complete. Kate Cambor's "Gilded Youth: Three Lives in France's Belle Époque" is, therefore, less a group study than three monographs linked and unified by a well-chosen series of dramatic events: Victor's Hugo's monumental funeral; the scandal surrounding the disastrous bankruptcy of the Panama Canal Company; the Dreyfus Affair; the death, in mysterious circumstances, of Daudet's teenage son; the final expedition of Charcot, the polar explorer who drowned when his ship sank in a storm off the coast of Iceland in 1936.

The sense of inherited grandeur as both millstone and crown is best conveyed in Cambor's account of the union, on Feb. 12, 1891, of two great literary dynasties. Léon Daudet, a medical student who had just failed a crucial examination, was the son of the celebrated author, Alphonse Daudet. His bride, Victor Hugo's granddaughter, was a fresh-faced former handmaiden of that self-satisfied old fraud. (Cambor makes no secret of her own disdain for a man whose favorite chair bore the phrase: "Ego Hugo.")

The wedding ceremony was a disaster. The Charcot family, among whose members the Daudets had numbered their closest friends, boycotted the occasion. Léon's mother had outraged them by claiming

that Jean-Martin Charcot, France's pre-eminent neurologist, had influenced the board that failed her son in his medical exams (while passing his own) because Léon had stolen the young Charcot's intended bride. At the church, the Daudets were forced to listen to paeans of bombastic Hugolatry. "It is the celebration of Homer that we celebrate, . . . the spirit of the great poet, who is in the midst of us," croaked one elderly statesman, urging Jeanne to cherish her potential to breed a flock of Hugolets: "You have within you a real treasure," he declared, "and this treasure, my child, you must never exhaust."

United mainly by a consuming desire for public approbation, the newly wedded Daudets were soon divided. Jeanne Hugo's subsequent marriage, in 1896, to the admirable and modest Jean-Baptiste — who had loved her since childhood — was equally doomed. In 1905, when he returned from his first polar expedition, Jeanne, already weary of spousal solitude, followed through on her threat to divorce him.

Despite the many testimonies to her beauty and sweetness, to her loyalty to her family heritage (as a married woman, she signed her name Charcohugo), Jeanne can't escape sounding spoiled and vapid. And Jean-Baptiste comes to life only in Cambor's vivid accounts of his journeys.

Uncompromising, aggressively emotional and fiercely reactionary, Léon Daudet occupies such a dominant place in Cambor's book that it made me wish she had simply focused on the Daudets: the promiscuous, syphilitic, inspired (and greatly loved) Alphonse, and Léon, his distorted mirror-image of a son, heir to all his father's faults and none of his virtues.

Léon Daudet personifies an aspect of French culture that remains insufficiently acknowledged. After spending his early adult years as a failed physician and mediocre novelist, he turned to politics and journalism. A virulent anti-Dreyfusard, he rejoiced when his father's old friend, Émile Zola, was put on trial and condemned to prison. Passionately devoted to the nationalist, royalist cause, he joined his second wife in founding the daily newspaper of the extremist right-wing political movement Action Française. His views, articulated in his column and in his frequent lectures, helped pave the way for the Nazi Party in Pétain's France. It's hard to believe that Daudet, had he not died of an aneurysm in June 1942, would have resisted the temptation to collaborate, and fervently, with the occupier of his homeland.

Monsters make for compelling reading. Cambor's group portrait is efficiently researched, and narrated with brio and style. But the star of "Gilded Youth," easily overshadowing the competition, is the grippingly unpleasant Léon Daudet.

Miranda Seymour's most recent book is a memoir, "Thrumpton Hall."

http://www.nytimes.com/2009/08/30/books/review/Seymour-t.html?8bu&emc=bua2

'Nothing Remains of Love'

By WILLIAM LOGAN

A VILLAGE LIFE

By Louise Glück

72 pp. Farrar, Straus & Giroux. $23

Even before the unknown versifier of Isaiah, poets probably looked at a lush meadow and saw a graveyard. Louise Glück's wary, pinch-mouthed poems have long represented the logical outcome of a certain strain of confessional verse — starved of adjectives, thinned to a nervous set of verbs, intense almost past bearing, her poems have been dark, damaged and difficult to avert your gaze from.

Poets, being creatures of routine, tend to settle into a style sometime in their 30s and plow those acres as if they'd been cleared by their fathers' fathers' fathers. Read a poet's second or third book and you will see the style of his dotage. Poets restless in their forms, unwilling to take yesterday's truth as gospel, are as rare as a blue rose; and rarer still are poets like Eliot, Lowell and Geoffrey Hill, who have convincingly changed their styles midcareer.

"A Village Life" is a subversive departure for a poet used to meaning more than she can say. All these years that Glück has been writing her stark, emaciated verse, there has been an inner short-story writer itching to break out. (The publicity optimistically refers to the new style as "novelistic"; but there is no novel here, only patches of long-windedness.) The lines are long, the poems sputtering on, sometimes for pages, until they finally run out of gas, as if they were the first drafts of a torpid afternoon. Even so, there's a faith in speech, as well as a generosity of instinct, apparent in these laggardly lines, though the reader may be forgiven for thinking that some charities are impositions.

As in Edgar Lee Masters's "Spoon River Anthology," Glück uses the village as a convenient lens to examine the lives within, which counterpoint the memories of her life without. Unlike Masters, she writes without moralizing, though with the same steady knowledge that our destination is the grave ("To get born, your body makes a pact with death, / and from that moment, all it tries to do is cheat"). Unfortunately, the quickest way to the mortuary is apparently marriage:

> He has found someone else — not another person exactly,
> but a self who despises intimacy, as though the privacy of marriage

is a door that two people shut together
and no one can get out alone, not the wife, not the husband,
so the heat gets trapped there until they suffocate,
as though they were living in a phone booth.

Perhaps I'm not the only reader who finds Glück hilarious, in a ghoulish way — like a stand-up vampire.

The tales that unfold piecemeal from this country town (what is gossip but a part of the whole?) bear the scars of everyday life — childhood fraught with unspoken secrets, adulthood always on the verge of adultery, lives of resentment and suppressed rage, lives missing passion or self-knowledge. The world of this village seems so repressed, you're surprised the inhabitants don't kill one another just to have something to do — or something to talk about. The unchanging fields stretch beyond, overseen by their animal familiars, the bat and the earthworm (both given poems in propria persona), creatures by nature blind and ravenous. The flourishing olive trees suggest that this site of municipal suffering lies somewhere in Italy or Greece, countries burdened with the myths of the ancient world.

This is a fantasy village, of course, this village of Glück's. There are cars and movies and television, so it isn't medieval, however timeless the attitudes; but the world of cellphones, iPods and computers has passed it by. Indeed, it's not clear whether the poet has projected certain scenes from an American childhood onto this fictional screen (the poet's voice is particularly hard to distinguish from her inventions here). What she has created is an HO-gauge model of sterility and futility, a place stultified in its antique habits and the passage of despair from adult to child, a Kafkaesque landscape marked by the autumn burning of leaves, an annual holocaust. Here the dead seem almost living, and the living already half dead — "Nothing proves I'm alive. / There is only the rain, the rain is endless." Even the view, with all the passive and frozen beauty of a Japanese scroll, is too much to bear ("as though this beauty were gagging you so you couldn't breathe").

The poet has long resisted giving her interior world any richness of description — a poem may contain rain, sea, clouds, sheep, a mountain, yet you learn little beyond the naked nouns. When a simile comes along, it's as if she had declared a public holiday (I'd max out my credit card for a few adjectives). What she chooses to reveal of this static pastoral lies in the predations or evasions of her verbs: flood, escape, shudder, vanish, scuffle, prowl, stalk. This mimesis denied creates a terrible hunger in the reader — Glück's intensity is often a form of starvation. It's like watching a black-and-white movie; the landscape is drawn in chiaroscuro. For a poetic world to be this narrow, the poet's desires must be powerfully austere. The real world, in other words, is so overwhelming it must be edited.

Every desire in Glück is cautious, every pleasure suspect. She's almost a feral poet, beadily watching her prey before making a devastating remark — her favorite form of greeting is the ambush. Yet such wariness betrays a terrible sensual longing, sustained despite inevitable disappointment. Even eating a tomato is antic with danger:

They're beautiful still on the outside,
some perfectly round and red, the rare varieties
misshapen, individual, like human brains covered in red oilcloth —
Inside, they're gone. Black, moldy —
you can't take a bite without anxiety.

Like human brains! After reading such lines, not only do you not want to eat bad tomatoes, you no longer want to eat good ones.

Glück's world is as close to Darwinian savagery as any a poet has invented (her psyche red in tooth and claw), but it would be a mistake not to see how vulnerable she is beneath her brutal observations. A poem about a mother trying to tell her daughter the facts of life is full of mortifying embarrassment — mother

gives daughter one of those insufferable books that make sex harder to follow than instructions for assembling a bicycle.

> Whatever holds human beings together
> could hardly resemble those cool black-and-white diagrams, which suggested,
> among other things, that you could only achieve pleasure
> with a person of the opposite sex,
> so you didn't get two sockets, say, and no plug.

The terrible need not to lie to herself ("Nothing remains of love," Glück says darkly, "only estrangement and hatred") forces the poet to rehearse the old tales to see where the disaster began.

Glück is perhaps the most popular literary poet in America. She doesn't have the audience of Mary Oliver or Billy Collins, whose books rise to the top of the poetry best-seller list (even poets are surprised to learn there is one) and stay there, as if they had taken out a long-term lease. Glück is too private and cunning a poet ever to win too many friends — indeed, part of her cachet is that her poems are like secret messages for the initiated.

Her early poems were all elbows and knees, Plathian with a rakish edge, full of wordplay and tight jazzy rhythms. Glück became a minimalist's minimalist, moody, anxious to her fingertips — a nail biter's nail biter. Since the early days of modernism, there has been an argument about how little a poem could contain before too many of the burdens of meaning passed from writer to reader. The one-word poems briefly the rage in the 1960s (one of the more famous was Aram Saroyan's "oxygen," just the element such a poem lacked) established that an ironic gesture needs no more than a single word to make its case — it's unfortunate that the argument proved so small and uninteresting. Yet Glück has forced a whole world into a snow globe, and her phrases have been especially rich in their betrayals.

Returning after some decades to a less styptic mode of speech takes courage, or desperation — sometimes finding a new rhythm, however, is like finding a new life. It's good to see a poet old enough to draw Social Security making new contracts with the language. Unfortunately, Glück doesn't yet have control of these long measures — the lines are slack, the fictions drowsy and the moments of heightened attention like oases in a broad desert (the poems don't argue, they merely accumulate). Without the energies of her short lines and sharply drawn moods, she turns out to have an imagination almost as conventional as anyone else's.

Glück is still a poet of sensibility more than sense, which means that the mortal pressure of her verse exceeds her ability to make memorable phrases. She offers the gratifications of what she calls, dryly, "normal shame and anxiety," even when the content remains slightly vacant. "A Village Life," though far from her most interesting or most characteristic book, is oddly personal in its distracted way, like an interminable stage whisper (there are odd echoes of M. Night Shyamalan's Hollywood dystopia of five years ago, "The Village"). Glück learned much from Plath about how to make a case of nerves central to poetry (both poets owe a shadowy debt to Eliot); but finally Plath is a poet for whom the world was too full, and Glück a poet for whom the world is not safe until absolutely empty.

Glück remains our great poet of annihilation and disgust, our demigoddess of depression. At her discomforting best, she reminds me of no poet more than Rilke, who was also a case of nerves and who also lived close to the old myths. Though her comments about him have been hedged, of all the Americans now writing Glück is the closest to being his secret mythographer. Her silences fall at times like moral resistance, and the most striking lines of her chatter are as haunting as an elegy for herself.

William Logan's most recent book of poetry is "Strange Flesh."

http://www.nytimes.com/2009/08/30/books/review/Logan-t.html?8bu&emc=bua2

African/American

By JESS ROW

THE THING AROUND YOUR NECK

By Chimamanda Ngozi Adichie

218 pp. Alfred A. Knopf. $24.95

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Midway through Chimamanda Ngozi Adichie's first story collection, "The Thing Around Your Neck," a gentlemanly British professor who has convened a workshop of African writers at a resort near Cape Town pronounces a Tanzanian's story about massacres in Congo just the thing he wants for his magazine. "It was urgent and relevant," Adichie writes. "It brought news." The professor goes on to say that the story a Nigerian writer has submitted — about a bank clerk in Lagos who is asked to offer sexual favors to secure a new client — is "agenda writing." "Women are never victims in that sort of crude way." The young woman interrupts him to say that the story was in fact her own experience, and then walks out, leaving his leering glances behind.

The tensions embodied in this moment — between fiction and autobiography, the expectations of the observer and the experience of the witness, not to mention the value of certain experiences in the global literary marketplace — practically seep through the pages of this collection. As a whole it traces the journey Adichie herself has taken. Brought up in the Nigerian college town of Nsukka, in the aftermath of the failed war for Biafran independence that killed two of her grandparents, she moved to the United States at 19 to attend college and had early literary success with her novels "Purple Hibiscus" and "Half of a Yellow Sun." All these personhoods are represented here: the sheltered child, the vulnerable immigrant in Philadelphia and Brooklyn, the foreign student adrift in a dormitory in Princeton, the young African writer asked to objectify herself for an uncomprehending audience.

In this way Adichie traverses a landscape and a mode of writing we've seen before, in the work of — for example — Bharati Mukherjee, Amy Tan, Chitra Divakaruni and Jhumpa Lahiri. And as with these writers, there's occasionally the feeling that these stories exhaust themselves too soon; they collapse under the weight of all that can't be said in the terse, monochromatic sentences of the conventional

Anglo-American short story. This is particularly the case in two stories about Nigerian women trapped in the United States by marriage, “Imitation” and “The Arrangers of Marriage.” In both cases the narration reveals so little about the protagonists’ inner lives that we begin to feel, a little uncomfortably, that Adichie is delivering the “news” the West wants to hear about Africa: pitiful victims, incorrigible villains, inspirational survivors.

Thankfully, that feeling doesn’t last long. “Ghosts,” in which an elderly professor in Nsukka meets an old colleague he assumed had died in the Biafran war, is a nearly perfect story, distilling a lifetime’s weariness and wicked humor into a few pages. “Tomorrow Is Too Far,” a kind of ghostless ghost story, delves beautifully into the layers of deception around a young boy’s accidental death, remembered by a young Nigerian-American woman who wants desperately to avoid her own culpability. And there is a whole suite of stories here in which Adichie calmly eviscerates the pretensions of Westerners whose interest in Africa masks an acquisitive, self-flattering venality.

Adichie is keenly aware of the particular burdens that come with literary success for an immigrant writer, a so-called hyphenated American. Though in this book she strikes a tricky balance — exposing, while also at times playing on, her audience’s prejudices — one comes away from “The Thing Around Your Neck” heartened by her self-awareness and unpredictability. She knows what it means to sit at the table, and also what it takes to walk away.

Jess Row is the author of “The Train to Lo Wu,” a collection of stories. He teaches at the College of New Jersey.

http://www.nytimes.com/2009/08/30/books/review/Row-t.html?8bu&emc=bua2

Treacherous Ground

By MARK LEWIS

NO QUARTER

The Battle of the Crater, 1864

By Richard Slotkin

411 pp. Random House. $28

Black soldiers contributed enormously to the Union cause during the Civil War but won no famous victories that can be used to dramatize their achievement. That's why Hollywood employed a glorious defeat — the Battle of Fort Wagner — as the climax of the film "Glory." In "No Quarter," the historian Richard Slotkin makes similarly skillful use of the Battle of the Crater, in which black troops almost dealt a death blow to the Confederacy, but ended up being scapegoated for an infamous Union disaster.

In July 1864, Ulysses S. Grant approved an ingenious plan for an assault on Elliott's Salient, part of the fortified line that Robert E. Lee had thrown up to defend the town of Petersburg, Va. Union troops tunneled under no man's land, hollowed out a cavern and packed it full of blasting powder. On July 30, they set off an enormous explosion that ripped the salient apart. When the dust settled, there was a gaping hole in the Confederate defenses. Thousands of Union troops, including a division of black soldiers, swarmed into the breach.

But the blast had produced a crater about 30 feet deep, and the assault troops bogged down as they picked their way around it. Meanwhile, Lee rushed up reserves to plug the gap. Both sides committed atrocities, as blacks and whites alike cried "no quarter" and murdered prisoners. By day's end, more than 500 Union soldiers were dead or dying on the field, and their comrades had retreated to their starting point. "It was the saddest affair I have witnessed in this war," Grant said.

Had Grant triumphed that day, much of the glory would have gone to the black troops, who penetrated farthest into Confederate territory. If these men had taken Cemetery Hill and swept on into Petersburg, the defense of Richmond would have become untenable. The Battle of the Crater might have passed into

tradition as the blow that doomed the Confederacy, administered by ex-slaves who were fighting, quite literally, for freedom.

Instead, white soldiers and Northern newspapers blamed the black troops for the defeat, along with incompetent generals like Ambrose Burnside. The setback was disastrously ill-timed for Abraham Lincoln, who was up for re-election. To counter criticism from white-supremacist Northern Democrats, Lincoln "had to show an inescapable link between the preservation of the Union, emancipation and the extension of civil liberties to blacks," Slotkin writes. "That link was symbolized by the black soldier."

Lincoln's critics cited the Crater rout as proof that he was wrong about emancipation. But he was saved from electoral defeat by Philip Sheridan's thrilling victory at Cedar Creek, and by William Tecumseh Sherman's capture of Atlanta. Paradoxically, Sherman's triumph lives on in the national memory mostly as a dramatic scene in the film of "Gone With the Wind," which takes a notably benign view of the Confederacy.

This sort of thing bothers Slotkin. In "Gunfighter Nation" (1993), he called upon progressive-minded historians to reject "nostalgia for a falsely idealized past," and to rewrite America's myths to reflect a more inclusive view of history. He is particularly attuned to the dramatic possibilities presented by the Battle of the Crater, which inspired his 1980 novel "The Crater." But Slotkin is too scrupulous a historian to write propaganda. "No Quarter" offers a riveting narrative and fair play to both sides, while exhuming an important episode from relative obscurity.

Slotkin's book is well timed. A group of historians made news this spring by petitioning President Obama to cancel the wreath the White House traditionally sends to a Confederate monument on Memorial Day. Obama sent it anyway, but he sent another to a memorial honoring black Civil War troops — including those who fought at the Crater.

Mark Lewis is writing a book about America's colonial experience in the Philippines.

http://www.nytimes.com/2009/08/30/books/review/Lewis-t.html?8bu&emc=bua2

Climate protection 'to cost more'

By Richard Black
Environment correspondent, BBC News website

Protecting societies against the impacts of climate change will be much more expensive than previously believed, according to a new analysis.

In 2007, the UN climate convention came up with a sum of $49-171bn per year.

The new report says the UN sums omitted important factors and the true cost will be two to three times higher.

Developing nations want rich countries to provide major sums for adaptation as part of the new UN climate deal due to be agreed in Copenhagen in December. "The amount of money on the table at Copenhagen is one of the key factors that will determine whether we achieve a climate change agreement," said lead author Martin Parry, a visiting research fellow with the Grantham Institute for Climate Change at Imperial College London.

" **Finance is the key that will unlock the negotiations in Copenhagen** "
Camilla Toulmin, IIED

"But previous estimates of adaptation costs have substantially misjudged the scale of funds needed."

Professor Parry co-chaired the Intergovernmental Panel on Climate Change (IPCC) working group on climate impacts for its 2007 assessment. The new report - issued under the aegis of the International Institute for Environment and Development (IIED) and the Grantham Institute - says that some aspects of the UN estimates were wrong by a factor of more than 100.

Call to caution

The UN climate convention (UNFCCC) made its assessment in 2007 after the IPCC concluded the task was too difficult; and Professor Parry suggested it had been done in a hurry, with some vital caveats ignored in subsequent deliberations.

A spokesman for the UNFCCC defended the process but said the organisation had a responsibility to be conservative.

"Looking at what was out there in 2007, these were best estimates, which we simply collected; and we had to err on the side of caution," he said.

Recently the UNFCCC's executive secretary Yvo de Boer has tended to use the figure of $100bn (£60bn) per year.

Professor Parry told BBC News that a key point of the new report, Assessing the Costs of Adaptation to Climate Change, was that it included "bottom-up" as well as "top-down" analyses.

"One study shows the cost of adapting a single watershed in China - that's one of the few case studies that's been done - comes in at a billion dollars a year," he said.

"So when you start adding up the various figures you soon start to exceed the global number (in the UN's analysis)." He said UNFCCC calculations had taken into account only half of the extra disease burden due to emerge from climate change, assumed low levels of future development in Africa (so giving less infrastructure to protect), used low estimates for sea level rise and had not included the economic costs of nature loss.

Mr de Boer told BBC News he was happy that thinking and understanding on the issue was evolving. "For me, the priority is not to try and determine with scientific precision exactly how much is going to be needed to cover the cost of adaptation in 2030," he said.

"The point is to put in place a robust architecture for raising adaptation funds and allocating them over time."

Financial key

Securing funds for climate protection, or adaptation, is a key priority for developing countries in the run-up to the Copenhagen conference, which is supposed to secure a new global agreement supplanting the Kyoto Protocol. Earlier this week the African Union suggested it would be asking for $67bn (£40bn) per year for Africa alone.

"Finance is the key that will unlock the negotiations in Copenhagen," said IIED director Camilla Toulmin. "But if governments are working with the wrong numbers, we could end up with a false deal that fails to cover the costs of adaptation to climate change."

Most is expected to be raised through levies on carbon trading, but Mr de Boer believes developed countries will need to pledge an up-front sums in the region of $10bn to enable poorer nations to begin assessing their needs and priorities.

Further analyses from the World Bank and management consultants McKinsey and Company are due out before the Copenhagen talks.

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Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8224823.stm

Published: 2009/08/27 17:50:44 GMT

Variety of dogs' coats explained

By Victoria Gill
Science reporter, BBC News

Wiry, smooth, curly or straight - the genetic reason for the the array of coats of different dog breeds is surprisingly simple, say scientists.

Just three genes account for the coat types that make canine pets so diverse. A team of researchers reports in the journal Science that different combinations of these genes account for all of the various textures.

The research could aid the study of the causes of genetic diseases that affect both dogs and humans.

The team was led by Elaine Ostrander from the National Human Genome Research Institute (NHGRI) in Bethesda, US.

She and her colleagues took DNA samples from 1,000 dogs of more than 80 different breeds as well as from a number of wild dogs, including wolves.

These samples gave the scientists access to each dog's genome, which they were able to analyse. They looked for "signposts" of DNA variation, called single nucleotide polymorphisms.

" **By mixing and matching... these three different genes, we could account for most of the variation that we see in coats in domestic dogs** "
Elaine Ostrander, NHGRI

These signal a mutation or change in the DNA code that could account for a particular characteristic.

Edouard Cadieu, a member of Dr Ostrander's research team decided to use this genetic data to study the dogs' coats.

"There are lots of obvious differences between dog breeds," said Dr Ostrander, "but the coats are just remarkable.

"It seems that every breed has a different coat. Some are long, some are short, some are curly, some are bristly, some are smooth, and there is every possible mixture therein."

Dr Cadieu searched for patterns that might reveal the genetic cause of this variety.

Dr Ostrander explained: "For example, for long hair he looked for a commonality in long-haired breeds that's distinct from what we see in short-haired breeds.

"Edouard started out looking at texture - or wiry hair - and quickly found that there was a single gene primarily responsible for that, as well as (for) the moustache and eyebrow pattern that you see in dogs like the schnauzer." He then moved on to length, and then to curliness. And for each characteristic he identified a single gene that was primarily responsible.

Wild genes

In each case there was an ancestral or "wild-type" form of the gene that dogs inherited from wolves.

There was also a variant or "domesticated form" that had been selected by breeders looking for particular traits like longer hair. Breeds with more wolf-like coats - such as those with short, straight hair like a beagle - displayed the wild-type version of the gene.

"Just by mixing and matching... these three different genes, we could account for most of the variation that we see in coats in domestic dogs," said Dr Ostrander.

The researchers say that the lessons learned from this study could help in the study of diseases that affect both humans and dogs.

Cathryn Mellersh, a geneticist from the Animal Health Trust in Suffolk, UK said: "This study is important because it proves a principle.

"You can use the dog genome as a model to investigate complex conditions and boil them down to a surprisingly small number of genes."

Dr Ostander concluded: "From a medical point of view, this simplicity is great news."

It means, she said, that the problems of diseases with a genetic basis are "much more solvable".

Dr Ostander also expressed her thanks to all of the dog-owners who donated DNA samples from their pets.

"They've turned out to be extremely helpful, and this data set is just going to keep giving and giving."

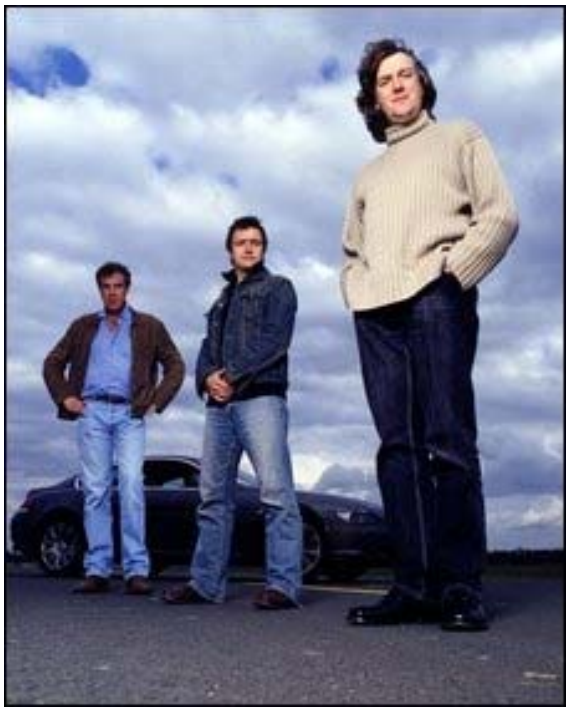
Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8224519.stm

Published: 2009/08/27 18:51:13 GMT

File-sharers' TV tastes revealed

By Rory Cellan-Jones
Technology correspondent, BBC News

Millions of television viewers are now using file-sharing services to access free and unauthorised copies of programmes, research has revealed.



US drama Heroes was the most popular illegal download this year, according to research firm Big Champagne.

About 55 million people downloaded the show, while 51 million chose to access Lost, the second most popular show.

Visits to leading "torrent" sites, which index video and music files, have also nearly doubled in the last year.

The proportion of file-sharing involving films and television rather than music is continuing to rise, the research shows.

"Millions of television viewers now access free, unauthorised versions of favourite shows at least some of the time," says Eric Garland, chief executive of Big Champagne.

"This is a socially acceptable form of casual piracy - and it is replacing viewing hours."

Film show

All of the programmes in the top 10 were American, but the survey also examined unauthorised downloads of popular BBC show Top Gear.

Most Popular Film Torrents
- Watchmen; 16,906,452
- The Curious Case of Benjamin Button; 13, 133, 137
- Yes Man; 13,038,364
- Twilight; 11,632,645
- Fast and Furious; 10,613,668
- Gran Torino; 9,880,700
- Marley and Me; 9,099,219
- Slumdog Millionaire; 8,840,884
- Bolt; 8,690,633
- Australia; 8,628,012

During the most recent series, the figures show around 300,000 downloads of each episode in the days immediately following their broadcast in the UK.

But the UK accounted for just 4% of the download activity, with 47% coming from the United States.

Big Champagne says Top Gear has been among the most pirated television programmes internationally.

The series appears on BBC America some time after it is shown in the UK, and it appears that some American fans are eager to download it before it is available legally.

The research also looks at unauthorised film downloads and shows they are getting lower audiences than those for TV programmes.

Most Popular TV Torrents
- Heroes; 54,562,012
- Lost; 51,151,396
- 24; 34,119,093
- Prison Break; 29,283,591
- House; 26,277,954
- Fringe; 21,434,755
- Desperate Housewives; 21,378,412
- Grey's Anatomy; 19,916,775
- Gossip Girl; 19,706,870
- Smallville; 19,598,999

Top of the chart was Watchmen, downloaded nearly 17 million times, followed by The Curious Case of Benjamin Button, with 13 million.

The Oscar-winning Slumdog Millionaire, a relatively low budget film compared with the two Hollywood blockbusters, was viewed by nearly 9 million unauthorised downloaders.

The research will be presented on Saturday at the Edinburgh Television Festival in a session on what television can learn from the music industry's experience with online piracy.

Mr Garland says there are major differences between the two industries and the impact on television may not be as severe as some TV executives fear: "We may see a lot of disruption but it is premature to say 'we're next'."

"The effect on the business is going to be very different."

Big Champagne's research also shows that the rate of piracy for live events, such as sport or talent shows, is much lower than that for popular drama series.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/technology/8224869.stm

Published: 2009/08/28 00:16:25 GMT

Soluble fibre 'effective for IBS'

A soluble fibre supplement should be the first line of attack in treating irritable bowel syndrome, experts say.

Researchers from Utrecht University in the Netherlands compared adding bran, a soluble supplement called psyllium and a dummy supplement to sufferers' diets.

They found psyllium was the most effective, warning that bran may even worsen the symptoms of the condition, the British Medical Journal reported.

As many as one in 10 people is estimated to have the condition.

It is characterised by abdominal pain and an irregular bowel habit.

" **I think adding psyllium to the diet is the best treatment option to start with** "
Dr Niek de Wit, researcher

Its exact cause is unknown and recommendations for treatment include dietary advice, antidepressants and drug treatments.

Many relying on dietary adjustments still turn to bran in a bid to help improve the way the intestines work.

But the Dutch study of 275 patients questions the wisdom of this approach.

The team gave patients 10g of either psyllium, bran or rice flour twice a day for 12 weeks.

Symptom severity

At the end of the study, those on psyllium, a naturally occurring vegetable fibre, reported symptom severity had been reduced by 90 points using a standard scale of rating problems.

For bran it was 58 points and for the placebo group, 49.

The report also showed that patients seemed less tolerant of bran, with more than half of the group dropping out during the trial, mostly because their symptoms worsened.

Soluble fibre can also be found in fruit such as apples and strawberries, as well as barley and oats.

But Dr Niek de Wit, one of the researchers, said: "It is unlikely that people with IBS would get enough from fruit and other foods to help them.

"I think adding psyllium to the diet is the best treatment option to start with. In the study, people did this by adding it to things such as yoghurt and it had a real effect."

Dr Anton Emmanuel, medical director of Core, the charity for diseases of the gut, said bran was being over-used.

He said the study was "helpful" and "reasonably robust", adding: "Putting it all together, patients should tolerate this form of fibre well and it may help some, especially those with a tendency to constipation."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8225516.stm

Published: 2009/08/27 23:03:38 GMT

Genetic advance raises IVF hopes

By Pallab Ghosh
BBC News, science correspondent

Researchers have found a potential way to correct an inherited disorder affecting thousands of women.

Working on monkeys, they transferred genetic material needed to create a baby from a defective egg to a healthy one, resulting in healthy births.

The US work, featured in the journal Nature, raises hopes of a treatment enabling women with defective eggs to have a child without using donor eggs.

However, the child would have a small number of genes from a "third parent".

" **It is estimated that every 30 minutes a child is born with this devastating disease and I believe we could prevent that** "
Dr Shoukhrat Mitalipov Oregon Health and Science University

The treatment would involve so-called "germ line" genetic changes which would be passed down through generations. The genetic fault is contained in structures in the egg called the mitochondria, which are involved in maintaining the egg's internal processes.

If an egg with faulty mitochondria is fertilised the resulting child could have any of hundreds of different diseases including anaemia, dementia, hypertension and a range of neurological disorders.

Previous failures

US researchers have previously tried and failed to correct this defect by adding healthy donated mitochondria into the eggs of patients wishing to have children. " **The fact that treatment effects would persist for generations means ethical debate is needed, as well as more safety tests** "
Dr Helen Wallace GeneWatch

But these attempts resulted in birth defects - probably because mitochondria are so delicate that they are damaged when they are transplanted from one egg to another.

As a result, the treatment was banned by the US until it could be demonstrated that it was safe in animal experiments.

A group at the Oregon Health and Science University has now done just that.

They transferred the DNA needed to make a baby out of monkey eggs, leaving behind the potentially diseased genes in the mitochondria. This was transplanted it into eggs emptied of DNA but containing healthy mitochondria.

The technique resulted in three healthy births with no sign of any birth defects.

Mixed response

Lead researcher Dr Shoukhrat Mitalipov believes the technology is now ready to be tried out on human patients.

He said: "It is estimated that every 30 minutes a child is born with this devastating disease and I believe we could prevent that." Dr Mitalipov has applied for a research licence to work with human eggs and embryos, and hopes to work with patients soon.

He said: "Moving to human trials could be very quick, maybe within two to three years.

"This type of gene therapy is much closer to clinical application than anything else before."

The development has been welcomed by Professor Peter Braude, an IVF specialist at Guys and St Thomas's hospital.

He said: "It is a very nice approach that could potentially help thousands of women with mitochondrial disease."

But some groups have expressed concern that this method involves making a genetic change to an egg that can be passed down through generations. Dr Helen Wallace, of the campaign group GeneWatch, said: "The fact that treatment effects would persist for generations means ethical debate is needed, as well as more safety tests."

But according to Professor Robin Lovell-Badge, of the National Institute for Medical Research in Mill Hill London, people should not worry unduly over the germ-line alterations.

He said: "Mitochondria do not confer any human-specific qualities.

"It would be similar to changing the bacteria in our intestines, which I suspect no one would care about.

"Altering the nuclear genome is a different matter. As it would be difficult and risky there would have to be very good reasons for doing this."

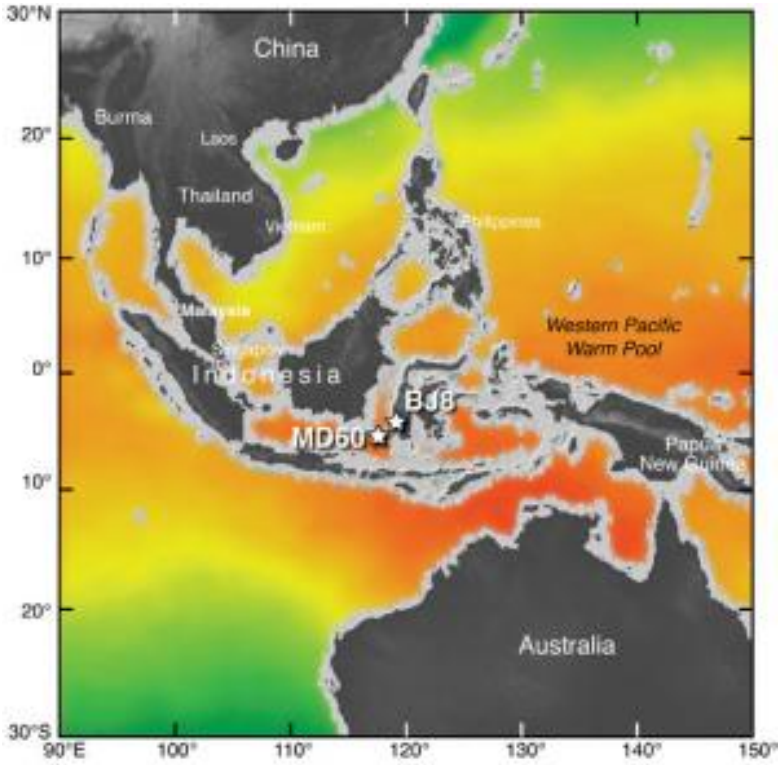
In the UK, the Human Fertilisation and Embryology Authority has licensed a number of tightly-controlled research projects into mitochondrial diseases.

But Parliament would have to change the law to allow the technique to be used on patients.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8220553.stm

Published: 2009/08/26 17:04:41 GMT

New Temperature Reconstruction From Indo-Pacific Warm Pool



A map of the Indo-Pacific region indicates the locations of sediment cores used for the study. Station BJ8 marks the cores taken by Oppo and her colleagues. MD60 marks the site of published data. (Credit: Jack Cook, Woods Hole Oceanographic Institution)

ScienceDaily (Aug. 28, 2009) — A new 2,000-year-long reconstruction of sea surface temperatures (SST) from the Indo-Pacific warm pool (IPWP) suggests that temperatures in the region may have been as warm during the Medieval Warm Period as they are today.

The IPWP is the largest body of warm water in the world, and, as a result, it is the largest source of heat and moisture to the global atmosphere, and an important component of the planet's climate. Climate models suggest that global mean temperatures are particularly sensitive to sea surface temperatures in the IPWP. Understanding the past history of the region is of great importance for placing current warming trends in a global context.

The study is published in the journal *Nature.*

In a joint project with the Indonesian Ministry of Science and Technology (BPPT), the study's authors, Delia Oppo, a paleo–oceanographer with the Woods Hole Oceanographic Institution, and her colleagues Yair Rosenthal of Rutgers State University and Braddock K. Linsley of the University at Albany-State University of New York, collected sediment cores along the continental margin of the Indonesian Seas and used chemical analyses to estimate water past temperatures and date the sediment. The cruise included 13 US and 14 Indonesian scientists.

"This is the first record from the region that has really modern sediments and a record of the last two millennia, allowing us to place recent trends in a larger framework," notes Oppo.

Global temperature records are predominantly reconstructed from tree rings and ice cores. Very little ocean data are used to generate temperature reconstructions, and very little data from the tropics. “As palaeoclimatologists, we work to generate information from multiple sources to improve confidence in the global temperature reconstructions, and our study contributes to scientists’ efforts towards that goal,” adds Oppo.

Temperature reconstructions suggest that the Northern Hemisphere may have been slightly cooler (by about 0.5 degrees Celsius) during the 'Medieval Warm Period' (~AD 800-1300) than during the late-20th century. However, these temperature reconstructions are based on, in large part, data compiled from high latitude or high altitude terrestrial proxy records, such as tree rings and ice cores, from the Northern Hemisphere (NH). Little pre-historical temperature data from tropical regions like the IPWP has been incorporated into these analyses, and the global extent of warm temperatures during this interval is unclear. As a result, conclusions regarding past global temperatures still have some uncertainties.

Oppo comments, “Although there are significant uncertainties with our own reconstruction, our work raises the idea that perhaps even the Northern Hemisphere temperature reconstructions need to be looked at more closely.”

Comparisons

The marine-based IPWP temperature reconstruction is in many ways similar to land temperature reconstructions from the Northern Hemisphere (NH). Major trends observed in NH temperature reconstructions, including the cooling during the Little Ice Age (~1500-1850 AD) and the marked warming during the late twentieth century, are also observed in the IPWP.

“The more interesting and potentially controversial result is that our data indicate surface water temperatures during a part of the Medieval Warm Period that are similar to today’s,” says Oppo. NH temperature reconstructions also suggest that temperatures warmed during this time period between A.D. 1000 and A.D. 1250, but they were not as warm as modern temperatures. Oppo emphasizes, “Our results for this time period are really in stark contrast to the Northern Hemisphere reconstructions.”

Reconstructing Historical Temperatures

Records of water temperature from instruments like thermometers are only available back to the 1850s. In order to reconstruct temperatures over the last 2,000 years, Oppo and her colleagues used a proxy for temperature collected from the skeletons of marine plankton in sediments in the Indo-Pacific Ocean. The ratio of magnesium to calcium in the hard outer shells of the planktonic foraminifera Globigerinoides ruber varies depending on the surface temperature of the water in which it grows. When the phytoplankton dies, it falls to the bottom of the ocean and accumulates in sediments, recording the sea surface temperature in which it lived.

“Marine sediments accumulate slowly in general -- approximately 3 cm/yr -- which makes it hard to overlap sediment record with instrumental record and compare that record to modern temperature records," says Oppo. "That’s what is different about this study. The sediment accumulates fast enough in this region to give us enough material to sample and date to modern times.”

The team generated a composite 2000-year record by combining published data from a piston core in the area with the data they collected using a gravity corer and a multi-corer. Tubes on the bottom of the multi-corer collected the most recently deposited sediment, therefore enabling the comparison of sea surface temperature information recorded in the plankton shells to direct measurements from thermometers.

Oppo cautions that the reconstruction contains some uncertainties. Information from three different cores was compiled in order to reconstruct a 2,000-year-long record. In addition sediment data have an inherent

uncertainty associated with accurately dating samples. The SST variations they have reconstructed are very small, near the limit of the Mg/Ca dating method. Even in light of these issues, the results from the reconstruction are of fundamental importance to the scientific community.

More Questions to Answer

The overall similarity in trend between the Northern Hemisphere and the IPWP reconstructions suggests that that Indonesian SST is well correlated to global SST and air temperature. On the other hand, the finding that IPWP SSTs seem to have been approximately the same as today in the past, at a time when average Northern Hemisphere temperature appear to have been cooler than today, suggests changes in the coupling between IPWP and Northern Hemisphere or global temperatures have occurred in the past, for reasons that are not yet understood. "This work points in the direction of questions that we have to ask," Oppo says. "This is only the first word, not the last word."

The US National Science Foundation and the WHOI Ocean and Climate Change Institute provided funding for this work.

Adapted from materials provided by Woods Hole Oceanographic Institution.

http://www.sciencedaily.com/releases/2009/08/090827131832.htm#

10- And 11-year-olds Feel Pressure To Have A Perfect Body

ScienceDaily (Aug. 28, 2009) — A study of 4254 Canadian schoolchildren has shown a direct association between BMI and satisfaction with their body shape. The research, published in the open access journal *BMC Public Health*, shows a linear response for girls, who were happiest when thinnest, and a U-shaped response for boys, who were unhappy when they were too skinny or too fat.

Bryn Austin worked a team of researchers from Harvard University and the University of Alberta, Canada, to investigate the relationship between size and body satisfaction, as well as the effects of rural/urban residence, parental education and income, and neighborhood household income. She said, "There is a well-established relationship between poor body satisfaction and increased risk of disordered weight control behaviors, including vomiting, fasting, and use of laxatives and diet pills for weight control. Importantly, body satisfaction appears to be responsive to school-based interventions. To increase our understanding of body satisfaction and its links with BMI in childhood, we studied the prevalence of poor body satisfaction in prepubescent girls and boys, and its association with body weight and socioeconomic factors".

The researchers measured the height and weight of the 10-11 year old children and asked them to indicate how much they agree with the statement, "I like the way I look". Overall, 7.3% of girls and 7.8% of boys reported poor body satisfaction. For normal weight, overweight and obese girls the prevalence of poor body satisfaction was 5.7%, 10.4% and 13.1%, respectively. For boys this was 7.6%, 8.4%, and 8.1%, respectively. Girls from parents with low educational attainment and residing in rural areas were more likely to report poor body satisfaction.

Speaking about the results, Austin said, "Poor body satisfaction among males with a low BMI may reflect the cultural ideal for males to attain both muscularity and leanness; whereas, among females, thinness remains the culturally defined ideal body shape. Our finding that girls who reside in rural areas, controlling for BMI, are more likely to report poor body satisfaction suggests that appearance-related pressures may be higher within rural areas, or perhaps that girls in urban areas benefit from existing programs that may protect against decrements in body satisfaction".

Journal reference:

1. S. Bryn Austin, Jess Haines and Paul J. Veugelers. **Body satisfaction and body weight: gender differences and sociodemographic determinants**. *BMC Public Health*, 2009; (in press) [link]

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

http://www.sciencedaily.com/releases/2009/08/090826191843.htm#

Alternate Explanation For Dune Formation On Saturn's Largest Moon

This is a portion of a Cassini radar mapper image obtained by the Cassini spacecraft on its Dec. 21, 2008, flyby of Saturn's moon Titan. The area shown covers the southern boundary of an equatorial band where longitudinal dunes (dunes that form along the wind direction) are pervasive. (Credit: NASA/JPL)

ScienceDaily (Aug. 28, 2009) — A new and likely controversial paper has just been published online in *Nature Geoscience* by LSU Department of Geography and Anthropology Chair Patrick Hesp and United States Geological Survey scientist David Rubin. The paper, "Multiple origins of linear dunes on Earth and Titan," examines a possible new mechanism for the development of very large linear dunes formed on the surface of Titan, Saturn's largest moon.

The authors examined the linear – or longitudinal – dunes that stretch across the surface of China's Qaidam Basin, finding them composed of sand and some salt and silt. The latter two elements make the dunes cohesive or sticky.

According to the study, this leads to a complete change in dune form from transverse dunes to linear dunes, even though the wind speed and direction does not change. Typically transverse dunes are formed by winds from a narrow directional range while longitudinal or linear dunes are formed by winds from two obliquely opposing directions. These findings offer an alternative interpretation of similar dunes found on Titan.

Hesp and Rubin suggest that if the giant linear dunes found on the surface of Titan are also formed from cohesive sediment, then they too could be formed by single-direction winds. This is in sharp contrast to earlier studies, which assumed that the sediments were loose and interpreted the dune shape as evidence of winds coming from alternating directions.

The alternative hypothesis that Titan's linear dunes are formed in cohesive sediment has significant implications for studies on Titan; if the Hesp and Rubin alternative is correct, new hypotheses regarding the composition, origin, evolution, grain size, stickiness, quantity, global transport patterns and suitability for wind transport of Titan's sediment; the velocities, directions and seasonal patterns of Titan's winds; and overall surface wetness will all have to be completely reassessed.

Journal reference:

1. David M. Rubin, Patrick A. Hesp. **Multiple origins of linear dunes on Earth and Titan**. *Nature Geoscience*, 2009; DOI: 10.1038/ngeo610

Adapted from materials provided by Louisiana State University.

http://www.sciencedaily.com/releases/2009/08/090825163726.htm#

US Crop Yields Could Wilt In Heat

Recently planted corn field. Yields of three of the most important crops produced in the United States – corn, soybeans and cotton – are predicted to fall off a cliff if temperatures rise due to climate change. (Credit: iStockphoto/Brad Wieland)

ScienceDaily (Aug. 28, 2009) — Yields of three of the most important crops produced in the United States – corn, soybeans and cotton – are predicted to fall off a cliff if temperatures rise due to climate change.

In a paper recently published online in *Proceedings of the National Academy of Sciences*, North Carolina State University agricultural and resource economist Dr. Michael Roberts and Dr. Wolfram Schlenker, an assistant professor of economics at Columbia University, predict that U.S. crop yields could decrease by 30 to 46 percent over the next century under slow global warming scenarios, and by a devastating 63 to 82 percent under the most rapid global warming scenarios. The warming scenarios used in the study – called Hadley III models – were devised by the United Kingdom's weather service.

The study shows that crop yields tick up gradually between roughly 10 and 30 degrees Celsius, or about 50 to 86 degrees Farenheit. But when temperature levels go over 29 degrees Celsius (84.2 degrees Farenheit) for corn, 30 degrees Celsius (86 degrees Farenheit) for soybeans and 32 degrees Celsius (89.6 degrees Farenheit) for cotton, yields fall steeply.

"While crop yields depend on a variety of factors, extreme heat is the best predictor of yields," Roberts says. "There hasn't been much research on what happens to crop yields over certain temperature thresholds, but this study shows that temperature extremes are not good."

Roberts adds that while the study examined only U.S. crop yields under warming scenarios, the crop commodity market's global reach makes the implications important for the entire world, as the United States produces 41 percent of the world's corn and 38 percent of the world's soybeans.

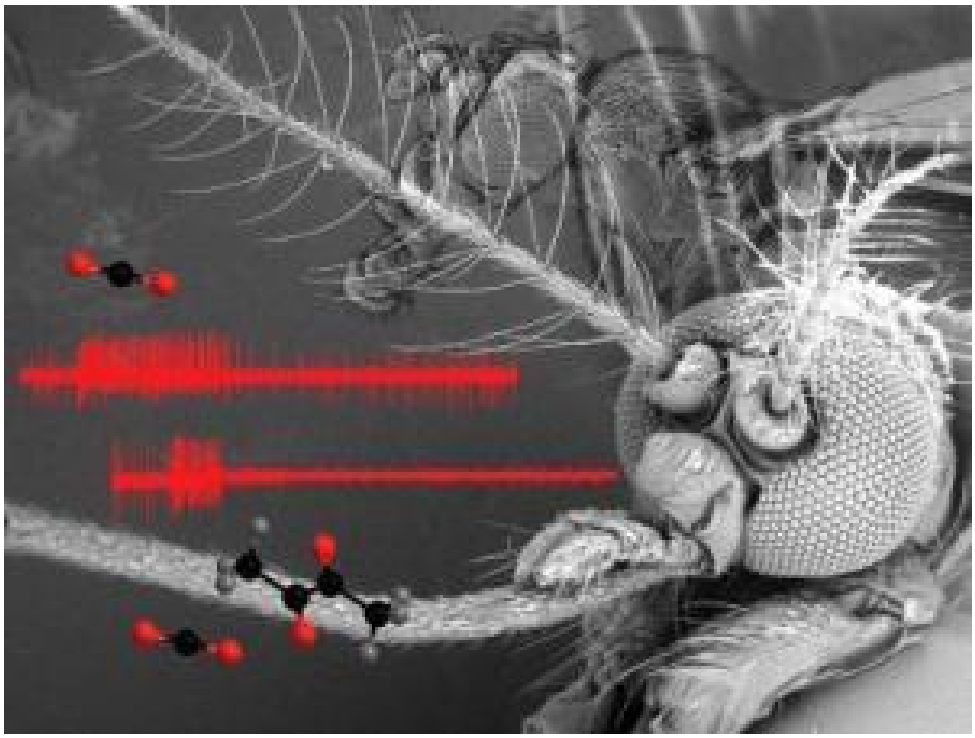
"Effects of climate change on U.S. crop production will surely be felt around the globe, especially in developing countries," he says.

Journal reference:

1. Wolfram Schlenker, Columbia University and Michael Roberts, North Carolina State University. **Nonlinear temperature effects indicate severe damages to U.S. crop yields under climate change**. *Proceedings of the National Academy of Sciences*, Aug. 24, 2009
2.

Adapted from materials provided by North Carolina State University.
http://www.sciencedaily.com/releases/2009/08/090824182533.htm#

Discovery Of Natural Odors Could Help Develop Mosquito Repellents



The image depicts scanning electron micrographs of the heads of a Culex quinquefasciatus mosquito (foreground) and Drosophila melanogaster (fruit fly; background). Representative traces of a CO2-sensitive neuron activated by CO2 (top trace) and inhibited by addition of odor 2,3-butanedione (bottom trace). The structures of CO2 and 2,3-butanedione are also shown. (Credit: S. Turner, UC Riverside)

ScienceDaily (Aug. 27, 2009) — Entomologists at the University of California, Riverside working on fruit flies in the lab have discovered a novel class of compounds that could pave the way for developing inexpensive and safe mosquito repellents for combating West Nile virus and other deadly tropical diseases.

When fruit flies undergo stress, they emit carbon dioxide (CO_2) that serves as a warning to other fruit flies that danger or predators could be nearby. The fruit flies are able to detect the CO_2 and escape because their antennae are equipped with specialized neurons that are sensitive to the gas.

But fruits and other important food sources for fruit flies also emit CO_2 as a by-product of respiration and ripening. If the innate response of the fruit fly is to avoid CO_2, how then does it find its way to these foods?

Anandasankar Ray, an assistant professor in the Department of Entomology, and Stephanie Turner, his graduate student, now provide an answer to the paradox.

They have identified a new class of odorants – chemical compounds with smells – present in ripening fruit that prevent the CO_2-sensitive neurons in the antennae from functioning. In particular two odors, hexanol and 2,3- butanedione, are strong inhibitors of the CO_2-sensitive neurons in the fruit fly.

The research has strong implications for control of deadly diseases transmitted by Culex mosquitoes such as West Nile virus disease and filariasis, an infectious tropical disease affecting the lymphatic system.

Since 1999, nearly 29,000 people in the United States have been reported with West Nile virus disease. Lymphatic filariasis has affected more than 120 million people in the world.

"CO_2 emitted in human breath is the main attractant for the Culex mosquito to find people, aiding the transmission of these deadly diseases," Ray said. "In our experiments we identified hexanol, and a related odor, butanal, as strong inhibitors of CO_2-sensitive neurons in Culex mosquitoes. These compounds can now be used to guide research in developing novel repellents and masking agents that are economical and environmentally safe methods to block mosquitoes' ability to detect CO_2 in our breath, thereby dramatically reducing mosquito-human contact."

Study results appear Aug. 26 in the advance online publication of *Nature.*

"This is a beautiful study that breaks new ground in the field of olfaction," said John Carlson, the Eugene Higgins Professor of Molecular, Cellular and Developmental Biology at Yale University, who was not involved in the research. "It shows that certain odorants can strongly inhibit the response of receptors that detect CO_2. The results suggest some very interesting new strategies for the control of certain insect pests."

Besides showing that inhibitory odors can play an important role in modifying insect behavior, the research paper also illustrates how some of these odors have a long-term effect. Ray and Turner found, for example, that some odors silenced the CO_2 neuron in the fruit fly well beyond the period of application.

"To our surprise, we found that exposure to a long-term CO_2 response inhibitor can exert a profound and specific effect on the behavior of the insect, even after the inhibitor is no longer in the environment," Ray said. "This means this odorant could potentially be used to keep mosquitoes at bay for longer periods of time, benefiting people in areas where mosquito-transmitted diseases are prevalent."

Ray received his doctoral degree in molecular, cellular and developmental biology from Yale University in 2005. He joined UC Riverside in 2007.

Originally from India, Ray contracted malaria during childhood. When his wife caught dengue fever on a trip to India a few years ago, he decided to intensify his research on mosquito-borne diseases.

Stephanie Turner, the first author of the research paper, received her bachelor's degree in biochemistry from UC Santa Cruz, where she performed research as an undergraduate. She worked for two years in biotechnology before joining the Cell, Molecular and Developmental Biology Graduate Program at UCR.

The research related to this project was conceived, initiated and carried out at UCR over the past one year, and was supported by UCR startup funds. Ray has plans to launch a startup company in the near future to take his basic science research on the odorants from the lab to applications that directly benefit people.

Ray and Turner already have begun work in the lab on mosquitoes that cause malaria and dengue fever. They also are setting up collaborations with a number of scientists from around the globe to do research on various mosquito species and tsetse flies.

The UCR Office of Technology Commercialization has filed a patent application on the discovery.

Adapted from materials provided by University of California - Riverside.

http://www.sciencedaily.com/releases/2009/08/090826152546.htm#

When Is The Pineapple Ripe? New System Uses Metal Oxide Sensors To Detect Safety And Quality Of Foods

Customers want fresh food, which is neither unripe nor spoiled. A new system based on metal oxide sensors could check the safety and quality of foods reliably, quickly and economically -- such as how ripe that pineapple really is. (Credit: Fraunhofer IPM)

ScienceDaily (Aug. 27, 2009) — When buying a pineapple, the customer often stands helplessly in front of the supermarket shelf – which one is already ripe? If the fruit is eaten immediately it's often still not sweet enough, if it's left too long it has rotten patches. Laboratory tests are too slow and too costly to provide the answers.

Major suppliers might soon be able to call on the help of a novel system that uses volatile components to detect when the pineapple is ripe and when it can be delivered to the supermarket. The system has been developed by researchers at the Fraunhofer Institutes for Molecular Biology and Applied Ecology IME in Schmallenberg and for Physical Measurement Techniques IPM in Freiburg. It checks gas emissions on-line – directly in the warehouse for instance.

"We have brought together various technologies based on the use of metal oxide sensors, similar to those installed in cars, for example, to close ventilation vents when driving through a tunnel. Researchers at IPM have developed these sensors further. If a gas flows over the sensor, at temperatures of 300 to 400°C, it will burn at the point of contact. The subsequent exchange of electrons changes the electrical conductivity," explains Dr. Mark Bücking, Head of Department at IME. "Before the gas reaches these sensors, it has to go through a separation column with polymers. Certain substances are already filtered out here." A prototype of the analysis equipment already exists. Initial tests were promising – the system measures the volatile substances just as sensitively as conventional equipment used in food laboratories. In a further step the researchers want to optimize the system and adapt it to specific problems. Bücking reckons that the equipment could come onto the market at a four-digit euro price.

The researchers are also investigating whether the equipment could be used to test pork. The male pig produces hormones and certain odorous substances necessary for reproduction. What the female pig finds attractive, however, smells anything but pleasant to human noses. It's true that most pigs are slaughtered well before sexual maturity – before any odorous substances have formed in the majority of pigs. As there is the risk, however, that some boars could produce odorous substances prematurely, all boars are castrated when they are young piglets. Castration may not be necessary in the future if the pork could be tested on-line before it is packaged.

Adapted from materials provided by Fraunhofer-Gesellschaft, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/08/090803095658.htm#

'Plasmobot': Scientists To Design First Robot Using Mould

Plasmodium used in the research. (Credit: Image courtesy of University of the West of England)

ScienceDaily (Aug. 27, 2009) — Scientists at the University of the West of England are to design the first ever biological robot using mould.

Researchers have received a Leverhulme Trust grant worth £228,000 to develop the amorphous non-silicon biological robot, plasmobot, using plasmodium, the vegetative stage of the slime mould *Physarum polycephalum*, a commonly occurring mould which lives in forests, gardens and most damp places in the UK. The Leverhulme Trust funded research project aims to design the first every fully biological (no silicon components) amorphous massively-parallel robot.

This project is at the forefront of research into unconventional computing. Professor Andy Adamatzky, who is leading the project, says their previous research has already proved the ability of the mould to have computational abilities.

Professor Adamatzky explains, "Most people's idea of a computer is a piece of hardware with software designed to carry out specific tasks. This mould, or plasmodium, is a naturally occurring substance with its own embedded intelligence. It propagates and searches for sources of nutrients and when it finds such sources it branches out in a series of veins of protoplasm. The plasmodium is capable of solving complex computational tasks, such as the shortest path between points and other logical calculations. Through previous experiments we have already demonstrated the ability of this mould to transport objects. By feeding it oat flakes, it grows tubes which oscillate and make it move in a certain direction carrying objects with it. We can also use light or chemical stimuli to make it grow in a certain direction.

"This new plasmodium robot, called plasmobot, will sense objects, span them in the shortest and best way possible, and transport tiny objects along pre-programmed directions. The robots will have parallel inputs and outputs, a network of sensors and the number crunching power of super computers. The plasmobot will be controlled by spatial gradients of light, electro-magnetic fields and the characteristics of the substrate on which it is placed. It will be a fully controllable and programmable amorphous intelligent robot with an embedded massively parallel computer."

This research will lay the groundwork for further investigations into the ways in which this mould can be harnessed for its powerful computational abilities.

Professor Adamatzky says that there are long term potential benefits from harnessing this power, "We are at the very early stages of our understanding of how the potential of the plasmodium can be applied, but in years to come we may be able to use the ability of the mould for example to deliver a small quantity of a chemical substance to a target, using light to help to propel it, or the movement could be used to help assemble micro-components of machines. In the very distant future we may be able to harness the power of plasmodia within the human body, for example to enable drugs to be delivered to certain parts of the human body. It might also be possible for thousands of tiny computers made of plasmodia to live on our skin and carry out routine tasks freeing up our brain for other things. Many scientists see this as a potential development of amorphous computing, but it is purely theoretical at the moment."

Professor Adamatzky has recently edited and had published by Springer, 'Artificial Life Models in Hardware' aimed at students and researchers of robotics. The book focuses on the design and real-world implementation of artificial life robotic devices and covers a range of hopping, climbing, swimming robots, neural networks and slime mould and chemical brains.

Adapted from materials provided by University of the West of England.

http://www.sciencedaily.com/releases/2009/08/090827073256.htm#

Super-sized Tiny Proteins: Software Helps Biologists Visualize Molecules

At the press of a button "BioBrowser" provides high-quality, interactive displays of molecules. (Credit: Copyright Fraunhofer Austria)

ScienceDaily (Aug. 27, 2009) — What are the causes of illness? How can the effect of medication be improved? Molecular biologists can now gain new insights by the virtual simulations generated with a new type of software.

If it's a question of the efficacy of vaccines or the aggressiveness of toxins, researchers must be able to simulate and analyze the molecules involved in three dimensions. What do they look like? What is the three-dimensional structure of a protein? How can this structure be used to predict which molecules the protein interacts with? What function does it have? In the software applications most widely used today, the depiction of the simulated protein and the quality of the graphics leave a great deal to be desired – especially if larger molecules, consisting of thousands of atoms, have to be visualized and examined.

This is likely to get a lot easier with the arrival of "BioBrowser" a software application developed as part of a German Research Foundation project by researchers specialized in Visual Computing at Fraunhofer Austria in Graz. Based on research data of molecular biologists, the software automatically calculates and displays 3D models of complex proteins – at the push of a button, in high quality, and interactively. Researchers can turn the molecule and look at it from every angle, enlarge it at will and select specific areas; the image is always razor sharp and users can switch between the most important variants.

Visualized models can be very large and complicated – they often consist of 50,000 and more atoms. "When examining molecules, an enormous flood of data is generated that in itself makes little sense at all. BioBrowser converts this data into graphic images and makes the links between different molecules visible", summarizes Dr. Eva Eggeling, Head of Visual Computing.

Interested researchers receive a download link on request that gives them direct free-of-charge access to the program. They can also arrange an appointment with colleagues in Graz to study the proteins on a large 3D projection screen. The Graz researchers are hoping this will give new drive to molecular biology and the development of medicines. At the moment they are working on extending and improving the user interface. Feedback from the first scientific users helps the Graz researchers decide whether they need to add other functions. The product is primarily directed at Austrian scientists, but can also be used worldwide. "We are also reckoning on enquires from other European countries, particularly from Germany and Switzerland", explains Eggeling.

Adapted from materials provided by Fraunhofer-Gesellschaft.

http://www.sciencedaily.com/releases/2009/08/090824204830.htm#

Women With Strong Thigh Muscles Protected From Symptomatic Knee Osteoarthritis

ScienceDaily (Aug. 27, 2009) — A new study by researchers at the University of Iowa Hospitals and Clinics found that thigh muscle strength does not predict the occurrence of knee osteoarthritis (OA) uncovered in x-rays, but does predict incidence of painful or stiff knee OA. Women with the strongest quadriceps muscles appeared to be protected against the development of knee OA symptoms.

Details of this study appear in the September issue of *Arthritis Care & Research*, a journal published by Wiley-Blackwell on behalf of the American College of Rheumatology.The knee is the most common weight-bearing joint affected by osteoarthritis or degenerative joint disease, a major cause of disability in the U.S. The Centers for Disease Control and Prevention (CDC) estimate that 26.9 million U.S. adults are affected by OA with 16% (aged 45+ years) of those cases occurring in the knee. Approximately 18.7 % of symptomatic knee OA patients are female and 13.5% are male. A Medical Expenditure Panel Survey estimates that total out-of-pocket expenditures for treatment of arthritis was $32 billion in 2005.

Neil Segal, M.D., M.S., and colleagues in a study funded by the National Institute on Aging followed 3,026 men and women ages 50-79 over a 30-month period in the Multicenter Knee Osteoarthritis Study (MOST) to assess whether knee extensor strength would predict incident radiographic (OA that can be determined through X-ray) or symptomatic knee OA. Of those enrolled, a total of 2,519 knees were included in the study of radiographic knee OA and 3,392 knees were evaluated for the combination of radiographic OA and symptoms of OA that include pain, aching or stiffness on most days of the month.

Participants were evaluated for thigh muscle strength using an isokinetic dynamometer, a device that measures the strength of different muscle groups. The balance of muscle strength between quadriceps and hamstrings (H:Q ratio) was used to assess weakness in the lower extremity musculature. X-rays of the knees were taken at the onset of the study and the conclusion to determine the presence of OA. A telephone screen at the beginning and end of the study was conducted to establish if frequent pain, aching or stiffness was present in the knee. Data on height, weight (Body Mass Index-BMI), femoral neck bone mineral density (BMD), and physical activity status was also collected from participants.By the conclusion of the study 48 of 680 men and 93 of 937 women developed OA detected by x-ray. At the end of the 30-month period 10.1% of women and 7.8% of men displayed signs of symptomatic knee OA. "Our results showed thigh muscle strength was not a significant predictor of radiographic knee OA," concluded the authors. Women in the top third of peak knee extensor strength had a lower incidence of symptomatic knee OA, while men with strong thigh muscles had only slightly better odds of developing OA symptoms compared to men with weaker knee extensor strength. "The H:Q ratios were not predictive of symptomatic knee OA in either men or women," added researchers.

Researchers acknowledge there to be some limitation to the study by not including assessments of hip abductor strength. "Study of hip abductor strength, which is important for control of the knee joint, may be useful in a more comprehensive study of risk for OA of the knee," said Dr. Segal. "These findings suggest that targeted interventions to reduce risk for symptomatic knee OA could be directed toward increasing knee extensor strength," he added.

Journal reference:

1. Neil A. Segal, James C. Torner, David Felson, Jingbo Niu, Leena Sharma, Cora E. Lewis, Michael Nevitt. **Effect of Thigh Strength on Incident Radiographic and Symptomatic Knee Osteoarthritis in a Longitudinal Cohort**. *Arthritis Care & Research*, Published Online: August 27, 2009

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

http://www.sciencedaily.com/releases/2009/08/090827072432.htm#

Extrasolar Hot Jupiter: The Planet That 'Shouldn't Exist'

Artist's impression shows a gas-giant exoplanet transiting across the face of its star. (Credit: ESA/C. Carreau)

ScienceDaily (Aug. 27, 2009) — A planet has been discovered with ten times the mass of Jupiter, but which orbits its star in less than one Earth-day.

The discovery, reported in this week's *Nature* by Coel Hellier, of Keele University in the UK, and colleagues, poses a challenge to our understanding of tidal interactions in planetary systems.

The planet, called WASP-18b, belongs to a now-common class of extrasolar planets known as 'hot Jupiters' — massive planets that are thought to have formed far from their host stars, and migrated inwards over time. WASP-18b is so massive, and so close to its star — only about three stellar radii away — that tidal interactions between star and planet should have caused the planet to spiral inwards to its destruction in less than a million years.

Yet, as Hellier and colleagues show, the WASP-18 parent star is about a billion years old — making the likelihood of observing WASP-18b about one in a thousand.

How can this unlikely discovery be explained? One possibility is that the tidal dissipation in the WASP-18 system is a thousandtimes less than in our Solar System; this and other possible explanations are discussed by Douglas Hamilton in an accompanying News and Views article.

But if the planet's remaining life is as short as predicted, the orbital decay should be measurable within a decade.

Journal references:

1. Coel Hellier, D. R. Anderson, A. Collier Cameron, M. Gillon, L. Hebb, P. F. L. Maxted, D. Queloz, B. Smalley, A. H. M. J. Triaud, R. G. West, D. M. Wilson, S. J. Bentley, B. Enoch, K. Horne, J. Irwin, T. A. Lister, M. Mayor, N. Parley, F. Pepe, D. L. Pollacco, D. Segransan, S. Udry & P. J. Wheatley. **An orbital period of 0.94 days for the hot-Jupiter planet WASP-18b**. *Nature*, 2009; 460 (7259): 1098 DOI: 10.1038/nature08245
2. Douglas P. Hamilton. **Extrasolar planets: Secrets that only tides will tell**. *Nature*, 2009; 460 (7259): 1086 DOI: 10.1038/4601086a

Adapted from materials provided by Nature.

http://www.sciencedaily.com/releases/2009/08/090827132901.htm#

Nuisance Or Nutrient? Kudzu Shows Promise As A Dietary Supplement

Kudzu, a nuisance vine, shows promise as a dietary supplement that fights an unhealthy condition called metabolic syndrome. (Credit: Wikimedia Commons)

ScienceDaily (Aug. 27, 2009) — Kudzu, the nuisance vine that has overgrown almost 10 million acres in the southeastern United States, may sprout into a dietary supplement. Scientists in Alabama and Iowa are reporting the first evidence that root extracts from kudzu show promise as a dietary supplement for a high-risk condition — the metabolic syndrome — that affects almost 50 million people in the United States alone. Their study appears in the current issue of ACS' Journal of Agricultural and Food Chemistry.

J. Michael Wyss and colleagues note in the new study that people with metabolic syndrome have obesity, high blood pressure, high blood cholesterol, and problems with their body's ability to use insulin. Those disorders mean a high risk for heart attacks, strokes, and other diseases. Scientists have been seeking natural substances that can treat the metabolic syndrome. The new study evaluated kudzu root extracts, which contain healthful substances called isoflavones. People in China and Japan long have used kudzu supplements as a health food.

The study found that a kudzu root extract had beneficial effects lab rats used as a model for research on the metabolic syndrome. After two months of taking the extract, the rats had lower cholesterol, blood pressure, blood sugar, and insulin levels that a control group not given the extract. Kudzu root "may provide a dietary supplement that significantly decreases the risk and severity of stroke and cardiovascular disease in at-risk individuals," the article notes.

Journal reference:

1. Peng et al. **Chronic Dietary Kudzu Isoflavones Improve Components of Metabolic Syndrome in Stroke-Prone Spontaneously Hypertensive Rats**. *Journal of Agricultural and Food Chemistry*, 2009; 57 (16): 7268 DOI: 10.1021/jf901169y

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

http://www.sciencedaily.com/releases/2009/08/090826110122.htm#

New Treatment Option For Ruptured Brain Aneurysms

ScienceDaily (Aug. 27, 2009) — Researchers in Finland have identified an effective new treatment option for patients who have suffered a ruptured brain aneurysm, a potentially life-threatening event. Results of the new study on stent-assisted coil embolization were published today in the online edition of *Radiology*.

An aneurysm is a bulge or sac that develops in a weak area of a cerebral artery wall. Subarachnoid hemorrhage occurs when an aneurysm ruptures, diverting oxygen-rich blood from vital areas to the space between the brain and the skull. The ruptured vessel can be repaired surgically or through a minimally invasive procedure called embolization, in which the sac is filled with metal coils in order to prevent repeat bleeding from the aneurysm and to restore normal blood flow in the artery.

"The treatment decision is complicated in cases of acutely ruptured aneurysms," said the study's lead author, Olli Tähtinen, M.D., assistant professor of radiology at Tampere University Hospital in Tampere, Finland.

Embolization treatment of cerebral artery aneurysms is becoming increasingly favored over surgical repair, especially when the patient is older or in poor medical condition. However, embolization is challenging when the neck of the aneurysm is wide, because the metal coils have a tendency to protrude out of the sac into the artery. A balloon-tipped catheter threaded to the site of the aneurysm can sometimes, but not always, solve the problem.

"When the width or neck of the bulge is particularly wide, aneurysms can be difficult to treat surgically or with balloon-assisted embolization," Dr. Tähtinen said.

The researchers studied the effects of stent-assisted embolization in 61 patients, including 41 women and 20 men, who were treated for subarachnoid hemorrhage at three Finnish hospitals over a 4.5-year period. According to Dr. Tähtinen, the study represents the most extensive analysis to date of stent-assisted embolization treatment of acute subarachnoid hemorrhage.

In the study, interventional radiologists performed coil embolization by first placing a stent, a small wire mesh tube, over the neck of the aneurysm to help keep the coils within the aneurysmal sac. The procedure was a technical success in 44 (72 percent) of the 61 patients. Adequate blood flow was restored in 39 (64 percent) of the patients.

"Our study shows that stent-assisted coil embolization is a feasible treatment option for ruptured brain aneurysms that are difficult to treat surgically or with balloon-assisted embolization," Dr. Tähtinen said. "Stent-assisted embolization may offer an important addition to the treatment repertoire for these critically ill patients."

"Wide-Necked Intracranial Aneurysms: Treatment with Stent-Assisted Coil Embolization during Acute Subarachnoid Hemorrhage—Experience in 61 Consecutive Patients." Collaborating with Dr. Tähtinen were Ritva L. Vanninen, M.D., Ph.D., Hannu I. Manninen, M.D., Ph.D., Riitta Rautio, M.D., Ph.D., Arto Haapanen, M.D., Ph.D., Tero Niskakangas, M.D., Ph.D., Jaakko Rinne, M.D., Ph.D., and Leo Kesi-Nisula, M.D., Ph.D.

Adapted from materials provided by Radiological Society of North America, via EurekAlert!, a service of AAAS.
http://www.sciencedaily.com/releases/2009/08/090825081119.htm#

Tiny Ancient Shells -- 80,000 Years Old -- Point To Earliest Fashion Trend

Perforated Nassarius gibbosulus from archaeological layers dated to between 73,400 and 91,500 years ago at Taforalt. (Credit: Image courtesy of d'Errico/Vanhaeren)

ScienceDaily (Aug. 27, 2009) — Shell beads newly unearthed from four sites in Morocco confirm early humans were consistently wearing and potentially trading symbolic jewelry as early as 80,000 years ago. These beads add significantly to similar finds dating back as far as 110,000 in Algeria, Morocco, Israel and South Africa, confirming these as the oldest form of personal ornaments. This crucial step towards modern culture is reported this week in the *Proceedings of the National Academy of Sciences* (PNAS).

A team of researchers recovered 25 marine shell beads dating back to around 70,000 to 85,000 years ago from sites in Morocco, as part of the European Science Foundation EUROCORES programme 'Origin of Man, Language and Languages'. The shells have man-made holes through the centre and some show signs of pigment and prolonged wear, suggesting they were worn as jewelry.

Across all the locations shells were found from a similar time period from the Nassarius genus. That these shells were used similarly across so many sites suggests this was a cultural phenomenon, a shared tradition passed along through cultures over thousands of years. Several of the locations where shells have been found are so far inland that the shells must have been intentionally brought there.

"Either people went to sea and collected them, or more likely marine shell beads helped create and maintain exchange networks between coastal and inland peoples. This shows well-structured human culture that attributed meaning to these things," said Francesco d'Errico, lead author and director of research at the French National Centre for Scientific Research (CNRS). "Organised networks would also assist trading of other items, as well as genetic and cultural exchange – so these shells help reveal the connections between cognition and culture."

For scientists, beadworks are not simply decoration, they also represents a specific technology that conveys information through a shared coded language. It indicates more advanced thinking and the

development of modern cultural traits, giving clues to how such innovative behaviours might link to the spread of humans out of Africa.

"The early invention of the personal ornament is one of the most fascinating cultural experiments in human history," d'Errico continued. "The common element among such ornaments is that they transmit meaning to others. They convey an image of you that is not just your biological self."

Until recently the invention of personal ornaments was thought to coincide with the colonisation of Europe some 40,000 years ago, linking advanced cognitive capacity to early human dispersal. Yet this changed with the 2006 discovery of shell beads in Africa and the Near East dating back 35,000 years earlier, showing that symbolic thinking emerged more gradually through human evolution.

Curiously, shell beads disappear from the archaeological record in Africa and the Near East 70,000 years ago, along with other cultural innovations such as engravings on ochre slabs, and refined bone tools and projectile points. They reappear in different forms up to 30,000 years later, with personal ornaments simultaneously re-emerging in Africa and the Near East, and for the first time in Europe and Asia. This may reflect an entirely new and independent phase of population growth with previously unseen innovations allowing a more efficient exploitation of a wider variety of environments.

The temporary disappearance of cultural innovations could well be linked to population decreases during a long period of harsher climate conditions 60,000 to 73,000 years ago. This would have isolated populations, disrupting social and exchange networks.

This study was part of a broad network of 21 research projects and 44 individual research teams from 12 European countries forming the European Science Foundation EUROCORES programme 'Origin of Man, Language and Languages' (OMLL). This highly interdisciplinary collaborative action brought together scientists from a wide range of disciplines including genetics, linguistics, anthropology, archaeology, neurophysiology or cognitive sciences.

Dr Eva Hoogland, EUROCORES coordinator for the cognitive sciences at the European Science Foundation said: "This study presents a very good example of the groundbreaking results that can be gained from an interdisciplinary environment. Some questions, such as those concerning the interconnections between human cognition and culture, can only be addressed if scientists of varying backgrounds join forces. As witnessed by this study, this opens up new avenues for research when it happens on a structural basis, by leading scientists from across Europe."

This research was also supported with funding from the Natural Environment Research Council, the British Academy and Oxford University in the UK and the Max Planck Society in Germany.

Adapted from materials provided by European Science Foundation, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/08/090827101204.htm#

Rejected Watermelons: The Newest Renewable Energy Source

Watermelon juice can be a valuable source of biofuel. Researchers have shown that the juice of reject watermelons can be efficiently fermented into ethanol. (Credit: iStockphoto/Klaudia Steiner)

ScienceDaily (Aug. 27, 2009) — Watermelon juice can be a valuable source of biofuel. Researchers have shown that the juice of reject watermelons can be efficiently fermented into ethanol.

Wayne Fish worked with a team of researchers at the USDA-Agricultural Research Service's South Central Agricultural Research Laboratory in Lane, Oklahoma, US, to evaluate the biofuel potential of juice from 'cull' watermelons – those not sold due to cosmetic imperfections, and currently ploughed back into the field. He said, "About 20% of each annual watermelon crop is left in the field because of surface blemishes or because they are misshapen. We've shown that the juice of these melons is a source of readily fermentable sugars, representing a heretofore untapped feedstock for ethanol biofuel production".

As well as using the juice for ethanol production, either directly or as a diluent for other biofuel crops, Fish suggests that it can be a source of lycopene and L-citrulline, two 'nutraeuticals' for which enough demand currently exists to make extraction economically worthwhile. After these compounds have been removed from the 'cull' juice, it can still be fermented into ethanol.

The researchers conclude, "At a production ratio of ~0.4 g ethanol/g sugar, as measured in this study, approximately 220 L/ha of ethanol would be produced from cull watermelons".

Journal reference:

1. Wayne W Fish, Benny D Bruton and Vincent M Russo. **Watermelon juice: a promising feedstock supplement, diluent, and nitrogen supplement for ethanol biofuel production**. *Biotechnology for Biofuels*, (in press) [link]

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

http://www.sciencedaily.com/releases/2009/08/090826073546.htm#

Short- And Long-term Memories Require Same Gene But In Different Circuits

Two different types of memory -- long-term and short-term -- are stored very differently in the human brain. The same appears to be true across the animal kingdom, even in insects such as the fruit fly. (Credit: iStockphoto/Mads Abildgaard)

ScienceDaily (Aug. 27, 2009) — Why is it that you can instantly recall your own phone number but have to struggle with your mental Rolodex to remember a new number you heard a few moments ago? The two tasks "feel" different because they involve two different types of memory – long-term and short-term, respectively – that are stored very differently in the brain. The same appears to be true across the animal kingdom, even in insects such as the fruit fly.

Assistant Professor Josh Dubnau, Ph.D., of Cold Spring Harbor Laboratory (CSHL) and his team have uncovered an important molecular and cellular basis of this difference using the fruit fly as a model. The results of their study appear in the August 25 issue of *Current Biology*.

The CSHL team has found that when fruit flies learn a task, each of two different groups of neurons that are part of the center of learning and memory in the fly brain simultaneously forms its own unique memory signal or trace. Both types of trace, the team discovered, depend on the activity of a gene called rutabaga, of which humans also have a similar version. A rapidly occurring, short-lived trace in a group of neurons that make up a structure called the "gamma" (γ) lobe produces a short-term memory. A slower, long-lived trace in the "alpha-beta" (αβ) lobe fixes a long-term memory.

A tale of two lobes

Neuroscientists call the rutabaga gene a coincidence detector because it codes for an enzyme whose activity levels get a big boost when a fly perceives two stimuli that it has to learn to associate with one another. This enzymatic activity in turn signals to other genes critical for learning and memory.

A classic experiment that teaches flies to associate stimuli – and one that the CSHL team used – is to place them in a training tube attached to an electric grid, and to administer shocks through the grid right after a certain odor is piped into the tube. Flies with normal rutabaga genes learn to associate the odor with the shock and if given a choice, buzz away from the grid. But flies that carry a mutated version of

rutabaga in their brains lack both short- and long-term memory, don't learn the association, and so fail to avoid the shocks.

The team has now found, however, that this total memory deficit does not occur when flies carry the mutated version in either the γ or in the αβ lobes. Flies in which normal rutabaga function was restored within the γ lobe alone regained short-term memory but not long-term memory. Restoring the gene's function in the αβ lobe alone restored long-term memory, but not short-term memory.

Long- and short-term memory involve different circuits

"This ability to independently restore either short- or long-term memory depending on where rutabaga is expressed supports the idea that there are different anatomical and circuit requirements for different stages of memory," Dubnau explains. It also challenges a previously held notion that neurons that form short-term memory are also involved in storing long-term memory.

Previous biochemical studies have suggested that rapid, short-lived signals characteristic of short-term memory cause unstable changes in a neuron's connectivity that are then stabilized by slower, long-lasting signals that help establish long-term memory in the same neuron. But anatomy studies have long hinted at different circuits. Surgical lesions that destroy different parts of an animal's brain can separately disrupt the two kinds of memory, suggesting that the two memory types might involve different neuronal populations.

"We've now used genetics as a finer scalpel than surgery to reconcile these findings," Dubnau says. His team's results suggest that biochemical signaling for both types of memory are triggered at the same time, but in different neuron sets. Memory traces form more quickly in one set than the other, but the set that lags behind consolidates the memory and stores it long-term.

Why two mechanisms?

But why might the fly brain divide up the labor of storing different memory phases this way? Dubnau's hunch is that it might be because for every stimulus it receives, the brain creates its own representation of this information. And each time this stimulus – for example, an odor – is perceived again, the brain adds to the representation and modifies it. "Such modifications might eventually disrupt the brain's ability to accurately remember that information," Dubnau speculates. "It might be better to store long-term memories in a different place where there's no such flux."

The team's next mission is to determine how much cross talk, if any, is required between the two lobes for long-term memory to get consolidated. This work will add to the progress that scientists have already made in treating memory deficits in humans with drugs aimed at molecular members of the rutabaga-signaling pathway to enhance its downstream effects.

Journal reference:

1. Allison. L. Blum, Wanhe Li, Mike Cressy, and Josh Dubnau. **Short- and Long-Term Memory in Drosophila Require cAMP Signaling in Distinct Neuron Types**. *Current Biology*, 2009; DOI: 10.1016/j.cub.2009.07.016

Adapted from materials provided by Cold Spring Harbor Laboratory.

http://www.sciencedaily.com/releases/2009/08/090817190748.htm#

Taking Up Music So You Can Hear

Musicians -- trained to hear sounds embedded in a rich network of melodies and harmonies -- are primed to understand speech in a noisy background, say in a restaurant, classroom or plane. (Credit: iStockphoto)

ScienceDaily (Aug. 27, 2009) — Anyone with an MP3 device -- just about every man, woman and child on the planet today, it seems -- has a notion of the majesty of music, of the primal place it holds in the human imagination.

But musical training should not be seen simply as stuff of the soul -- a frill that has to go when school budgets dry up, according to a new Northwestern University study.

The study shows that musicians -- trained to hear sounds embedded in a rich network of melodies and harmonies -- are primed to understand speech in a noisy background, say in a restaurant, classroom or plane.

It is the first demonstration of musical training offsetting the deleterious effects of background noise, and the implications are provocative.

"The study points to a highly pragmatic side of music's magic," said Nina Kraus, Hugh Knowles Professor of Communication Sciences and Neurobiology and director of Northwestern's Auditory Neuroscience Laboratory, where the research was done.

The findings strongly support the potential therapeutic and rehabilitation use of musical training to address auditory processing and communication disorders throughout the life span.

Hearing speech in noise is difficult for everyone. But the difficulty is particularly acute for older adults, who are likely to have hearing and memory loss, and for poor readers who have normal hearing but whose nervous systems poorly transcribe sounds that ultimately are critical to good reading skills.

"Many older adults will say, 'I can hear what you're saying, but I don't understand you,'" Kraus said. "So they might have a little bit of a hearing loss, but often not enough to warrant the difficulty that a lot of older adults report."

Such populations could benefit from the reordering of the nervous system that occurs with musical training, according to the study. Because the brain changes with experience, musicians have better-tuned circuitry -- the pitch, timing and spectral elements of sound are represented more strongly and with greater precision in their nervous systems.

"Musical training makes musicians really good at picking out melodies, the bass line, the sound of their own instruments from complex sounds," Kraus said. Now, for the first time, this study has confirmed that such fine tuning of the nervous system also makes musicians highly adept at translating speech in noise.

The finding has particular implications for hearing certain consonants which are vulnerable to misinterpretation by the brain and are a big problem for some poor readers in a noisy environment. The brain's unconscious faulty interpretation of sounds makes a big difference in how words ultimately will be read.

Thirty-one study participants, with normal hearing and a mean age of 23, were divided into one group with music experience and another without it. They had to listen to sentences presented in increasingly noisy conditions and repeat back what they heard.

Better perception in noise was linked with better working memory and tone discrimination ability. The results imply that musical training enhances the ability to hear speech in challenging listening environments by strengthening auditory memory and the representation of important acoustic features.

In one of the tests, for example, participants had to repeat back "The square peg will settle in the round hole." Such longer sentences that are syntactically correct but lack familiar cues measure working memory as well as the ability to distinguish sounds in noise.

The Auditory Neuroscience Lab at Northwestern has helped establish the relationship between sound encoding in the brain and linguistic abilities by showing that the very neural sound transcription processes that are deficient in children with dyslexia are enhanced in people with musical experience. Based on this collective work, poor readers may show greater benefits from training programs that include music as well as speech sounds.

By reinforcing the pervasive effects that musical experience has on sound-processing abilities, Kraus stressed, this study underscores the importance of music education being more accessible to the general population.

Journal reference:

1. Alexandra Parbery-Clark, Erika Skoe, Carrie Lam and Nina Kraus. **Musician Enhancement for Speech-in-Noise**. *Ear and Hearing*, (in press)

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

http://www.sciencedaily.com/releases/2009/08/090817142857.htm#

Blast Waves May Cause Human Brain Injury Even Without Direct Head Impacts

The Army's Advanced Combat Helmet replaced the older Personal Armor System for Ground Troops helmet. Its Kevlar shell provides ballistic and impact protection, and its reduced edge cut, although reducing area of coverage, improves soldiers' field of vision and hearing. (Credit: Photo courtesy U.S. Army)

ScienceDaily (Aug. 27, 2009) — New research on the effects of blast waves could lead to an enhanced understanding of head injuries and improved military helmet design.

Using numerical hydrodynamic computer simulations, Lawrence Livermore scientists Willy Moss and Michael King, along with University of Rochester colleague Eric Blackman, have discovered that nonlethal blasts can induce enough skull flexure to generate potentially damaging loads in the brain, even without direct head impact.

Traumatic brain injury (TBI) results from mechanical loads in the brain, often without skull fracture, and causes complex, long-lasting symptoms.

TBI in civilians is usually caused by direct head impacts resulting from motor vehicle and sports accidents. TBI also has emerged among military combat personnel exposed to blast waves. As modern body armor has substantially reduced soldier fatalities from explosive attacks, the lower mortality rates have revealed the high prevalence of TBI.

There has been extensive research on how head impacts, for example from automobile accidents, cause traumatic brain injury. But TBIs resulting from blast waves without head impacts have not been well understood.

To tackle this puzzle, the team used three-dimensional hydrodynamic simulations to prove that direct action of the blast wave on the head causes skull flexure, producing mechanical loads in brain tissue comparable to those in an injury-inducing impact, even at nonlethal blast pressures as low as 1 bar above atmospheric pressure.

In particular, the team showed that blast waves affect the brain very differently from direct impacts.

The primary source of injury from direct impacts is the force resulting from the bulk acceleration of the head. In contrast, a blast wave squeezes the skull, creating pressures as large as an injury-inducing impact and pressure gradients in the brain that are much larger. This occurs even when the bulk head accelerations induced by a blast wave are much smaller than from a direct impact.

“The blast wave sweeps over the skull like a rolling pin going over dough,” said King, LLNL co-principal investigator.

Although the simulations show that the skull is deformed only about 50 microns (the width of a human hair), “this is large enough to generate potentially damaging loads in the brain,” according to Moss.

Because blast waves and direct impact affect the head in fundamentally different ways, armor systems that are designed to protect soldiers from impacts and projectiles may not be optimal for blast wave protection.

The team studied how helmets and their suspension systems influence the blast-induced mechanical loads in the brain.

They looked at two common systems: a nylon web system formerly used in the Personnel Armor Systems Ground Troops infantry helmet and viscoelastic foam pads like those in advanced combat helmets. Both helmets were modeled as hemi-ellipsoidal Kevlar shells.

In the first case, the 1.3 centimeter gap between the webbing and the shell allows the blast wave to “wash” under the helmet. In this case, the blast wave is focused by the shape of the helmet and the pressures under the helmet exceed those outside, so the helmet doesn't prevent the rippling deformation of the skull and pressure gradients in the brain.

In the second case, this “under wash” effect is mostly prevented by the presence of the foam pads, but under blast loading, the pads can become stiffer so that the blast wave-induced motion or deformation of the helmet is transferred to the skull. This can result in dangerous loads in the brain.

“The possibility that blasts may contribute to traumatic brain injury has implications for injury diagnosis and improved armor design,” Moss said.

Blackman added, “By comparing the effect of blasts on the head with the effect of head impacts we'd be able to make some sense of the distinct mechanisms of injury, the damage a solider might incur, and how a helmet might be designed to minimize both.”

The research appears online Aug. 26 in Physical Review Letters.

Adapted from materials provided by DOE/Lawrence Livermore National Laboratory.

http://www.sciencedaily.com/releases/2009/08/090826152713.htm#

People Vary Widely In Ability To Eliminate Arsenic From The Body

Large variations exist in people's ability to eliminate arsenic (sample shown) from the body, a new study shows. (Credit: Wikimedia Commons)

ScienceDaily (Aug. 27, 2009) — Large variations exist in peoples' ability to eliminate arsenic from the body, according to a new study that questions existing standards for evaluating the human health risks from the potentially toxic substance. The study found that some people eliminate more than 90 percent of the arsenic consumed in the diet. Others store arsenic in their bodies, where it can have harmful effects.

The research, based on the first application of new methods for studying arsenic, is scheduled for the Sept. 21 issue of ACS's Chemical Research in Toxicology.In the study, Kevin Francesconi and colleagues point out that drinking water in many parts of the world, including some regions of the United States, contain amounts of arsenic that exceed the World Health Organization's maximum acceptable levels. Consumption of seafood, the article notes, is another major source of arsenic contamination. Health effects from chronic arsenic exposure include skin and internal cancers, cardiovascular disease, and possibly diabetes, it adds.

The scientists describe monitoring arsenic excretion in the urine of human volunteers. They found that ability to eliminate arsenic from the body varied greatly, with some participants excreting up to 95 percent of the ingested arsenic but others eliminating as little as four percent. "This observed individual variability in handling [arsenic] exposure has considerable implications for the risk assessment of arsenic ingestion," the paper states. It adds that further study is needed to assess potential risks to humans consuming seafood products. "The data presented here suggest that the long held view that seafood arsenic is harmless because it is present mainly as organoarsenic compounds needs to be reassessed."

Journal reference:

1. Reingard Raml, Georg Raber, Alice Rumpler, Thomas Bauernhofer, Walter Goessler, Kevin A. Francesconi. **Individual Variability in the Human Metabolism of an Arsenic-Containing Carbohydrate, 2',3'-Dihydroxypropyl 5-deoxy-5-dimethylarsinoyl-ß-D-riboside, a Naturally Occurring Arsenical in Seafood**. *Chemical Research in Toxicology*, September 21, 2009 DOI: 10.1021/tx900158h

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

http://www.sciencedaily.com/releases/2009/08/090826110159.htm

EPA Pesticide Exposure Test Too Short, Overlooks Long Term Effects, According To Expert

The highly toxic pesticide endosulfan—a neurotoxin banned in several nations but still used extensively in U.S. agriculture—can exhibit a "lag effect" with the fallout from exposure not surfacing until after direct contact has ended. (Credit: iStockphoto/Tracy Hebden)

ScienceDaily (Aug. 27, 2009) — The four-day testing period the U.S. Environmental Protection Agency (EPA) commonly uses to determine safe levels of pesticide exposure for humans and animals could fail to account for the toxins' long-term effects, University of Pittsburgh researchers report in the September edition of *Environmental Toxicology and Chemistry.*

The team found that the highly toxic pesticide endosulfan—a neurotoxin banned in several nations but still used extensively in U.S. agriculture—can exhibit a "lag effect" with the fallout from exposure not surfacing until after direct contact has ended. Lead author Devin Jones, a recent Pitt biological sciences graduate, conducted the experiment under Rick Relyea, an associate professor of biological sciences in Pitt's School of Arts and Sciences, with collaboration from Pitt post-doctoral researcher John Hammond.

The team exposed nine species of frog and toad tadpoles to endosulfan levels "expected and found in nature" for the EPA's required four-day period, then moved the tadpoles to clean water for an additional four days, Jones reported. Although endosulfan was ultimately toxic to all species, three species of tadpole showed no significant sensitivity to the chemical until after they were transferred to fresh water. Within four days of being moved, up to 97 percent of leopard frog tadpoles perished along with up to 50 percent of spring peeper and American toad tadpoles.

Of most concern, explained Relyea, is that tadpoles and other amphibians are famously sensitive to pollutants and considered an environmental indicator species. The EPA does not require testing on amphibians to determine pesticide safety, but Relyea previously found that endosulfan is 1,000-times more lethal to amphibians than other pesticides. Yet, he said, if the powerful insecticide cannot kill one the world's most susceptible species in four days, then the four-day test period may not adequately gauge the long-term effects on larger, less-sensitive species."When a pesticide's toxic effect takes more than four days to appear, it raises serious concerns about making regulatory decisions based on standard four-day tests for any organism," Relyea said. "For most pesticides, we assume that animals will die during the period of exposure, but we do not expect substantial death after the exposure has ended. Even if EPA regulations required testing on amphibians, our research demonstrates that the standard four-day toxicity test would have dramatically underestimated the lethal impact of endosulfan on even this notably sensitive species."

Andrew Blaustein, a professor in Oregon State University's nationally ranked Department of Zoology, who is familiar with the Pitt study, said the results raise concerns about standards for other chemicals and the delayed dangers that might be overlooked. Some of the frog eggs the Pitt team used had been collected by Blaustein's students for an earlier unrelated experiment, but he had no direct role in the current research.

"The results are somewhat alarming because standards for assessing the impacts of contaminants are usually based on short-term studies that may be insufficient in revealing the true impact," Blaustein said. "The implications of this study go beyond a single pesticide and its effect on amphibians. Many other animals and humans may indeed be affected similarly."Tadpoles in the Pitt project spent four days in 0.5 liters of water containing endosulfan concentrations of 2, 6, 7, 35, 60, and 296 parts-per-billion (ppb), levels consistent with those found in nature. The team cites estimates from Australia—where endosulfan is widely used—that the pesticide can reach 700 ppb when sprayed as close as 10 meters from the ponds amphibians typically call home and 4 ppb when sprayed within 200 meters. The EPA estimates that surface drinking water can have chronic endosulfan levels of 0.5 to 1.5 ppb and acute concentrations of 4.5 to 23.9 ppb.

Leopard frogs, spring peepers, and American toads fared well during the experiment's first four days, but once they were in clean water, the death rate spiked for animals previously exposed to 35 and 60 ppb. Although the other six species did not experience the lag effect, the initial doses of endosulfan were still devastating at very low concentrations. Grey and Pacific tree frogs, Western toads, and Cascades frogs began dying in large numbers from doses as low as 7 ppb, while the same amount killed all green frog and bullfrog tadpoles.The endosulfan findings build on a 10-year effort by Relyea to understand the potential links between the global decline in amphibians, routine pesticide use, and the possible threat to humans in the future.

A second paper by Relyea and Jones also in the current *Environmental Toxicology and Chemistry* expands on one of Relyea's most notable investigations, a series of findings published in Ecological Applications in 2005 indicating that the popular weed-killer Roundup® is "extremely lethal" to amphibians in concentrations found in the environment. The latest work determined the toxicity of Roundup Original Max for a wider group of larval amphibians, including nine frog and toad species and four salamander species.In November 2008, Relyea reported in Oecologia that the world's 10 most popular pesticides—which have been detected in nature—combine to create "cocktails of contaminants" that can destroy amphibian populations, even if the concentration of each individual chemical is within levels considered safe to humans and animals. The mixture killed 99 percent of leopard frog tadpoles and endosulfan alone killed 84 percent.A month earlier, Relyea published a paper in Ecological Applications reporting that gradual amounts of malathion—the most popular insecticide in the United States—too small to directly kill developing leopard frog tadpoles instead sparked a biological chain reaction that deprived them of their primary food source. As a result, nearly half the tadpoles in the experiment did not reach maturity and would have died in nature.

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2. Rick A. Relyea and Devin K. Jones. **The Toxicity Of Roundup Original Maxh To 13 Species Of Larval Amphibians**. *Environmental Toxicology and Chemistry*, Vol. 28, No. 9, pp. 2004-2008, 2009

Adapted from materials provided by University of Pittsburgh.

http://www.sciencedaily.com/releases/2009/08/090817143610.htm#

A new study raises the question of whether being honest is a conscious decision at all.

Photo courtesy of Rui Ornelas

In a famous set of experiments in the 1970s, children were observed trick-or-treating in the suburbs. Some were asked their names and addresses upon arriving at a door, while some were asked nothing. All were instructed to take just one piece of candy from the bowl, but as soon as the owner of the home retreated into the kitchen, the children who hadn't provided their names and addresses shoveled the candy into their bags, sometimes taking everything in the bowl. Psychologists posited that anonymity made the children feel safe from the repercussions of their actions, an effect they call deindividuation.

Moral psychologists have since constructed myriad experiments to probe the workings of human morality, studying how we decide to cheat or to play by the rules, to lie or to tell the truth. And the results can be surprising, even disturbing. For instance, we have based our society on the assumption that deciding to lie or to tell the truth is within our conscious control. But Harvard's Joshua Greene and Joseph Paxton say this assumption may be flawed and are probing whether honesty may instead be the result of controlling a desire to lie (a conscious process) or of not feeling the temptation to lie in the first place (an automatic process). "When we are honest, are we honest because we actively force ourselves to be? Or are we honest because it flows naturally?" Greene asks.

Greene and Paxton have just published a study in the *Proceedings of the National Academy of Sciences* that attempts to get at the subconscious underpinnings of morality by recording subjects' brain activity as they make a decision to lie. Under the fMRI, subjects were asked to predict the result of a coin toss and were allowed to keep their predictions to themselves until after the coin fell, giving them a chance to lie. As motivation, they were paid for correct predictions. For comparison, the researchers ran tests in which they asked subjects to reveal their predictions before the coin toss. The scientists then analyzed the subjects' success rates using statistics: The dishonest were identified as those who guessed the results of the coin toss more times than chance would dictate.

Greene and Paxton had hypothesized that if deciding to be honest is a conscious process—the result of resisting temptation—the areas of the brain associated with self-control and critical thinking would light up when subjects told the truth. If it is automatic, those areas would remain dark.

What they found is that honesty *is* an automatic process—but only for some people. Comparing scans from tests with and without the opportunity to cheat, the scientists found that for honest subjects, deciding to be honest took no extra brain activity. But for others, the dishonest group, both deciding to lie and deciding to tell the truth required extra activity in the areas of the brain associated with critical thinking and self-control.

Their findings—that honesty is automatic for some people—is part of a growing body of work that shows that many, if not most, of our daily actions are not under our conscious control. According to John Bargh, a Yale social psychologist who studies automaticity, even our higher mental processes, ranging from persistence at an activity to social stereotyping to stopping to help a person in need, are performed unconsciously in response to environmental cues. And Jon Haidt of the University of Virginia has found through numerous studies that we make some moral judgments, like those involved in the trolley problem, based entirely on our emotions and are unable to explain logically why some things are right and others wrong.

Greene and Paxton's study suggests that honesty in particular is automatic only for some, which Bargh interprets to mean that some portion of the population might be naturally honest, while others struggle with telling the truth. "It could potentially be some of the most intriguing evidence for group selection," Bargh speculates, adding that the results are reminiscent of the evolutionary idea that "cheaters" and "suckers" coexist in a specific ratio in the animal kingdom. The classic example is parasitic cuckoos and the hapless birds that raise the cuckoos' young. Bargh wonders if the ratio of "cheaters" to "suckers" exists in our species as well. In the Halloween party experiment, were there children who did not take extra candy even though they hadn't revealed their names and addresses?

Greene and Paxton specifically state in the paper that they are not drawing conclusions about how the "honest" and "dishonest" group behave beyond the confines of the experiment, so to answer some of these deeper questions they plan to submit subjects to a retest and assess the robustness of the labels. If these designations hold up to further testing—if people really are consistently honest or dishonest—the pair would then hope to identify what individual personality traits might predict each case. Then the experimenters will also try to track down what kind of situations—like being reprimanded or being alone in the room—bring out honesty and dishonesty. They hope to thus search out the roots of automatic morality.

One surprising finding from this study reveals the complexity Greene and others face in trying to dissect moral behavior: The decision to lie for personal gain turns out to be a strikingly unemotional choice. Some moral dilemmas Greene studies, like the trolley problem, trigger emotional processing centers in our brains. In his coin toss experiment, there was no sign at all that emotions factored into a subject's decision to lie or to tell the truth. "Moral judgment is not a single thing," Greene concludes, suggesting that although we often lump them together under the heading of "morality," deciding what's right or wrong and deciding to tell the truth or to tell a lie may, in some situations, be entirely disconnected processes.

http://seedmagazine.com/content/article/truth_or_lies/

Clive Thompson on the New Literacy

By Clive Thompson ✉08.24.09

Illustration: Mads Berg

START

PREVIOUS: Jargon Watch: Booing, Green Trade War, Decision Engine

As the school year begins, be ready to hear pundits fretting once again about how kids today can't write—and technology is to blame. Facebook encourages narcissistic blabbering, video and PowerPoint have replaced carefully crafted essays, and texting has dehydrated language into "bleak, bald, sad shorthand" (as University College of London English professor John Sutherland has moaned). An age of illiteracy is at hand, right?

Andrea Lunsford isn't so sure. Lunsford is a professor of writing and rhetoric at Stanford University, where she has organized a mammoth project called the Stanford Study of Writing to scrutinize college students' prose. From 2001 to 2006, she collected 14,672 student writing samples—everything from in-class assignments, formal essays, and journal entries to emails, blog posts, and chat sessions. Her conclusions are stirring.

"I think we're in the midst of a literacy revolution the likes of which we haven't seen since Greek civilization," she says. For Lunsford, technology isn't killing our ability to write. It's reviving it—and pushing our literacy in bold new directions.

The first thing she found is that young people today write far more than any generation before them. That's because so much socializing takes place online, and it almost always involves text. Of all the writing that the Stanford students did, a stunning 38 percent of it took place out of the classroom—life writing, as Lunsford calls it. Those Twitter updates and lists of 25 things about yourself add up.

It's almost hard to remember how big a paradigm shift this is. Before the Internet came along, most Americans never wrote anything, ever, that wasn't a school assignment. Unless they got a job that required producing text (like in law, advertising, or media), they'd leave school and virtually never construct a paragraph again.

But is this explosion of prose good, on a technical level? Yes. Lunsford's team found that the students were remarkably adept at what rhetoricians call *kairos*—assessing their audience and adapting their tone and technique to best get their point across. The modern world of online writing, particularly in chat and on discussion threads, is conversational and public, which makes it closer to the Greek tradition of argument than the asynchronous letter and essay writing of 50 years ago.

The fact that students today almost always write for an audience (something virtually no one in my generation did) gives them a different sense of what constitutes good writing. In interviews, they defined good prose as something that had an effect on the world. For them, writing is about persuading and organizing and debating, even if it's over something as quotidian as what movie to go see. The Stanford students were almost always less enthusiastic about their in-class writing because it had no audience but the professor: It didn't serve any purpose other than to get them a grade. As for those texting short-forms and smileys defiling *serious* academic writing? Another myth. When Lunsford examined the work of first-year students, she didn't find a single example of texting speak in an academic paper.

Of course, good teaching is always going to be crucial, as is the mastering of formal academic prose. But it's also becoming clear that online media are pushing literacy into cool directions. The brevity of texting and status updating teaches young people to deploy haiku-like concision. At the same time, the proliferation of new forms of online pop-cultural exegesis—from sprawling TV-show recaps to 15,000-word videogame walkthroughs—has given them a chance to write enormously long and complex pieces of prose, often while working collaboratively with others.

We think of writing as either good or bad. What today's young people know is that knowing who you're writing for and why you're writing might be the most crucial factor of all.

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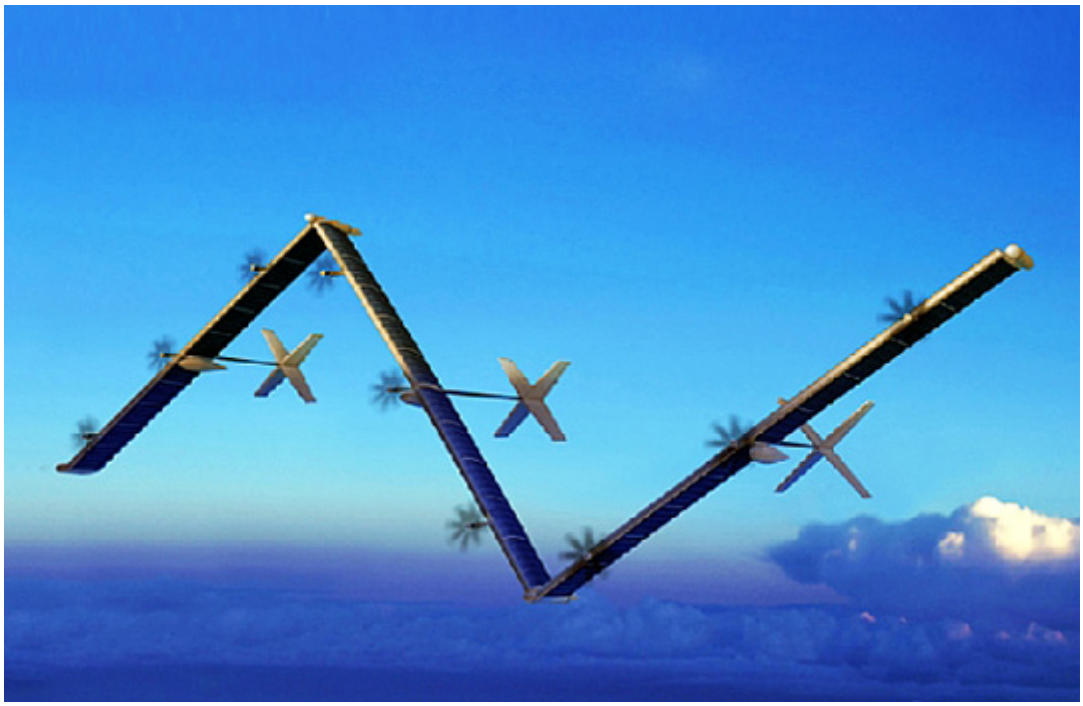
http://www.wired.com/techbiz/people/magazine/17-09/st_thompson

August 24, 2009

Solar Powered Plane Could Fly for Five Years Straight
by Sarah Parsons



Homer's beloved character, Odysseus, may have garnered international acclaim by traversing the globe in a ship, but we think the famed traveler's latest namesake represents a much hotter way to roam. Aurora Flight Sciences has unveiled a solar-powered concept plane, the *Odysseus*. The autonomous surveillance craft boasts the ability to fly above the earth for up to **five years straight**, deriving power solely from its solar panels
The *Odysseus* is actually a combination of three planes made up of 164-foot-long, wing-shaped structures. The planes would be launched separately and then combine once in the stratosphere, where air is calmer. Once the craft is fully assembled, it measures 492 feet in width and is capable of zipping along at 140 miles per hour at an altitude of 60,000 to 90,000 feet. Solar panels lining the top of the plane provide power, and the craft itself is capable of autonomously changing its shape in order to maximize sunlight exposure. Researchers are currently exploring different ways the plane could store power when the sun isn't shining–possible methods include flywheels, fuel cells or even batteries.

So far, the plane is just in the concept stage, but researchers are currently working on a half-sized plane and expect to complete a full-sized prototype within the next five years. Once the company creates a fully functioning plane, the *Odysseus* could come in handy for the environment and national security: researchers say the craft could be used for surveillance, like patrolling borders or observing suspected nuclear reactor sites. The sun-powered plane could also be used for environmental surveillance, monitoring storm development, the ozone layer and even changes brought on by global warming.

+ Aurora Flight Sciences

http://www.inhabitat.com/2009/08/24/solar-powered-plane-could-fly-for-five-years-straight/

August 24, 2009

World's Tallest Wooden Building Planned for Norway
by Bridgette Meinhold

Recently the Norwegian Barents Secretariat announced plans for a new cultural center that is being touted as the world's tallest wooden building. The Secretariat hopes that the new structure will serve as a physical symbol of their important role in the High North - a lighthouse of sorts and a beacon of knowledge and development. As part of that role, the new office and cultural center will also act as a model for sustainable building and carbon neutrality.Currently the world's tallest wooden structure is said to be a 144 ft, 13-story home in Arkhangelsk, in North-West Russia built by Nikolai Sutyagin. The new tower by the Secretariat will be located in Kirkenes, Norway and will be 16-17 stories tall and constructed from natural materials with innovative and environmental solutions in all parts of the building. Oslo-based Reiulf Ramstad Architects are responsible for the ambitious project, which will be situated in downtown Kirkenes on the historical ground of a multiethnic area.To achieve carbon neutrality, Reiulf Ramstad Architects is relying on integrated systems that also enable it- to adapt to the changing seasons and climate. The firm also plans to reuse biodegradable household and industrial waste to produce biogas. Recycled materials from the surrounding area will be incorporated into the design, which is based on traditional architecture from Russia, Sweden, Finland and Norway.The interior of the center will house energy-efficient offices for the Barents Secretariat as well as a library, a theater and a creative environment for artists, researchers, students and other relevant institutions. Their goal is that the wooden building will serve as an example of sustainable construction for the surrounding region while acting as a center for cooperation between Russians, Finns, Swedes, Saamis and Norwegians.

+ Reiulf Ramstad Architects

http://www.inhabitat.com/2009/08/24/worlds-tallest-wooden-building-planned-for-norway/

August 24, 2009

Hemcrete®: Carbon Negative Hemp Walls
by Daniel Flahiff

Buildings account for **thirty-eight percent** of the CO2 emissions in the U.S., according to the U.S. Green Building Council, and demand for carbon neutral and/or zero footprint buildings is at an all-time high. Now there is a new building material that is not just carbon neutral, but is actually carbon negative. Developed by U.K.-based Lhoist Group, Tradical® Hemcrete® is a bio-composite, thermal walling material made from hemp, lime and water. What makes it carbon negative? There is more CO2 locked-up in the process of growing and harvesting of the hemp than is released in the production of the lime binder. Of course the equation is more complicated than that, but Hemcrete® is still an amazing new technology that could change the building industry.

Good looking, environmentally friendly and 100% recyclable, Hemcrete® is as versatile as it is sustainable. It can be used in a mind-boggling array of applications from roof insulation to wall construction to flooring. Hemcrete® is waterproof, fireproof, insulates well, does not rot [when used above ground] and is completely recyclable. In fact, the manufacturers say that demolished Hemcrete® walls can actually be used as fertilizer!

Available for years in the U.K., Hemcrete® is only now finding its way into North America. The species of hemp used to manufacture Hemcrete® is illegal to grow in the U.S., making Hemcrete® an expensive option for U.S. builders for now. As pressure for more sustainable building materials grows, lawmakers are certain to revisit this and other similarly restrictive statutes, particularly if there is money to be made. And judging from the success of Hemcrete® in Europe and elsewhere, there is plenty to be made; it is so profitable overseas that Hemp Technologies, one of the biggest manufacturers of hemp products in the UK, is actively recruiting as many new growers as it can.

http://www.inhabitat.com/2009/08/24/hemcrete-carbon-negative-hemp-walls-7x-stronger-than-concrete/

'Artificial trees' to cut carbon

By Judith Burns
Science and environment reporter, BBC News

Engineers say a forest of 100,000 "artificial trees" could be deployed within 10 to 20 years to help soak up the world's carbon emissions.

The trees are among three geo-engineering ideas highlighted as practical in a new report.

The authors from the Institution of Mechanical Engineers say that without geo-engineering it will be impossible to avoid dangerous climate change.

The report includes a 100-year roadmap to "decarbonise" the global economy.

No silver bullet

Launching the report, lead author Dr Tim Fox said geo-engineering should not be viewed as a "silver bullet" that could combat climate change in isolation.

He told BBC News it should be used in conjunction with efforts to reduce carbon emissions and to adapt to the effects of climate change.

Many climate scientists calculate that the world has only a few decades to reduce emissions before there is so much carbon dioxide in the atmosphere that a dangerous rise in global temperature is inevitable.

The authors of this report say that geo-engineering of the type they propose should be used on a short-term basis to buy the world time, but in the long term it is vital to reduce emissions.

They define two types of geo-engineering. Nem Vaughan of University of East Anglia said: "The first category attempts to cool the planet by reflecting some of the sunlight away. The problem with this is that it just masks the problem."

"The other type of geo-engineering is to remove carbon dioxide from the atmosphere and store it."

Hundreds of options

The team studied hundreds of different options but have put forward just three as being practical and feasible using current technology.

A key factor in choosing the three was that they should be low-carbon technologies rather than adding to the problem.

Dr Fox told BBC News: "Artificial trees are already at the prototype stage and are very advanced in their design in terms of their automation and in the components that would be used.

"They could, within a relatively short duration, be moved forward into mass production and deployment."

The trees would work on the principle of capturing carbon dioxide from the air through a filter.

The CO2 would then be removed from the filter and stored. The report calls for the technology to be developed in conjunction with carbon storage infrastructure.

Dr Fox said the prototype artificial tree was about the same size as a shipping container and could remove thousands of times more carbon dioxide from the atmosphere than an equivalent sized real tree.

Another of the team's preferred methods of capturing carbon is to install what they term "algae based photobioreactors" on buildings. These would be transparent containers containing algae which would remove carbon dioxide from the air during photosynthesis.

The third option focuses on the reduction of incoming solar radiation by reflecting sunlight back into space. The report says the simplest way of doing this is for buildings to have reflective roofs.

The authors stress that all of these options will require more research and have called for the UK government to invest 10 million pounds in analysis of the effectiveness, risks and costs of geo-engineering.

Dr Fox said: "We very much believe that the practical geo-engineering that we are proposing should be implemented and could be very much part of our landscape within the next 10 to 20 years."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8223528.stm

Published: 2009/08/27 00:33:41 GMT

Launch for amphibian 'life raft'
By Richard Black
Environment correspondent, BBC News website

Conservationists have launched a new initiative aimed at safeguarding the world's amphibians from extinction.

The Amphibian Survival Alliance will bring together existing projects and organisations, improving co-ordination, scientific research and fund-raising.

About a third of amphibian species are threatened with extinctions.

A two-day summit held last week in London identified the two main threats as destruction of habitat and the fungal disease chytridiomycosis.

"The world's amphibians are facing an uphill battle for survival," said James Collins, co-chair of the Amphibian Specialist Group (ASG) co-ordinated by the International Union for the Conservation of Nature (IUCN).

" **If we want to stop the amphibian extinction crisis, we have to protect the areas where amphibians are threatened by habitat destruction** "
Claude Gascon, ASG

"By far the worst threats are infectious disease and habitat destruction, so the Alliance will focus on these issues first."

Last week's meeting, held at the Zoological Society of London (ZSL), declared that research into possible treatments for the chytrid fungus should be a top priority.

Identified only a decade ago, the fungus now infects amphibians in the Americas, Australia, Europe, Asia and Africa.

How it originated and how it kills are matters of ongoing research.

But in practical terms, finding something that can stop it in open country rather than the laboratory is the big challenge.

Researchers have found that some amphibian species carry chemicals on their skin that provide a natural defence.

WHAT ARE AMPHIBIANS?

- First true amphibians evolved about 250m years ago
- There are three orders: frogs (including toads), salamanders (including newts) and caecilians, which are limbless
- Adapted to many different aquatic and terrestrial habitats
- Present today on every continent except Antarctica
- Many undergo metamorphosis, from larvae to adults

The idea is to see whether these chemicals can be turned into something that can attack the fungus in the wild, providing a defence for species that currently have none.

The new Amphibian Survival Alliance (ASA) sees this line of research as an urgent priority.

More difficult to tackle will be the ongoing destruction of habitat that is a concern in most continents, but especially in parts of Asia that are seeing rapid expansion of cities, industry and infrastructure.

"If we want to stop the amphibian extinction crisis, we have to protect the areas where amphibians are threatened by habitat destruction," said Claude Gascon, the Amphibian Specialist Group's other co-chair.

"One of the reasons amphibians are in such dire straits is because many species are only found in single sites and are therefore much more susceptible to habitat loss."

As a group, amphibians are considerably more threatened than birds, mammals, fish or reptiles.

Apart from habitat loss and chytrid, issues of concern are:

- unsustainable hunting for food, medicine and the pet trade
- chemical pollution
- climatic change
- introduced species
- other infectious diseases

The formation of the ASA was proposed in 2006 but adequate financial and institutional backing did not materialise.

At that stage scientists were divided over how money and resources should be split between conservation in the wild and captive breeding.

Now there is general agreement that both strategies are necessary.

Initial backing emerged at the ZSL meeting in the form of a $200,000 pledge that will fund the ASA co-ordinator's post for two years.

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Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8222549.stm

Published: 2009/08/26 13:37:03 GMT

Guilt and Atonement on the Path to Adulthood

By JOHN TIERNEY

Here is an experiment you don't want to try at home.

Show a toy — a doll, say, or a model boat — to a toddler and explain that it it's something special you've had since you were little. Ask the child to be "very careful" with it. Hand over the toy, which appears to be in fine condition, except that you've secretly rigged it to break spectacularly as soon as the child handles it.

When your precious toy falls apart, express regret by mildly saying, "Oh, my." Then sit still and observe the child.

The point is not to permanently traumatize anyone — the researchers who performed this experiment quickly followed it with a ritual absolving the child of blame. But first, for 60 seconds after the toy broke, the psychologists recorded every reaction as the toddlers squirmed, avoided the experimenter's gaze, hunched their shoulders, hugged themselves and covered their faces with their hands.

It was part of a long-term study at the University of Iowa to isolate the effects of two distinct mechanisms that help children become considerate, conscientious adults. One mechanism, measured in other experiments testing toddlers' ability to resist temptations, is called effortful self-control — how well you can think ahead and deliberately suppress impulsive behavior that hurts yourself and others.

The other mechanism is less rational and is especially valuable for children and adults with poor self-control. It's the feeling measured in that broken-toy experiment: guilt, or what children diagnose as a "sinking feeling in the tummy."

Guilt in its many varieties — Puritan, Catholic, Jewish, etc. — has often gotten a bad rap, but psychologists keep finding evidence of its usefulness. Too little guilt clearly has a downside — most obviously in sociopaths who feel no remorse, but also in kindergartners who smack other children and snatch their toys. Children typically start to feel guilt in their second year of life, says Grazyna Kochanska, who has been tracking children's development for two decades in her laboratory at the University of Iowa. Some children's temperament makes them prone to guilt, she said, and some become more guilt-prone thanks to parents and other early influences.

"Children respond with acute and intense tension and negative emotions when they are tempted to misbehave, or even anticipate violating norms and rules," Dr. Kochanska said. "They remember, often subconsciously, how awful they have felt in the past."

In Dr. Kochanska's latest studies, published in the August issue of The Journal of Personality and Social Psychology, she and colleagues found that 2-year-olds who showed more chagrin during the broken-toy experiment went on to have fewer behavioral problems over the next five years. That was true even for the ones who scored low on tests measuring their ability to focus on tasks and suppress strong desires to act impulsively.

"If you have high guilt," Dr. Kochanska said, "it's such a rapid response system, and the sensation is so incredibly unpleasant, that effortful control doesn't much matter."

But self-control was critical to children in the studies who were low in guilt, because they still behaved well if they had high self-control.

"Even if you don't have that sinking feeling in the tummy, you can still suppress impulses," Dr. Kochanska said. "You can stop and remember what your parents told you. You can stop and reflect on the consequences for others and yourself."

But what if your child lacks both self-control and guilt? What can you do? And should you feel guilty for doing a lousy job of parenting?

Well, you could blame yourself, although researchers haven't been able to link any particular pattern of parenting to children's levels of guilt, says June Tangney, a psychologist at George Mason University. But Dr. Tangney, who has studied guilt extensively in both children and adults, including prison inmates, does have some advice for parents. (To offer your thoughts on parents and guilt, go to nytimes.com/tierneylab.)

"The key element is the difference between shame and guilt," Dr. Tangney says. Shame, the feeling that you're a bad person because of bad behavior, has repeatedly been found to be unhealthy, she says, whereas guilty feelings focused on the behavior itself can be productive. But it's not enough, Dr. Tangney says, for parents just to follow the old admonition to criticize the sin, not the sinner. "Most young children," Dr. Tangney said, "really don't hear the distinction between 'Johnny, you did a bad thing' versus 'Johnny, you're a bad boy.' They hear 'bad kid.' I think a more active, directive approach is needed."

She recommends focusing not just on the bad deed, but more important, on how to make amends. "Both children and adults can be surprisingly clueless about whether and how to make things right," Dr. Tangney said. "Little kids are overwhelmed by the spilled mess of milk on the floor. Parents can teach and support them to say 'I'm sorry' and to clean it up, maybe leaving the kitchen a little cleaner than it was before."

That was the same atonement strategy, by the way, followed by the experimenters in Iowa who tricked the children with the broken toy. After the 60 seconds of angst, the children were asked what had happened and then were told that the toy could be easily repaired. The researcher would then leave the room with the broken toy and return in half a minute with an intact replica of it. The experimenter took the blame for having caused the damage, reassuring the children that it wasn't their fault and that the toy was now as good as new anyway.

No harm, no foul, no guilt. If only the rest of their lives were so simple.

http://www.nytimes.com/2009/08/25/science/25tier.html?_r=1

Expanding waistlines may cause shrinking brains

- 23 August 2009 by **Nora Schultz**
- Magazine issue 2722

Not just a physical health risk (Image: Paul Viant/Getty)

BRAIN regions key to cognition are smaller in older people who are obese compared with their leaner peers, making their brains look up to 16 years older than their true age. As brain shrinkage is linked to dementia, this adds weight to the suspicion that piling on the pounds may up a person's risk of the brain condition.

The brains of elderly obese people looked 16 years older than the brains of those who were lean

Previous studies suggested that obesity in middle age increases the risk of dementia decades later, which is accompanied by increased brain shrinkage compared with leaner people. Now brain scans of older people have revealed the areas that are hardest hit, as well as the full extent of brain size differences between obese people and those of average weight.

From brain scans initially carried out for a different study, Paul Thompson from the University of California in Los Angeles and colleagues selected 94 from people in their 70s who were still "cognitively normal" five years after the scan. This was to exclude people with disorders that might have confused the results. The researchers then transformed these scans into detailed three-dimensional maps.

People with higher body mass indexes had smaller brains on average, with the frontal and temporal lobes - important for planning and memory, respectively - particularly affected (*Human Brain Mapping*, DOI: 10.1002/hbm.20870). While no one knows whether these people are more likely to develop dementia, a smaller brain is indicative of destructive processes that can develop into dementia.

The team also found that the brains of the 51 overweight people were 6 per cent smaller than those of their normal-weight counterparts, on average, and those of the 14 obese people were 8 per cent smaller. "The brains of overweight people looked eight years older than the brains of those who were lean, and 16 years older in obese people," says Thompson.

High insulin levels and type 2 diabetes tend to accompany being overweight and are risk factors for brain tissue loss and dementia. However, the relationship between brain size and body mass index still stood when the researchers accounted for these conditions, indicating that body fat levels may be

linked directly to brain shrinkage. Thompson suggests that as increased body fat ups the chances of having clogged arteries, which can reduce blood and oxygen flow to brain cells, the resulting reduction in metabolism could cause brain cell death and the shrinking seen.

In an as yet unpublished study, Thompson's team has shown that exercise, which improves cardiovascular health and blood flow, protects the very brain regions that had shrunk in the current study. "The most strenuous kind of exercise can save about the same amount of brain tissue that is lost in the obese," he says. This indicates that it is blood flow that drives brain health, not the other way round. As these areas undergo the most remodelling throughout adult life, they may be more sensitive to any changes in oxygen supply and nutrients, Thompson suggests.

But Deborah Gustafson at the University of Gothenburg in Sweden, who previously found that overweight women had less brain tissue than their leaner counterparts, questions whether obesity is driving brain atrophy or vice versa. She points out that brain atrophy in the frontal and temporal lobes, which also control eating behaviour and metabolism, could cause weight gain. "There are not enough longitudinal data available for us to know which is the chicken and which is the egg."

http://www.newscientist.com/article/mg20327222.400-expanding-waistlines-may-cause-shrinking-brains.htm

Heat Forms Potentially Harmful Substance In High-fructose Corn Syrup, Bee Study Finds

A new study shows that heat can produce a potentially toxic substance in high-fructose corn syrup that may kill honeybees. (Credit: Wikimedia Commons)

ScienceDaily (Aug. 27, 2009) — Researchers have established the conditions that foster formation of potentially dangerous levels of a toxic substance in the high-fructose corn syrup (HFCS) that is often fed to honey bees. Their study, which appears in the current issue of ACS' bi-weekly *Journal of Agricultural and Food Chemistry*, may also have implications for soft drinks and dozens of other human foods that contain HFCS. The substance, hydroxymethylfurfural (HMF), forms mainly from heating fructose.

In the new study, Blaise LeBlanc and Gillian Eggleston and colleagues note HFCS's ubiquitous usage as a sweetener in beverages and processed foods. Some commercial beekeepers also feed it to bees to increase reproduction and honey production. When exposed to warm temperatures, HFCS can form HMF and kill honeybees. Some researchers believe that HMF may be a factor in Colony Collapse Disorder, a mysterious disease that has killed at least one-third of the honeybee population in the United States.

The scientists measured levels of HMF in HFCS products from different manufacturers over a period of 35 days at different temperatures. As temperatures rose, levels of HMF increased steadily. Levels jumped dramatically at about 120 degrees Fahrenheit.

"The data are important for commercial beekeepers, for manufacturers of HFCS, and for purposes of food storage. Because HFCS is incorporated as a sweetener in many processed foods, the data from this study are important for human health as well," the report states. It adds that studies have linked HMF to DNA damage in humans. In addition, HMF breaks down in the body to other substances potentially more harmful than HMF.

Journal reference:

1. LeBlanc et al. **Formation of Hydroxymethylfurfural in Domestic High-Fructose Corn Syrup and Its Toxicity to the Honey Bee (Apis mellifera)**. *Journal of Agricultural and Food Chemistry*, 2009; 57 (16): 7369 DOI: 10.1021/jf9014526

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

http://www.sciencedaily.com/releases/2009/08/090826110118.htm#

Water Quality Improves After Lawn Fertilizer Ban, Study Shows

The Huron River. In an effort to keep lakes and streams clean, municipalities around the country are banning or restricting the use of phosphorus-containing lawn fertilizers, which can kill fish and cause smelly algae blooms and other problems when the phosphorus washes out of the soil and into waterways. (Credit: Image courtesy of University of Michigan)

ScienceDaily (Aug. 27, 2009) — In an effort to keep lakes and streams clean, municipalities around the country are banning or restricting the use of phosphorus-containing lawn fertilizers, which can kill fish and cause smelly algae blooms and other problems when the phosphorus washes out of the soil and into waterways.

But do the ordinances really help reduce phosphorus pollution? That's been an open question until now, says John Lehman, professor of ecology and evolutionary biology at the University of Michigan.

"It's one of those things where political organizations take the action because they believe it's the environmentally conscious thing to do, but there's been no evidence offered in peer-reviewed literature that these ordinances actually have a salutary effect," Lehman said.

Now, such evidence exists in a study published by Lehman and students Douglas Bell and Kahli McDonald in the journal Lake and Reservoir Management. The paper, published online Aug. 14, shows that phosphorus levels in the Huron River dropped an average of 28 percent after Ann Arbor adopted an ordinance in 2006 that curtailed the use of phosphorus on lawns. Phosphorus is naturally plentiful in southeast Michigan soils, so fertilizing established lawns with the nutrient is generally unnecessary.

Lehman was in an ideal position to assess the effectiveness of the Ann Arbor ordinance because he and undergraduate student Julie Ferris were already studying nutrient levels in the Huron River and two downstream lakes, Ford Lakes and Belleville Lake, for a different research project. Ferris used some of the data from that project in her senior honors thesis, and she and Lehman published a paper on the Ford Lake and Belleville Lake research, but they weren't sure what to do with the rest of the data from the Huron River around Ann Arbor.

"As we were talking about it, I got a phone call from Ann Arbor environmental coordinator Matt Naud, who knew about the work we had been doing," Lehman said. "He said the city council had enacted an ordinance that would reduce the use of phosphorus-containing fertilizers, and he wondered if we would be able to detect any change that might occur as a result."

Using statistical models, Lehman and Ferris figured out how much sampling would be required to confidently detect a 25 percent decrease in phosphorus concentrations. "We came up with the result that for most of the river that runs through Ann Arbor, we should be able to detect a change of that magnitude by sampling once a week for one summer or two summers, depending on the sampling station."

Naud found funding to pay a student to do the work over the next two summers. By that time, Ferris had graduated and gone on to medical school, so Lehman recruited Bell to do the sampling and chemical analyses. When Bell graduated and took a job measuring phosphorus on research cruises around Bermuda, McDonald joined the project.

"Right away, we started to see decreases," Lehman said. After the first year of data collection, it was clear that phosphorus concentrations were lower after the ordinance was enacted than before. But did the ordinance cause the drop? Though that explanation seems likely, public education efforts and general increased environmental awareness among Ann Arbor residents also may have entered in.

At any rate, the study already has attracted the attention of the Southeast Michigan Council of Governments (SEMCOG), which invited Lehman to present the study results at a meeting earlier this year, and may well generate interest beyond Michigan's borders.

"Although the science wasn't difficult, its ramifications in a political sense and in an environmental sense will not be insignificant," Lehman said.

The research was funded by the Environmental Protection Agency, the U.S. Department of Agriculture and the city of Ann Arbor.

Adapted from materials provided by University of Michigan.

http://www.sciencedaily.com/releases/2009/08/090817190741.htm#

Trifid Nebula: A Massive Star Factory

The massive star factory known as the Trifid Nebula was captured in all its glory with the Wide-Field Imager camera attached to the MPG/ESO 2.2-metre telescope at ESO's La Silla Observatory in northern Chile. So named for the dark dust bands that trisect its glowing heart, the Trifid Nebula is a rare combination of three nebulae types that reveal the fury of freshly formed stars and point to more star birth in the future. The field of view of the image is approximately 13 x 17 arcminutes. (Credit: ESO)

ScienceDaily (Aug. 26, 2009) — A new image of the Trifid Nebula, shows just why it is a firm favorite of astronomers, amateur and professional alike. This massive star factory is so named for the dark dust bands that trisect its glowing heart, and is a rare combination of three nebula types, revealing the fury of freshly formed stars and presaging more star birth.

Smouldering several thousand light-years away in the constellation of Sagittarius (the Archer), the Trifid Nebula presents a compelling portrait of the early stages of a star's life, from gestation to first light. The heat and "winds" of newly ignited, volatile stars stir the Trifid's gas and dust-filled cauldron; in time, the dark tendrils of matter strewn throughout the area will themselves collapse and form new stars.

The French astronomer Charles Messier first observed the Trifid Nebula in June 1764, recording the hazy, glowing object as entry number 20 in his renowned catalogue. Observations made about 60 years later by John Herschel of the dust lanes that appear to divide the cosmic cloud into three lobes inspired the English astronomer to coin the name "Trifid".

Made with the Wide-Field Imager camera attached to the MPG/ESO 2.2-metre telescope at ESO's La Silla Observatory in northern Chile, this new image prominently displays the different regions of the Trifid Nebula as seen in visible light. In the bluish patch to the upper left, called a reflection nebula, gas scatters the light from nearby, Trifid-born stars. The largest of these stars shines most brightly in the hot, blue portion of the visible spectrum. This, along with the fact that dust grains and molecules scatter blue

light more efficiently than red light — a property that explains why we have blue skies and red sunsets — imbues this portion of the Trifid Nebula with an azure hue.

Below, in the round, pink-reddish area typical of an emission nebula, the gas at the Trifid's core is heated by hundreds of scorching young stars until it emits the red signature light of hydrogen, the major component of the gas, just as hot neon gas glows red-orange in illuminated signs all over the world.

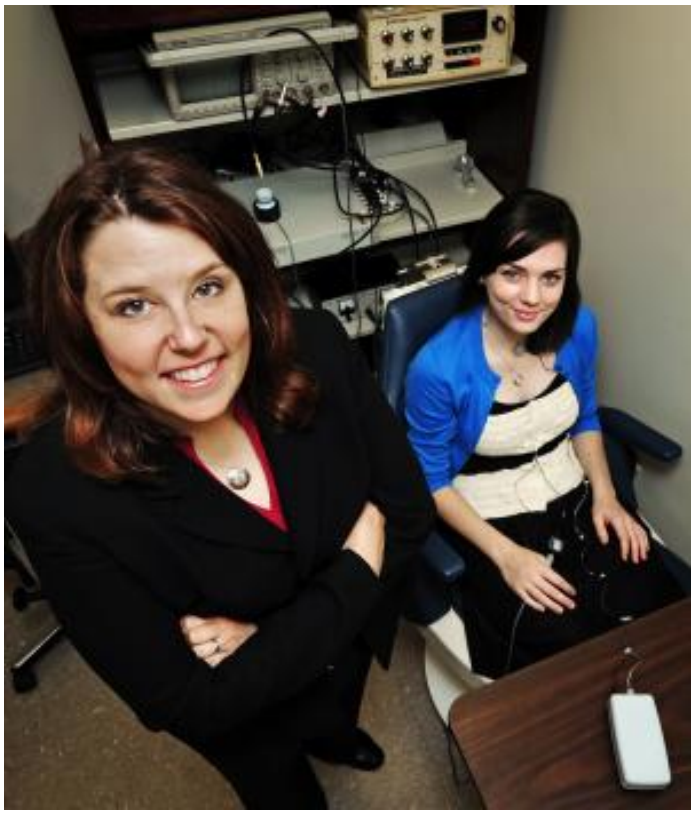
The gases and dust that crisscross the Trifid Nebula make up the third kind of nebula in this cosmic cloud, known as dark nebulae, courtesy of their light-obscuring effects. Within these dark lanes, the remnants of previous star birth episodes continue to coalesce under gravity's inexorable attraction. The rising density, pressure and temperature inside these gaseous blobs will eventually trigger nuclear fusion, and yet more stars will form.

In the lower part of this emission nebula, a finger of gas pokes out from the cloud, pointing directly at the central star powering the Trifid. This is an example of an evaporating gaseous globule, or "EGG", also seen in the Eagle Nebula, another star-forming region. At the tip of the finger, which was photographed by Hubble a knot of dense gas has resisted the onslaught of radiation from the massive star.

Adapted from materials provided by European Southern Observatory - ESO.

http://www.sciencedaily.com/releases/2009/08/090826073442.htm#

New Technology Helps Parkinson's Patients Speak Louder



Jessica Huber, at left, an associate professor in Purdue's Department of Speech, Language and Hearing Sciences, and graduate student Meghan Moran demonstrate a new technology developed in Huber's lab that helps Parkinson's patients overcome the tendency to speak too quietly. The system works by playing a recording of ambient sound, which resembles the noisy chatter of a restaurant full of patrons. A sensor placed on the neck detects that the person has begun to speak and tells the device to play the babble through an earpiece worn by the patient. Patients also wear a mask and sensors in elastic bands placed around the rib cage to precisely record respiratory, laryngeal and articulatory data. (Credit: Purdue University photo/Andrew Hancock)

ScienceDaily (Aug. 26, 2009) — Researchers have developed a new technology that helps Parkinson's patients overcome the tendency to speak too quietly by playing a recording of ambient sound, which resembles the noisy chatter of a restaurant full of patrons.

"People with Parkinson's disease commonly have voice and speech problems," said Jessica Huber, an associate professor in Purdue's Department of Speech, Language and Hearing Sciences. "At some point in their disease they will have some form of voice or speech disorder that generally occurs a little later in the disease."

Parkinson's affects 1.5 million people in the United States and is one of the most common degenerative neurological diseases. About 89 percent of those with Parkinson's have voice-related change, which is related to how loudly they speak, and about 45 percent have speech-related change, or how clearly they speak.

"A major therapy is to get people to speak louder, which also may cause them to articulate more clearly," Huber said.

The most common therapy, the Lee Silverman voice treatment program, trains patients to speak louder in one-hour sessions four days a week for a month.

"Some Parkinson's patients do great with this approach, but others do not," Huber said. "They forget to keep speaking louder the minute they have left the therapy room. Lee Silverman tends to work less for people with later stages of disease or those who have some cognitive decline. So I wanted to know whether there was an easier way to cue people during therapy, rather than telling them, 'Try to be twice as loud,' or 'Try to focus on this sound meter and achieve this loudness.'"

Huber used a new approach: The patients were asked to speak louder while a recording of background "multitalker babble noise" was played. The noise is essentially the sound of a restaurant full of patrons, but without the clattering silverware and clinking glasses.

"They had an easier time getting louder when I had the noise in the room," she said. "Ordinarily, when I asked them to be twice as loud they would say they couldn't. They couldn't speak 10 decibels louder, but when I turned on the babble noise, they spoke over 10 decibels louder."

The background sound elicits a well-known phenomenon called the Lombard effect, a reflex in which people automatically speak louder in the presence of background sound.

"You go into a loud room at a party and you talk louder without even realizing it," Huber said. "We've all had the experience where the room suddenly gets quiet and you're still shouting but you didn't know you were."

Huber created a new electronic technology using this principle. The voice-activated device automatically plays the background babble when the person begins to speak. A sensor placed on the neck detects that the person has begun to speak and tells the device to play the babble through an earpiece worn by the patient.

"I got the idea that if we train them with a natural cue in their everyday environment, we will probably get better results," she said. "We ask them to wear the system for about four hours a day as they go about their daily routine."

A critical part of the research is to integrate the voice-detection sensor, called an accelerometer, developed in work led by biomedical engineering doctoral students Matias Zanartu and Julio C. Ho and biomedical engineering professor George Wodicka, head of Purdue's Weldon School of Biomedical Engineering.

"This sensor is crucial because it is essential that the background babble noise only turn on when the subject talks," Huber said.

The device prototype was built by engineering resources manager Jim Jones and senior research engineer Kirk Foster, both in the Weldon School. An earlier prototype had been built by Scott Kepner, manager of technical services, and Derek Tully, assistant manager of technical services, both in the Department of Speech, Language and Hearing Sciences.

Six patients wore the portable system for eight weeks. Data collected showed the system effectively prompts Parkinson's patients to speak louder and more clearly.

"Their speech changes significantly," said Huber, who is working with Meghan Darling, a doctoral student in Speech, Language and Hearing Sciences. "There have been times where I have called patients and they've had the device on and I didn't really recognize them. And these are patients I've known for a long time. This is beneficial also because it trains them in their everyday environment - in their homes, with their spouses, in their churches, in their social groups."

Huber determined the system works by measuring how much louder patients talked while on the device and without the device after eight weeks of training.

The researchers also are interested in examining the physiological changes elicited by the device. Patients wear a mask and sensors in elastic bands placed around the rib cage to precisely recording respiratory, laryngeal and articulatory data.

"We know the lung volume, and we know the pressure and the airflow they generate during speech, which tells us not only whether they are talking louder but how they are talking louder," Huber said. "For example, maybe they are using solely the respiratory system to get louder, or maybe it's all about the larynx."

The researchers also will test how well the system works by having people who are not speech pathologists listen to the patients pronouncing words that could be easily confused with other words.

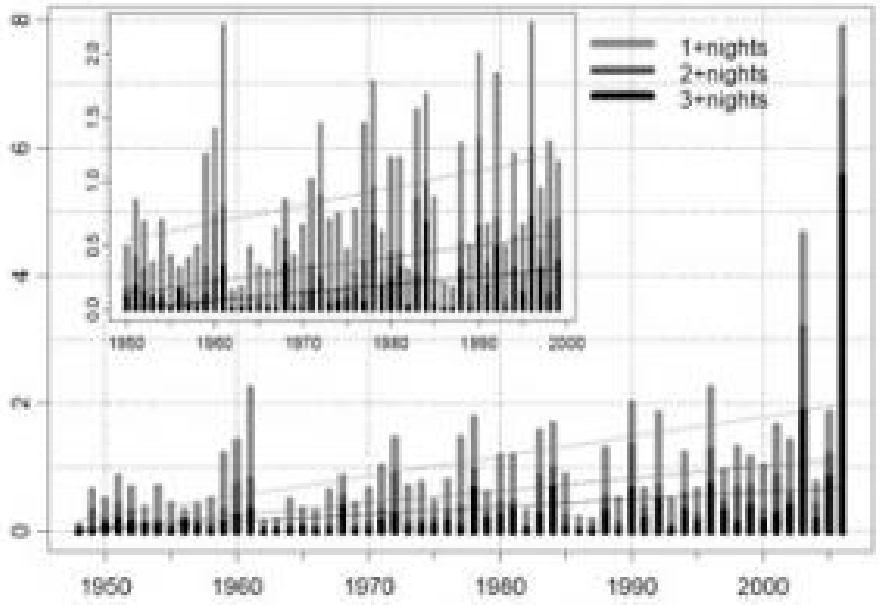
Researchers will work in the future with patients at the Rehabilitation Institute of Indianapolis. Further research is needed to determine whether patients continue speaking louder when they are not wearing the device. The system could be further developed to use rechargeable batteries, Huber said.

The research is funded by the National Institutes of Health. Purdue has filed a provisional patent on the concept.

Adapted from materials provided by Purdue University.

http://www.sciencedaily.com/releases/2009/08/090825151006.htm#

Deadly Heat Waves Are Becoming More Frequent In California



An index of regional summertime heat wave activity that reflects intensity, duration and spatial extent of heat waves over California and Nevada. The index is computed using nighttime (minimum) temperatures for local durations of at least one, two and three consecutive days/nights. (Credit: Scripps Institution of Oceanography, UC San Diego)

ScienceDaily (Aug. 26, 2009) — From mid July to early August 2006, a heat wave swept through the southwestern United States. Temperature records were broken at many locations and unusually high humidity levels for this typically arid region led to the deaths of more than 600 people, 25,000 cattle and 70,000 poultry in California alone.

An analysis of this extreme episode carried out by researchers at Scripps Institution of Oceanography, UC San Diego, put this heat wave in the context of six decades of observed heat waves. Their results suggest that such regional extremes are becoming more and more likely as climate change trends continue.

The team, led by climate scientist Alexander Gershunov, examined meteorological conditions that lead to this and other recorded heat waves, when temperatures rose into the hottest one percent of historical summertime daily and nightly temperatures recorded in California and Nevada since 1948. The scientists found that heat waves in the region often fall into either of two types: the typical "daytime" events characterized by dry daytime heat and rejuvenating nighttime cooling, or the less typical "nighttime" heat waves characterized additionally by high humidity and hot muggy days and nights.

Since the early 1990s, nighttime heat wave events in California, which historically had been less common, have become more prevalent, increasing in both frequency and intensity. The pinnacle of nighttime heat waves occurred in a 17-day episode during July 2006 when a persistent warm pattern was aggravated by unusually humid conditions, associated with warm ocean waters off Baja California, Mexico.

"Water vapor is the main greenhouse gas. During the night in humid environments, air doesn't cool nearly as much as it does in dry conditions," said Gershunov. "Elevated humidity also causes heat waves to last longer. Hotter nights pre-condition hotter days and the cycle feeds on itself until the winds change. The weather pattern that traditionally causes heat waves in California is tending to bring with it more

humidity, changing the character of heat waves from the dry daytime heat and cool nights typical for this region, to the muggy heat around the clock that locals are simply not accustomed to."

A preliminary version of the study, co-authored by Scripps climate researchers Dan Cayan and Sam Iacobellis, appeared July 27 in the online edition of the American Meteorological Society's *Journal of Climate*.

The 2006 event caused a wide variety of systemic impacts. One percent of the state's dairy cows succumbed, milk production was reduced by 10 percent, agriculture took a heavy toll and energy and water delivery infrastructure was stressed almost to the breaking point. Electrical blackouts were avoided, but only barely through a series of heroic measures by California's electrical power managers. Additionally, the heat wave impacted emergency and social service networks as well as natural ecosystems.

The 2006 pattern of extreme muggy heat is actually part of a trend of increasing nighttime heat wave activity observed over the last six decades. This trend has accelerated since the 1980s and has become especially prevalent in this decade. The nighttime heat waves of 2001, 2003 and 2006 were each unprecedented on record when they occurred. The source of the moisture that propelled the heat wave was an area of the eastern Pacific Ocean where a strong increase in sea surface temperatures has been observed and linked to global-scale trends of human-induced warming of the upper oceans.

Humidity is the key ingredient forming muggy nighttime heat waves. That same humidity usually provides some daytime relief by stoking afternoon cloud formation. The authors note that in the 2006 event, however, and to a lesser degree in the next largest 2003 event, the convection that usually triggers afternoon cooling was stifled.

"This conspicuous relative absence of convection in the presence of so much moisture led to intense daytime warming which in turn promoted more intense and extensive nighttime heat, without any observed precedent," the researchers wrote.

While mechanisms driving this regional anomaly are still under investigation, the researchers concluded that the trend towards more frequent and larger-scale muggy heat waves should be expected to continue in the region as climate change evolves over the next decades.

The study has spurred new collaborations with the public health and energy sectors. In one follow-up project, Gershunov and colleagues are applying a similar analysis to wintertime temperatures in the Midwest and Northeast. The newer study includes an explicit predictive component and is the first commissioned by corporate partners in collaboration with the Scripps Partnership for Hazards and Environmental Applied Research (SPHEAR) program. Partners Chesapeake Energy, Citadel Investment Group and Susquehanna International Group plan to use the results of the study to better understand and forecast natural gas demand in these regions during winter months.

Adapted from materials provided by University of California - San Diego.

http://www.sciencedaily.com/releases/2009/08/090825151008.htm#

Evidence Of Iridescence In 40 Million-year-old Feather Fossil

Scientists discovered that nanostructures found in this 40-million-year-old fossil were responsible for producing iridescent colors in the living feather. (Credit: Jakob Vinther/Yale University)

ScienceDaily (Aug. 26, 2009) — Known for their wide variety of vibrant plumage, birds have evolved various chemical and physical mechanisms to produce these beautiful colors over millions of years. A team of paleontologists and ornithologists led by Yale University has now discovered evidence of vivid iridescent colors in feather fossils more than 40 million years old.

The finding, published online August 26 in *Biology Letters*, signifies the first evidence of a preserved color-producing nanostructure in a fossilized feather.

Iridescence is the quality of changing color depending on the angle of observation, such as the rainbow of colors seen in an oil slick. The simplest iridescent feather colors are produced by light scattering off the feather's surface and a smooth surface of melanin pigment granules within the feather protein. Examining feather fossils from the Messel Shale in Germany with an electron microscope, scientists have documented this smooth layer of melanin structures, called melanosomes.

"These feathers produced a black background with a metallic greenish, bluish or coppery color at certain angles—much like the colors we see in starlings and grackles today," said Richard Prum, chair of the Department of Ecology & Evolutionary Biology at Yale and one of the paper's authors.

For more than 25 years, paleontologists have found microscopic tubular structures on fossilized feathers and hair. These were long interpreted as bacteria that had digested the feathers at the time they were fossilized. The team had previously discovered that these structures were in fact not bacteria but melanosomes, which then allowed them to document the original color patterns. Following up on the new finding, they are racing to discover what additional coloration features may be found in fossil feathers.

"The discovery of ultra-structural detail in feather fossils opens up remarkable possibilities for the investigation of other features in soft-bodied fossils, like fur and even internal organs," said Derek Briggs, Yale's Frederick William Beinecke Professor of Geology and Geophysics, and an author of the study.

The discovery could pave the way for determining color features of other ancient birds and even dinosaurs, the team said.

"Of course, the 'Holy Grail' in this program is reconstructing the colors of the feathered dinosaurs," said Yale graduate student and lead author Jakob Vinther. "We are working hard to determine if this will be possible."

Other authors of the paper include Julia Clarke (University of Texas at Austin) and Gerald Mayr (Senckenberg Research Institute, Germany).

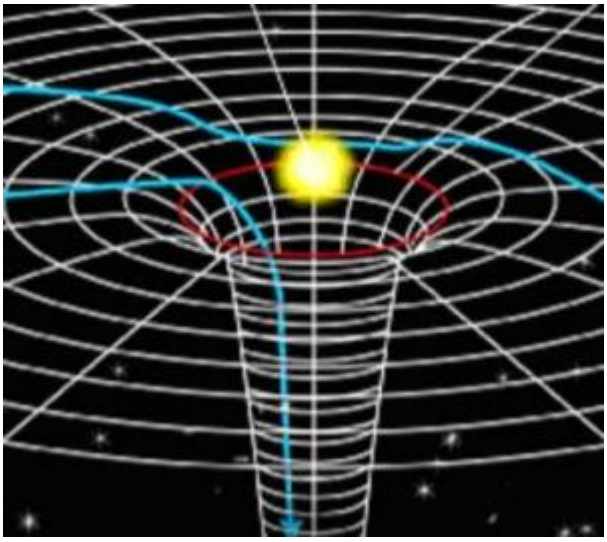
Funding was provided by the National Science Foundation, the National Geographic Society and Yale University.

Citation: Biology Letters (doi:10.1098/rsbl.2009.0524)

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

http://www.sciencedaily.com/releases/2009/08/090826072957.htm#

Rewriting General Relativity? Putting A New Model Of Quantum Gravity Under The Microscope



Scientists are trying to figure out to what extent a new theory of quantum gravity will reproduce general relativity -- the theory that currently explains, to very high accuracy, how masses curve spacetime and create the influence of gravity. (Credit: Image copyright American Physical Society / Illustration: Carin Cain)

ScienceDaily (Aug. 26, 2009) — Does an exciting but controversial new model of quantum gravity reproduce Einstein's theory of general relativity?

Scientists at Texas A&M University in the US explore this question in a paper appearing in *Physical Review Letters* and highlighted with a Viewpoint in the August 24th issue of *Physics*.

"If it ain't broke, don't fix it," sums up fairly well how many scientists have viewed Einstein's theory of general relativity. The theory, which Einstein developed in the early 20th century, says that matter curves spacetime, and it is this curvature which deflects massive bodies – an effect that we interpret as the influence of gravity. The theory has been tested to extremely high accuracy and without it, our satellite global positioning system would be off by about 10 km per day.

Despite the success of general relativity, one of the most important problems in modern physics is finding a theory of quantum gravity that reconciles the continuous nature of gravitational fields with the inherent 'graininess' of quantum mechanics. Recently, Petr Hořava at Lawrence Berkeley Lab proposed such a model for quantum gravity that has received widespread interest, in no small part because it is one of the few models that could be experimentally tested. In Hořava's model, Lorentz symmetry, which says that physics is the same regardless of the reference frame, is violated at small distance scales, but remerges over longer distance scales

The team at Texas A&M, which includes Hong Lu, Jianwei Mei and Christopher Pope, report their investigations into how the modifications proposed in Hořava's theory will broadly affect the solutions of general relativity. One aspect of their study is that it leads to an important caveat, described by Horatiu Nastase in a Viewpoint commentary in Physics (physics.aps.org). Lu et al.'s calculations, explains Nastase, suggest that Hořava's model only reproduces general relativity on unobservable scales, "larger than the size of the Universe".

Lu et al.'s paper is an important contribution to testing the Hořava model and shows that a good deal of work remains to understand its full implications.

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

http://www.sciencedaily.com/releases/2009/08/090824115758.htm

After An Earthquake: Watching Over The Water System

UCI engineers Pai Chou (pictured), Masanobu Shinozuka and colleagues are developing a water pipe monitoring system that features GPS tracking, fail-safe wireless communication and cameras such as the one shown to record video. (Credit: Daniel A. Anderson / University Communications)

ScienceDaily (Aug. 26, 2009) — After a big earthquake, it's key to keep the water system afloat. Water is necessary for life, and it fights the fires that often accompany such disasters.

UC Irvine engineers plan to outfit the local water system with sensors that will alert officials when and where pipes crack or break, hastening repair - thanks to nearly $5.7 million over three years from the National Institute of Standards and Technology and several local water groups.

"When an earthquake occurs and infrastructure systems fail, continued service of the water network is most critical," said Masanobu Shinozuka, lead project investigator and civil & environmental engineering chair. "Before anything happens, I'd like to have a pipe monitoring system in place to let us know when and where damage occurs. It could minimize misery and save lives."

About 240,000 water-main breaks occur per year in the U.S., according to the Environmental Protection Agency. For example, in December a burst sent about 150,000 gallons of water per minute onto a busy Maryland road, stranding motorists in the icy deluge. Water system failures are estimated to waste up to 6 billion gallons of drinking water every day.

Shinozuka and Pai Chou, electrical engineering & computer science associate professor, have created CD-sized sensing devices that attach to the surface of pressurized (drinking water) and nonpressurized (wastewater) pipes. They will detect vibration and sound changes that could indicate pipe problems. Through antennae, the sensors will relay information wirelessly over long distances to a central location for recording, processing and diagnostic analysis.

Initially, the sensor network will cover about one square mile of the local water system; eventually, it could encompass more than 10 square miles - the largest of its kind to date. A small-scale pressurized water pipe network designed and built by UCI researchers has confirmed that this type of damage identification works well.

The research team now is designing a system that functions underground as well as over a larger area. The main hurdles, Shinozuka said, are powering the sensors (batteries and solar energy are not strong enough), making them more cost-effective and robust in tough environments, and achieving long-range wireless communication efficiently and accurately.

Using existing pipe networks, the team will then test and calibrate the sensors by simulating and monitoring pressure changes equivalent to those arising from actual pipe damage. The sensors will complement an existing monitoring system called Supervisory Control and Data Acquisition.

"SCADA sensors are too sparsely placed for identifying damage with the kind of precision we desire when a large earthquake or other natural hazard affects many locations," Shinozuka said.

"An isolated malfunction is far different from a situation in which pipes break all over the place," he said. "Our next-generation system will inform us as soon as possible when and where damage occurs and to what extent so we can better mitigate the consequences."

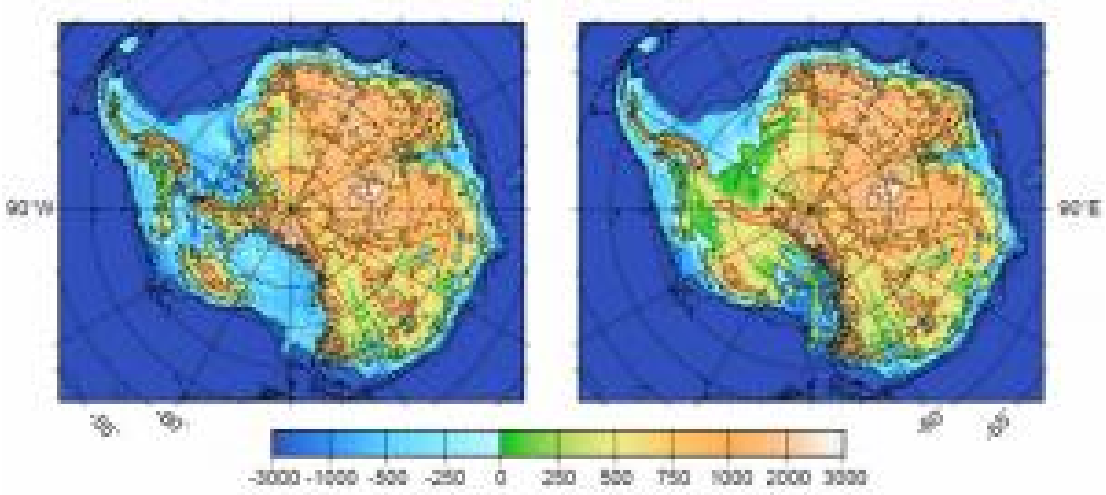
As the research progresses, the team plans to develop methods of rapidly repairing pipe damage at joints and other vulnerable locations.

Collaborating with UCI on the endeavor are Fountain Valley-based Earth Mechanics Inc., the Irvine Ranch Water District, the Orange County Sanitation District and the Santa Ana Watershed Project Authority.

Adapted from materials provided by University of California - Irvine.

http://www.sciencedaily.com/releases/2009/08/090818130607.htm

Scientists Propose Antarctic Location For 'Missing' Ice Sheet



Maps of Antarctic topography with restorations for removal of the load of modern ice only (left), and additionally for erosion, sedimentation, thermal contraction, and horizontal plate motion in geologically active regions (right). Models correcting only for ice load have been used in all simulations of ice growth to date, but significant changes result from additionally correcting for other geologic processes. (Credit: Image courtesy of University of California - Santa Barbara)

ScienceDaily (Aug. 26, 2009) — New research by scientists at UC Santa Barbara indicates a possible Antarctic location for ice that seemed to be missing at a key point in climate history 34 million years ago. The research, which has important implications for climate change, is described in a paper published today in *Geophysical Research Letters*, a journal of the American Geophysical Union.

"Using data from prior geological studies, we have constructed a model for the topography of West Antarctic bedrock at the time of the start of the global climate transition from warm 'greenhouse' earth to the current cool 'icehouse' earth some 34 million years ago," explained Douglas S. Wilson, first author and an associate research geophysicist with UCSB's Department of Earth Science and Marine Science Institute.

Wilson and his co-author, Bruce Luyendyk, a professor in the Department of Earth Science, discovered that, contrary to most current models for bedrock elevations of West Antarctica, the bedrock in the past was of much higher elevation and covered a much larger area than today. Current models assume that an archipelago of large islands existed under the ice at the start of the climate transition, similar to today, but Wilson and Luyendyk found that does not fit their new model. In fact, the authors state that the land area above sea level of West Antarctica was about 25 percent greater in the past.

The existing theory leaves West Antarctica in a minor role in terms of the ice accumulation beginning 34 million years ago. Ice sheet growth on earth is believed to have developed on the higher and larger East Antarctic subcontinent while West Antarctica joined the process later around 14 million years ago. "But a problem exists with leaving West Antarctica out of the early ice history," said Wilson. "From other evidence, it is believed that the amount of ice that grew on earth at the 34 million year climate transition was too large to be accounted for by formation on East Antarctica alone, the most obvious location for ice sheet growth. Another site is needed to host the extra missing ice."

Evidence for that large mass of ice comes from two sources: the chemical and isotopic composition in shell material of marine microfossils, which are sensitive to ocean temperatures and the amount of ice on

land; and from geologic records of lowered sea level at the time that indicate how much ice formed on land to produce the sea level drop.

The new study, by showing that West Antarctica had a higher elevation 34 million years ago than previously thought, reveals a possible site for the accumulation of the early ice that is unaccounted for. "Preliminary climate modeling by researchers at Pennsylvania State University demonstrates that this new model of higher elevation West Antarctica bedrock topography can indeed host the missing ice," said Luyendyk. "Our results, therefore, have opened up a new paradigm for the history of the growth of the great global ice sheets. Both East and West Antarctica hosted the growing ice."

The new hypothesis may solve another conflict among climate scientists. Given that more ice grew than could be hosted on East Antarctica alone, some researchers have proposed that the missing ice formed in the northern hemisphere. This would have been many millions of years before the well-known documentation of ice growth there, which started about three million years ago; evidence for ice sheets in the northern hemisphere prior to that time is not established. The new bedrock model shows it is not necessary to have ice hosted in the northern polar regions at the start of global climate transition; West Antarctica could have accommodated the extra ice.

Luyendyk is also affiliated with UCSB's Institute for Crustal Studies. The National Science Foundation's Office of Polar Programs funded the research.

Adapted from materials provided by University of California - Santa Barbara.

http://www.sciencedaily.com/releases/2009/08/090825151004.htm#

Elderly skin 'raises cancer risk'

Older people are more at risk of skin cancer and infection because their skin is unable to mobilise the immune system to defend itself, UK research suggests.

It contradicts previous thinking that defects in a type of immune cell called a T cell were responsible for waning immunity with age.

In fact, it is the inability of the skin to attract T cells to where they are needed that seems to be at fault.

The findings are published in the Journal of Experimental Medicine.

Study leader, Professor Arne Akbar from University College London, said reduced immunity in older people is well known, but why and how it happens is not.

" **Going in to intervene may have consequences that we don't realise and that's where we need to do more research** "
Professor Arne Akbar, study leader

A number of volunteers - one group of 40-year-olds and one group aged over 70 - were injected with an antigen to stimulate an immune response from T cells.

As expected, the immune response in the older group was much less than that in the younger volunteers.

But when the researchers looked at the T cells there was nothing wrong with them.

What had declined in the older group was the ability of the skin to attract T cells - effectively the signals to direct them to the right place were missing.

Reversible

Further experiments with skin samples in a test tube showed that the skin was still able to send the appropriate signals when pushed, suggesting the problem is reversible.

"At the outset we thought it would be the cells responsible for combating infections that might be at fault, but the surprising thing was the T cells were fine but they couldn't get into the skin - the signals were missing," Mr Akbar said.

He said it raised the possibility of ways to boost the immune system in older people to give them a better chance of fighting infection and reducing the risk of skin cancer.

"The question that it raises is what survival advantage there is to this, is there a negative reason for having too much immunity in the skin when you get older?

"Going in to intervene may have consequences that we don't realise and that's where we need to do more research."

He added that the same immune problems may be apparent in other tissues in the body.

Steve Visscher, deputy executive at the Biotechnology and Biological Sciences Research Council, which funded the research, said knowing more about the ageing process was vital as people increasingly live longer.

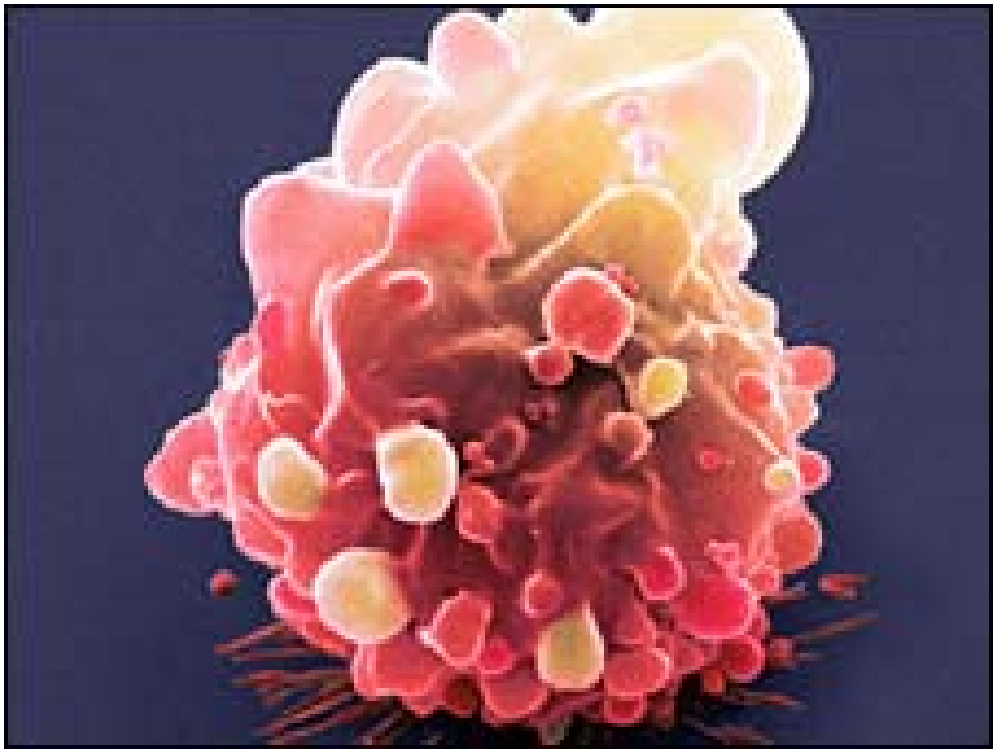
"The more knowledge we have about healthy ageing, the better we get at preventing, managing and treating diseases that are simply a factor of an ageing body."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8226129.stm

Published: 2009/08/29 23:01:04 GMT

'Cancer hope' from WWII-era drug

One of the earliest chemotherapy drugs appears to work against a genetic fault that can trigger bowel and other cancers, UK researchers say.



In laboratory tests methotrexate, first administered in the 1940s, was found to destroy cells containing the damaged MSH2 gene.

This raises the hope of targeted treatments for those whose cancer is driven by the faulty gene.

Patient trials have already begun, EMBO Molecular Medicine reports.

The genetic condition HNPCC leaves people with a propensity to develop certain forms of cancer: some 90% of men and 70% of women will have developed bowel cancer by the time they reach 70.

METHOTREXATE
- Methotrexate heralded in the modern era of chemotherapy drugs
- In the 1940s, doctors reported remarkable results when treating children who were very ill with leukaemia
- It works by stopping cancer cells making and repairing DNA and therefore growing and multiplying
- Subsequently used as part of chemotherapy regime for many cancers, including breast, bladder and bone
- Over the years as medicine has developed other drugs have been preferred
- Still used for leukaemia and also now found to be effective for other conditions, such as Crohn's disease and psoriasis

This accounts for about 5% of all bowel cancer cases, and the condition also contributes to tumours of the stomach, womb, ovaries and kidneys.

About 40% of people with HNPCC carry a faulty MSH2 gene. The gene usually plays a vital role in repairing DNA damage, but if it is damaged, mistakes accumulate in the cells and increase the risk of a cancer developing.

People who develop bowel cancer as a result may have more than one tumour, making the condition harder to treat.

Years after it was first used in the US, methotrexate is still commonly used in the treatment of leukaemia. It works by stopping cancer cells growing and multiplying, but is not normally deployed against solid tumours as newer, better drugs have been developed.

"What's exciting about methotrexate is that it selectively destroys the cells lacking the MSH2 function. This indicates that it may make an excellent treatment for patients with the genetic alteration," said Professor Alan Ashworth, who led the study at the Institute of Cancer Research.

Tailored treatment

Dr Lesley Walker of Cancer Research UK, which funded the research, said: "In the past, many treatments were developed which indiscriminately kill dividing cells. With improved scientific understanding, we are starting to be able to offer targeted therapies that are selective for the genetic faults in cancer.

"It's really fascinating that our scientists have discovered that an old- fashioned drug of this type shows new promise for this very specific group of patients."

Independent experts welcomed the findings.

"This is good news from one of our oldest chemotherapy drugs. It won't be for everyone, but it does hold out hope of a tailored treatment for those affected - a form of personalised chemotherapy," said Professor Will Steward, of the charity Beating Bowel Cancer.

Rob Glynne-Jones, chief medical advisor at Bowel Cancer UK, said: "The discovery that the faulty MSH2 gene has been found to be a specific target for Methotrexate is a really exciting development.

"It will probably only be relevant to a small proportion of patients who have bowel cancer, as HNPCC is only responsible for about 5% of bowel cancer cases. However, this is another positive step in using molecular biology and genetics to individualise a patient's treatment."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8223441.stm

Published: 2009/08/30 23:28:10 GMT

THE FUTURE OF READING
A New Assignment: Pick Books You Like

By MOTOKO RICH

JONESBORO, Ga. — For years Lorrie McNeill loved teaching "To Kill a Mockingbird," the Harper Lee classic that many Americans regard as a literary rite of passage.

But last fall, for the first time in 15 years, Ms. McNeill, 42, did not assign "Mockingbird" — or any novel. Instead she turned over all the decisions about which books to read to the students in her seventh- and eighth-grade English classes at Jonesboro Middle School in this south Atlanta suburb.
Among their choices: James Patterson's adrenaline-fueled "Maximum Ride" books, plenty of young-adult chick-lit novels and even the "Captain Underpants" series of comic-book-style novels.
But then there were students like Jennae Arnold, a soft-spoken eighth grader who picked challenging titles like "A Lesson Before Dying" by Ernest J. Gaines and "The Bluest Eye" by Toni Morrison, of which she wrote, partly in text-message speak: "I would have N3V3R thought of or about something like that on my own."

The approach Ms. McNeill uses, in which students choose their own books, discuss them individually with their teacher and one another, and keep detailed journals about their reading, is part of a movement to revolutionize the way literature is taught in America's schools. While there is no clear consensus among English teachers, variations on the approach, known as reading workshop, are catching on.
In New York City many public and private elementary schools and some middle schools already employ versions of reading workshop. Starting this fall, the school district in Chappaqua, N.Y., is setting aside 40 minutes every other day for all sixth, seventh and eighth graders to read books of their own choosing.
In September students in Seattle's public middle schools will also begin choosing most of their own books. And in Chicago the public school district has had a pilot program in place since 2006 in 31 of its 483 elementary schools to give students in grades 6, 7 and 8 more control over what they read. Chicago officials will consider whether to expand the program once they review its results.

None of those places, however, are going as far as Ms. McNeill.

In the method familiar to generations of students, an entire class reads a novel — often a classic — together to draw out the themes and study literary craft. That tradition, proponents say, builds a shared literary culture among students, exposes all readers to works of quality and complexity and is the best way to prepare students for standardized tests.

But fans of the reading workshop say that assigning books leaves many children bored or unable to understand the texts. Letting students choose their own books, they say, can help to build a lifelong love of reading.

"I feel like almost every kid in my classroom is engaged in a novel that they're actually interacting with," Ms. McNeill said, several months into her experiment. "Whereas when I do 'To Kill a Mockingbird," I know that I have some kids that just don't get into it."

Critics of the approach say that reading as a group generally leads to more meaningful insights, and they question whether teachers can really keep up with a roomful of children reading different books. Even more important, they say, is the loss of a common body of knowledge based on the literary classics — often difficult books that children are unlikely to choose for themselves.

"What child is going to pick up 'Moby-Dick'?" said Diane Ravitch, a professor of education at New York University who was assistant education secretary under President George H. W. Bush. "Kids will pick things that are trendy and popular. But that's what you should do in your free time."

Indeed, some school districts are moving in the opposite direction. Boston is developing a core curriculum that will designate specific books for sixth grade and is considering assigned texts for each grade through the 12th.

Joan Dabrowski, director of literacy for Boston's public schools, said teachers would still be urged to give students some choices. Many schools in fact take that combination approach, dictating some titles while letting students select others.

Even some previously staunch advocates of a rigid core curriculum have moderated their views. "I actually used to be a real hard-line, great-books, high-culture kind of person who would want to stick to Dickens," said Mark Bauerlein, professor of English at Emory University and the author of "The Dumbest Generation: How the Digital Age Stupefies Young Americans and Jeopardizes Our Future." But now, in the age of Game Boys and Facebook, "I think if they read a lot of Conan novels or Hardy Boys or Harry Potter or whatever, that's good," he said. "We just need to preserve book habits among the kids as much as we possibly can."

In Search of a Better Way

As a teenager growing up just a few miles from Jonesboro, Ms. McNeill loved the novels of Judy Blume and Danielle Steel. But in school she was forced to read the classics. She remembers vividly disliking "The Adventures of Huckleberry Finn." Still, she went on to teach it to her own students.

In 1999 she moved to Jonesboro Middle School, where more than 80 percent of the students are eligible for free lunches. Teachers there stuck to a curriculum prescribed by the county. Working with students designated as gifted, Ms. McNeill began teaching familiar novels like "Lord of the Flies" and "Mockingbird." But she said, "I just never felt that they were as excited about reading as I wanted them to be."

Ms. McNeill, an amateur poet whose favorite authors include Barbara Kingsolver and Nick Hornby, wondered if forcing some students through a book had dampened their interest in reading altogether. She tried "literature circles," in which a smaller group chose a book to read together, and had some success. Then, in early 2008, she attended a professional seminar in Atlanta led by Nancie Atwell, the author of "In the Middle" and "The Reading Zone," popular guidebooks for teachers that promote giving students widespread choice. "In the Middle" has sold nearly half a million copies since it was first published in 1987.

An Eye-Opening Experience

Over the last two decades, Ms. Atwell, along with Lucy M. Calkins, founding director of the Reading and Writing Project at Columbia University's Teachers College, has emerged as a guru of the reading workshop approach. Ms. Atwell brings 45 teachers a year to her base of operations, the Center for Teaching and Learning, a small private school she founded in Edgecomb, Me., an hour north of Portland.

Last September Ms. McNeill spent a week there with four other English teachers, each of whom had paid $800, observing Ms. Atwell's work.

That first cool fall morning, 17 seventh- and eighth-grade students assembled for their reading and writing class in a large room overlooking a grove of birch and maple trees. Shelves of books ringed the room. The students flopped in forest green beanbag chairs set in a circle on the carpeted floor. At the front Ms. Atwell sat in a rocking chair, a small stack of volumes beside her.
Ms. McNeill watched closely, taking notes. After a session in which the students edited poems they had been writing, Ms. Atwell ceded the rocking chair to students, who gave short talks recommending books to their classmates.

One eighth grader presented "Getting the Girl" by Markus Zusak, the author of "The Book Thief," a best-selling young-adult novel about the Holocaust that had been one of the boy's favorites. He highlighted the book's unusual line breaks and one-word sentences, concluding, "It's a fun, good read."
When Ms. Atwell resumed her seat in the rocking chair, she pitched several titles she had read over the weekend. She held up "The Story of Edgar Sawtelle," the novel by David Wroblewski that had been anointed by Oprah Winfrey.

"It is just incredible," she said, leaning forward. "It is about signing, dog-breeding, muteness, adolescence, the beauty of the American Midwest." Before she could even lay it back on the floor, Maura Anderson, an eighth grader, asked if she could take it to start reading that afternoon.
In a 30-minute reading period that followed, each student hunkered low in a beanbag chair. Ms. Atwell moved quietly among them, coming in close for whispered conferences and noting page numbers to make sure each student had read at least 20 pages the night before.

One girl had "Nineteen Minutes" by Jodi Picoult, while a boy a few seats away read Khaled Hosseini's novel "The Kite Runner." Another boy was absorbed in "If I Die in a Combat Zone," by Tim O'Brien.
Throughout the week the teachers observed Ms. Atwell open each class with a mini-lesson about a poem as well as one in which she talked about research on how the brain learns to read fluidly.
Despite the student freedom, Ms. Atwell constantly fed suggestions to the children. She was strict about not letting them read what she considered junk: no "Gossip Girl" or novels based on video games. But she acknowledged that certain children needed to be nudged into books by allowing them to read popular titles like the "Twilight" series by Stephenie Meyer.

At the end of the first day the teachers discussed the demands of standardized testing and how some had faced resistance from administrators. Ms. McNeill said her students had so little freedom that they even had to be escorted to the bathrooms.

Suddenly she was overcome with emotion as she contrasted that environment with the student-led atmosphere in Ms. Atwell's class. "It makes me sad that my students can't have this every day," she said, wiping away tears. "These children are so fortunate."

Ms. Atwell reminded the teachers that she had once taught in a public school and faced strict requirements. "There is nothing that we are doing here that can't be done in any public school," she said. "The question is, how do you tweak these hidebound traditions of the institutions?"
Choice as a Motivator

Literacy specialists say that giving children a say in what they read can help motivate them. "If your goal is simply to get them to read more, choice is the way to go," said Elizabeth Birr Moje, a literacy professor at the University of Michigan. Ms. Moje added that choices should be limited and that teachers should guide students toward high-quality literature.

Though research on the academic effects of choice has been limited, some studies have shown that giving students modest options can enhance educational results. In 11 studies conducted with third, fourth and fifth graders over the past 10 years, John T. Guthrie, now a retired professor of literacy at the University

of Maryland, found that giving children limited choices from a classroom collection of books on a topic helped improve performance on standardized reading comprehension tests.

"The main thing is feeling in charge," he said. Most experts say that teachers do not have to choose between one approach or the other and that they can incorporate the best of both methods: reading some novels as a group while also giving students opportunities to select their own books.
But literacy specialists also say that instilling a habit is as important as creating a shared canon. "If what we're trying to get to is, everybody has read 'Ethan Frome' and Henry James and Shakespeare, then the challenge for the teacher is how do you make that stuff accessible and interesting enough that kids will stick with it," said Catherine E. Snow, a professor at the Harvard University Graduate School of Education. "But if the goal is, how do you make kids lifelong readers, then it seems to me that there's a lot to be said for the choice approach. As adults, as good readers, we don't all read the same thing, and we revel in our idiosyncrasies as adult readers, so kids should have some of the same freedom."
Ms. McNeill returned to Jonesboro determined to apply what she had observed. She knew she was luckier than some of the other teachers in the Edgecomb program, who were saddled with large classes and short periods. She had no more than 20 students in any class, for 100 minutes every day.

Trying to emulate the relaxed atmosphere of Ms. Atwell's classroom, Ms. McNeill pushed the desks out of their rows and against the white cinderblock walls. She placed a circle of carpet swatches on the tile floor and put a small wooden rocking chair at the front.

Her principal, Freda Givens, was supportive, persuaded by Ms. McNeill's enthusiasm. But Ms. McNeill warned her: "I am not sure how it's going to pan out on the standardized tests."

Ms. McNeill started to build her classroom library. All told, she spent about $1,000 of her own money buying books, many of which were titles she had seen in Ms. Atwell's classroom, including "The Story of Edgar Sawtelle"; "The Road" by Cormac McCarthy; and several novels by the young-adult favorites Walter Dean Myers and Sarah Dessen.

Modeling herself after Ms. Atwell, she began conducting sales pitches for books in her warm drawl and invited her students to do so, too. Every day Ms. McNeill allotted 30 minutes for the students to read on their own. Chatty, but firm if she detected that someone was not reading, she scooted from student to student on a lime-green stool, noting page numbers on a clipboard chart. She asked questions about the books and suggested new ones.

Many students began the year choosing books she regarded as too simple, and she prodded them to a higher level. After Khristian Howard, an earnest seventh grader, read "Chaka! Through the Fire," a memoir by the R&B star Chaka Khan, Ms. McNeill suggested that she try Maya Angelou's autobiography, "I Know Why the Caged Bird Sings."

Khristian, who found the book tough at first, ended up writing an enthusiastic six-page entry in her journal. Ms. McNeill went on to suggest "The Bell Jar" by Sylvia Plath and "A Tree Grows in Brooklyn" by Betty Smith, a book, Khristian wrote, that she "really didn't want to come to an end."
To help teach concepts like allegory or foreshadowing, Ms. McNeill began virtually every session by dissecting a poem that the class then discussed. One morning this spring Jabari Denson, an eighth grader, read aloud "Mother to Son" by Langston Hughes. The class spent 15 minutes teasing out the metaphorical meaning of a line about "places with no carpet on the floor."

She required that the students record their impressions of each book, citing specific passages and analyzing themes. Jennae often wrote four or five pages in her tightly packed print. A year earlier she had been bored by reading and had little to say about books.

But now new worlds were opening. In January she read "It's Kind of a Funny Story," a novel by Ned Vizzini about a depressed teenager who ends up in a psychiatric ward. "After reading this book, I have decided that I want to be a psychologist," Jennae wrote in the spiral-bound notebook where she kept her journal. The book, she continued, had changed how she viewed mental illness.

"I think people that are labeled 'crazy' aren't crazy at all; they just see the world differently than others," she wrote. "They don't really know how to express it correctly so nobody else knows how to accept it so they lock them away in a psych ward."

Ms. McNeill did hit some snags. In January two of her students failed a state writing assessment. Over dinner one night with her husband, Dan McNeill, she confessed her fear that Ms. Givens, the principal, might not let her continue with her radical approach. But Ms. Givens did not interfere.
Ms. McNeill knew that students who were now being asked to write much more frequently about their reading might be tempted to copy the work of others. In March one of her most reluctant seventh graders plagiarized a journal entry about "Tomorrow, When the War Began," a novel by John Marsden about children coping with an invasion of Australia. The boy did not even bother to remove the words "The Horn Book, starred review," from the printout he pasted into his notebook.
She admonished the boy and asked him to redo his entry. She was discouraged to see that he wrote only one paragraph that amounted to not much more than a plot summary, concluding, "I highly recommend this book to young teens who like this kind of stuff."

To Ms. McNeill's chagrin, several students, most of them boys, stubbornly refused to read more challenging fare. One afternoon this spring she pulled her stool next to Masai, an eighth grader who wore a sparkling stud in one ear, as he stared at a laptop screen on which he was supposed to be composing a book review. Beside him sat the second volume in the "Maximum Ride" series, which chronicles the adventures of genetically mutated children who are part human, part bird. He was struggling to find anything to write.

"I keep trying to get you to read things other than James Patterson," Ms. Atwell said, tapping the book's cover. "But if you are going to write a book review of substance, you are going to have to find substance in the book."

In staff meetings with fellow English teachers, Ms. McNeill showed them her students' journals and explained her new teaching methods. A few were curious, but none were ready to give up their textbooks or class novels.

Some colleagues suggested that Ms. McNeill was only able to teach this way because of who was in her class. "Ms. McNeill has the freedom to do that because she teaches gifted students," said Linda White, an eighth-grade teacher.

But in May Ms. McNeill felt vindicated when she received the results of her students' performance on standardized state reading tests.

Of her 18 eighth graders, 15 exceeded requirements, scoring in the highest bracket. When the same students had been in her seventh-grade class, only 4 had reached that level. Of her 13 current seventh graders, 8 scored at the top.

In the final week of school Helen Arnold, Jennae's mother, sent Ms. McNeill an e-mail message thanking her. "She never really just read herself for enjoyment until she took your class," Ms. Arnold wrote.
Ms. McNeill knew she had not succeeded in persuading all of her students to read deeply or widely. But she was optimistic that she would capture a few more in the coming school year.
A week after her students left for the summer, Ms. McNeill boxed up the class sets of "To Kill a Mockingbird," along with "Diary of Anne Frank" and "The Giver" by Lois Lowry, keeping just three copies of each for her collection. She carted the rest to the English department storeroom.

http://www.nytimes.com/2009/08/30/books/30reading.html?_r=1&ref=books

How Did They End Up That Way?

By MICHIKO KAKUTANI

HOMER & LANGLEY

By E. L. Doctorow

208 pages. Random House. $26.

The last name of the title characters of E. L. Doctorow's new novel, "Homer & Langley," is Collyer, and the book's brothers do, in fact, turn out to be versions of those infamous New York pack rats, whose overstuffed Harlem brownstone — crammed floor to ceiling with towering piles of newspapers, suitcases and boxes, as well as 14 pianos, half a dozen toy train sets, chandeliers, a car chassis and more than 100 tons of garbage — made their name synonymous with obsessive-compulsive collecting.

The corpses of the two men would be found in their Fifth Avenue home by police in 1947: one buried under an avalanche of rat-infested trash; the other, dead of starvation and assorted ailments.

How did the well-to-do scions of one of New York's oldest families come to such a sad and ludicrous end? The story is a kind of male, New York City version of "Grey Gardens," and it has fascinated writers for years. It reportedly inspired Marcia Davenport's 1954 novel, "My Brother's Keeper," and Richard Greenberg's 2002 play, "The Dazzle," and now Mr. Doctorow, using his patented blend of fact and fiction, has tackled it here, producing a slight, unsatisfying, Poe-like story that turns out to be a study in morbid psychology.

Mr. Doctorow (the E. stands for Edgar) has said he was named for Poe, and he's ventured into his namesake's Gothic territory before with his 1994 novel "The Waterworks," a story about science and detection and families. That novel, like the author's best-known works, "Ragtime," "World's Fair" and "Billy Bathgate," showcased the author's magical ability to conjure a vanished New York from the dust and smoke of history.

Clearly Mr. Doctorow wants to do something similar here, going so far as to extend his heroes' lives through the Watergate era, but the reader unfortunately gets little visceral sense of the city or the country in these pages. After all, Homer and Langley spent much of their lives as recluses and came to inhabit a suffocating realm bounded by the walls of their town house. As a result, there are few excursions into the New York City Mr. Doctorow knows so well, and lots of time — far more than the reader might wish — spent inside the Collyer brothers' musty, dusty, junk-filled home.

In Mr. Doctorow's fictionalized telling of the Collyers' story, Langley suffered from a mustard gas attack during World War I and returned home, damaged and possibly mad. His brother, Homer, who narrates the story, went blind as a teenager but became a skilled pianist and enjoyed the attention of lots of women, who apparently found his helplessness alluring.

As recounted in these pages, the Collyers' parents died during the great flu epidemic of 1918, and after Langley's return from the war, the brothers set up housekeeping together. For a while the pair maintained an engagement with the world. Homer has an affair with a house servant; Langley has a short-lived marriage to a tempestuous woman. Both of them develop unconsummated crushes on the beautiful and virginal Mary Elizabeth Riordan, who works as Homer's assistant. There are visits to speakeasies and nightclubs, and encounters with a gangster who may remind readers of Dutch Schultz in "Billy Bathgate."

Langley becomes increasingly eccentric, however, holding forth tediously on his Theory of Replacements, a cynical hypothesis that holds that "everything in life gets replaced": that children are replacements of their parents, and that new generations of geniuses, baseball players and kings are replacements of earlier generations of geniuses, baseball players and kings. Langley sets about collecting and saving newspapers so he can create Collyer's One Edition for All Time, a quixotic, all-purpose newspaper that will sum up all the varieties of human experience in one set of stories.

Speaking directly to us in a slightly wistful voice, Homer is an engaging enough narrator, and his account of his and Langley's earlier years can be poignant, as he draws portraits of the people who enter and exit their lives like a passing parade: the charming Mary Elizabeth, who leaves to attend a Roman Catholic junior college; Harold Robileaux, their cook's grandson and a talented cornet player, who goes off to war and never returns; and Mr. and Mrs. Hoshiyama, a quiet, industrious Japanese couple who take care of the Collyer house until they are arrested by the F.B.I. and sent off to an internment camp in the wake of Pearl Harbor.

But as the Collyers isolate themselves from the world and retreat to their monstrously overcluttered house, the narrative stutters and stalls. Mr. Doctorow never succeeds in making the brothers' transition from mild eccentricity to out-and-out madness understandable to the reader.

And even though the two men come to constitute each other's entire world, their relationship, too, remains oddly opaque: because Homer's blindness never hobbled his life as a young man, his growing dependence on Langley feels hokey and contrived, as does his deference to Langley's more and more antisocial behavior.

Langley stops paying bills and is soon at war with the city and Con Ed; the electricity and water are turned off; and neighborhood children take to pelting the dilapidated house with rocks. Newspapers start doing articles about the brothers, writing of "the decline of a House, the Fall of a reputable family."

Meanwhile, the stuff in their house seems to multiply. There are "corridors of newspaper bales," and piles of equipment, collectibles and junk: "the guts of pianos, motors wrapped in their power cords, boxes of tools, paintings, car body parts, tires, stacked chairs, tables on tables, headboards, barrels, collapsed stacks of books, antique lamps," piles of clothing and rolled-up carpets.

Like characters in a Poe story, Homer and Langley have entombed themselves within their once-elegant mansion — and become the center of "a circle of animosity rippling outward from our neighbors to creditors, to the press, to the municipality, and, finally to the future."

As reimagined by Mr. Doctorow, however, their story has no Poe-like moral resonance. It's simply a depressing tale of two shut-ins who withdrew from life to preside over their own "kingdom of rubble."

http://www.nytimes.com/2009/09/01/books/01kakutani.html?ref=arts

Landscape of Eros, Through the Peephole

By HOLLAND COTTER

PHILADELPHIA — "Marcel, Marcel, I love you like Hell, Marcel." So ran a mash note written to Marcel Duchamp in 1923 by the Baroness Elsa von Freytag-Loringhoven, one of the scores of women, and many men, for whom Duchamp was a personal fixation, erotic, aesthetic or otherwise.

For many contemporary art lovers he is a fixation still, the archangel of a once and possibly future avant-garde and a patron saint of postmodernism. And the Philadelphia Museum of Art, rich with relics of his sly, seductively standoffish spirit, is a pilgrimage site.

The 1912 painting "Nude Descending a Staircase," Duchamp's first succès de scandale, is here. So is "The Bride Stripped Bare by Her Bachelors, Even" (1915-23), also called "The Large Glass," a see-through mural about mechanized love and erotic frustration. And then there are the "erotic objects," paperweight-size things molded from the body's intimate nooks and crevices.

Duchamp's great monument to eros, though, is the tableau called "Étant Donnés: 1. La Chute d'Eau, 2. Le Gaz d'Éclairage" ("Given: 1. The Waterfall, 2. The Illuminating Gas"). Created in almost complete secrecy between 1946 and 1966, it was his final work, and also his weirdest and most mysterious. And it is the subject of a potent exhibition at the museum called "Marcel Duchamp: Étant Donnés," which, among other things, finesses the lingering myth that Duchamp ended up abandoning art for a life of chess and cogitation.

In reality, and by his own description, he simply went "underground." He went on with his very active art-world social life, but told almost no one about the art he was making. He left the completed "Étant Donnés" in his bare-bones Manhattan studio when he died in 1968. The next year it was placed, as he had assumed it would be, on permanent view in the Philadelphia Museum gallery dedicated to the big cache of his work that came to the museum with the Arensberg collection in the 1950s. The gallery has been reinstalled with new material, much of it never before exhibited, to create the present show.

Jasper Johns, a longtime Duchampian, once referred to "Étant Donnés" as "the strangest work of art in any museum." And strange it is. It occupies a closed-off room in a dead-end area at the back of the main

Duchamp gallery. The room can't be entered. The entrance is blocked by a pair of locked antique wooden doors, solid except for two tiny side-by-side peepholes in their center.
When you look through the holes — only one person at a time can do so, making for a very self-conscious viewing experience — you see a shattered brick wall just beyond the door, and in the distance a painted landscape of hills, autumn-tinged trees and what appears to be an actively flowing waterfall.
In the foreground, just past the shattered wall, the nude body of a woman reclines on a nest of dried branches, her legs spread wide to reveal oddly malformed genitals. Her face is obscured by her blond hair. Her lower legs and right arm are out of the range of vision. Her left arm is raised at the elbow, and in her hand she holds a small, glowing electric lamp.

The sight, at once bucolic and freakish, provoked an uproar when the piece had its public debut 40 years ago. What are we looking at? The aftermath of rape, mutilation and attempted murder? A profane update of Bernini's "Ecstasy of St. Teresa"? (Duchamp sometimes referred to the figure as "Our Lady of Desires.")

Either way, it must have struck some feminists as one more addition to art history's archive of aggression against women. And these viewers would have found small comfort in learning that the piece was conceived as a kind of erotic homage to two specific women in Duchamp's life.
One was the Brazilian-born sculptor Maria Martins, with whom he had an affair from 1946 to 1951. His art went wild during that time. The "erotic objects" proliferated. He made paintings from semen and collages from body hair. The nude in "Étant Donnés" is largely pieced together from casts of Martins's voluptuous figure. She was both the object of the work and a collaborator: Duchamp consulted her repeatedly as the work progressed.

The other woman was Duchamp's second wife, Alexina, known as Teeny, whom he married after the Martins affair, in 1954. It is a cast of her hand that holds the electric lamp in the tableau. She was privy to every step in the progress of the piece as it evolved toward completion.

It is the making of "Étant Donnés," rather than its enigmatic meaning, that this exhibition focuses on. Michael R. Taylor, curator of modern art at the Philadelphia Museum, essentially gives us a detailed backstage tour of the fabrication process, a tour all the more intriguing for being devoted to an artist who, it is often said, came to disdain all creative tools apart from ideas.

Proof to the contrary is here. Almost every surviving scrap of physical material related to "Étant Donnés" has been gathered, either from the museum's deep Duchamp archives or from other collections. From 1946, early in the piece's history, comes a highly polished pencil drawing of Martins's nude body; later come plaster casts of her limbs and samples of "skin" made from parchment, all evidence of Duchamp's fascination with craft and the naturalistic effects it could achieve: flesh that was smooth but not slick; skin that looked warm but not too flushed.

The background landscape was a similar blend of artifice and realism. The scene originated in photographs Duchamp took on a vacation in Switzerland. He enlarged the prints, cut them up and rearranged them to eliminate any evidence of buildings. After photographing and printing the altered panorama on cloth, he meticulously colored it with oil paint and chalk. He made the "moving" waterfall from translucent plastic backed by rotating discs powered by a motor housed in a biscuit tin.

The illusion of space and atmosphere seen in the peephole view is remarkable, especially given the out-of-sight construction that produces it, a ramshackle exercise in bad carpentry and precarious wiring, with pieces of drapery held in place by clothespins. It's all documented in a series of Polaroids Duchamp took of the nearly finished piece in 1965, when he learned that the lease on his longtime studio in Manhattan wasn't being renewed and that he had to move everything to a different space.

The Polaroids, being exhibited publicly for the first time, left me a little breathless. They are documents, not of a fabled retirement, not of cerebral dandyism, but of effort, effort, effort, and the strain and anxiety Duchamp was under as he began to form, through photographs, the rudiments of an instruction manual for dismantling and reassembling the flimsy product of nearly 20 years' work.

The same dynamic of effort animates Mr. Taylor's exceptional catalog, which weighs a scholarly ton but is as absorbing to read as a whodunit. I wolfed it down, transfixed, in a night and a day.

It covers not only, step by step, the two decades of the tableau's creation, but also the minutiae of its delicate transfer to Philadelphia, an operation overseen by a young curator named Anne d'Harnoncourt, who a few years later would help to organize the museum's great Duchamp retrospective and would then serve as the institution's much-admired director from 1982 until her sudden death last year.

Both the book and the exhibition are dedicated to her. And both include something she would have liked: work by contemporary artists for whom Duchamp, and "Étant Donnés" in particular, has been an inspiration. Robert Gober and Marcel Dzama are among those covered in the catalog. Ray Johnson is in the show, with some snappy mail-art drawings that filter Duchamp's piece through a homoerotic lens — quite plausibly, given Duchamp's efforts to scramble conventional gender categories in his work.
And there is a film by a contemporary female artist, Hannah Wilke (1940-93), who went to art school in Philadelphia, saw "Étant Donnés " soon after its installation and remembered finding it "repulsive." She later did a performance about it in which she assumed the place of the prone figure. And in a 1976 film made in the museum's Duchamp gallery, she engaged with "The Bride Stripped Bare by Her Bachelors, Even," his other grand erotic masterwork.

Dressed in a high-fashion white tailored suit and fedora, she does a slow striptease in front of the piece, or rather behind it, as the camera shoots her performance through the glass and through Duchamp's painted phallic and vaginal forms frozen in unconsummated union.
Wilke, who was a great beauty, preens, shifts, undoes a button, tips her hat, shifts, stares, slowly pulls at a zipper. The Bride and the Bachelors can never complete their erotic task, but she can. In her performance she was the cool but active counterpart to the woman in "Étant Donnés," just as exposed but in control of the exposure.

Duchamp, the transcendent pornographer, would have understood all these contradictions. I suspect he saw himself both as the distanced creator of his final work and as the passively light-bearing figure lying within it. And surely he would have agreed with Wilke's tough-love words: "To honor Duchamp is to oppose him." Because he opposed himself — or the mythical self he invented — by slaving away at material forms of art that he had declared beneath contempt. His dispassionate passion is what continues to make him magnetic. Tough self-love, perverse and seductive, is what "Étant Donnés" is about.
"Marcel Duchamp: Étant Donnés" continues through Nov. 29 at the Philadelphia Museum of Art,

Benjamin Franklin Parkway at 26th Street; (215) 763-8100, philamuseum.org.

http://www.nytimes.com/2009/08/28/arts/design/28duchamp.html?ref=design

Botox for the Brain

A Harvard psychologist argues that our mindless acceptance of stereotypes leads to premature aging.

- By: Tom Jacobs | August 26, 2009 |

In a landmark experiment, Harvard University psychologist Ellen Langer had seniors live in a secluded monastery as though it were 1959. The results were surprising.stockxpert.com

Here's an innovative way to lower health care costs: Set everyone's biological clock back 20 years. Senior citizens of 75 will enjoy the strength and stamina they had at 55, meaning they will need far less medical attention. The energetic elderly will remain productive members of their community later into life, which could also ease the strain on Social Security. Granted, this sounds like an unusually wonky episode of *The Twilight Zone*. But three decades ago, Harvard University psychologist Ellen Langer conducted a landmark experiment that suggested reverse aging needn't be relegated to the realm of science fiction. Her revealing study, the many follow-ups it spawned and the implications of their findings are the subject of her fascinating new book *Counterclockwise: Mindful Health and the Power of Possibility*.

It's a brightly written work — Langer has a knack for metaphors — that deftly challenges an array of assumptions we hold about health. She reminds readers that many definitive-sounding diagnoses are in fact best guesses, and that no study, however elegant and persuasive, can truly tell us the best course of treatment for any particular patient. Physicians, she counsels, should be thought of as "consultants." Ultimately, we know our own bodies best.

In a sense, this is a book about the limits of empirical knowledge. But as Langer sees it, the ambiguity that inevitably accompanies medical research can be profoundly liberating. If we can't be sure that a diagnosis — or a widely accepted truism such as "memory loss is inevitable with age" — truly applies in our case, we're less likely to stick ourselves with a self-limiting label. "While many of our experienced disabilities may be a natural part of aging," she writes, "many are instead a function of our mindsets about old age."

The ingenious counterclockwise experiment was conducted in 1979. Langer and her students recruited two small groups of elderly men to spend a week living in a secluded New Hampshire monastery. Those in the control group spent the seven days reminiscing about the past, while those in the experimental group effectively re-entered the past. Their environment was designed to convey the impression they were living in 1959. They watched movies, listened to songs and read magazines from that era and discussed "current events" such as the first U.S. satellite launches. "Both groups came out of the experience with their hearing and memory improved," Langer reports. (It appears our bodies respond to being intellectually and emotionally engaged.) But members of the experimental group experienced more dramatic benefits. They were more likely to improve their scores on an intelligence test; more likely to show improvement in joint flexibility and dexterity; and more likely to look younger, as judged by a group of outside observers who compared before-and-after photos. Also, their fingers were longer. Since their arthritis declined in severity, they were able to extend their digits past the point they could a week earlier.

A fluke, perhaps? Well, Langer offers plenty of other data suggesting a strong link between self-perception and health. My favorite involves a group of hotel maids who reported their long hours and family responsibilities didn't give them time to exercise. They were then told that their work, with all its bending and scrubbing, in fact involves quite a bit of exercise. So informed, they lost an average of 2 pounds over the next four weeks. Langer, who has spent several decades studying the effects of mindfulness, notes the women were paying renewed attention to activities that long ago became routine and mechanical. That, she suggests, is the key: If you're noticing the precise condition of the carpet rather than daydreaming as you vacuum, chances are you'll push the machine a little bit harder.

Langer defines mindfulness not in the sense of meditation and detachment popularly associated with Buddhism, but rather as being aware enough to notice subtle changes in ourselves and in our environment. The health implications of such alertness are obvious: If we notice small shifts in how we feel, we can address problems before they become acute. She argues we will also begin to realize that the distinction we make between being "sick" and "well" is often arbitrary and usually unhelpful, in that it prompts us to bounce back and forth between willful ignorance of our body's workings and helpless dependence on a medical professional.

Langer wrote a best-selling book on mindfulness in 1990, and this latest volume may also climb the charts: A Hollywood movie focusing on the counterclockwise experiment, starring Jennifer Aniston as the research psychologist, is scheduled for release next year. No doubt the renewed interest in Langer's research reflects a widespread fear of aging among baby boomers, many of whom will resonate to her ideas. How many have the discipline to follow through on her recommendations is another question. Living a fully engaged life in which we constantly question not only society's assumptions about aging but also our own ingrained beliefs is a bit more involved than getting a Botox injection.

Nevertheless, policymakers and health educators need to be exposed to these concepts. (Her chapter about the consequences of language used by doctors should be taught in medical schools. Does anyone really feel better when told their cancer is "in remission"?) Langer persuasively suggests it is no coincidence that a society that worships youth and considers the elderly somewhat embarrassing is bankrupting itself with health care costs. If pop culture and the mass media equate being old with being weak, helpless and irrelevant, why wouldn't the elderly feel feeble?

So the fountain of youth may in fact be the flood of chemicals in our brain that processes both internal and external messages about old age and dutifully passes them on to our joints, blood vessels and vital organs. Perhaps it's time to start noticing these cerebral downloads and disregard the disempowering ones. Personally, I'm planning to pop in a tape of *When Harry Met Sally* into the VCR and celebrate the fall of the Berlin Wall. It turns out 1989 was quite a year.

http://www.miller-mccune.com/culture_society/botox-for-the-brain-1397

Tunnels Concentrate Air Pollution By Up To 1,000 Times

New research suggests that ultrafine particles are lurking inside road tunnels in concentration levels so high they have the potential to harm drivers and passengers. (Credit: iStockphoto/Tobias Helbig)

ScienceDaily (Aug. 30, 2009) — A toxic cocktail of ultrafine particles is lurking inside road tunnels in concentration levels so high they have the potential to harm drivers and passengers, a new study has found.

The study, which has been published in *Atmospheric Environment*, measured ultrafine particle concentration levels outside a vehicle travelling through the M5 East tunnel in Sydney.

Study co-author and director of Queensland University of Technology's International Laboratory for Air Quality and Health, Professor Lidia Morawska, said road tunnels were locations where maximum exposure to dangerous ultrafine particles in addition to other pollutants occurred.

"The human health effects of exposure to ultrafine particles produced by fuel combustion are generally regarded as detrimental," Professor Morawska said.

"Effects can range from minor respiratory problems in healthy people, to acute myocardial infarction (heart attack) in people with existing heart complaints.

Professor Morawska said the study involved more than 300 trips through the four kilometres of the M5 East tunnel, with journeys lasting up to 26 minutes, depending on traffic congestion.

"What this study aimed to do was identify the concentration levels found in the tunnel. It generated a huge body of data on the concentrations and the results show that, at times, the levels are up to 1000 times higher than in urban ambient conditions," she said.

She said drivers and occupants of new vehicles which had their windows closed were safer than people travelling in older vehicles.

"People who are driving older vehicles which are inferior in terms of tightness and also those riding motorcycles or driving convertibles, these people are exposed to incredibly high concentrations," she said.

"When compared with similar studies reported previously, the measurements here were among the highest recorded concentrations," she said.

Professor Morawska said tunnels were becoming an increasingly necessary infrastructure component in many cities across the world.

"When governments are building tunnels for urban design reasons, they should also consider the impact these tunnels are having on the environment and to people's health," she said.

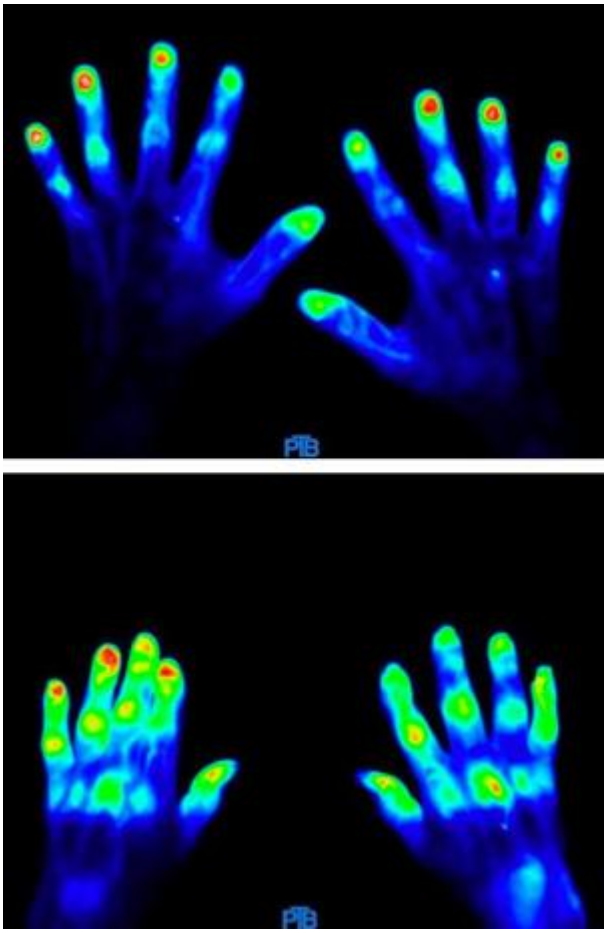
"The study highlights why governments need to consider how they are going to deal with the air pollution levels inside the tunnel and removal of ultrafine particles in the outside environment."

The study was conducted jointly by Professor Richard de Dear and his doctoral candidate, Mr Luke Knibbs from Macquarie University, in collaboration with Professor Morawska and Dr Kerrie Mengersen from QUT.

Adapted from materials provided by Queensland University of Technology.

http://www.sciencedaily.com/releases/2009/08/090827101241.htm

Rheumatism Video Discloses Center Of Inflammation At An Early Stage



Top: A person with healthy hands, 45 seconds after application of the contrast medium. The image was taken by the PTB 2-Hand-Imager. Bottom: A person suffering from rheumatoid arthritis, 45 seconds after application of the contrast medium. The image was taken by the PTB 2-Hand-Imager. (Credit: Image courtesy of PTB)

ScienceDaily (Aug. 29, 2009) — It can strike anyone: rheumatism occurs just as often as diabetes, arteriosclerosis and cancer combined. Approximately one percent of the population is stricken with the rheumatoid arthritis. Mostly it begins with initial inflammation in the finger joints. If it is discovered in time and a treatment is begun, the chances are good that the dreaded joint damage can be averted.

Now scientists at the Physikalisch-Technische Bundesanstalt (PTB), Berlin Institute, in a cooperation project with several partners, have developed such an early detection method. Their optical imaging method for rheumatism works with a fluorescent dye which is stimulated by near-infrared light and is absolutely harmless. With this method, centres of rheumatism can be detected at an earlier stage than is possible with an X-ray apparatus and is less expensive than a magnetic resonance tomograph.

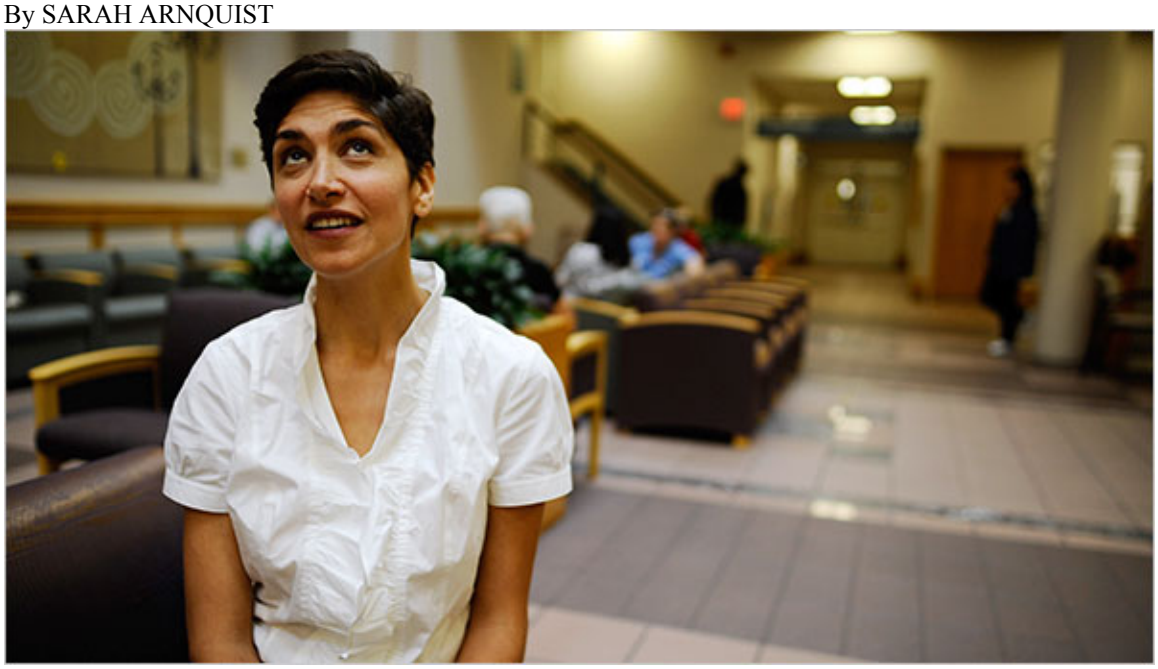
Following the promising results of a clinical preliminary study still ongoing, the Berlin medical technology company "mivenion" acquired licensing rights from PTB in order to prepare a larger study. Also, the statutory health insurance companies have already shown interest in the imaging method, which should make rheumatism diagnostics and treatment distinctly more cost effective – particularly as a new, specific rheumatism contrast medium could in future improve it still another step.

Adapted from materials provided by Physikalisch-Technische Bundesanstalt (PTB).

http://www.sciencedaily.com/releases/2009/08/090824205742.htm

Research Trove: Patients' Online Data

By SARAH ARNQUIST



CAMBRIDGE, Mass. — After Amy Farber learned she had the rare and fatal disease called LAM in 2005, she became determined to increase and speed up research into her illness with the hope of finding a cure in her lifetime.

Dr. Farber, now 39, was a law student with a doctorate in anthropology who was about to start a family. She quit law school and founded the LAM Treatment Alliance to raise money and connect a network of scientists around the world to research this mysterious disease, which destroys young women's lungs.

To her dismay, she says, she encountered a cumbersome research system fraught with obstacles to collaboration and progress — one that failed to focus on patient needs.

"We can do better," she remembers thinking.

She took her frustrations to Dr. George Demetri, a member of her organization's advisory board. A professor and cancer researcher at Harvard Medical School, Dr. Demetri had long wanted to use the Internet to connect patients around the globe and mine their collective wisdom for new insights into the rare cancers he studies.

That led her to Frank Moss, director of the Massachusetts Institute of Technology Media Laboratory, and a new collaboration between her group and the Media Lab: LAMsight, a Web site that allows patients to report information about their health, then turns those reports into databases that can be mined for observations about the disease.

Since the Internet's earliest days, patients have used the Web to share experiences and learn about diseases and treatments. But now advocates like Dr. Farber say that online communities have the potential to transform medical research — especially into rare diseases like hers that lack the number of patients needed for large-scale studies and rarely attract research financing from the drug industry. Also, she said, it empowers patients to contribute, ask questions and help lead the way to discoveries.

"Patients have been a tremendously underutilized resource," she said.

Mr. Moss, who came to the laboratory in 2005 from the drug industry, agrees. Patients' everyday experiences in living with an illness are an enormous source of untapped data, he said; aggregated, those data could generate new hypotheses and avenues for research. "We're really turning patients into scientists and changing the balance of power between clinicians and scientists and patients," he said.

Scientists and entrepreneurs are increasingly exploring ways to tap that potential, and not just for rare diseases.

Several private companies are now collecting patient data and genetic information online to use in recruiting patients for clinical trials, conducting research internally or to sell to drug and biotechnology companies.

Supporters of this model — sometimes called crowd-sourcing or open-source research — call it democratization of research and say they are pioneering new models that put patients in control of their data and build bridges between researchers, patients and their doctors. They say these methods are far cheaper and faster than traditional research, which has high start-up costs and relies heavily on clinicians.

Still, some experts are skeptical. Questions abound about how these sites will guarantee patient privacy; whether patients fully understand what it means to share their medical information online; whether private businesses should have to follow the same strict patient protection rules that govern most researchers; and the quality problems of user-generated data.

The Web offers great potential to reach large numbers of patients quickly, but self-reported data creates considerable research dilemmas, said Dr. James Potash, an associate professor of psychiatry at Johns Hopkins School of Medicine.

Dr. Potash cited two studies that examined the quality of information reported online by depressed patients. Patients reported their diagnosis online; doctors then interviewed them to confirm it. In one study, only two-thirds of the online responses were validated; in the other study, it was three-fourths.

Those numbers are not good enough for high-quality research, Dr. Potash said. Without the ability to ensure a correct diagnosis and accurate patient information, usually gained in face-to-face interviews, researchers can end up with a "garbage in, garbage out" problem, he said.

"Faster is only better if the work is done well," he said. "You don't want to speed the train up and have it fly off the tracks."

Dr. Demetri, of Harvard, acknowledges the challenges of using data self-reported online. "We all are sensitive to the fact that we are making the rules up as we go along," he said. "I worry about going back to observations of low quality and low power, and I want to be careful that we avoid misleading observations."

No one expects that observational research using online patient data will replace experimental controlled trials, said Ian Eslick, the M.I.T. doctoral student developing the LAMsight project.

The data generated by the project will be used mainly for exploratory analysis and hypothesis generation, Mr. Eslick said, although he added that the online approach could eventually yield new models for conducting experimental research.

"There's an idea that data collected from a clinic is good and data collected from patients is bad," he said. "Different data is effective at different purposes, and different data can lead to different kinds of error."

In June, the Belgian pharmaceutical company UCB announced a partnership to build an online epilepsy community with PatientsLikeMe, among the first private companies to develop a platform for data sharing by patients. PatientsLikeMe, based in Cambridge, has as members tens of thousands of patients who contribute detailed information about their diseases, drugs, doses and side effects.

Mark McDade, UCB's chief operating officer, said the regulatory approval process should be changed to incorporate not just safety and efficacy but also measurements on how drugs affect patients' lives — data that is now slow and expensive to collect.

Genetic companies have also taken up patient-driven research. The Silicon Valley company 23andMe, for example, started a program this summer called "Research Revolution." People can buy a stripped-down version of 23andMe's genetic service, which gives people DNA information on ancestry and risk for certain diseases, for $99 and then contribute their genetic data toward research into the disease of their choice.

The company plans to store the genetic profiles of thousands of people to use for research internally and in partnerships with other companies. "We call it research 2.0," said Linda Avey, a founder of 23andMe. "It's the Wikipedia approach versus Encyclopaedia Britannica approach."

Such databases could be a valuable resource for researchers needing to recruit huge numbers of patients quickly, said Dr. Robert Cooke-Deegan, director of the Center for Genome Ethics, Law & Policy at Duke University's Institute from Genome Sciences and Policy.

But private companies like 23andMe and PatientsLikeMe are not bound by the same patient protection rules that govern traditional medical researchers who receive federal financing. Company leaders say they have detailed patient privacy statements and ethics policies.

As these companies evolve, however, Dr. Cooke-Deegan said he expected them to have to deal with more issues of privacy and informed consent, since maintaining patient trust is crucial to their success.

Ben Heywood, co-founder and president of PatientsLikeMe, said his company's business model was built on trust.

"We are only successful if our patients are engaged and using the site," Mr. Heywood said. "If we break their trust, we lose our community and we have nothing."

Dr. Cooke-Deegan said the model was so new that its implications had yet to be thought through. "I'm very suspicious of a company that has tons of private data getting too cozy with the drug or biotech industry," he said. "But I don't want to say it's not going to work, because I can see all kinds of value that could come out of this."

Dr. Farber hopes her Web site will become the world's largest database of active LAM patients. More than 100 registered users on five continents are using the site, which has no advertising, she said.

LAM, short for lymphangioleiomyomatosis, kills by slowly destroying the lungs. Breathing problems have not yet impeded Ms. Farber's push for new research, but she says each healthy day with her husband and young daughter is a blessing.

http://www.nytimes.com/2009/08/25/health/25web.html?nl=health&emc=healthupdateema1

For Parents on NICU, Trauma May Last

By LAURIE TARKAN

Kim Roscoe's son, Jaxon, was born three months early, weighing two and a half pounds. But for nine days he did exceedingly well in the neonatal intensive care unit, and Ms. Roscoe felt little different from the other new mothers.

Her nightmare started on Day 10.

"I had left him late the night before, in my arms, tiny but perfect," said Ms. Roscoe, now 30, of Monterey, Calif. But when she returned to the NICU the next day, Jaxon was in respiratory and kidney failure, and his body had swollen beyond recognition.

"He was hooked up to ventilators, his skin was turning black, the alarms kept dinging over and over," Ms. Roscoe recalled.

Jaxon is 16 months old now, and home with his family. But he was in the NICU for 186 days, and his days and weeks were punctuated by near-death episodes.

During the six-month ordeal, Ms. Roscoe had constant nightmares. She slept with her shoes on, expecting a call from the hospital at any moment. She became angry at the world, and so jumpy she thought a supermarket scanner was one of Jaxon's monitors going off. Her husband, Scott, immersed himself in projects, took care of their daughter, Logan, now 6, and held things together emotionally.

About three months after her son's birth, Ms. Roscoe asked to see a psychiatrist. She was given a diagnosis of post-traumatic stress disorder, or P.T.S.D. — a mental illness more often associated with surviving war, car accidents and assaults, but now being recognized in parents of premature infants in prolonged intensive care.

A new study from Stanford University School of Medicine, published in the journal Psychosomatics, followed 18 such parents, both men and women. After four months, three had diagnoses of P.T.S.D. and seven were considered at high risk for the disorder.

In another study, researchers from Duke University interviewed parents six months after their baby's due date and scored them on three post-traumatic stress symptoms: avoidance, hyperarousal, and flashbacks or nightmares. Of the 30 parents, 29 had two or three of the symptoms, and 16 had all three.

"The NICU was very much like a war zone, with the alarms, the noises, and death and sickness," Ms. Roscoe said. "You don't know who's going to die and who will go home healthy."

Experts say parents of NICU infants experience multiple traumas, beginning with the early delivery, which is often unexpected. "The second trauma is seeing their own infant having traumatic medical procedures and life-threatening events, and also witnessing other infants going through similar experiences," said the author of the Stanford study, Dr. Richard J. Shaw, an associate professor of child psychiatry at Stanford and the Lucile Packard Children's Hospital.

"And third, they often are given serial bad news," he continued. "The bad news keeps coming. It's different from a car accident or an assault or rape, where you get a single trauma and it's over and you have to deal with it. With a preemie, every time you see your baby the experience comes up again."

Abby Schrader and her partner, Sharon Eble, delivered twins at 23 weeks. Both girls, born at 1 pound 5 ounces each, were having continuous near-death events. "We were constantly being asked whether we wanted to remove support," said Ms. Schrader, of Philadelphia.

Eighteen days after the girls' birth, the couple did withdraw support from one baby, whose health had badly deteriorated. The surviving twin, Hallie, now 3, was in the NICU for 121 days and continued to have medical problems once home. "From the moment of their birth, and still to this day, we feel like we're triaging everything and just hanging on," Ms. Schrader said.

The Stanford study found that although none of the fathers experienced acute stress symptoms while their child was in the NICU, they actually had higher rates of post-traumatic stress than the mothers when they were followed up later. "At four months, 33 percent of fathers and 9 percent of mothers had P.T.S.D.," Dr. Shaw said.

It may be that cultural roles compel the men to keep a brave front during the trauma to support their partners, Dr. Shaw said, adding, "But three months later, when the mothers have recovered, that's when the fathers are allowed to fall apart."

The post-traumatic stress may take the form of nightmares or flashbacks. Sufferers may feel panic every time a beeper goes off in the intensive care unit, or they may avoid the trauma by not visiting the unit or by emotionally distancing themselves from their child. Over time, they may develop depression, anxiety, insomnia, numbness, anger and aggression. These symptoms, of course, can impair their abilities as parents.

Several studies have shown that the risk of P.T.S.D. was not related to how tiny or sick the child was or how long the stay in the NICU. "It had to do with the parents' coping style," Dr. Shaw said. "There were some who were more resilient and others more vulnerable."

In one study of rural African-Americans, those who were at greater risk of post-traumatic stress reported more problems in their daily lives, like financial trouble or lack of a partner, said the study's author, Diane Holditch-Davis, a professor at Duke University School of Nursing. One of the biggest problems for these parents is coping after they finally leave the NICU.

"It may be several months later when they're ready to process what they experienced, but at that point, family and friends don't want to talk about it anymore," Dr. Holditch-Davis said.

Ms. Schrader, in Philadelphia, felt a similar isolation in dealing with her surviving daughter's health problems. "We got the sense that people just didn't want to hear about it anymore," she said. Experts say parents who are at risk for post-traumatic stress should be identified ahead of time and given help to prepare them for dealing with the initial trauma. But many hospitals are focused on saving the infants, not the emotional crises of the parents.

"Some hospitals have really great programs, and in some, it's really very sad," said Liza Cooper, director of the March of Dimes NICU Family Support program, which offers psychological support to parents in 74 hospitals nationwide. Even though most units have social workers, she went on, "there's really no one there to support the parents, provide group activities or education."

Vicki Forman did not realize that she was suffering from post-traumatic stress until about four years after the premature birth of her twins, when she began researching her book "This Lovely Life" (Mariner Books, 2009), about her experience in the NICU and raising her surviving son with multiple disabilities.

"What the parent is going through is more or less dismissed because what you're contending with are the health issues of your child," she said. "Occasionally a social worker will say, 'Are you taking care of yourself?' but never, 'This is a traumatic experience you endured and you need to pay attention to these symptoms.' "

Some hospitals pair parents of premature babies in intensive care with those who have been through the experience. One study found that 16 weeks after childbirth, mothers who were matched with NICU veterans had less anxiety and depression, and felt they had more social support, than mothers in a control group.

In addition to the family support program, the March of Dimes runs an online support community called shareyourstory.org. "The most critical piece is to help prepare someone so they know what to expect and don't fall into a world of frightening unknowns," said Ms. Cooper, from the March of Dimes.

Untreated P.T.S.D. can have lingering effects on the child. During the NICU stay, for instance, traumatized parents may find it hard to hold or even look at their child, and that can profoundly affect the baby's attachment to the mother. Later, mothers might experience "vulnerable child syndrome," in which they become so anxious that a minor medical event sends them into a panic. Normal, everyday risks can seem life-threatening; children can learn to gain unhealthy attention from physical complaints.

In her book, Ms. Forman wrote: "From the moment my twins were born, I saw potential for tragedy wherever I turned. It would be years before I stopped thinking that way."

In Monterey, Kim Roscoe is coping with a similar anxiety now, 16 months after Jaxon's birth. "I still freak out if he has a runny nose," she said. "And when he gets a fever, I'm back in the NICU."

http://www.nytimes.com/2009/08/25/health/25trau.html?nl=health&emc=healthupdateema1

When a Doctor Is More, and Less, Than a Healer

By ABIGAIL ZUGER, M.D.

RIGHT OF THIRST

By Frank Huyler. Harper Perennial. 355 pages. $14.99.

PICTURING MEDICAL PROGRESS FROM PASTEUR TO POLIO

A History of Mass Media Images and Popular Attitudes in America. By Bert Hansen. Rutgers University Press. 348 pages. $37.95.

Members of the healing professions who write (generally about themselves) are easy to distinguish from writers who make a living in the healing professions. From the first group comes an endless stream of memoir, self-conscious, well intentioned and predictable. From the second comes all kinds of other verbiage, good and bad, distinguished from the general run of other writing only in that the medical details are correct.

And then there is Frank Huyler, a poet and emergency room doctor in New Mexico, who resists classification. His 1999 pitch-perfect book of short essays, "The Blood of Strangers," was certainly cast in the autobiographical mold, but the voice was so unusual, the touch so light and sure, you could have walked along with him forever. His new novel, "Right of Thirst," easily holds its own with the best contemporary fiction, and yet it hails from deep within medicine and seeks to illuminate the profession as surely as ordinary memoirs do.

Charles Anderson is a middle-age cardiologist, the type who ties a perky little bow tie every morning and strides through the hospital trailing residents, enjoying their sycophantic attentions even as he recognizes — for he is more self-aware than the tie might suggest — the game of admiration and self-promotion for what it is.

The premature death of his wife explodes his world. He cannot put the pieces back together and blindly casts around for somewhere else to be. Anywhere will do: with no particular interest in geopolitics, international health, suffering humanity or, really, even himself, Charles impulsively signs on with a relief agency to man a station for earthquake victims high in the mountains of an unnamed Himalayan country.

But the refugees (the local ones, that is) are slow to arrive, and Charles is left alone in the poorly supplied medical tent with his own thoughts — exactly the company he wanted to avoid. The other relief worker, a young German woman working on a Ph.D. in population genetics, ignores him. The local facilitator on loan from the army is an impassive cipher. Charles can focus only on the impending patients.

The three wait in the camp for the healing to begin — a triad of doctor, nurse and administrator as potent as any other human triangle. It is almost "Waiting for Godot," the medical version, but eventually the stalemate ends when a border skirmish upends their makeshift little world.

A lesser writer would have piled on the medical color — health care in the developing world is full of attention-gripping pus and gore. Dr. Huyler indulges only a little: the reader winds up learning more about guns than scalpels. Yet the story never abandons the big medical themes: doctor and patient, illness and health are, after all, border zones in a state of permanent skirmish. There is also the timeless, ugly question of how and why a fistful of cash can transform what doctors like to call the natural history of disease. Dr. Huyler's writing is quiet, precise, spellbinding from beginning to end.

He is the one casting the spell, so I suppose he is entitled to break it himself, as he does with a thud after the story ends. In an afterword, readers will find a request that they do their part for health care in inaccessible mountain ranges by donating a few dollars to a Bolivian charity on whose board of directors Dr. Huyler's brother serves.

You didn't catch Sartre taking up a collection for the homeless. Poet though Dr. Huyler may be, there is clearly enough physician left in him for this kind of pragmatic hat-passing — one more interesting facet of this strikingly multilayered writer.

That doctors and their work now routinely populate all forms of popular American culture is a historical aberration. Bert Hansen, a professor of medical history at Baruch College of the City University of New York, begins his illustrated account of the start of this phenomenon with the observation that until late in the 19th century, no one really wanted any more contact with doctors than was necessary — certainly not in publications intended to entertain.

When a doctor's image did appear, he was generally depicted as a ponderous, bearded creature, with the depressed mien of an utterly useless man. A cartoon run in the satirical weekly Puck in 1884 lambastes a Philadelphia medical school as a "physician factory," sucking up hapless local youth through a chute and disgorging an army of saw-wielding, frock-coated maniacs.

Louis Pasteur changed all that. In 1885 the success of his rabies vaccine gripped the public's attention, and the media rushed to glorify and sanctify him and his suddenly attractive profession. Forget the inconvenient detail that Pasteur was actually not a medical doctor at all: cue the white coat, the pristine glassware stacked on the laboratory bench, the heroic demeanor and, of course, the grateful patients. As scientific triumphs accumulated, the hagiography of the doctor spread throughout the media, from print advertisements to radio spots, from comic books to adoring photo essays in Life magazine.

While various slipups in the years since this golden era have made it pretty clear that Ronald Colman, Paul Muni and Edward G. Robinson no longer set professional standards, it is still nice to see them all again in Dr. Hansen's book, superheroes fighting the good fight.

http://www.nytimes.com/2009/08/25/health/25book.html?nl=health&emc=healthupdateema9

Mysterious Glaciers That Grew When Asia Heated Up

BYU professor Summer Rupper doing field work with Switzerland's Gornergrat glacier. Her newest study details how a group of Himalayan glaciers grew despite a significant rise in temperatures. (Credit: Image courtesy of Brigham Young University)

ScienceDaily (Aug. 29, 2009) — Ice, when heated, is supposed to melt.

That's why a collection of glaciers in the Southeast Himalayas stymies those who know what they did 9,000 years ago. While most other Central Asian glaciers retreated under hotter summer temperatures, this group of glaciers advanced from one to six kilometers.

A new study by BYU geologist Summer Rupper pieces together the chain of events surrounding the unexpected glacial growth.

"Stronger monsoons were thought to be responsible," said Rupper, who reports her findings in the September issue of the journal *Quaternary Research*. "Our research indicates the extra snowfall from monsoonal effects can only take credit for up to 30 percent of the glacial advance."

As Central Asia's summer climate warmed as much as 6 degrees Celsius, shifting weather patterns brought more clouds to the Southeast Himalayas. The additional shade created a pocket of cooler temperatures.

Temperatures also dropped when higher winds spurred more evaporation in this typically humid area, the same process behind household swamp coolers.

The story of these seemingly anomalous glaciers underscores the important distinction between the terms "climate change" and "global warming."

"Even when average temperatures are clearly rising regionally or globally, what happens in any given location depends on the exact dynamics of that place," Rupper said.

The findings come from a framework Rupper developed as an alternative to the notion that glaciers form and melt in direct proportion to temperature. Her method is based on the balance of energy between a glacier and a wide range of climate factors, including wind, humidity, precipitation, evaporation and cloudiness.

Gerard Roe and Alan Gillespie of the University of Washington are co-authors of the new study.

Knowing how glaciers responded in past periods of climate change will help Rupper forecast the region's water supply in the coming decades. She and collaborators are in the process of determining how much of the Indus River comes from the vast network of glaciers far upstream from the agricultural valleys of India and Pakistan.

"Their study can be used to help assess future glaciological and hydrological changes in the most populated part of our planet, which is a region that is now beginning to experience the profound effects of human-induced climate change," said Lewis Owen, a geologist at the University of Cincinnati who was not affiliated with this study.

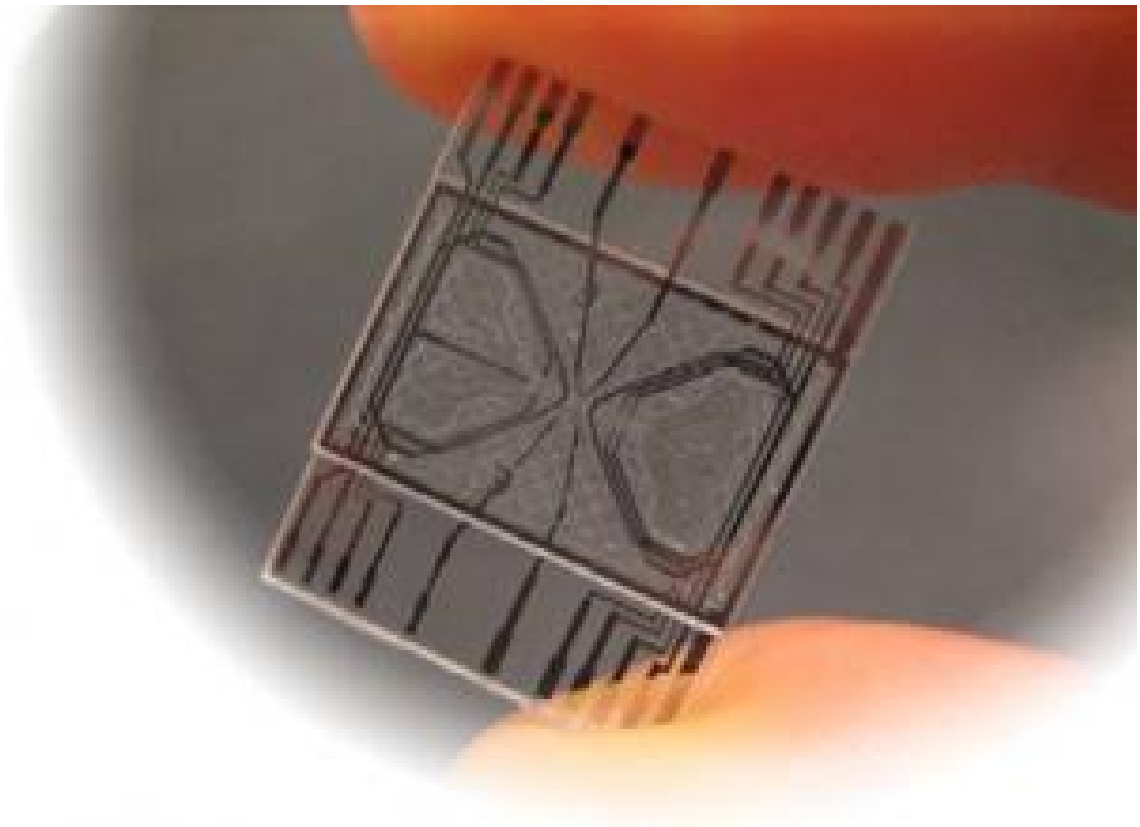
Journal reference:

1. Summer Rupper, Gerard Roe, Alan Gillespie. **Spatial patterns of Holocene glacier advance and retreat in Central Asia**. *Quaternary Research*, 2009; DOI: 10.1016/j.yqres.2009.03.007

Adapted from materials provided by Brigham Young University.

http://www.sciencedaily.com/releases/2009/08/090827101207.htm

Device For On-The-Spot Blood Analysis



Researchers have developed a microfluidic single-cell impedance cytometer that performs a white cell differential count. (Credit: Image courtesy of University of Southampton)

ScienceDaily (Aug. 29, 2009) — A hand-held device which could offer point-of-care blood cell analysis in doctors' surgeries is being developed by academics at the University of Southampton and is described in a paper in *Lab on a Chip* this month.

A team led by Professor Hywel Morgan at the University's Nano Research Group within the School of Electronics and Computer Science (ECS) in conjunction with Professor Donna Davies and Dr Judith Holloway at the School of Medicine, has developed a microfluidic single-cell impedance cytometer that performs a white cell differential count. The system was developed in collaboration with Philips Research.

The chip within the device uses microfluidics – a set of technologies that control the flow of minute amounts of liquids – to measure a number of different cells in the blood. According to Dr David Holmes at ECS, lead author of the paper, the microfluidic set-up uses miniaturised electrodes inside a small channel. The electrical properties of each blood cell are measured as the blood flows through the device. From these measurements it is possible to distinguish and count the different types of cell, providing information used in the diagnosis of numerous diseases. The system which can identify the three main types of white blood cells: T lymphocytes, monocytes and neutrophils is faster and cheaper than current methods.

'At the moment if an individual goes to the doctor complaining of feeling unwell, a blood test will be taken which will need to be sent away to the lab while the patient awaits the results,' said Professor Morgan. 'Our new prototype device may allow point of care cell analysis which aids the GP in diagnosing

acute diseases while the patient is with the GP, so a treatment strategy may be devised immediately. Our method provides more control and accuracy than that what is currently on the market for GP testing.

The next step for the team is to integrate the red blood cell and platelet counting into the device. Their ultimate aim is to set up a company to produce a handheld device which would be available for about £1,000 and which could use disposable chips costing just a few pence each. Devices such as these will be fabricated in the Southampton Nanofabrication Centre, which opens on 9 September and will make smaller, more powerful nano- and bio-nanotechnologies possible and save industry time and money.

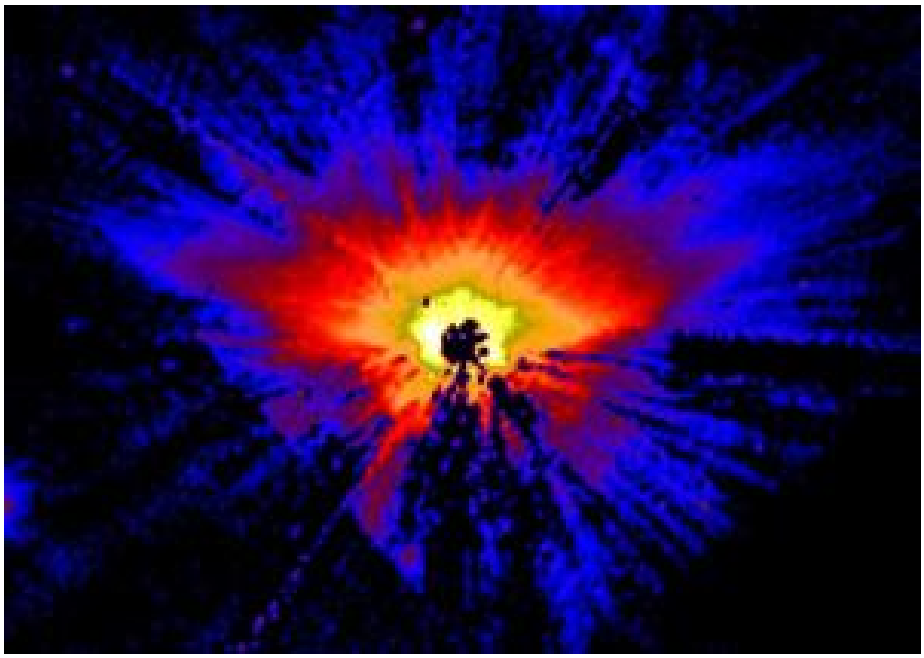
Journal reference:

1. David Holmes, David Pettigrew, Christian H. Reccius, James D. Gwyer, Cees van Berkel, Judith Holloway, Donna E. Davies and Hywel Morgan. **Leukocyte analysis and differentiation using high speed microfluidic single cell impedance cytometry**. *Lab on a Chip*, 2009; DOI: 10.1039/b910053a

Adapted from materials provided by University of Southampton, via AlphaGalileo.

http://www.sciencedaily.com/releases/2009/08/090825103225.htm

Warped Debris Disks Around Stars Are 'Blowin' In The Wind'



The inner, yellow portion of HD 61005's disk spans 5.4 billion miles, or about the width of Neptune's orbit in our own solar system. This false-color Hubble view masks the star's direct light to bring out detail in the disk. (Credit: NASA/ESA/D. Hines (Space Science Inst., New Mexico) and G. Schneider (Univ. of Arizona))

ScienceDaily (Aug. 28, 2009) — The dust-filled disks where new planets may be forming around other stars occasionally take on some difficult-to-understand shapes. Now, a team led by John Debes at NASA's Goddard Space Flight Center in Greenbelt, Md., finds that a star's motion through interstellar gas can account for many of them.

"The disks contain small comet- or asteroid-like bodies that may grow to form planets," Debes said. "These small bodies often collide, which produces a lot of fine dust." As the star moves through the galaxy, it encounters thin gas clouds that create a kind of interstellar wind. "The small particles slam into the flow, slow down, and gradually bend from their original trajectories to follow it."

Far from being empty, the space between stars is filled with patchy clouds of low-density gas. When a star encounters a relatively dense clump of this gas, the resulting flow produces a drag force on any orbiting dust particles. The force only affects the smallest particles -- those about one micrometer across, or about the size of particles in smoke.

"This fine dust is usually removed through collisions among the particles, radiation pressure from the star's light and other forces," explained Debes. "The drag from interstellar gas just takes them on a different journey than they otherwise would have had."

Working with Alycia Weinberger at the Carnegie Institution of Washington and Goddard astrophysicist Marc Kuchner, Debes was using the Hubble Space Telescope to investigate the composition of dust around the star HD 32297, which lies 340 light-years away in the constellation Orion. He noticed that the interior of the dusty disk -- a region comparable in size to our own solar system -- was warped in a way that matched a previously known warp at larger distances.

"Other research indicated there were interstellar gas clouds in the vicinity," Debes said. "The pieces came together to make me think that gas drag was a good explanation for what was going on."

"It looks like interstellar gas helps young planetary systems shed dust much as a summer breeze helps dandelions scatter seeds," Kuchner said.

As dust particles respond to the interstellar wind, a debris disk can morph into peculiar shapes determined by the details of its collision with the gas cloud. In a face-on encounter, such as that of the star HD 61005 in the constellation Puppis, the disk's edge bends gently away from the direction of motion. Fine dust trails behind, forming a cylindrical wake. If the disk instead slices edgewise through interstellar gas, the resulting headwind blows away fine dust from the portion inside the cloud, resulting in a lop-sided disk.

"The drag from interstellar gas only affects the outskirts of the disk, where the star's gravity can't really hold onto the material," Weinberger said.

The systems studied are about 100 million years old and resemble our own solar system shortly after the major planets formed. Although astronomers don't know whether planets lurk within the disks of these systems, a better understanding of processes affecting a disk's outer regions will shed light on how "ice giant" planets like Uranus and Neptune -- and the more distant swarm of small, icy bodies known as the Kuiper Belt -- formed within the solar system.

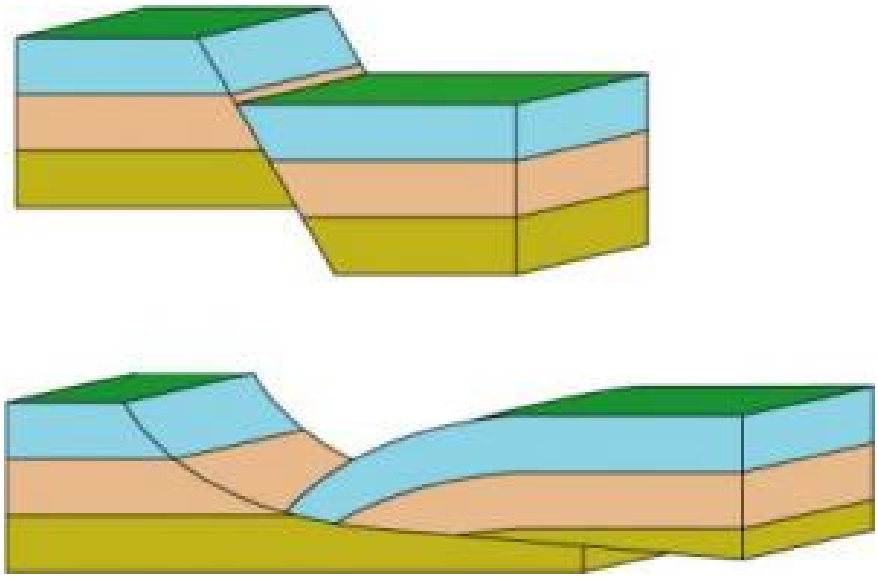
Astronomers have sometimes attributed warps and bends in debris disks to the presence of undiscovered planets or to past encounters with another star. "But we expect interstellar gas to be around -- it's everywhere," Debes said. "It's important to consider the ecology of these debris disks before running to such conclusions, and this model explains a lot of the weirdly shaped disks we see."

A paper describing the model appears in the September 1 issue of *The Astrophysical Journal.*

Adapted from materials provided by NASA/Goddard Space Flight Center.

http://www.sciencedaily.com/releases/2009/08/090828104137.htm

Slowly Slip-sliding Faults Don't Cause Earthquakes, Study Suggests



The graphic on the top shows how a high-angle normal fault cuts between two of the earth's plates. The block on the right shifts down as the fault moves. The graphic on the bottom shows a low-angle normal fault. The block on the right cannot move directly down, but instead can slip to the right. (Credit: Courtesy of Gabriele Casale)

ScienceDaily (Aug. 28, 2009) — Some slow-moving faults may help protect some regions of Italy and other parts of the world against destructive earthquakes, suggests new research from The University of Arizona in Tucson.

Until now, geologists thought when the crack between two pieces of the Earth's crust was at a very gentle slope, there was no movement along that particular fault line.

"This study is the first to show that low-angle normal faults are definitely active," said Sigrún Hreinsdóttir, UA geosciences research associate.Richard A. Bennett, a UA assistant professor of geosciences, wrote in an e-mail. "We can show that the Alto Tiberina fault beneath Perugia is steadily slipping as we speak--fortunately, for Perugia, without producing large earthquakes."

Perugia is the capital city of Italy's Umbria region. Creeping slowly is unusual, Bennett said. Most faults stick, causing strain to build up, and then become unstuck with a big jerk. Big jerks are big earthquakes.

For decades, researchers have known about the Alto Tiberina and similar faults and debated whether such features in the Earth's crust were faults at all, because they didn't seem to produce earthquakes.

Hreinsdóttir and Bennett have now shown that the gently sloping fault beneath Perugia is moving steadily at the rate of approximately one-tenth of an inch (2.4 mm) a year.

Perugia has not experienced a damaging earthquake in about 2,000 years, Hreinsdóttir said. Because the fault is actively slipping, it might not be collecting strain, she said. "To have an earthquake, you have to have strain."

Other towns in the region that lie near steeply sloping faults, including L'Aquila and Assisi, have experienced large earthquakes within the last 20 years.

The team published their paper, "Active aseismic creep on the Alto Tiberina low-angle normal fault, Italy," in the August issue of Geology. The National Science Foundation funded the research.

In the same issue of Geology, Geoffrey A. Abers terms the UA team's work "a fascinating new discovery." Abers, of Lamont-Doherty Earth Observatory of Columbia University in Palisades, N.Y., was not involved in the research.

The UA team became interested in the Alto Tiberina fault because previous research suggested the fault might be moving.To check on the fault, the UA team measured rock movements in and around Perugia using a technique called geodesy.

Geodesy works much like the GPS system in a car. Geoscientists put GPS units on rocks, Bennett said. Just as the car's GPS uses global positioning satellites to tell where the car is relative to a desired destination, the geodesy network can tell where one antenna and its rock are relative to another antenna.

Taking repeated measurements over time shows whether the rocks moved relative to one another.

In some cases, the GPS sites are too far apart to attribute very small movements of the Earth to an individual fault such as the Alto Tiberina, Hreinsdóttir said. However, the University of Perugia established a dense network of GPS stations in the region in 2005.

The UA team analyzed data from 19 GPS stations within approximately a 30-mile (50 km) radius around Perugia. Having such closely spaced stations and several years of data were key for detecting the fault's tiny motions, she said."This study is one more piece in the puzzle to understand seismic hazards in the region and can apply to other regions of the world that have low-angle normal faults," Hreinsdóttir said.

Bennett said there are numerous examples of such faults that are thought to be inactive, including the western U.S., Italy, Greece and Tibet.He and UA geosciences doctoral candidate Austin Holland are now investigating similar faults in Arizona. One such fault, the Catalina Detachment, was involved in the formation of the Santa Catalina and Rincon Mountains that surround Tucson to the north and the east.

"No large earthquakes are known to have occurred on the Catalina detachment in historic times, so we don't really know if that fault is active or not," Bennett said. "Based on the results from the Alto Tiberina, it's possible the Catalina Detachment fault just slides very slowly and doesn't produce earthquakes."

The motion would be so slow as to be undetectable until the most recent technological advances in geodesy, he said. "The technology has evolved so far that we are now confident we can see little motions."

To better assess the earthquake risk in the Tucson region, his team is using geodesy throughout southern Arizona to recheck the markers that the National Geodetic Survey measured in the late 1990s.

"Now we can go out and repeat measurements to see how the positions have changed in ten years," he said.

Bennett will soon be able to say how fast the Tucson area's mountains are moving -- his team took measurements earlier this year and is analyzing the data now.

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

http://www.sciencedaily.com/releases/2009/08/090828103942.htm

Asia Faces Food Shortage By 2050 Without Water Reform

This is an example of the irrigation in Uzbekistan. (Credit: IWMI)

ScienceDaily (Aug. 28, 2009) — A comprehensive new study of irrigation in Asia warns that, without major reforms and innovations in the way water is used for agriculture, many developing nations face the politically risky prospect of having to import more than a quarter of the rice, wheat and maize they will need by 2050.

This warning, along with related forecasts and possible solutions, appear in a report entitled, "Revitalizing Asia's Irrigation: To Sustainably Meet Tomorrow's Food Needs", which was presented August 17 at 2009 World Water Week in Stockholm by the International Water Management Institute (IWMI). IWMI, FAO and partner researchers obtained the findings using a computer model called WATERSIM, which helps examine difficult tradeoffs between food security and the environment, specifically in relation to water supplies.

The study was carried out by IWMI and the United Nations Food and Agriculture Organization (FAO) along with researchers from partner organizations with funding from the Asian Development Bank (ADB). It outlines three options for meeting the food needs of Asia's population, which will expand by one and a half billion people over the next 40 years. The first is to import large quantities of cereals from other regions; the second to improve and expand rainfed agriculture; and the third to focus on irrigated farmlands.

"In the wake of a major global food crisis in 2007 and 2008, cereal prices are expected to be higher and more volatile in the coming years," said Colin Chartres, director general of IWMI, whose research is supported by the Consultative Group on International Agricultural Research (CGIAR). "Asia's food and feed demand is expected to double by 2050. Relying on trade to meet a large part of this demand will impose a huge and politically untenable burden on the economies of many developing countries. The best

bet for Asia lies in revitalizing its vast irrigation systems, which account for 70 percent of the world's total irrigated land."

Asian agriculture registered dramatic advances during the 1960s and 1970s through a combination of irrigation, improved crop varieties and fertilizers. The resulting Green Revolution made it possible to avert widespread hunger and raise living standards. From 1970 to 1995, the area under irrigation in Asia more than doubled, according to the IWMI-FAO report, making this the world's most intensively irrigated continent.

"Today, the option of expanding irrigated land area in Asia to feed a growing population is becoming increasingly problematic due to land or water constraints," explained Aditi Mukherji, IWMI scientist and one of the lead authors of the report.

To meet expected cereal demand by 2050, IWMI's projections show that, with present trends of yield growth, we would have to increase by 30 percent the amount of irrigated farmland in South Asia, and 47 percent in East Asia. Without water productivity gains South Asia would need 57 percent more water for irrigated agriculture and East Asia 70 percent more. Given the existing scarcity of land and water, and growing water needs of cities, such a scenario is untenable. This clearly points to a need for dramatic increases in water productivity, which can only be achieved with a complete revitalization of irrigation infrastructure, management and policy.

The scenarios presented in the IWMI-FAO report do not factor in climate change, which will likely make rainfall more erratic and increase the strain on already overstretched irrigation systems. As a result, even the study's pessimistic assumptions may prove overly optimistic, according to modeling experts.

The potential for improvement is particularly great in South Asia, where more than half of the harvested area is irrigated yet yields are low. Asia as a whole could obtain as much as three-quarters of the additional food it will need by improving the performance of irrigated crop production, and South Asia could satisfy all of its additional demand.

"Another option is to shift more land to rainfed farming," said Mukherji. "But the scope for expansion is extremely limited."

In South Asia, for example, 94 percent of the land suitable for farming is already in production. As a consequence, significant expansion of rainfed farming would come largely at the expense of fragile marginal areas with high environmental costs in terms of biodiversity loss and greenhouse gas emissions.

In the report, IWMI and FAO propose a comprehensive and innovative strategy to improve the performance of Asia's irrigated agriculture. "This involves a comprehensive transition from outdated models, technologies and institutions to a more economically sustainable, service-oriented approach," said Thierry Facon, FAO's senior irrigation expert.

The key element of the strategy is to modernize the region's large-scale irrigation systems, which were built to rely on surface water. Constructed throughout much of Asia in the 1970s and 1980s, these systems are currently in poor condition. As cereal prices declined during the period of infrastructure expansion, investments in irrigation became less attractive. Furthermore, agriculture diversified toward high-value crops, such as vegetables and fruits, which required more flexible approaches to irrigation.

A recent project in Sri Lanka, which takes into account lessons learned from many years of experience, offers a model for improving irrigation management. It combines the best of traditional and new technologies in schemes referred to locally as "village tank cascade systems."

Another critical measure is to selectively support rather than thwart the trend toward individual farmers' use of inexpensive pumps to extract groundwater for irrigation. In India, an estimated 19 million such

pumps are providing water for more than 60 percent of the nation's total irrigated area. South Asia as a whole uses about 250 cubic kilometers of groundwater annually, accounting for almost half the world's total groundwater use.

"Governments' inability to regulate this practice is giving rise to scary scenarios of groundwater over-exploitation, which could lead to regional food crises and widespread social unrest," said Tushaar Shah of IWMI and a co-author of the report. "Rather than condemn such a widespread practice, governments should actively support innovative initiatives."

Another important component of the IWMI-FAO strategy is to involve the private sector more actively in publicly managed irrigation systems. Positive experiences in China and elsewhere attest to the potential of that approach.

"Irrigation and the water sector more generally have direct links with energy, trade, labor and other sectors that are crucial to Asia's larger political economy," Shah added. "To address challenges of food security and water management, we must look beyond the irrigation sector for solutions."

Adapted from materials provided by International Water Management Institute.

http://www.sciencedaily.com/releases/2009/08/090817143558.htm

Feelings Of Hopelessness Linked To Stroke Risk In Healthy Women

ScienceDaily (Aug. 28, 2009) — Healthy middle-aged women with feelings of hopelessness appear to experience thickening of the neck arteries, which can be a precursor to stroke, according to new research out of the University of Minnesota Medical School.

The study, published online August 27 in *Stroke: Journal of the American Heart Association*, found that hopelessness — negative thinking and feelings of uselessness — affects arteries independent of clinical depression and before women develop clinically relevant cardiovascular disease.

Researchers looked at 559 women (average age 50, 62 percent white, 38 percent African American) who were generally healthy and did not show signs of clinical cardiovascular disease.

They measured hopelessness with a two-item questionnaire assessing expectancies regarding future and personal goals. Depressive symptoms were measured with a 20-item Center for Epidemiologic Studies Depression Scale. Thickness of neck arteries was assessed using ultrasound.

The study found a consistent, progressive, and linear association between increasing neck artery thickness and rising levels of hopelessness. The overall difference in arterial thickening between women with higher versus lower hopelessness scores, about .02 millimeters (mm), was equal to about one year of thickening. Those with the highest hopelessness scores had an average .06 mm greater thickening than those in the lowest group — a clinically significant difference. This correlation remained after adjusting for any influence of age, race, income, cardiovascular risk factors, and depression.

"Previous studies have shown that hopelessness is associated with cardiovascular disease outcomes in men and also in women with documented heart disease. However, this is the first study to suggest that hopelessness may be related to subclinical cardiovascular disease in women without clinical symptoms of heart disease and who are generally healthy," said Susan A. Everson-Rose, Ph.D., M.P.H., principal investigator of the study, associate director of the Program in Health Disparities Research, and associate professor of medicine.

"These findings suggest that women who experience feelings of hopelessness may have greater risk for future heart disease and stroke," Everson-Rose said. "In fact, our data indicate that hopelessness may be uniquely related to cardiovascular disease risk. We did not see similar relations when looking at global depressive symptoms."

Researchers used data from Chicago and Pittsburgh sites of the Study of Women's Health Across the Nation (SWAN) to examine associations of hopelessness and depressive symptoms with carotid IMT, an early marker of atherosclerosis.

"The findings we observed are based on cross-sectional data — a snapshot in time — so we look forward to examining the longitudinal relations between hopelessness and heart disease risk in women," Everson-Rose said.

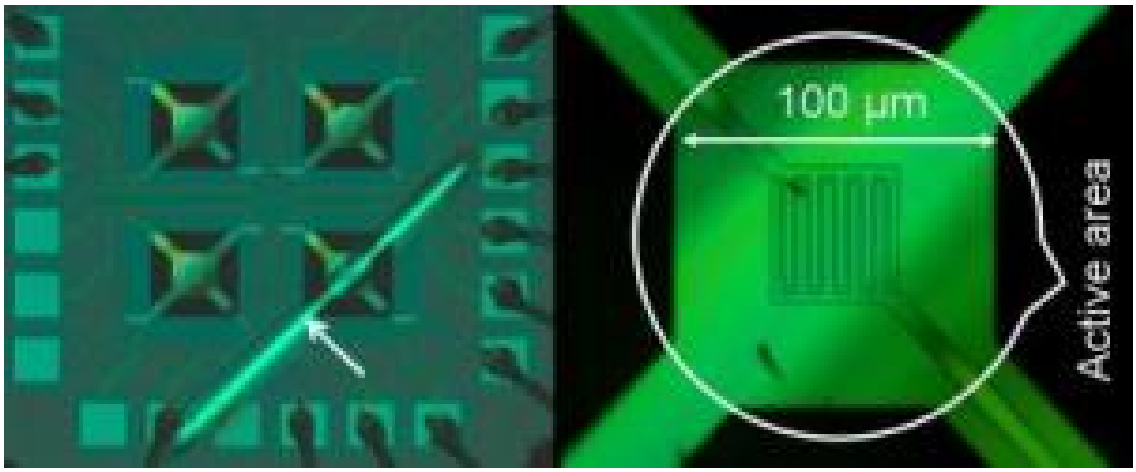
The paper's lead author, Mary O. Whipple, B.A., was a summer research intern during the study. Other co-authors are Tené T. Lewis, Ph.D.; Kim Sutton-Tyrrell, Dr. P.H.; Karen A. Matthews, Ph.D.; Emma Barinas-Mitchell, Ph.D. and Lynda H. Powell, Ph.D.

This study was partially funded by the National Institutes of Health.

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

http://www.sciencedaily.com/releases/2009/08/090827180811.htm

Novel Temperature Calibration Improves Microhotplate Technology



The NIST microhotplate uses its thermal efficiency in conjunction with a thermocouple to form a self-test temperature sensing system. Four microhotplates (left image) are seen with a strip of rhodium film (marked by an arrow) crossing the bottom right microhotplate. This strip makes contact with the platinum in the microhotplate structure (seen in the closeup image on the right) to form a stable thermocouple for measuring temperature. (Credit: M. Afridi, NIST)

ScienceDaily (Aug. 25, 2009) — Researchers at the National Institute of Standards and Technology (NIST) have developed a new calibration technique that will improve the reliability and stability of one of NIST's most versatile technologies, the microhotplate. The novel NIST device is being developed as the foundation for miniature yet highly accurate gas sensors that can detect chemical and biological agents, industrial leaks and even signs of extraterrestrial life from aboard a planetary probe.

The tiny microhotplates—no wider than a human hair—are programmed to cycle through a range of temperatures. They can be coated with metal oxide films tailored to detect specific gas species. Airborne chemicals attach to the surface of the detector depending on the type of film and the temperature of the surface, changing the flow of electricity through the device, which serves as the "signature" for identifying both the type and concentration of the gas in the ambient air.

Accurate microhotplate temperature measurements are crucial for the discrimination and quantification of gas species, while reliable, long-term operation demands that the microhotplate's temperature sensors be either highly stable or able to sense when they've drifted, a functionality known as a "built-in self test" (BIST). As demonstrated for the first time in a paper in an upcoming issue of *IEEE Electron Device Letters*, the new calibration method satisfies both requirements.

A portion of the polysilicon heater making up the microhotplate originally served as the device's temperature sensor. However, this sensor would slowly drift over time from its initial calibration. Within three months, the temperature readings were off by as much as 25 degrees Celsius at high temperatures.

The NIST engineers overcame this shortcoming by using data from two additional temperature sensors—a highly stable, thin-film platinum/rhodium thermocouple integrated in the microhotplate structure for one sensor and the thermal efficiency of the structure itself for the other. Comparing the temperatures reported by these two sensors provides the microhotplate with its internal monitoring system. As long as the absolute value of the difference between the reported temperatures remains below a specified threshold value, the average of the two readings is considered reliable. Should the difference exceed the threshold, the system reports an error.

The original polysilicon sensor still provides the microhotplate's initial temperature measurement, which is used to calibrate the other two sensors. With the complete "check and balance" system in place, temperature measurements are accurate to within 1.5 degrees Celsius.

Having successfully demonstrated the new temperature calibration system for their microhotplate, the NIST researchers are working on additional advancements for the technology. Next in line is the development of a built-in system for sensing contamination of the metal oxide films critical to the microhotplate's use in gas detection.

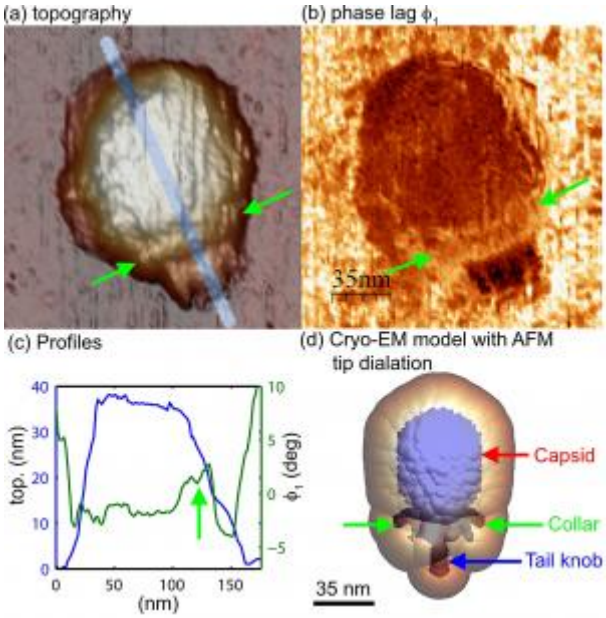
Journal reference:

1. M. Afridi, C. Montgomery, E. Cooper-Balis, S. Semancik, K.G. Kreider and J. Geist. **Analog BIST functionality for microhotplate temperature sensors**. *IEEE Electron Devices*, Volume 30, No. 9 (September 2009)

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

http://www.sciencedaily.com/releases/2009/08/090811191656.htm

Discovery To Aid Study Of Biological Structures, Molecules



Researchers in the United States and Spain have discovered that an atomic force microscope - a tool widely used in nanoscale imaging - works differently in watery environments, a step toward better using the instrument to study biological molecules and structures. The researchers demonstrated their new understanding of how the instrument works in water to show details of the mechanical properties of a virus called Phi29. The images in "a" and "c" show the topography, and the image in "b" shows the different stiffness properties of the balloonlike head, stiff collar and hollow tail of the Phi29 virus, called a bacteriophage because it infects bacteria. (Credit: C. Carrasco-Pulido, P. J. de Pablo, J. Gomez-Herrero, Universidad Autonoma de Madrid, Spain)

ScienceDaily (Aug. 24, 2009) — Researchers in the United States and Spain have discovered that a tool widely used in nanoscale imaging works differently in watery environments, a step toward better using the instrument to study biological molecules and structures.

The researchers demonstrated their new understanding of how the instrument - the atomic force microscope - works in water to show detailed properties of a bacterial membrane and a virus called Phi29, said Arvind Raman, a Purdue professor of mechanical engineering.

"People using this kind of instrument to study biological structures need to know how it works in the natural watery environments of molecules and how to interpret images," he said.

An atomic force microscope uses a tiny vibrating probe to yield information about materials and surfaces on the scale of nanometers, or billionths of a meter. Because the instrument enables scientists to "see" objects far smaller than possible using light microscopes, it could be ideal for studying molecules, cell membranes and other biological structures.

The best way to study such structures is in their wet, natural environments. However, the researchers have now discovered that in some respects the vibrating probe's tip behaves the opposite in water as it does in air, said Purdue mechanical engineering doctoral student John Melcher.

Purdue researchers collaborated with scientists at three institutions in Madrid, Spain: Universidad Autónoma de Madrid, Instituto de Ciencia de Materiales de Madrid and the Centro Nacional de Biotecnología.

Findings, which were detailed in a paper appearing online last week in the U.S. publication *Proceedings of the National Academy of Sciences*, are related to the subtle differences in how the instrument's probe vibrates. The probe is caused to oscillate by a vibrating source at its base. However, the tip of the probe oscillates slightly out of synch with the oscillations at the base. This difference in oscillation is referred to as a "phase contrast," and the tip is said to be out of phase with the base.

Although these differences in phase contrast reveal information about the composition of the material being studied, data can't be properly interpreted unless researchers understand precisely how the phase changes in water as well as in air, Raman said.

If the instrument is operating in air, the tip's phase lags slightly when interacting with a viscous material and advances slightly when scanning over a hard surface. Now researchers have learned the tip operates in the opposite manner when used in water: it lags while passing over a hard object and advances when scanning the gelatinous surface of a biological membrane.

Researchers deposited the membrane and viruses on a sheet of mica. Tests showed the differing properties of the inner and outer sides of the membrane and details about the latticelike protein structure of the membrane. Findings also showed the different properties of the balloonlike head, stiff collar and hollow tail of the Phi29 virus, called a bacteriophage because it infects bacteria.

"The findings suggest that phase contrast in liquids can be used to reveal rapidly the intrinsic variations in local stiffness with molecular resolution, for example, by showing that the head and the collar of an individual virus particle have different stiffness," Raman said.

The research was funded by the National Science Foundation and was conducted at the Birck Nanotechnology Center in Purdue's Discovery Park. The biological membrane images were taken at Purdue, and the virus studies were performed at the Universidad Autónoma de Madrid.

The paper was authored by Melcher; Carolina Carrasco, a postdoctoral researcher at Universidad Autónoma de Madrid and the Instituto de Ciencia de Materiales de Madrid; Purdue postdoctoral researcher Xin Xu; José L. Carrasco, a researcher at Departmento de Estructura de Macomoléculas, Centro Nacional de Biotecnología, Consejo Superior de Investigaciones Científicas; Julio Gómez-Herrero and Pedro José de Pablo, both researchers from Universidad Autónoma de Madrid; and Raman.

Adapted from materials provided by Purdue University.

http://www.sciencedaily.com/releases/2009/08/090811191654.htm

Universal Influenza Vaccination May Reduce Antibiotic Use

ScienceDaily (Aug. 24, 2009) — We all know that influenza vaccination helps prevent disease, but a new study from Canada suggests it may also prevent another public health problem: inappropriate antibiotic use. The findings come from a new study in the September 1, 2009 issue of Clinical Infectious Disease, which is now available online.

Starting in 2000, the Canadian province of Ontario introduced a universal immunization program offering free influenza vaccines to anyone 6 months of age or older. Other provinces continued to target only high-risk groups and their contacts for vaccination. The authors compared prescription rates for influenza-associated respiratory antibiotics before and after the Ontario program began, and compared the Ontario prescription rates with those of other provinces.

The broader immunization effort in Ontario was associated with a 64 percent decline in these antibiotic prescriptions compared with the other provinces that maintained targeted vaccination programs. Additionally, influenza-associated mortality fell 39 percent. Flu-related hospitalizations, emergency department use, and doctors' office visits also fell an average of 52 percent.

Influenza and upper respiratory conditions account for a substantial number of antibiotic prescriptions, even though antibiotics don't work against viruses such as the flu. The overuse of antibiotics and the development of antibiotic-resistant bacteria continue to be serious public health problems. According to study author Fawziah Marra, PharmD, of the University of British Columbia, the study's findings suggest that "jurisdictions wishing to decrease antibiotic use might consider programs to increase influenza vaccination."

Adapted from materials provided by Infectious Diseases Society of America.

http://www.sciencedaily.com/releases/2009/08/090820161343.htm

Not So Fast

Sending and receiving at breakneck speed can make life queasy; a manifesto for slow communication

By JOHN FREEMAN

The boundlessness of the Internet always runs into the hard fact of our animal nature, our physical limits, the dimensions of our cognitive present, the overheated capacity of our minds. "My friend has just had his PC wired for broadband," writes the poet Don Paterson. "I meet him in the café; he looks terrible—his face puffy and pale, his eyes bloodshot. . . . He tells me he is now detained, night and day, in downloading every album he ever owned, lost, desired, or was casually intrigued by; he has now stopped even listening to them, and spends his time sleeplessly monitoring a progress bar. . . . He says it's like all my birthdays have come at once, by which I can see he means, precisely, that he feels he is going to die." We will die, that much is certain; and everyone we have ever loved and cared about will die, too, sometimes—heartbreakingly—before us. Being someone else, traveling the world, making new friends gives us a temporary reprieve from this knowledge, which is spared most of the animal kingdom. Busyness—or the simulated busyness of email addiction—numbs the pain of this awareness, but it can never totally submerge it. Given that our days are limited, our hours precious, we have to decide what we want to do, what we want to say, what and who we care about, and how we want to allocate our time to these things within the limits that do not and cannot change. In short, we need to slow down.

Our society does not often tell us this. Progress, since the dawn of the Industrial Age, is supposed to be a linear upward progression; graphs with upward slopes are a good sign. Processing speeds are always getting faster; broadband now makes dial-up seem like traveling by horse and buggy. Growth is eternal. But only two things grow indefinitely or have indefinite growth firmly ensconced at the heart of their being: cancer and the corporation. For everything else, especially in nature, the consuming fires eventually come and force a starting over.

The ultimate form of progress, however, is learning to decide what is working and what is not; and working at this pace, emailing at this frantic rate, is pleasing very few of us. It is encroaching on parts of our lives that should be separate or sacred, altering our minds and our ability to know our world, encouraging a further distancing from our bodies and our natures and our communities. We can change this; we have to change it. Of course email is good for many things; that has never been in dispute. But we need to learn to use it far more sparingly, with far less dependency, if we are to gain control of our lives.

In the past two decades, we have witnessed one of the greatest breakdowns of the barrier between our work and personal lives since the notion of leisure time emerged in Victorian Britain as a result of the Industrial Age. It has put us under great physical and mental strain, altering our brain chemistry and daily

needs. It has isolated us from the people with whom we live, siphoning us away from real-world places where we gather. It has encouraged flotillas of unnecessary jabbering, making it difficult to tell signal from noise. It has made it more difficult to read slowly and enjoy it, hastening the already declining rates of literacy. It has made it harder to listen and mean it, to be idle and not fidget.
The U.S. Army Signal Corps used carrier pigeons to relay messages in World War I.
This current model includes email, a phone, camera and video camera.
This is not a sustainable way to live. This lifestyle of being constantly on causes emotional and physical burnout, workplace meltdowns, and unhappiness. How many of our most joyful memories have been created in front of a screen?
If we are to step off this hurtling machine, we must reassert principles that have been lost in the blur. It is time to launch a manifesto for a slow communication movement, a push back against the machines and the forces that encourage us to remain connected to them. Many of the values of the Internet are social improvements—it can be a great platform for solidarity, it rewards curiosity, it enables convenience. This is not the manifesto of a Luddite, this is a human manifesto. If the technology is to be used for the betterment of human life, we must reassert that the Internet and its virtual information space is not a world unto itself but a supplement to our existing world, where the following three statements are self-evident.
1. Speed matters.
We have numerous technologies that can work with extreme rapidity. But we don't use these capabilities because they are either dangerous (even the Autobahn has begun applying speed limits, due to severe accidents) or uncomfortable (imagine turbulence at 1,200 miles per hour) or would ruin the point of having the technology at all (played back faster than it was recorded, Led Zeppelin's syrupy metal sound turns to tinsel).
The speed at which we do something—anything—changes our experience of it. Words and communication are not immune to this fundamental truth. The faster we talk and chat and type over tools such as email and text messages, the more our communication will resemble traveling at great speed. Bumped and jostled, queasy from the constant ocular and muscular adjustments our body must make to keep up, we will live in a constant state of digital jet lag.
This is a disastrous development on many levels. Brain science may suggest that some decisions can be made in the blink of an eye, but not all judgments benefit from a short frame of reference. We need to protect the finite well of our attention if we care about our relationships. We need time in order to properly consider the effect of what we say upon others. We need time in order to grasp the political and professional ramifications of our typed correspondence. We need time to shape and design and filter our words so that we say exactly what we mean. Communicating at great haste hones our utterances down to instincts and impulses that until now have been held back or channeled more carefully.
Continuing in this strobe-lit techno-rave communication environment as it stands will be destructive for businesses. Employees communicating at breakneck speed make mistakes. They forget, cross boundaries that exist for a reason, make sloppy errors, offend clients, spread rumors and gossip that would never travel through offline channels, work well past the point where their contributions are helpful, burn out and break down and then have trouble shutting down and recuperating. The churn produced by this communication lifestyle cannot be sustained. "To perfect things, speed is a unifying force," the race-car driver Michael Schumacher has said. "To imperfect things, speed is a destructive force." No company is perfect, nor is any individual.
It is hard not to blame us for believing otherwise, because the Internet and the global markets it facilitates have bought into a fundamental warping of the actual meaning of speed. Speed used to convey urgency; now we somehow think it means efficiency. One can even see this in the etymology of the word. The earliest recorded use of it as a verb—"to go fast"— dates back to 1300, when horses were the primary mode of moving in haste. By 1569, as the printing press was beginning to remake society, speed was being used to mean "to send forth with quickness." By 1856, in the thick of the Industrial Revolution, when machines and mechanized production and train travel were remaking society yet again, "speed" took on another meaning. It was being used to "increase the work rate of," as in speed up.
There is a paradox here, though. The Internet has provided us with an almost unlimited amount of information, but the speed at which it works—and we work through it—has deprived us of its benefits. We might work at a higher rate, but this is not working. We can store a limited amount of information in our brains and have it at our disposal at any one time. Making decisions in this communication brownout, though without complete information, we go to war hastily, go to meetings unprepared, and build

relationships on the slippery gravel of false impressions. Attention is one of the most valuable modern resources. If we waste it on frivolous communication, we will have nothing left when we really need it. Everything we say needn't travel at the fastest rate possible. The difference between typing an email and writing a letter or memo out by hand is akin to walking on concrete versus strolling on grass. You forget how natural it feels until you do it again. Our time on this earth is limited, the world is vast, and the people we care about or need for our business life to operate will not always live and work nearby; we will always have to communicate over distance. We might as well enjoy it and preserve the space and time to do it in a way that matches the rhythms of our bodies. Continuing to work and type and write at speed, however, will make our communication environment resemble our cities. There will be concrete as far as the eye can see.

2. The Physical World matters.

A large part of electronic communication leads us away from the physical world. Our cafes, post offices, parks, cinemas, town centers, main streets and community meeting halls have suffered as a result of this development. They are beginning to resemble the tidy and lonely bedroom commuter towns created by the expansion of the American interstate system. Sitting in the modern coffee shop, you don't hear the murmur or rise and fall of conversation but the continuous, insect-like patter of typing. The disuse of real-world commons drives people back into the virtual world, causing a feedback cycle that leads to an ever-deepening isolation and neglect of the tangible commons.

This is a terrible loss. We may rely heavily on the Internet, but we cannot touch it, taste it or experience the indescribable feeling of togetherness that one gleans from face-to-face interaction, from the reassuring sensation of being among a crowd of one's neighbors. Seeing one another in these situations reinforces the importance of sharing resources, of working together, of balancing our own needs with those of others. Online, these values become notions that are much more easily suspended to further our own self-interest. Not surprisingly, political movements that begin online must have a real-world component; otherwise they evaporate and dissolve into the blur of other activities.

It is almost impossible to navigate the Web without having to stutter-step around ads and blinking messages from sponsors. In using this tool so heavily, consumers aren't just frying their attention spans, they're forfeiting one of the large sources of information that comes from face-to-face interaction and business. A butcher can tell you which cuts of meat are the freshest; an online grocer may not. That same butcher, if he is good, might not just remember your preferences—which an online retailer can do frighteningly well—but ask you how your mother has been doing, whether you caught the latest football game. These interactions remind us that we are more than consumers; they remind us that we are part of the world in a way no amount of online shopping ever will.

If we spend our evening online trading short messages over Facebook with friends thousands of miles away rather than going to our local pub or park with a friend, we are effectively withdrawing from the people we could turn to for solace, humor and friendship, not to mention the places we could go to do this. We trade the complicated reality of friendship for its vacuum-packed idea.

3. Context matters

We need context in order to live, and if the environment of electronic communication has stopped providing it, we shouldn't search online for a solution but turn back to the real world and slow down. To do this, we need to uncouple our idea of progress from speed, separate the idea of speed from efficiency, pause and step back enough to realize that efficiency may be good for business and governments but does not always lead to mindfulness and sustainable, rewarding relationships. We are here for a short time on this planet, and reacting to demands on our time by simply speeding up has canceled out many of the benefits of the Internet, which is one of the most fabulous technological inventions ever conceived. We are connected, yes, but we were before, only by gossamer threads that worked more slowly. Slow communication will preserve these threads and our ability to sensibly choose to use faster modes when necessary. It will also preserve our sanity, our families, our relationships and our ability to find happiness in a world where, in spite of the Internet, saying what we mean is as hard as it ever was. It starts with a simple instruction: Don't send.

—John Freeman is the acting editor of Granta magazine. This essay was adapted from his book "The Tyranny of E-Mail," forthcoming from Scribner.

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