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Coming to Know the Limits of Healing

By COLIN FERNANDES, M.D.

As I pondered postgraduate choices in medical school, I divided the medical specialties into joyful ones like obstetrics (congratulations, it's a healthy baby girl), grim ones like oncology (better get your affairs in order) and faceless ones like pathology (in which the good or bad news is delivered via an impersonal report).

I recognized I didn't have what it took to be grim. And because I love dealing with people, faceless was out. I landed in pain medicine by chance, and surprisingly, I've found that it fits in the joyful category: there are few better feelings than easing a patient's suffering.

Still, after a demoralizing recent constellation of patients, I was left wondering which is worse: informing people that they are going to die, or that they are likely to spend the rest of their lives in pain.

I've followed one older patient for five years now. He is a lovable gentleman in his 80s with chronic back and leg pain. Over the years, we've been through successive trials of different medications and treatments — some of them quite unconventional. Despite our best efforts, he continues to suffer moderately severe chronic pain.

My patient and his family are habitually early for clinic appointments, always exquisitely polite, forever compliant with my treatment recommendations. That he is never demanding, only grateful, makes it all the harder when my efforts fail.

Then there are the young veterans, frequently in their 20s, freshly back from combat. Chronic pain is often complicated by traumatic brain injury, untreated post-traumatic stress disorder, and sleep and mood disorders.

The challenge here is to find a balance between pain relief and side effects; to ensure that opioid painkillers like Percocet and Vicodin are being used to treat pain, not mood or sleep. I find myself in the unenviable position of limiting access to pain medications if their use will lead to functional decline.

The American Pain Society and the American Academy of Pain Medicine recently published their joint Opioid Treatment Guidelines. They include some sobering facts — for example, that nearly all the highest-quality trials evaluating the value of opioids for chronic noncancer pain were short-term efficacy studies, just 16 weeks or less. In clinical practice, patients are often maintained on opioids for years or decades.

Moreover, the studies generally excluded patients at higher risk for substance abuse or with significant coexisting medical or psychiatric problems; that, too, is unrealistic in clinical practice.

And trials suggest that on average, patients given opioids experience an improvement of only 2 to 3 points on a pain scale of 0 to 10. Side effects and risks abound: chronic constipation, sedation and somnolence, a worsening of mood, opioid-induced hyperalgesia (a paradoxical phenomenon in which pain medications actually increase pain), hypogonadism (impaired endocrine function) and addiction. Recent studies also suggest an adverse effect on immune function.

Still another slap in the face came in an article from The Journal of the American Board of Family Medicine that a colleague helpfully placed on my desk. The title — "Overtreating Chronic Back Pain: Time to Back Off?" — and the introduction said it all: "Innovation has often outpaced clinical science, leaving uncertainty about the efficacy and safety of many common treatments. Complications and even deaths related to pain management are increasing."

The downward spiral, the authors wrote, begins with inappropriate imaging, which may reveal irrelevant and incidental findings that lead to unnecessary treatment. Echoing the new guidelines, the authors called for judicious use of opioids to treat chronic low back pain. And they advocated more careful selection of candidates for spinal injections and spine surgery, pointing out that such interventions can actually make matters worse.

"First do no harm" is the guiding principle we learned in medical school. But one skill that is not taught is an easy way to say, "There is nothing more I can offer you."

I've learned that my specialty, like every other, has its limitations. I've learned not to take those limitations personally: they are not a reflection of my inadequacies, merely the current state of the science. (Mastering this is where science becomes art.)

I've learned, too, that it is important that I come to terms with these therapeutic gaps first, so I am effectively able to convey realistic expectations, not perpetuate medical myth. At last, I've grown more comfortable with two of the hardest words in a doctor's vocabulary: "enough" and "no."

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http://www.nytimes.com/2009/09/08/health/08case.html?ref=views

Infection-allergy link questioned

The notion of exposing young children to infections in a bid to protect them from later allergies is wrong, latest research suggests.

The decades-old "hygiene hypothesis" holds that early exposure to microbes somehow challenges the immune system and strengthens it against allergies.

Studies have shown children exposed to bugs by older siblings or attending nursery cut their future allergy risk.

But new work published by the American Thoracic Society casts doubt on this.

No benefit

The study by Dutch investigators at the Erasmus University found although children in day care got more colds and other infections, they were just as likely as other children to go on to develop asthma or another allergy by the age of eight.

" **There is some truth in the hygiene hypothesis** "
A spokeswoman from Allergy UK

The children who went to nursery and who had older siblings had more than quadruple the risk of frequent chest infections and double the risk of wheezing in early life, with no obvious pay off in terms of later protection from allergy.

The infections may, therefore, do more harm than good, contrary to common belief, the authors told the American Journal of Respiratory and Critical Care Medicine.

Lead author of the study on 4,000 children, Dr Johan de Jongste, said: "Early day care should not be promoted for reasons of preventing asthma and allergy.

"Early day care merely seems to shift the burden of respiratory morbidity to an earlier age where it is more troublesome than at a later age."

Other experts have questioned if we need exposure to dirt and germs to build a balanced and healthy immune system.

Too clean?

Experience shows children who grow up on farms are less likely to develop allergies like hay fever and asthma.

And there is the belief that too much cleanliness is not a good thing, and our excessive use of disinfectant products is partly to blame for the recent allergy boom.

But Professor Sally Bloomfield from the International Scientific Forum on Home Hygiene disagrees. She said: "There is no evidence at all for this. However much we clean our homes we are still constantly exposed to microbes."

A spokeswoman from Allergy UK said: "There is some truth in the hygiene hypothesis. Certainly, little Johnny playing in the mud and growing up on a farm may be more healthy than other children. And we are probably mollycoddling our children a little too much.

"But allergies run in families. In susceptible individuals, there is something in their environment that triggers the allergy. For asthma, that could be a dusty home."

Dr Elaine Vickers of Asthma UK said: "The hygiene hypothesis is a hot topic of debate in the research community.

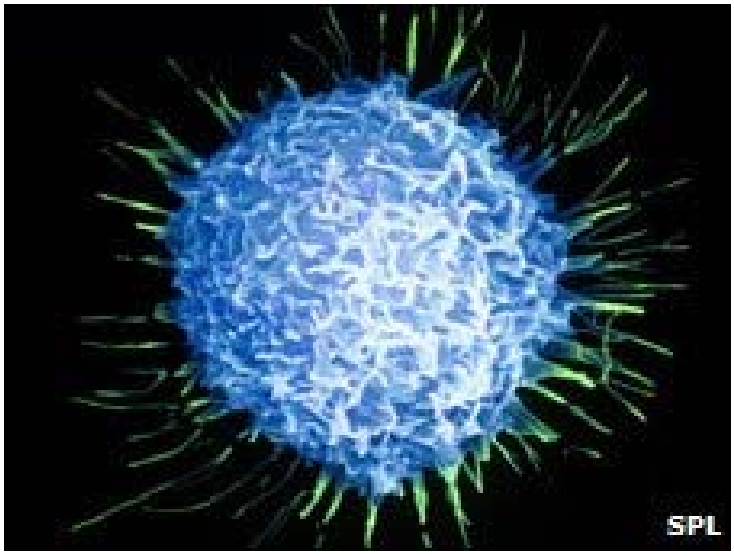
"Whatever the truth, the best advice we can currently give to parents is not to smoke around their children and make sure they have a balanced diet and get plenty of exercise."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8241774.stm

Published: 2009/09/08 10:31:05 GMT

Virus linked to prostate tumours

Scientists have produced compelling evidence that a virus known to cause cancer in animals is linked to prostate cancer in humans.



The researchers from the University of Utah and Columbia University medical schools found the virus in 27% of the 200 cancerous prostates they looked at.

They say it was associated with more aggressive tumours and found in only 6% of non-cancerous prostates.

The finding raises the prospect of one day producing a vaccine.

Previous research has linked XMRV (Xenotropic murine leukaemia virus) to prostate cancer but not specifically to the aggressive form of the disease.

Retrovirus

XMRV is a retrovirus like HIV which works by inserting a copy of its own DNA into the chromosomes of a cell they infect.

" **We still don't know that this virus causes cancer in people, but that is an important question we are going to investigate.** "
Dr Ila Singh, University of Utah

Where this occurs next to a gene that regulates cell growth it can disrupt the normal development of the cell.

XMRV is known to cause leukaemia and other tumours in animals.

Dr Ila Singh, who led the study from the pathology department at the University of Utah, said: "We still don't know that this virus causes cancer in people, but that is an important question we are going to investigate.

"One of the things peculiar about this virus is that it has an androgen response element - it grows better in the presence of testosterone and possibly other steroid hormones.

PROSTATE CANCER FACTS
- Most common cancer in men in UK
- 10,000 die each year
- Most cases are in those aged 70-74
- Higher rates in most deprived populations
- Source: Cancer Research UK

"This is particularly interesting because if we can prove that it responds to oestrogen it could have a role in other cancers.

"We are already looking at the bodies of 100 women and 100 men, who died from other causes, to see if any other organs carry the virus."

Risk factor

Dr Helen Rippon, Head of Research Management at The Prostate Cancer Charity, said the research was intriguing but posed several key questions about the role the infection plays in prostate cancer.

" **It is critically important to identify key triggers of prostate cancer to improve early detection** "
Dr Helen Rippon, Prostate Cancer Charity

She said: "Around the world, extensive work is being undertaken to identify risk factors for prostate cancer which will enable treatments and tests for the disease to be refined.

"It is critically important to identify key triggers of prostate cancer to improve early detection of the disease in men with potentially life threatening prostate cancer."

Dr Chris Parker, Cancer Research UK's prostate cancer expert at the Institute of Cancer Research said: "This exciting study raises the possibility that the virus might contribute to the development of some prostate cancers.

"In the future, if it turns out to be true, then we could speculate about the possibility of vaccination to protect against prostate cancer, similar to the approach now used to prevent cervical cancer."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8241835.stm

Published: 2009/09/07 23:44:17 GMT

Planes 'threaten climate targets'

By Roger Harrabin
BBC Environment Analyst

The UK may have to cut emissions of greenhouse gases by 90% by 2050 so the aviation sector can continue to grow.

That is the warning from the government's official climate advisers, the Climate Change Committee (CCC).

It would mean even bigger cuts than the 80% drop on 1990 levels already planned for households and industry in Britain.

But the committee also says global aviation emissions should be capped during the forthcoming Copenhagen climate talks.

The committee was asked by government to advise on what should be done about emissions from aviation.

" **It is vital that an agreement capping global aviation emissions is part of a Copenhagen deal** "
David Kennedy, CCC chief executive

In a letter to the Transport Secretary Lord Adonis and the Climate Secretary Ed Miliband, the committee says the aviation industry will have to cut emissions from planes back to their 2005 level by 2050.

That is much more permissive than the overall UK target of cutting emissions 80% on 1990 levels by 2050.

The failure of aviation to play its full part could mean that the rest of the economy has to reduce its emissions by 90% instead of 80%.

This 90% target is so ambitious that it might be easier for some sectors to make the leap to zero carbon emissions rather than trying to whittle down pollution decade by decade.

And some analysts think this might be an easier and cheaper approach than reaching a 90% cut in stages.

The options

The committee members see alternatives.

Planes, they say, might use biofuels or aviation might cut emissions below 2005 levels through new technology.

Plane operators might also be able to buy emissions permits in international emissions trading.

But all of these options carry difficulties of their own.

Biofuels compete with crops for land and are already in demand for fuelling cars.

It looks to be a huge task for aviation to restrict emissions to 2005 levels, even without trying to go further.

And the emissions trading system in which rich countries pay poor ones to clean up their pollution may prove to be a stop-gap solution which could be defunct by 2050.

The CCC's recommendations are designed to reduce aviation emissions in line with a global reduction in emissions of all greenhouse gases of 50% by 2050.

It says that, if left unchecked, global aviation could account for 15-20% of all the manmade CO2 produced in 2050.

The committee advises that:

- All CO2 emissions from aviation should be capped, either through a global aviation deal or by including international aviation emissions in national emission reduction targets;
- Any international agreement to reduce emissions should be no less than the EU's target of a 5% reduction in net emissions from 2013-2020;
- Emissions allowances for aviation in the EU emissions trading scheme, says the CCC, should be fully auctioned to prevent windfall profits for airlines;
- Funds should be found for radical innovation in engine, airframe and fuel technology;
- Additional non-CO2 gases from aviation are contributing to global warming. The effects of these should be addressed within a global deal on aviation.

The CCC's Chief Executive David Kennedy said: "It is vital that an agreement capping global aviation emissions is part of a Copenhagen deal.

"We are calling for a cap that would not require people to fly less than today, but would constrain aviation emissions growth going forward."

The right-leaning think-tank Policy Exchange recently proposed that world production of sustainable biofuels should be diverted from cars to planes in order to overcome the lack of current breakthrough technologies in aviation.

" **The only way to make the deep cuts in aviation emissions that we need is to stop building new runways, like the one at Heathrow** "
Vicky Wyatt, Greenpeace climate change campaigner

Greenpeace climate change campaigner Vicky Wyatt said: "Any government of whatever stripe, were they to follow the committee's advice, would find it almost impossible to build a third runway at Heathrow.

"We already fly more than any other nation on Earth and other industries such as the power sector would have to reduce their emissions even further to create room for the aviation sector to grow even more. Electricity consumers could end up footing the bill.

"The only way to make the deep cuts in aviation emissions that we need is to stop building new runways, like the one at Heathrow."

Secretary of the CCC, David Kennedy, told the BBC it would discuss Heathrow as part of a deeper review on aviation due later in the year, but that it was by no means clear whether or not it would make policy recommendations on the expansion of the airport.

Meanwhile, the Times newspaper has reported that passengers will face new taxes to halt the rise in aviation pollution, but Mr Kennedy said under the current EU emissions trading scheme (EUETS), supported by the UK government, taxes would rise very gently.

In the first decade they would be barely noticeable, he said: "Under the current regime it is likely that in about 30 years taxes would have risen sufficiently to make us think about whether we want to take that third long-haul flight of the year."

The trading scheme currently proposes giving airlines 85% of their emissions permits free of charge.

The committee recommended that airlines should have to buy all their permits at auction to prevent them making a windfall profit.

Mr Kennedy said there was no evidence that this would double the cost of tickets for passengers.

When power firms were given free permits under the EUETS they made billions of pounds in windfall profits by passing on the notional market cost of the emissions permits to consumers even though they had not had to pay for the permits themselves.

Mr Kennedy declined to comment on whether the committee would make recommendations on further aviation taxes in its forthcoming review, but the BBC understands that as car taxes are much higher per tonne of CO2 produced the committee may compare the taxes on planes and cars.

The shadow energy and climate change secretary, Greg Clark said: "The Climate Change Committee was established by the Climate Change Act... to give advice to the government, so its recommendations need to be taken seriously.

He added that the government's policy on aviation would "lack credibility" as long as it continued to support a third runway at Heathrow.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8243922.stm

Published: 2009/09/09 06:34:45 GMT

Chimps imitate yawning animations

By Victoria Gill
Science reporter, BBC News

Yawning is so contagious that chimpanzees can "catch" it from cartoons, according to research.

Scientists from Emory University in Atlanta, US, have discovered that an animation of a yawning chimp will stimulate real chimps to yawn.

They describe in the Royal Society journal, Proceedings B, how this could assist in the future study of empathy.

The work could also help unravel if and how computer games might cause children to imitate what they see on screen.

Previous studies have already shown contagious yawning in chimpanzees - stimulated by video-recorded footage of yawns.

"We wanted to expand on that," explained Matthew Campbell, a researcher from Emory University's Yerkes National Primate Research Center and lead author of the study.

"We're interested in using animation for presenting stimuli to animals, because we can control all the features of what we show them," he continued.

" **One possibility is to look at what factors in animations promote more or less imitation** "
Matthew Campbell, Emory University

Although Dr Campbell doesn't think the chimps were "fooled" by the animations into thinking they were looking at real chimps, he explained that there was evidence that chimpanzees "process animated faces the same way they process photographs of faces".

He said: "It's not a real chimpanzee, but it kind of looks like a chimpanzee, and they're responding to that."

He and his team, including Devyn Carter who designed the animations, showed the animals the yawning sequences.

"We also had the animations doing other movements with their mouths that the chimps often do," he said.

"The chimps showed a lot more yawning during the yawn video than when the control videos were playing.

He told BBC News that the only way he and his colleagues could explain the "very strong difference" they saw was that seeing the yawns was making the animals yawn.

On screen

This is an introductory experiment that the researchers say has demonstrated the utility of animations in behavioural experiments.

In his future work, Dr Campbell would like to pin down exactly how these measurable behaviours are related to the more difficult to measure phenomenon of empathy.

"We'd like to know more about behaviours related to empathy, like consolation - when an individual does something nice to the victim of aggression," he told BBC News.

"So we want to see if our good contagious yawners are also good consolers."

As well as tracing the development of empathy in our primate relatives, the research could have a more direct human perspective.

"There's a lot of concern about children and what they see on TV and the video games they play, so one possibility is to look at what factors in animations promote more or less imitation in non-humans," said Dr Campbell.

"So if we make the animations more realistic, are we going to get more contagious yawning out of the chimpanzees?

"And does that imply that realism promotes mimicry? If so, that could be really useful for work with humans as well."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8244963.stm

Published: 2009/09/08 23:13:27 GMT

The age of enhancement

David Edmonds
3rd September 2009 — Issue 162
A cornucopia of drugs will soon be on sale to improve everything from our memories to our trust in others

On 6th December 2004 a baby girl named Yan was born. Her father, an internet entrepreneur, is called Shen Tong. Yan was Shen's first child, and you might have expected him to have an excitable, sleepless night. But oddly the opposite occurred. He slept better than he had done for 15 years, six months and two days. It's possible to be exact about the timing because 15 years, six months and two days earlier was 4th June 1989 and on that day Shen had been on a boulevard just off Tiananmen Square in Beijing. He was a 20-year-old student, and like thousands of others he was demonstrating in favour of political reform.After martial law was declared, Shen watched as the army drove through the city. Between outbursts of shooting, students tried to reason with the military. Shen approached a truckload of soldiers; he wanted, he says, to calm the surrounding crowd. Suddenly an officer pulled out a pistol. Parts of the rest of the story are hazy. Shen was dragged back by others. A shot was fired, and a female student, roughly Shen's age and standing just behind him, was hit in the face. She died. Shen remembers her covered in blood. He is convinced that the bullet was intended for him. Shen moved to the US, but violent images recurred in his dreams for many years—until, that is, the arrival of Yan. Not only did he sleep well that night, but the following night, and the night after that.Post-traumatic stress disorder (PTSD) is a condition that can occur after a distressing event. It involves a traumatic memory which comes back to mind repeatedly and involuntarily. It's associated with chronic anxiety and hyper vigilance. The numbers affected are contentious. By one mid-range estimate tens of thousands of US veterans of Iraq and Afghanistan suffer from it. As do British veterans of the Falklands war—more of whom have committed suicide than died in active service. The Pentagon has sunk hundreds of millions of dollars into PTSD research. But of course, as Shen Tong knows, you don't have to be a soldier to experience it.

Investigation of PTSD has been an important cause of new research into memory. And our understanding of memory is, in turn, propelling a debate about what is known as enhancement, or the boosting of human capacities beyond a normal level. The first issue to emerge was physical enhancement, such as doping in sports and mood enhancement with drugs like Prozac. Then came varieties of cognitive enhancement, as aids to concentration like Ritalin or newer "neuroenhancing" drugs like Adderall which are used by stressed students or harried office workers. Most contentiously, scientists now see possibilities to modify our moral character, using neurological techniques to make us ethically better—or perhaps worse (See box p44). And the latest research holds out the promise of drugs to help forget traumatic memories, or even to stay devoted to our sexual partners. Many people—notably some religious leaders, doctors, scientists, politicians and philosophers—have misgivings about much of this. But when they spell out their qualms, their reasoning is often shakier than it first appears. Nonetheless, this is not a debate we can ignore. What scientists are now discovering about memory presents us with an interesting set of dilemmas.Our understanding of memory is in its infancy, but developing fast. We know that the hippocampus (the size of a little finger and so-called because it loosely resembles a sea horse) is the area of the brain that is thought to consolidate memory and place facts in context. We know too that the almond-shaped amygdala is the Clapham Junction of the brain's emotional system. (People who have damage to the amygdala don't even flinch if a gun is held to their head.) The amygdala provides signals to the hippocampus about which memories it is important to store. The more intense the emotional arousal in the amygdala, the more likely a memory is to be retained.

There's an obvious evolutionary reason for humans to have excellent recall of scary situations. But with PTSD sufferers the brain's warning system has, as it were, short-circuited, or over-reacted. A soldier who witnesses a comrade shot in a trench beside him might have a fearful memory when he next sees or hears a gun. A person with PTSD will experience the same anxiety routinely, and often when the connection is far more tenuous—whenever he sees mud, or a hole in the ground, for example, but perhaps too as he dozes off to sleep.A pharmaceutical treatment is close. Some time ago researchers discovered that if subjects took propranolol, a beta-blocker, within a few hours of a traumatic episode, it reduced the likelihood of their developing PTSD. This was a fascinating finding, but given the need to administer the drug so quickly, of limited practical use (unless soldiers carry a supply with them). More recent studies suggest that propranolol can assist even those who have suffered from PTSD for years.

Memory specialists use this analogy to explain the drug's impact. Imagine that you order a book in a library. The book is collected from the stacks. If you read it by an open window with the sun streaming in, the book will be slightly bleached. When you return it, what is stored is a fainter copy. Propranolol operates as fierce bleaching sunlight. If subjects with PTSD are prompted to conjure up an unwelcome recurring memory while being injected with the drug then the memory is re-filed in the brain in a weakened state. Fewer nightmares, less anxiety: an effect similar, some think, to the way that the emotional impact of his child's birth may have metaphorically shone bright rays on Shen Tong's ghastly dreams.

The first mouse completed its swim in eight seconds. It wasn't exactly the Michael Phelps of the rodent world, but Peter Giese looked impressed. The second mouse was far slower, though at 21 seconds still well above average. Both animals were frantically circling a pool about two metres in diameter, their paws flapping rapidly but ineffectively. A camera tracked them, producing a map of their journeys on a screen in the corner of the room. Mice dislike water. But in one section of the pool was a tiny platform: once they found it they could clamber aboard. To help them detect it objects were attached to the room's walls—an orange chair to our left, two footballs to our right. If the mice looked up, they could use these as visual aids to orient themselves. Finding the platform was not easy, however, especially as half the animals had been genetically modified. They were, in effect, Alzheimer's mice, created with too much amyloid-peptide, the protein that causes the disease.

We were in the basement of a medical research block of King's College London. Here Giese, an affable middle-aged German-born professor, was testing another new memory drug. It had already been found to be effective in chicks. Mice, which are biologically closer to humans, were the next stage of investigation. The drug appeared to combat the worst effects of amyloid-peptide, although it is not yet clear why, or

how. The point of the experiment was to see whether mice, when injected with the new drug, would locate the platform more quickly. Giese was cagey about the findings but it seemed as if his research team had encouraging results. The implications are immense—the cost to society of memory disorders is inestimable, affecting not just those with Alzheimer's but sufferers from schizophrenia, depression and PTSDs.

Much memory research has been driven by the hope of curing illness that causes memory to operate at below a normal level. But restoring normal memory may also provide the key to memory enhancement for the healthy too. Our ability to learn is closely linked, of course, to our ability to memorise. In the not too distant future Giese believes there will be memory pills—mental Viagra, he calls it—that will help the many elderly people who experience memory loss. Within three decades, he thinks, there will be cognitive enhancers on the market that develop standard skills, such as mastering a foreign language. "I'm sure you'll be able to go to the store and buy one of them, and learn French more quickly."

We would all welcome a cure for Alzheimer's. And if it's a good thing to prevent memory deterioration, why should we not also embrace memory enhancement? In the media, enhancement breakthroughs inevitably lead to warnings that scientists are playing God or creating brave new worlds. But finding a rational objection, one not based on a gut reaction of repugnance, isn't easy. The premise of the pro-enhancers is seductive: the world would be a better place if people became smarter and happier—so long as they'd chosen to become so.

Hostility to this idea is widespread. For instance, some disability rights campaigners resent that the enhancement debate implies that there are superior and inferior human beings. Many religious leaders oppose enhancement research on stem cells and embryos. But the most sustained recent critique has been delivered by Harvard philosopher Michael Sandel, this year's Reith lecturer. During the Bush years Sandel served on the President's Council on Bioethics—and his academic credentials combine with a flair for communication to make him an influential figure in this field.

Biomedical technologies hold out the prospect that we can make our children taller, more musical, or faster on the athletics field. But it's a drive towards perfectionism that Sandel urges us to resist. He wants us to appreciate what he calls the "gifted" character of human powers and achievements. It's hubristic, he says, to try to exert dominion over all of nature, including human nature. Parents love their offspring for who they are. There's a contingency to how children turn out, a fact that's integral to the sort of parental love we admire.

The value of contingency does not just apply to one's offspring. Among Sandel's illustrations is sport. It might, for a time, be enthralling to watch a biologically souped-up baseball player whack every pitch for a home run but, predicts Sandel, we'd soon tire of it as "our admiration for the achievement shifts from the player to the pharmacist." And underlying this shift is our desire to see the display of "natural" human gifts that might involve hard work and training but not the short cut of an injection or a gene manipulation.

One difficulty with Sandel's position is that it's not clear there would be a unanimous response to his baseball thought experiment. Some of us might delight in watching a football game between 22 Rooneys and Ronaldos, while listening to an orchestra of enhanced musicians could prove a sublime experience. It is a point made by a prominent opponent of Sandel, Allen Buchanan of Duke University. In a series of lectures at Oxford in spring 2009, Buchanan pointed out that bioengineering would not necessarily replace sweat and grind. It certainly hasn't yet. Take the case of US baseball player Barry Bonds, embroiled in a steroid abuse scandal. Bonds is alleged to have taken drugs to follow a gruelling training regime: he was not avoiding graft, but enabling it.

There's also the tricky distinction between natural and non-natural enhancements, which can be a little blurry—as even Sandel acknowledges in his book, The Case Against Perfection. Runners are allowed to increase their speed by wearing trainers, or through diet and training. What, then, about altitude training, which boosts the production of red blood cells—which carry oxygen? Perhaps that seems acceptable too.

But is there any ethical difference between flying to Mexico to train and undergoing a blood transfusion that produces the same physiological result? (The practice is now illegal, but it wasn't in the 1970s when blood-doping rumours pursued long-distance runner Lasse Viren.) Or indeed, between this and sealed "altitude houses" which simulate thin air and in which athletes can sleep? Nor can any clear-cut line be sliced between enhancement and treatment. With laser surgery, a person who wanted to remedy their shortsightedness may emerge from the operation with far better vision than average. But should Olympic archers be allowed to undergo this treatment? And, were it possible to reverse memory loss, would it be acceptable to give a patient far greater power of recall than he or she had before?

Other objections to enhancement seem just as problematic. It's said that it will lead to a growing gap between those who can afford it and those who can't—an empirical claim and one that needs to be monitored and, if true, addressed. But problems of equality are not unique to enhancement. And evidence so far suggests that drugs that boost cognition may be an egalitarian force. Intriguingly, many studies have shown that neuroenhancing drugs are less effective for those with above average capability. Pro-enhancers—who include not only thinkers like Buchanan but, more pertinently, pharmaceutical companies eyeing lucrative new markets—believe that use of such drugs will spread in the same way as mobile phones: initially expensive toy-gadgets for the rich and within a few years dispersed through society and across nations.

Then there's the precautionary principle. This flags a warning: we should be careful with this stuff. Bioengineering can effect change with great power and speed—and set in train irreversible transformations, the consequences of which we cannot predict. And this is clearly a sensible concern; Buchanan says that we need to worry "about the unwitting disruption of benign interdependencies," by which he means that we may tinker with one cognitive ability and inadvertently botch up another. But while Buchanan acknowledges the danger he also highlights another risk; that we underestimate the benefits of society where people can become cleverer, better at making choices, more productive and happier.

At the heart of the debate there remains unease about tampering with the very things that make humans human. And while we are becoming accustomed to some varieties of enhancement, our capacity to manipulate not just our bodies and our cognitive faculties, but potentially also our core emotions, is taking us into a world of dizzyingly new options. Take sex and love, for instance. If you want to know about the birds and the bees, a good place to start is the vole. To the human eye, these rodents, with their stout bodies and hairy tails, are not the most attractive creatures in the animal kingdom. But fortunately for the survival of their species the male and female prairie vole seem to rub along pretty well. So well, that, most unusually, these animals remain sexually faithful to each other for the duration of their short lives.

The prairie vole has a close cousin called the meadow vole. It looks almost identical but differs in one particular: the male meadow vole is highly promiscuous. It's this peculiarity that has led the social neurobiologist Larry Young of Emory University to devote the last 15 years of his life to studying voles. He discovered that when prairie voles mate, a hormone called vasopressin is released, and that the cells that respond to the vasopressin—the receptors—are located in the pleasure areas of the vole brain. The vole sees its mating partner as the cause of the pleasure, and thus a bond between the pair is formed. For meadow moles, however, the receptors are in a different part of the brain, so there isn't the same pair-forming impact of mating. But by introducing a single new gene, one that influences vasopressin receptors, Young's team managed to change the male meadow voles into loyal lovers.

When it comes to love and sex, humans and voles seem to have a lot in common. A study in 2008 of Swedish twin brothers found that differences in the way that the hormone vasopressin was absorbed correlated strongly with how well each man fared in marriage, assessed by levels of infidelity and divorce. One day we may demand our partners test for the hormone, or farther on in the future, even use gene therapy to foster sexual fidelity (surely an enhancement that the church would approve?).

In a 2008 paper Anders Sandberg and Julian Savulescu of Oxford's Uehiro Centre for Practical Ethics somewhat clinically divide erotic love into three parts. After lust (seeking sexual union with any appropriate partner), comes attraction (choosing and preferring a partner), followed by attachment (staying together). Each stage is associated with a brain system that can be modulated by chemical stimuli, for example, lust by testosterone, and attachment by entactogens. If we want to encourage long-term relationships—and the empirical evidence is that they lead to health and happiness—then must we conclude, as Sandberg and Savulescu do, that "we should use our growing knowledge of the neuroscience of love to enhance the quality of love by biological manipulation"? Not necessarily. This is where concerns about human nature, identity and authenticity creep in. How should we feel about a flagging relationship kept alive through chemical infusions? Whatever your answer Savulescu says it is paternalistic to deny individuals the right to decide. "I'm not the diviner of what true love is. It's up to people to make decisions about how to use these technologies to benefit their relationships."

We are in the midst of a revolution in biotechnology and there will soon be a cornucopia of enhancement pills on sale. How far this requires a revolution in our moral thinking is a moot point. It is already common for American students to boost their exam performance with drugs like Adderall or Provigil. But the writing of this article has been fortified by a more traditional enhancer—caffeine. While we may blanch at the idea of love potions, a more traditional fluid has lubricated many first dates, and lowered inhibitions—alcohol.

What's new is the power and effectiveness of the drugs. But speaking after his experiment with the swimming mice, Peter Giese took some comfort in one of his laboratory findings: an improvement in one area of cognition sometimes appears to lead to a decline in another. Evolution, he thinks, has so optimised the brain that its capacities operate in a fragile equilibrium. His team has engineered ordinary mice to learn quicker and better, but these bionic creatures are less able to apply their knowledge flexibly. However, as Giese acknowledges, some of us may be willing to make these kind of trade-offs.One day, in theory, science may crack the trade-off problem. It may be feasible to strengthen one capacity with minimal or no cost to another. Even so, enhancement will never automatically equate to improvement. An ability to delete or weaken selective memories is a blessing to those incapacitated by PTSD. But would we want armies in which no soldier would suffer trauma from conflict? For society, the moral dilemmas thrown up by the biomedical breakthroughs are acute. And the pace of scientific change is far outstripping public debate. We have yet to get a firm grip of the slippery concepts of human nature, and the linked notions of identity and authenticity. On an individual level, though, the choice can be straightforward. "Memory is a very curious thing," says Shen Tong. What if he had been offered the memory-weakening pill and guaranteed its safety? "Oh yes, I'd have taken it."

Moral enhancement: a question of trust

Economists use a game of trust to reveal our moral intuitions. Person A and Person B are both given £12. Person A is the depositor, Person B the trustee. Person A can choose how much to deposit with Person B: nothing, £4, £8 or £12. When the money is transferred it immediately triples in value. Thus, if Person A gives Person B £8, she is left with £4, while Person B now has $3\times8 + 12 = £36$. Person B can then choose to give as much back to Person A as he thinks appropriate. If he were to give back £20, say, he would still be left with more than he began. But he could hand over all £36 or nothing at all.

This game has been used to show that humans are not entirely rationally self-interested. But for our purposes what is interesting is this: when subjects are given the hormone oxytocin they are more likely to hand over a larger share of their money, exhibiting greater trust that the other person will treat them fairly. Boosting oxytocin levels is not a high-tech procedure; the hormone can be delivered by nasal spray. Trust is central to our personal and business relationships, and altering trust levels could alter society in a profound way. Enhancement is not identical to improvement. Pumping oxytocin through the air-conditioning could be used for less noble purposes: companies manipulating their consumers, politicians their voters, or predatory men their dates.

http://www.prospectmagazine.co.uk/2009/09/the-age-of-enhancement/

Where do we go from here?

Robert Skidelsky

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The markets have ruled for a third of a century, but it has all ended in tears. A return to selfish nationalism is possible. If we are to avoid this sombre outcome, we must find ways to rub the rough edges off globalisation

Any great failure should force us to rethink. The present economic crisis is a great failure of the market system. As George Soros has rightly pointed out, "the salient feature of the current financial crisis is that it was not caused by some external shock like Opec… the crisis was generated by the system itself." It originated in the US, the heart of the world's financial system and the source of much of its financial innovation. That is why the crisis is global, and is indeed a crisis of globalisation.

There were three kinds of failure. The first, discussed by John Kay in this issue, was institutional: banks mutated from utilities into casinos. However, they did so because they, their regulators and the policymakers sitting on top of the regulators all succumbed to something called the "efficient market hypothesis": the view that financial markets could not consistently mis-price assets and therefore needed little regulation. So the second failure was intellectual. The most astonishing admission was that of former Federal Reserve chairman Alan Greenspan in autumn 2008 that the Fed's regime of monetary management had been based on a "flaw." The "whole intellectual edifice," he said, "collapsed in the summer of last year." Behind the efficient market idea lay the intellectual failure of mainstream economics. It could neither predict nor explain the meltdown because nearly all economists believed that markets were self-correcting. As a consequence, economics itself was marginalised.

But the crisis also represents a moral failure: that of a system built on debt. At the heart of the moral failure is the worship of growth for its own sake, rather than as a way to achieve the "good life." As a result, economic efficiency—the means to growth—has been given absolute priority in our thinking and

policy. The only moral compass we now have is the thin and degraded notion of economic welfare. This moral lacuna explains uncritical acceptance of globalisation and financial innovation. Leverage is a duty because it "levers" faster growth. The theological language which would have recognised the collapse of the credit bubble as the "wages of sin," the come-uppance for prodigious profligacy, has become unusable. But the come-uppance has come, nevertheless.

Historians have always been fascinated by cyclical theories of history. Societies are said to swing like pendulums between alternating phases of vigour and decay; progress and reaction; licentiousness and puritanism. Each outward movement produces a crisis of excess which leads to a reaction. The equilibrium position is hard to achieve and always unstable.

In his Cycles of American History (1986) Arthur Schlesinger Jr defined a political economy cycle as "a continuing shift in national involvement between public purpose and private interest." The swing he identified was between "liberal" (what we would call social democratic) and "conservative" epochs. The idea of the "crisis" is central. Liberal periods succumb to the corruption of power, as idealists yield to time-servers, and conservative arguments against rent-seeking excesses win the day. But the conservative era then succumbs to a corruption of money, as financiers and businessmen use the freedom of de-regulation to rip off the public. A crisis of under-regulated markets presages the return to a liberal era.

This idea fits the American historical narrative tolerably well. It also makes sense globally. The era of what Americans would call "conservative" economics opened with the publication of Adam Smith's Wealth of Nations in 1776. Yet despite the early intellectual ascendancy of free trade, it took a major crisis—the potato famine of the early 1840s—to produce an actual shift in policy: the 1846 repeal of the Corn Laws that ushered in the free trade era.

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In the 1870s, the pendulum started to swing back to what the historian AV Dicey called the "age of collectivism." The major crisis that triggered this was the first great global depression, produced by a collapse in food prices. It was a severe enough shock to produce a major shift in political economy. This came in two waves. First, all industrial countries except Britain put up tariffs to protect employment in agriculture and industry. (Britain relied on mass emigration to eliminate rural unemployment.) Second, all industrial countries except the US started schemes of social insurance to protect their citizens against life's hazards. The great depression of 1929-32 produced a second wave of collectivism, now associated with the "Keynesian" use of fiscal and monetary policy to maintain full employment. Most capitalist countries nationalised key industries. Roosevelt's new deal regulated banking and the power utilities, and belatedly embarked on the road of social security. International capital movements were severely controlled everywhere.

This movement was not all one way, or else the west would have ended up with communism, which was the fate of large parts of the globe. Even before the crisis of collectivism in the 1970s, a swing back had started, as trade, after 1945, was progressively freed and capital movements liberalised. The rule was free trade abroad and social democracy at home.

The Bretton Woods system, set up with Keynes's help in 1944, was the international expression of liberal/social democratic political economy. It aimed to free foreign trade after the freeze of the 1930s, by providing an environment that reduced incentives for economic nationalism. At its heart was a system of fixed exchange rates, subject to agreed adjustment, to avoid competitive currency depreciation.

The crisis of liberalism, or social democracy, unfolded with stagflation and ungovernability in the 1970s. It broadly fits Schlesinger's notion of the "corruption of power." The Keynesian/social democratic policymakers succumbed to hubris, an intellectual corruption which convinced them that they possessed the knowledge and the tools to manage and control the economy and society from the top. This was the malady against which Hayek inveighed in his classic The Road to Serfdom (1944). The attempt in the

1970s to control inflation by wage and price controls led directly to a "crisis of governability," as trade unions, particularly in Britain, refused to accept them. Large state subsidies to producer groups, both public and private, fed the typical corruptions of behaviour identified by the new right: rent-seeking, moral hazard, free-riding. Palpable evidence of government failure obliterated memories of market failure. The new generation of economists abandoned Keynes and, with the help of sophisticated mathematics, reinvented the classical economics of the self-correcting market. Battered by the crises of the 1970s, governments caved in to the "inevitability" of free market forces. The swing-back became worldwide with the collapse of communism.

A conspicuous casualty of the swing-back was the Bretton Woods system that succumbed in the 1970s to the refusal of the US to curb its domestic spending. Currencies were set free to float and controls on international capital flows were progressively lifted. This heralded a wholesale change of direction towards free markets and the idea of globalisation. This was, in concept, not unattractive. The idea was that the nation state—which had been responsible for so much organised violence and wasteful spending—was on its way out, to be replaced by the global market. The prospectus was perhaps best set out by the Canadian philosopher, John Ralston Saul, in a 2004 essay in which he proclaimed the collapse of globalisation: "In the future, economics, not politics or arms, would determine the course of human events. Freed markets would quickly establish natural international balances, impervious to the old boom-and-bust cycles. The growth in international trade, as a result of lowering barriers, would unleash an economic-social tide that would raise all ships, whether of our western poor or of the developing world in general. Prosperous markets would turn dictatorships into democracies."

Today we are living through a crisis of conservatism. The financial crisis has brought to a head a growing dissatisfaction with the corruption of money. Neo-conservatism has sought to justify fabulous rewards to a financial plutocracy while median incomes stagnate or even fall; in the name of efficiency it has promoted the off-shoring of millions of jobs, the undermining of national communities, and the rape of nature. Such a system needs to be fabulously successful to command allegiance. Spectacular failure is bound to discredit it.

The situation we are in now thus puts into question the speed and direction of progress. Will there be a pause for thought, or will we continue much as before after a cascade of minor adjustments? The answer lies in the intellectual and moral sphere. Is economics capable of rethinking its core principles? What institutions, policies and rules are needed to make markets "well behaved"? Do we have the moral resources to challenge the dominance of money without reverting to the selfish nationalisms of the 1930s?

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The enquiry must start with economics. If the case for the deregulated market system is intellectually sound, it will be very hard to change. Free- marketeers claim, contrary to Soros, that the crisis is the fault of governments. US money was kept too cheap for too long after the technology bubble burst in 2000 and the attacks of 11th September 2001. The market was temporarily fooled by the government. This is a shaky defence, to say the least: if the market is so easily fooled, it cannot be very efficient.

One can also argue that the problem is not with the market system, but the fact that markets are too few and inflexible. This seems to be the view of Yale economist Robert J Shiller. He likens the financial system to an early aircraft. Just because it is prone to crash doesn't mean we should stop trying to perfect it. Shiller claims that new derivative products will soon be able to insure homeowners against the risk of house prices going down. To my mind, this is an example of trying to cure a state of inebriation by having another whiskey. There are two things wrong with it. First, if financial innovation is, in fact, the route to greater market efficiency, the financial system would have been getting more stable in the last 25 years of explosive financial engineering. Instead it has become more volatile. Second, the assumption that, given enough innovation, uncertainty can be reduced to risk, is just wrong. There will never be sufficient knowledge to enable contracts to be made to cover all future contingencies.

An analogous argument is that there was not enough marketisation in the global monetary system. Instead of the "clean" floating of currencies, "dirty" floating became the rule. Importantly, China and most of east Asia refused to float their currencies freely. China reverted unilaterally to a form of Bretton Woods, deliberately undervaluing the yuan against the US dollar. The resulting imbalances enabled American consumers to borrow $700bn a year from the parsimonious but super-competitive Chinese, at the cost of losing millions of manufacturing jobs to them. The Chinese saved, the Americans spent, and their debt-fuelled spending created the asset bubbles that led to the credit collapse. This source of instability needs no revision of economic theory, simply the establishment of a free market in foreign currencies. However, the assumption that a world in which currencies were allowed to float freely would be immune from the financial storms we have experienced depends on the belief that currencies will always trade at the correct prices—the global version of the efficient market hypothesis.

A different claim, which goes back to Marx, is that certain structures of economy are less stable than others. Globalisation has increased instability by producing a shift in world GDP shares from wages to profits as the release of low-wage populations into the global economy has undermined the bargaining power of labour in rich countries. This has led to a crisis of under-consumption, staved off only by the expansion of debt (as Gerald Holtham points out, in Prospect's December 2008 issue). There is some truth in this. A greater equality of incomes would create more stable purchasing power.

But the main source of instability lies in the financial markets themselves. And here it is clear that the battle of economic ideas still needs to be fought. Keynes is important in this because he produced the most powerful case for supposing that financial markets are not efficient in the sense required by efficient market theory. As he explained in The General Theory of Employment, Interest, and Money (1936), classical economics had ignored the two main causes of systemic financial failure: the existence of (unmeasurable) uncertainty and the role of money as a "store of value." The first led to periodic collapses of confidence; the second led investors to hoard cash if interest rates fell too low, making automatic recovery from collapses difficult. The function of government was to remove the depressive effect of both by giving investors continuous confidence to invest.

Contrary to the belief of some recent economic theories, the future is just as unknowable as Keynes thought it was. The mathematical "quants" who set up the Long Term Capital Management hedge fund in 1994 worked to a risk model which showed that the kind of financial meltdown which, in fact, bankrupted them four years later, could occur only once every four million years. This was not a rationalisation of financial interests: it was self-deception.

What economics needs, therefore, if it is to have any purchase on real world behaviour, is a new starting point. It needs to accept that the changing nature of the world precludes people from having enough information to always make contracts at the "right" prices. Such a change is a necessary condition for a permanent change in policy. Each previous crisis has produced a leading economist with the authority to challenge the prevailing consensus. So the call for a new Keynes is not just rhetorical.

Opinion as to the degree of supervision, regulation and control needed to make a market economy well-behaved is to be found along a continuum. At one end are the free-marketeers who believe only the lightest touch only is needed; at the other are classical Marxists who believe it requires public ownership of the whole economy. In between are varieties of social democrats and middle wayers, the most famous of whom is Keynes. This territory is sure to be extensively explored over the next few years as the pendulum starts swinging back. For the question of making markets well behaved goes beyond the question of securing their efficiency. It involves making the market economy compatible with other valued aspects of life. The French social democratic slogan of the mid-1990s—"market economy yes, market society no"—encapsulates the idea that limits should be placed on the power of the market to shape social life according to its own logic.

The battleground will be about the role of the nation-state in the globalising economy of the future, for the nation-state is the main repository and guardian of the values and traditions threatened by the disruptive power of the global market. A paradox of globalisation—which was supposed to see a withering of the

nation-state—is that it has led to a revival of nationalism. A deregulated world turned out, unsurprisingly, to be one dominated by the strong. This process reached its apogee with the presidency of George W Bush and the Iraq war—which emphasised US determination to act as a free agent. Other states, too, in Europe and elsewhere, are now acting as semi-free agents. The effective choice is between a more regulated global capitalist system and its possibly violent breakup into a menagerie of warrior nationalisms.
But to ensure we have an ordered system requires us to make globalisation efficient and acceptable. In the course of that debate, I expect one crucial point to emerge: the benefits of globalisation are real, but have been exaggerated. Improvements in the allocation of capital and reductions in opportunities for corruption are offset by increased volatility. Globalisation also raises huge issues of political accountability and social cohesion that are scarcely considered by economists, and only lazily by politicians.

There seem to be four main reasons for this blind spot. The first is the intellectual domination of economics in this debate, with its individualistic and developmental perspective. Globalisation—the integration of markets in goods, services, capital and labour—must be good because it has raised many millions out of poverty in poorer countries faster than would otherwise have been possible. Any interference with this process is impious. A second idea is that it is inevitable: technology—most conspicuously the internet—abolishes national frontiers. Technology cannot be undone. So, whether we like it or not, globalisation is our fate, and our morals and social conventions must adapt to it. The third idea is that globalisation is evolutionary; any check would be regressive. Fourthly, globalisation forces us to think of the world as a unit, which is necessary if we are to solve planet-wide problems.

These are powerful propositions, derived from the era of scarcity and not adjusted to the era of partial abundance, nor to the existence of natural limits to growth. Today the benefits of globalisation are much more obvious for poor than for rich countries. In the 1950s and 1960s, the northern hemisphere was for free trade, the southern protectionist. Today the position is partly reversed. Globalisation offers the best hope for poor countries to catch up with the rich. But growth has become less important for rich countries. In the early 1930s, Keynes thought that the international division of labour could be carried too far. “Let goods be homespun,” was the title of an article he wrote in 1932. He wanted a “well-balanced” or “complete” national life, allowing a country to display the full range of its aptitudes, and not simply to be a link in a value-adding productive chain spanning the globe. Moreover, the economic benefits of offshoring are far from evident for richer states. Since 1997, Britain has lost 1.1m manufacturing jobs—29 per cent of its total—many of them to developing countries. The result has been a dramatic deterioration in Britain’s current account balance, and a decline into deficit on the investment income balance too, meaning we pay more to foreign investors in interest and dividends than we receive from abroad. This makes it harder for Britons to pay down their huge debts to the outside world.

Keynes’s warning that the pursuit of export-led growth is bound to set nations at each others’ throats is still relevant. But that does not mean just sticking as we are. Some rowing back of financial globalisation and cross-border financial institutions is required to rebalance market and state. This process is underway, as national regulators take a tighter grip over the financial institutions they are bailing out. Regulators are increasingly sceptical of banks that depend excessively on wholesale funding. Without this, there will be a natural tendency for banks to shrink back within their own frontiers.

One of the biggest problems with the global trading order remains the enormous arbitrages in tax, labour and non-wage costs that exist. These have encouraged companies to relocate operations, and depressed the bargaining power of labour. Companies like WalMart of the US and Nokia of Finland have been huge outsourcers to Asia. The only solution short of raising barriers is for governments to co-operate in flattening out some of these differences—for China, for example, to increase wages. Ralston Saul has noted that the era of globalisation saw “multiple binding economic treaties… put in place while almost no counterbalancing binding treaties were negotiated for work conditions, taxation, the environment or legal obligations.” It will be difficult to create new global systems that balance public good and self interest. But the alternative is the beggar-my-neighbour world of protectionism.

Another way to curb outsourcers would be to use antitrust powers. Breaking up megalithic multinationals would at least prevent them enjoying quasi-monopoly rents, and thus reduce the incentive.

Globalisation is necessarily blind to the idea of political accountability because none exists at the planetary level. Yet the crisis has challenged the idea that we should all unthinkingly follow the logic of the bond market. When the crunch came, we discovered that national taxpayers still stand behind banks, and national insolvency regimes matter. A more rules-based exchange rate system is not inconceivable. This might seek to put some curbs on capital movements—especially at times of economic stress.

And, in this new climate, national politicians are likely to reach for ideas and influences that until recently would have seemed exotic. The idea, for example, that economic growth does not, beyond a certain point, make people happier. David Cameron, a market-friendly Conservative, has talked about the importance of general wellbeing as an alternative to the mania for economic growth. Rich countries could probably abandon the globalist project without much damage to their material standards and with possible gain to their quality of life. Rejecting the inevitability of market-based globalisation would not necessarily be harmful—especially if it were accompanied by a reassertion of democracy at a national level. This is not a pipe dream. New Zealand, which was the first country to attempt to become a post-national nation state in the 1980s with a radical programme of privatisation and deregulation, changed tack in 1999. The electorate endorsed an interventionist government devoted to raising taxes, reimposing economic regulations and establishing a stable private sector. It happened because reform failed to deliver the goods. Other countries may follow suit if the political costs of maintaining a global economy are seen as too high. Rich countries surely have a duty to help poor countries, but not at the expense of an awful way of life.

“Well-behaved” markets should not only be more stable, they should be more morally acceptable. It is indefensible for a top American CEO to earn 367 times more than the average worker (against 40 times in the 1970s). Part of the swing-back in political economy will be to use the tax system to redress the balance between capital and impotent labour.
The crisis has rightly led to a revival of interest in Keynes. But he was a moralist as well as an economist. He believed that material wellbeing is a necessary condition of the good life, but that beyond a certain standard of comfort, its pursuit can produce corruption, both for the individual and for society.

He reunited economics with ethics by taking us back to the primary question: what is wealth for? The good life was one to be lived in harmony with nature and our fellows. Yet “we destroy the beauty of the countryside because the unappropriated splendours of nature have no economic value. We are capable of shutting off the sun and the stars because they do not pay a dividend.” Not everything should be sacrificed for efficiency. And Keynes was a liberal nationalist.

In terms of our pendulum analogy, he was someone who instinctively sought an equipoise: not in the timeless equilibrium of classical economics, but in a balance in political economy between freedom and control, national and international wellbeing, efficiency and morality. He was an Aristotelian, who believed that vices are virtues carried to excess. This is a good philosophy for today.

http://www.prospectmagazine.co.uk/2009/01/wheredowegofromhere/

The meaning of Huntington

Eric Kaufmann

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Samuel Huntington died a pariah among America's intellectual elite. It's because he was normal

Samuel Huntington passed away on Christmas Eve. He is assured a place in the pantheon of modern "big idea" thinkers, alongside his student Francis Fukuyama. But few in this group were as controversial, or as consistently unpopular among their peers. Huntington was accused of everything from militarism to nativism. Noam Chomsky attacked him in the pages of the New York Review of Books over the bombing of Vietnam, and later described the Clash of Civilizations (1996)—Huntington's most famous book—as a tool for the American elite to "control people." He was denied membership of America's prestigious National Academy of Sciences twice.

Why did he raise such hackles? Certainly, he was politically difficult to pin down. A lifelong Democrat, who worked for the ultra-liberal presidential candidate Hubert Humphrey in 1968 and voted for John Kerry in 2004, he was also a consistent conservative who backed the Vietnam war. His brief military career left an indelible mark, nowhere more evident than in his first book, The Soldier and the State (1957), which extols the ethos of the elite West Point military academy. At West Point, he wrote, "collective will supplants individual whim"—a latter-day Sparta in the midst of a civilian Babylon. With this book, his destiny to rile liberal colleagues was well underway; one reviewer portrayed him as a third-rate Mussolini.

Both Wasp and Episcopalian, he spent nearly half a century at Harvard and is descended from several generations of Harvard men. But his nationalism was political, not ethnic, valuing institutions like the military and the constitution rather than a timeless landscape or heroic ancestors. In The Promise of Disharmony (1981), he writes of American identity as an idea. America lacked class conflict, so had no need for the mystical folk nationalism of Europe. Wasps and immigrants alike, he argued, were eager to throw off their past and forge a liberal nation. Not a word did he write romanticising puritans or pioneers.

Huntington was instinctively a conservative because he valued an ordered society, but he also championed conservatism as a necessary instrument to defend liberal institutions against communism. In many of his books he attacked idealistic liberals for holding such institutions to impossible, utopian standards that undermined their effectiveness in the world.

Right up to the fall of communism, Huntington's thinking bore the impress of cold war neoconservatism. He believed that non-western culture presented few obstacles to the spread of democracy. But the collapse of communism shook this view, generating in him a new appreciation for the power of culture. Four years after the fall of the Berlin wall he penned his signature article, "The Clash of Civilizations," later turned into the book of the same name, arguing that cultural conflict would define the post-cold war era.

Huntington had a cyclical view of history, and feared a decline of America and the west through hubris and decay. In The Clash of Civilizations he argued trenchantly for a revival of collective spirit, and a rejection of both multiculturalism at home and neoconservative universalism abroad. Better, he came to think, to keep America strong by respecting differences overseas while striving to renew western civilisation at home.

It was not until 9/11 that Huntington became a household name; his "clash of civilisations" catchphrase adopted by everyone from southern Sudanese rebels to Silvio Berlusconi. It also ignited controversy. From the left, Edward Said claimed that a "clash of ignorance" was painting Islam as a monolith. From the right, neoconservatives were dismayed at Huntington's rejection of their universalist incursions into Muslim lands. (His opposition to the second Iraq war, inconvenient and largely ignored by liberal critics, is quite consistent with his scepticism of the universalisms of both left and right.)

In his final polemic, Who Are We? (2004), Huntington raised the stakes by urging a renewal of American cultural nationalism. Hispanics had overtaken African-Americans as the largest minority, and as a result multiculturalism was challenging the nation's anglo-protestant cultural centre. In response, Huntington rethought his exceptionalist, creedal nationalism to include a cultural component. In taking this step, he resembled his fellow Wasp New Yorker, the late historian John Higham, who worried that the volume and geographic concentration of Hispanics differed from the dispersed, polyglot influxes of the past. Huntington's fears of Latino secession are surely misplaced, but his concern for America's cultural centre and his disdain for its cosmopolitan absentee elite resonated with many Americans. The nation's intellectual elites were less amused, describing his book as racist and ensuring him virtual pariah status at Harvard and beyond.

This should not stop us recognising his achievements. He provides a much needed cultural corrective to both "realist" international relations theories, and Francis Fukuyama's liberal internationalist The End of History. Ultimately, however, Huntington's civilisational argument fails as a clear explanation of state behaviour, mostly because people cannot imagine their civilisation as they can their nation. People distinguish themselves from next door nations but not distant cultural blocs. Shared civilisational identity can count when alliances between countries are formed, but it is far from decisive. Islam and western Christendom might seem to be partial exceptions to this rule, but even the umma and EU remain too abstract for most.

An iconoclast to the core, Huntington never threw his lot in with left or right. He was too statist to be a libertarian, too realist to embrace neoconservatism, and too sympathetic to nationalism, religion and the military to identify with liberal Democrats. As a conservative Democrat, then, he is an intellectual rarity. But his estrangement from the American elite merely confirms him as normal: the median postwar American voter has always identified as a conservative Democrat. A tiny band of liberal nationalist centrists—figures like Michael Lind or the recently deceased Arthur Schlesinger Jr—are his true kindred spirits. In arguing for a less overbearing America that should just be itself, they, more than his illustrious students, define Huntington's legacy.

http://www.prospectmagazine.co.uk/2009/02/themeaningofhuntington/

Blowing the Pixie Dust Off Disney's Archives

By BROOKS BARNES

GLENDALE, Calif. — For the last 50 years, inside an unmarked warehouse here, a historic movie prop has rested in a deep, deep sleep. Last month a Walt Disney Company archivist awakened it.

Wearing white gloves, Becky Cline, manager of the sprawling repository, gently opened a crate containing the giant bejeweled storybook used for the opening scene of "Sleeping Beauty," the animated classic from 1959. "We have to be really, really careful with this," Ms. Cline said, almost in a whisper.
The prop, along with dozens of other specimens from Disney films that have long been kept under lock and key, will headline an unusual exhibition of memorabilia that opens on Thursday and runs through the weekend at the Anaheim Convention Center in Southern California. Also included: the coonskin cap that Fess Parker wore as Davy Crockett (leading to a national craze), Annette Funicello's Mouseketeer shirt, a costume from the 1950s TV series "Zorro" and the four-wheeled star of "The Love Bug."
The exhibition, "Treasures of the Walt Disney Archives," will also include modern grails (Miley Cyrus's blond "Hannah Montana" wig) and items from Walt Disney's own office (like the rotary-dial telephone, dingy cord and all). "We would never clean it — that's Walt's grime," Ms. Cline said.
The exhibition forms the centerpiece of Disney's attempt to stage its own version of Comic-Con International, the giant annual gathering for fans of comics and science-fiction entertainment that has become a major event on Hollywood's calendar. Called D23 Expo, Disney's show will include elaborate pavilions where the company's theme park, movie studio, television and consumer products branches will promote their wares — both existing and planned. Over 30,000 people are expected to attend.
It's an overt sales pitch for the Disney brand, already considered one of the strongest in the world. But the company is also keenly aware that the Internet has given consumers added muscle in determining public sentiment — over 1,000 blogs parse all things Disney — and is trying to "superserve" that constituency.
D23 is the brainchild of the company's public relations branch. (The 23 is short for 1923, the year Walt Disney opened his California studio.) Disney will auction a handful of items in conjunction with the exhibition, including animation cels from films like "The Jungle Book," a pirate galleon vehicle from the Peter Pan's Flight ride at Disneyland and props from "High School Musical 3: Senior Year."
The event is also emblematic of a philosophical shift at Disney. In previous decades the company's point of view was imperious: we are the great and powerful Disney, and we will tell families how best to spend their leisure time. That approach made some consumers resentful, a sentiment that a new executive team has spent recent years working to soothe. Moreover, Disney now feels competition from Nickelodeon and DreamWorks Animation, among others.

The archives are a good example of the attitude change. The company has given independent researchers access and has occasionally lent or donated items. The Smithsonian Institution has one of Disneyland's famous teacups, for instance. But most of the trove has been almost entirely hidden from the public.
Ms. Cline estimates that 80 percent of the collection, which the company says contains over a million items, has never been exhibited. That mandate partly came from Walt Disney himself, who died in 1966: we do not talk about how we make the magic.
The holdings were even a bit of a mystery to Robert A. Iger, who became Disney's chief executive four years ago. He toured the archive after taking over and was surprised at what he found. The 92-item exhibition may ultimately be mounted as a traveling show, similar to what Warner Brothers is doing with its successful tour of "Harry Potter" props.
"It became increasingly apparent that the crown jewels of eight decades of Disney history needed to be shared with the world," Mr. Iger said in an e-mail message.
Ms. Cline and her seven archives colleagues are still trying to catalog everything, while crossing their fingers that some vanished items, like the carpetbag that Julie Andrews carried in "Mary Poppins," will turn up. ("In decades past, studios either threw this stuff away or let it walk off the lot — it just wasn't deemed important," said Tim Luke, a memorabilia dealer in Hobe Sound, Fla., who organized sales that included Disneyana when working at Christie's in the 1990s.)
Since Mr. Iger put a renewed focus on the collection, archivists have added about 15,000 items, partly by combing through storerooms. They discovered Walt Disney's travel trunks from the 1930s (he often gave his old personal items to the props department) and a matronly dress Bette Davis wore in the 1978 film "Return From Witch Mountain."
One particularly good find was a costume used to prepare "Pinocchio" in 1940. (The studio shot footage of costumed actors pantomiming action in the script so animators could study their movements.) It was rotting off its hanger in the back of a wardrobe building.
"Sometimes we have to get really down and dirty," Ms. Cline said, recalling the time she and a colleague donned hard hats and dust masks to salvage items at a Walt Disney World ride being refurbished.
Less arduous was a recent trip to George Lucas's compound in Northern California. Ms. Cline flew there to fetch the white leather uniform Michael Jackson wore in "Captain EO," the film that was a 1980s-era attraction at Disney's parks. Mr. Lucas, who produced and was a co-writer of the mini-movie, agreed to lend the costume for the D23 exhibition after Jackson's death.
But much of Ms. Cline's attention has been focused on the "Sleeping Beauty" storybook. With its hammered brass cover and hand-painted pages, the prop cost about $1,500 to make (or $11,000, when adjusted for inflation). Time has not been kind, however, and some of the colored-glass frills need repair. Ms. Cline will hand carry the book to the Anaheim Convention Center. "It's not just a movie prop — it's part of our bedrock," she said.

http://www.nytimes.com/2009/09/09/movies/09archive.html?th&emc=th

UK 'could face blackouts by 2016'

By Roger Harrabin
Environment analyst, BBC News

The government's new energy adviser says the UK could face blackouts by 2016 because green energy is not coming on stream fast enough.

Ministers have previously denied that the UK is heading for an energy gap.

But David MacKay, who takes up his post at the Department of Energy on 1 October, says that the public keep objecting to energy projects.

This, he says, is creating a huge problem, which could turn out the lights.

Professor MacKay is a researcher at Cambridge University.

His recent book, Sustainable Energy - Without The Hot Air, won applause for its examination of current government plans to keep the lights on whilst also cutting carbon emissions.

It concluded that policy is moving in the right direction, but the sums on energy provision simply do not add up - not enough power capacity is being built.

Speaking unofficially, he told BBC News that this meant that Britain could face blackouts in 2016 - when coal and nuclear stations are phased out.

"There is a worry that in 2016 there might not be enough electricity. My guess is that what the market might do is fix that problem by making more gas power stations, which isn't the direction we want to be going in," he said.

"So we really should be upping the build rate of the alternatives as soon as possible."

Professor MacKay blamed the public for opposing wind farms, nuclear power, and energy imports, whilst demanding an unchanged lifestyle.

You cannot oppose them all, he said, and hope to have a viable policy on energy and climate change.

HAVE YOUR SAY Blackouts might make people realise we need to invest in modern nuclear power stations and other means of clean fuel Andrew Lye, Pembrokeshire

"We've got to stop saying no to these things and understand that we do have a serious building project on our hands," he said.

Professor MacKay said he looked forward to engaging the public in a more open debate about what he calls the realities of energy policy when he takes up his post.

His says his new masters in Department of Energy and Climate Change have impressive commitment to solve the issues.

Professor MacKay's many supporters will hope that he is allowed to continue speaking openly to the public after he takes office.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8249540.stm

Published: 2009/09/11 00:40:01 GMT

No change in health gap from 1900

The link between poverty and early death is as strong today as it was a century ago, a study shows.

Despite major changes in the causes of death since the 1900s, the association between deprivation and mortality remains "firmly entrenched", it found.

It is possible that the health effects of poverty have passed through the generations, wrote Dr Ian Gregory in the British Medical Journal.

One public health expert said inequalities may have even got worse.

" **The extent to which the association remained was surprising** "
Dr Ian Gregory, study author

Dr Gregory, a senior lecturer at the University of Lancaster, looked at census and mortality data from England and Wales from the 1900s and compared that with data from 2001.

His figures highlight the dramatic improvement seen in early deaths over the past one hundred years.

In the 1900s, 33% of deaths occurred in the under fives and only 13% occurred over the age of 75 but a century later deaths in the under fives account for less than 1% and 65% of deaths now occur in those over 75.

Life expectancy has also improved, rising from 46 to 77 in men and 50 to 81 in women.

He also found that the causes of death had changed markedly with respiratory, infectious and parasitic diseases heading the table in the 1900s compared with cancer, heart disease and stroke in 2001.

Poverty

Dr Gregory then compared the mortality rates in areas of high deprivation in the two time periods.

Although people's experience of poverty changed over the years - in the 1900s it meant not having the bare necessities for existence but a century later poverty is defined as relative to society as a whole - the association between deprivation and high mortality did not change.

This is despite widescale reforms such as the introduction of the NHS and social security in addition to large rises in standards of living and huge advances in medicine, he said.

He added that patterns from the Edwardian era are still strong predictors of ill health today.

"The extent to which the association remained was surprising," he said.

But he said it did not necessarily mean that initiatives to reduce health inequalities had not had an effect.

"The unknown factor is what would have happened if we hadn't done anything - could things have got much much worse - and I suspect they could have done.

Professor Alan Maryon-Davis, President of the Faculty of Public Health said to some extent the gap may have got even worse in recent years.

"In the 1900s, it would have been infectious diseases but now it's more about chronic diseases linked to lifestyle.

"The health threats may have changed, but the gap between the haves and have-nots is still there, and so too is the difference in mortality.

"This research really drives home the message that the surest way to reduce the health risks of poverty, is to reduce poverty itself."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8249092.stm

Published: 2009/09/11 02:00:31 GMT

Low self-esteem leads to obesity

Children with self-esteem problems are more likely to be obese as adults, a research team has found.

A study of 6,500 participants in the 1970 British Birth Cohort Study found that 10-year-olds with lower self esteem tended to be fatter as adults.

The affect was particularly true for girls, researchers from King's College London reported.

One obesity expert said the results highlighted that early intervention was key to tackling obesity.

" **This is not about people with deep psychological problems, all the anxiety and low self-esteem were within the normal range** "
Professor David Collier, King's College London

The children had their weight and height measured by a nurse at the age of 10 and they self-reported when they were 30.

Their emotional states were also noted, the researchers reported in the journal BMC Medicine.

Children with a lower self-esteem, those who felt less in control of their lives, and those who worried often were more likely to gain weight over the next 20 years, the results showed.

Professor David Collier, who led the research, said: "What's novel about this study is that obesity has been regarded as a medical metabolic disorder - what we've found is that emotional problems are a risk factor for obesity.

"This is not about people with deep psychological problems, all the anxiety and low self-esteem were within the normal range."

Strategies

Another researcher, Andrew Ternouth, said: "While we cannot say that childhood emotional problems cause obesity in later life, we can certainly say they play a role, along with factors such as parental weight, diet and exercise.

"Strategies to promote the social and emotional aspects of learning, including the promotion of self-esteem, are central to a number of recent policy initiatives.

"Our findings suggest that approaches of this kind may carry positive benefits for physical health as well as for other aspects of children's development."

Dr Ian Campbell, of the charity, Weight Concern, said: "This study presents some disturbing evidence that, as we suspected, childhood psychological issues have an influence on future weight gain and health.

"Many of the adults we work with have identifiable underlying emotional and self esteem issues and are often resistant to treatment.

"The message here is that early intervention, in childhood, can be the key to combating adult obesity.

"That requires much more than health practitioners can deliver alone and needs greater alertness from parents, teachers, and anyone involved in the welfare of children."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8248768.stm

Published: 2009/09/11 02:07:07 GMT

September 9, 2009

World's Largest Solar Plant in China Will Power 3 Million Homes
by Ariel Schwartz

Arizona-based First Solar announced yesterday plans to construct the world's largest solar plant in Ordos, China. When completed in 2019, the 2,000 megawatt Ordos solar farm will produce enough power to provide for **3 million homes**. It's a development that makes China, the second largest energy-using country, one of the biggest players in the solar energy game.

It seems like a new "world's largest solar plant" or "world's most efficient solar cell" is being announced every day, but the Ordos solar farm is an especially big deal–the 25 square mile, multi-billion dollar plant makes other solar projects look tiny by comparison. Other major projects in the works, such as First Solar's 550-megawatt project in California and the US Army's 500 megawatt solar thermal project in the Mojave Desert, don't even come close to matching Ordos.

Still, renewable energy projects get scrapped or pared down all the time. That means it will be worth keeping an eye on Ordos, which is scheduled to begin the first of its four phases of construction in 2010, to see if it is actually completed. If it is, the country that is now the world's biggest polluter could easily also become the world's biggest renewable energy consumer.

http://www.inhabitat.com/2009/09/09/worlds-largest-solar-plant-in-china-will-power-3-million-homes/

Speed Bumps Harvest Electricity from Moving Cars

by Sarah Parsons

Fast food lovers may finally feel a little less guilty about getting greasy burgers. One New Jersey Burger King recently equipped its drive-thru with a speed bump that harvests electricity from cars that pass by. The speed bump is part of a pilot project from New Energy Technologies, and if all goes well, drivers could see energy-harvesting speed bumps at drive-thrus, toll plazas and even shopping centers.The speed bumps, or "MotionPower Energy Harvesters," look much different from your typical concrete humps. The "bump" is actually flat, with long, skinny pedals running across the top. As cars drive over the speed bump, it pushes the pedals down and turns the gears inside. The spinning creates about 2,000 watts of electricity from a car moving at five miles per hour.Energy created by the cars is instantaneous (like solar and wind power), meaning that speed bump developers must also figure out a way to store power for later use. To that end, developers at New Energy Technologies are currently experimenting with mini-flywheels (a device that stores energy by spinning), and also plan to look into supercapacitors and other energy-storing mechanisms. Eventually, once storage is perfected, the speed bumps could be used to power street lamps or even feed power directly to the grid.While the pilot project has seen encouraging results, don't expect to see energy-harvesting speed bumps at your local Mickey D's anytime soon: The devices won't be commercially available til sometime next year. Still, it's intriguing to think that those midnight french fry cravings may help create clean, renewable power.

+ New Energy Technologies

http://www.inhabitat.com/2009/09/08/speed-bumps-harvest-electricity-from-moving-cars/

Netherlands Petting Farm Combines Architecture & Nature

by Beth Shea

Visiting a petting farm or zoo is a classic, treasured event in the life of a child. Interacting with and feeding animals is an enriching way to teach kids about nature while breaking the barriers between animals and humans. Recently nominated for a 2009 World Architecture Festival Award (WAF Award), 70F Architecture's Petting Farm in Almere, Netherlands affords visitors the added bonus of being awed by sustainable architectural design.

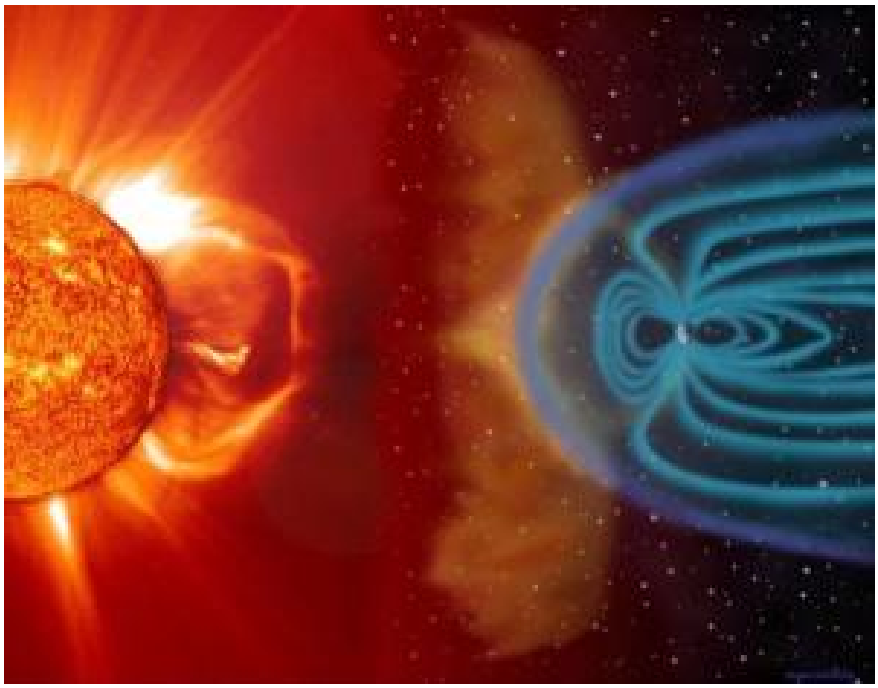
The gorgeously crafted petting farm has no doors – but relies on shutters to usher animals and people in and out. The upper half of the building features an open facade system to continuously ventilate the entire farm. The building itself also 'wakes up and goes to sleep everyday' via shutters that open and close by reacting to the rising and setting sun.

No strangers to designing amazing spaces for animals, 70F's Sheep Stable won the WAF Award in 2008 for the 'World's Best Pleasure Building.' WAF Awards judges noted that, "The architects had to design a modest building to house a small flock of sheep in a park near the city that could also receive visitors for education purposes… the construction uses a clear curved steel structure clad in wood and the building's form suggests references to the local vernacular and manufacturing techniques."

via Archinect

http://www.inhabitots.com/2009/09/03/award-winning-netherlands-petting-farm-combines-architecture-nature/

Surprise In Earth's Upper Atmosphere: Mode Of Energy Transfer From The Solar Wind



In addition to emitting electromagnetic radiation, the sun emits a stream of ionized particles called the solar wind that affects Earth and other planets in the solar system. (Credit: SOHO image composite by Steele Hill (NASA))

ScienceDaily (Sep. 11, 2009) — UCLA atmospheric scientists have discovered a previously unknown basic mode of energy transfer from the solar wind to the Earth's magnetosphere. The research, federally funded by the National Science Foundation, could improve the safety and reliability of spacecraft that operate in the upper atmosphere.

"It's like something else is heating the atmosphere besides the sun. This discovery is like finding it got hotter when the sun went down," said Larry Lyons, UCLA professor of atmospheric and oceanic sciences and a co-author of the research, which is in press in two companion papers in the *Journal of Geophysical Research*.

The sun, in addition to emitting radiation, emits a stream of ionized particles called the solar wind that affects the Earth and other planets in the solar system. The solar wind, which carries the particles from the sun's magnetic field, known as the interplanetary magnetic field, takes about three or four days to reach the Earth. When the charged electrical particles approach the Earth, they carve out a highly magnetized region — the magnetosphere — which surrounds and protects the Earth.

Charged particles carry currents, which cause significant modifications in the Earth's magnetosphere. This region is where communications spacecraft operate and where the energy releases in space known as substorms wreak havoc on satellites, power grids and communications systems.

The rate at which the solar wind transfers energy to the magnetosphere can vary widely, but what determines the rate of energy transfer is unclear.

"We thought it was known, but we came up with a major surprise," said Lyons, who conducted the research with Heejeong Kim, an assistant researcher in the UCLA Department of Atmospheric and Oceanic Sciences, and other colleagues.

"This is where everything gets started," Lyons said. "Any important variations in the magnetosphere occur because there is a transfer of energy from the solar wind to the particles in the magnetosphere. The first critical step is to understand how the energy gets transferred from the solar wind to the magnetosphere."

The interplanetary magnetic field fluctuates greatly in magnitude and direction.

"We all have thought for our entire careers — I learned it as a graduate student — that this energy transfer rate is primarily controlled by the direction of the interplanetary magnetic field," Lyons said. "The closer to southward-pointing the magnetic field is, the stronger the energy transfer rate is, and the stronger the magnetic field is in that direction. If it is both southward and big, the energy transfer rate is even bigger."

However, Lyons, Kim and their colleagues analyzed radar data that measure the strength of the interaction by measuring flows in the ionosphere, the part of Earth's upper atmosphere ionized by solar radiation. The results surprised them.

"Any space physicist, including me, would have said a year ago there could not be substorms when the interplanetary magnetic field was staying northward, but that's wrong," Lyons said. "Generally, it's correct, but when you have a fluctuating interplanetary magnetic field, you can have substorms going off once per hour.

"Heejeong used detailed statistical analysis to prove this phenomenon is real. Convection in the magnetosphere and ionosphere can be strongly driven by these fluctuations, independent of the direction of the interplanetary magnetic field."

Convection describes the transfer of heat, or thermal energy, from one location to another through the movement of fluids such as liquids, gases or slow-flowing solids.

"The energy of the particles and the fields in the magnetosphere can vary by large amounts. It can be 10 times higher or 10 times lower from day to day, even from half-hour to half-hour. These are huge variations in particle intensities, magnetic field strength and electric field strength," Lyons said.

The magnetosphere was discovered in 1957. By the late 1960s, it had become accepted among scientists that the energy transfer rate was controlled predominantly by the interplanetary magnetic field.

Lyons and Kim were planning to study something unrelated when they made the discovery.

"We were looking to do something else, when we saw life is not the way we expected it to be," Lyons said. "The most exciting discoveries in science sometimes just drop in your lap. In our field, this finding is pretty earth-shaking. It's an entire new mode of energy transfer, which is step one. The next step is to understand how it works. It must be a completely different process."

The National Science Foundation has funded ground-based radars which send off radio waves that reflect off the ionosphere, allowing scientists to measure the speed at which the ions in the ionosphere are moving.

The radar stations are based in Greenland and Alaska. The NSF recently built the Poker Flat Research Range north of Fairbanks.

"The National Science Foundation's radars have enabled us to make this discovery," Lyons said. "We could not have done this without them."

The direction of the interplanetary magnetic field is important, Lyons said. Is it going in the same direction as the magnetic field going through the Earth? Does the interplanetary magnetic field connect with the Earth's magnetic field?

"We thought there could not be strong convection and that the energy necessary for a substorm could not develop unless the interplanetary magnetic field is southward," Lyons said. "I've said it and taught it. Now I have to say, 'But when you have these fluctuations, which is not a rare occurrence, you can have substorms going off once an hour.'"

Lyons and Kim used the radar measurements to study the strength of the interaction between the solar wind and the Earth's magnetosphere.

One of their papers addresses convection and its affect on substorms to show it is a global phenomenon.

"When the interplanetary magnetic field is pointing northward, there is not much happening, but when the interplanetary magnetic field is southward, the flow speeds in the polar regions of the ionosphere are strong. You see much stronger convection. That is what we expect," Lyons said. "We looked carefully at the data, and said, 'Wait a minute! There are times when the field is northward and there are strong flows in the dayside polar ionosphere.'"

The dayside has the most direct contact with the solar wind.

"It's not supposed to happen that way," Lyons said. "We want to understand why that is."

"Heejeong separated the data into when the solar wind was fluctuating a lot and when it was fluctuating a little," he added. "When the interplanetary magnetic field fluctuations are low, she saw the pattern everyone knows, but when she analyzed the pattern when the interplanetary magnetic field was fluctuating strongly, that pattern completely disappeared. Instead, the strength of the flows depended on the strength of the fluctuations.

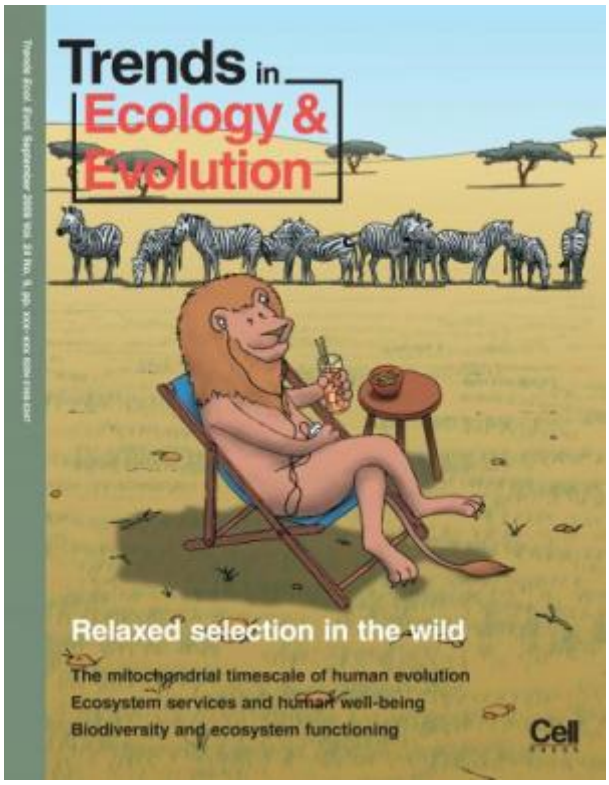
"So rather than the picture of the connection between the magnetic field of the sun and the Earth controlling the transfer of energy by the solar wind to the Earth's magnetosphere, something else is happening that is equally interesting. The next question is discovering what that is. We have some ideas of what that may be, which we will test."

Co-authors on the papers include colleagues at Chungbuk National University in South Korea and SRI International in Menlo Park, Calif.

Adapted from materials provided by University of California - Los Angeles. Original article written by Stuart Wolpert.

http://www.sciencedaily.com/releases/2009/09/090910091337.htm

Evolutionary Fate Of 'Useless' Traits: Why Some Traits Break Down Quickly While Others Persist Over Time



This is a cartoon version of relaxed selection, as featured in the September 2009 issue of the journal TREE (Lahti, D. C., N. A. Johnson, et al. [2009]). (Credit: Cover design by Philip Patenall)

ScienceDaily (Sep. 11, 2009) — What happens when traits no longer give creatures a competitive edge?

Some subterranean animals that live in darkness function perfectly well without eyesight, for example. And the tiny leg bones buried in the backs of whales — left over from their land-dwelling ancestors — don't get much action in the ocean.

In a recent review, researchers teamed up to take a closer look at the evolutionary fate of useless traits. Supported by the National Evolutionary Synthesis Center (NESCent) in Durham, NC, their aim was to examine what happens to traits that are no longer needed. "Just about everybody who thinks about trait evolution focuses on traits that are beneficial," writes first author David Lahti, a biologist at Queens College. "But few people think about traits that are useless, or that are becoming less useful over time."

For example, the ability to recognize and flee from enemies becomes less critical in predator-free habitats. "There are many examples of animals that were once subject to predation, but have since been introduced to areas where predators are absent or have been killed off," Lahti says. In these cases, studies show that traits which were once key to survival – vigilance, caution, speed and agility – start to erode over time. "Things like alertness, having to run fast, having to fly — many predator avoidance traits end up being useless to those animals," Lahti says.

Under an evolutionary phenomenon called relaxed selection, traits that were advantageous in one time and place become obsolete in another. Traits that aren't actively maintained by natural selection tend to become smaller or less functional over time, studies suggest. The researchers wanted to know why some traits break down quickly, while others take longer to go away. "All traits will eventually disappear if

they have no function," Lahti explains. "The question we're asking now is: how do you know how fast that will happen?"

To answer this question, the researchers scoured the literature for examples of relaxed selection. After reviewing more than 80 studies spanning nearly 150 years of research, they pinpointed several factors that determine how quickly traits are lost. "Numerous cases of trait loss illustrate that evolution isn't necessarily progressive," says co-author Norman Johnson of the University of Massachusetts. "It seems that not all the same evolutionary rules are followed when you're losing a trait as when you're gaining it," Lahti adds.

Traits that are energetically expensive to develop or maintain tend to be phased out more quickly, they found. The threespine stickleback, for instance, is a little fish that evolved body armor to help protect itself from predators. Sticklebacks require a lot of energy and minerals to build armor, Lahti explains. When these fish are introduced to predator-free lakes where their bony plates aren't needed anymore, individuals that avoid wasting valuable energy on useless armor fare better over time. The result? Populations that are safe from predators lose their armor over the generations. "The biggest reason why a trait goes away quickly is because it's costly," Lahti says.

Rapid trait loss is also more likely when it involves relatively simple genetic changes, studies reveal. For example, many cave-dwelling creatures such as crickets and cavefish lose their eyesight as they adapt to life in the dark. "Until very recently, we didn't know anything about the genetics or development of eyes in cave fish," Lahti explains. "People assumed it happened in successive small steps, over a long period of time." But recent research on the genetics of eye development in these animals suggests that a small number of genes play a big role in blindness. "Until modern genetic techniques we never would have guessed that these big changes in the eyes could happen by such minor genetic changes," Lahti says.

By studying relaxed selection in plants and animals in the wild, the authors hope to understand the consequences for humans as well. Advances in medicine and technology shelter humans from many sources of selection that acted in the past, Lahti explains. This might allow traits that were helpful to our ancestors to fade away over time. "Modern technology insulates us from selection in many ways," Lahti says. "It's a valid question to ask what the effects of this are likely to be."

Additional collaborators on the study include Beverly Ajie, Sarah Otto, Andrew Hendry, Daniel Blumstein, Richard Coss, Kathleen Donohue, and Susan Foster.

The team's findings were published in the September 2009 issue of Trends in Ecology and Evolution (TREE).

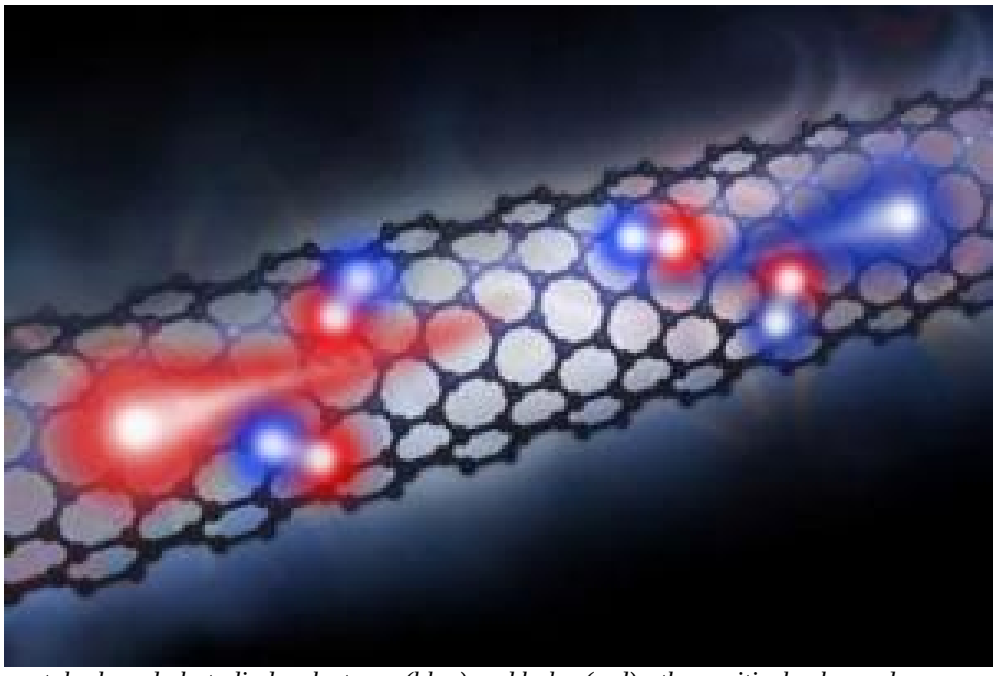
Journal reference:

1. Lahti, D. C., N. A. Johnson, et al. **Relaxed selection in the wild**. *Trends in Ecology and Evolution*, 2009; 24(9): 487-496 DOI: 10.1016/j.tree.2009.03.010

Adapted from materials provided by National Evolutionary Synthesis Center (NESCent), via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/09/090908103904.htm

Carbon Nanotubes Could Make Efficient Solar Cells



In a carbon nanotube-based photodiode, electrons (blue) and holes (red) - the positively charged areas where electrons used to be before becoming excited - release their excess energy to efficiently create more electron-hole pairs when light is shined on the device. (Credit: Nathan Gabor)

ScienceDaily (Sep. 11, 2009) — Using a carbon nanotube instead of traditional silicon, Cornell researchers have created the basic elements of a solar cell that hopefully will lead to much more efficient ways of converting light to electricity than now used in calculators and on rooftops.

The researchers fabricated, tested and measured a simple solar cell called a photodiode, formed from an individual carbon nanotube. Reported online Sept. 11 in the journal *Science*, the researchers -- led by Paul McEuen, the Goldwin Smith Professor of Physics, and Jiwoong Park, assistant professor of chemistry and chemical biology -- describe how their device converts light to electricity in an extremely efficient process that multiplies the amount of electrical current that flows. This process could prove important for next-generation high efficiency solar cells, the researchers say.

"We are not only looking at a new material, but we actually put it into an application -- a true solar cell device," said first author Nathan Gabor, a graduate student in McEuen's lab.

The researchers used a single-walled carbon nanotube, which is essentially a rolled-up sheet of graphene, to create their solar cell. About the size of a DNA molecule, the nanotube was wired between two electrical contacts and close to two electrical gates, one negatively and one positively charged. Their work was inspired in part by previous research in which scientists created a diode, which is a simple transistor that allows current to flow in only one direction, using a single-walled nanotube. The Cornell team wanted to see what would happen if they built something similar, but this time shined light on it.

Shining lasers of different colors onto different areas of the nanotube, they found that higher levels of photon energy had a multiplying effect on how much electrical current was produced.

Further study revealed that the narrow, cylindrical structure of the carbon nanotube caused the electrons to be neatly squeezed through one by one. The electrons moving through the nanotube became excited and created new electrons that continued to flow. The nanotube, they discovered, may be a nearly ideal

photovoltaic cell because it allowed electrons to create more electrons by utilizing the spare energy from the light.

This is unlike today's solar cells, in which extra energy is lost in the form of heat, and the cells require constant external cooling.

Though they have made a device, scaling it up to be inexpensive and reliable would be a serious challenge for engineers, Gabor said.

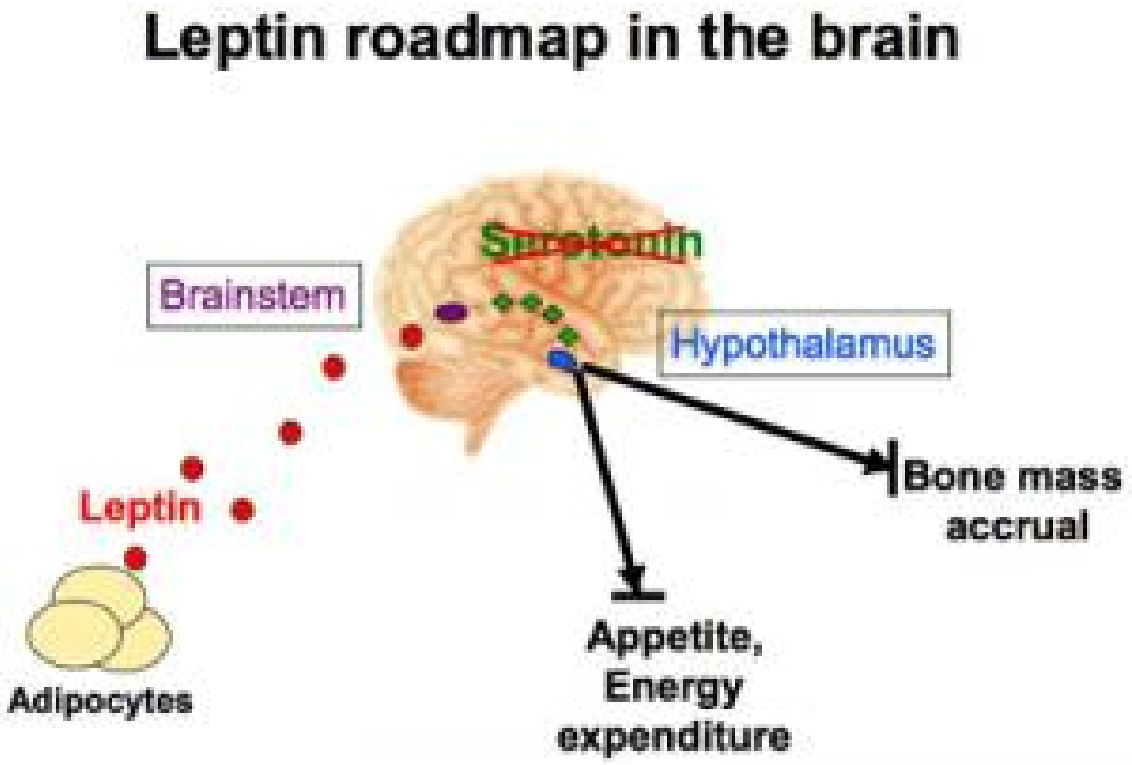
"What we've observed is that the physics is there," he said.

The research was supported by Cornell's Center for Nanoscale Systems and the Cornell NanoScale Science and Technology Facility, both National Science Foundation facilities, as well as the Microelectronics Advanced Research Corporation Focused Research Center on Materials, Structures and Devices. Research collaborators also included Zhaohui Zhong, of the University of Michigan, and Ken Bosnick, of the National Institute for Nanotechnology at University of Alberta.

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

http://www.sciencedaily.com/releases/2009/09/090910151927.htm

Roadmap Of Leptin Explains Its Regulation Of Bone And Appetite: New Clues For Obesity And Osteoporosis Prevention



This figure (Figure 7 from Cell paper) is a schematic representation of the pathway used by leptin in the brain to inhibit both bone mass accrual and appetite. It has been assumed that leptin acts in the hypothalamus to regulate these two functions, but inactivation of the leptin receptor in hypothalamic neurons affects neither bone mass nor appetite. This suggests that in fact leptin does not act in the hypothalamus. In this issue of Cell, Yadav et al. show that leptin regulates these two physiological functions by inhibiting serotonin synthesis and release in brainstem, which acts in the hypothalamus through three serotonin receptors (Htr1a, 2b and 2C) present on specific nuclei. These results modify the map of leptin signaling in the brain and indicate that the serotonergic neurons exert a more fundamental influence on several homeostatic functions than previously thought. (Credit: Columbia University Medical Center)

ScienceDaily (Sep. 11, 2009) — New research from Columbia University Medical Center has illuminated a previously unknown leptin-serotonin pathway in the brain that simultaneously promotes appetite and bone mass accrual. The research, which explains how leptin – well-known appetite-suppressing hormone – acts in the brain, is published in the Sept. 4 issue of *Cell*.

When the leptin-serotonin pathway is turned on in mice, the researchers found, appetite increases, the animals eat more, gain weight, and their bone mass increases. When the pathway is turned off, mice eat less, lose weight, and their bones weaken. Furthermore, leptin was found to not act in the hypothalamus as previously thought, but in the brain stem acting on serotonin, a hormone that in the brain acts to control appetite, mood and anger.

The identification of this pathway helps explain why, as doctors have long known, obese people tend to have a significantly lower prevalence of osteoporosis, says the study's senior author, Gerard Karsenty, M.D., Ph.D., chair of the Department of Genetics & Development at Columbia University's College of Physician and Surgeons. Though obese people produce high levels of leptin, they are resistant, or unresponsive, to its signals – instead, they operate in a false state of leptin deficiency, which increases serotonin – and thereby, appetite and bone mass. Dr. Karsenty points out that these current findings may

have more influence on developing a new way to reduce appetite and obesity than preventing osteoporosis.

"It will be difficult to turn on the pathway to strengthen bone without increasing appetite at the same time," Dr. Karsenty said. "But this finding shows that it is feasible to alter parts of the leptin-serotonin pathway to decrease appetite without weakening bone."

Hormone Leptin Supresses Bone Formation By Shutting Off Serotonin

Dr. Karsenty and his colleagues discovered this pathway after first noticing the powerful effect of leptin – known for suppressing appetite – on bone mass accrual. Dr. Karsenty previously discovered that leptin is the most powerful inhibitor of bone formation in the body. This new study reveals that high levels of leptin suppress bone formation by shutting off the synthesis of serotonin in certain neurons in the brainstem.

Dr. Karsenty and his colleagues were surprised to observe that increased serotonin in the brainstem also increased appetite in mice. "We previously thought that leptin's modes of action on appetite and bone mass accrual were distinct," Dr. Karsenty said. "But we found instead that they behave more like twins – taking the same pathway through the brainstem. This correlates strikingly with the fact that leptin appears during evolution of bone cells when bone is first formed in the body."

Dr. Karsenty's team found that the appetite and bone pathways diverge once serotonin is released: one set of serotonin receptors turns on appetite, while a second increases bone mass accrual.

The findings may open the door for weight loss drugs that have no side effects on bone density.

"Theoretically, one can imagine that a drug that blocks only the appetite receptors, but not the bone receptors, could help people lose weight without losing bone mass," Dr. Karsenty said.

Dr. Karsenty explained the surprising link between appetite and the skeleton by noting that the pathway monitors the amount of energy available to maintain bone.

"Our bones are constantly broken down and rebuilt during our lifetimes, and those renovations require an enormous and daily supply of energy," he said.

Discovery Clarifies Previous Research; Adds To Work On Bone

In November 2008, Dr. Karsenty published a paper in *Cell*, which describes how serotonin released from the gut controls bone formation. Unlike the brain's serotonin, an increase in gut serotonin impairs bone formation.

Dr. Karsenty's new research shows that while both derivations of serotonin influence bone mass, the brain's serotonin dominates the effect of serotonin from the gut.

Leptin-serotonin Pathway May Also Explain Osteoporosis/Anti-depressant Link

In some studies, selective serotonin reuptake inhibitors (SSRIs), which are commonly used to treat depression, have been associated with osteoporosis in some patients.

SSRIs enhance the action of serotonin, and depending on the person, that may lead to weakened, or strengthened bones, says study co-author J. John Mann, M.D., Ph.D., professor of translational neuroscience (in psychiatry and in radiology) and vice chair for Research in the Department of Psychiatry at Columbia University Medical Center and the New York State Psychiatric Institute.

"SSRIs work in the brain and in the gut, but in some people they may work more strongly in the gut," Dr. Mann said. "In that case, SSRIs could lead to a decrease in bone growth and osteoporosis."

The hope is that these research findings will help explain this phenomena and lead to potential treatment for this side effect.

Journal reference:

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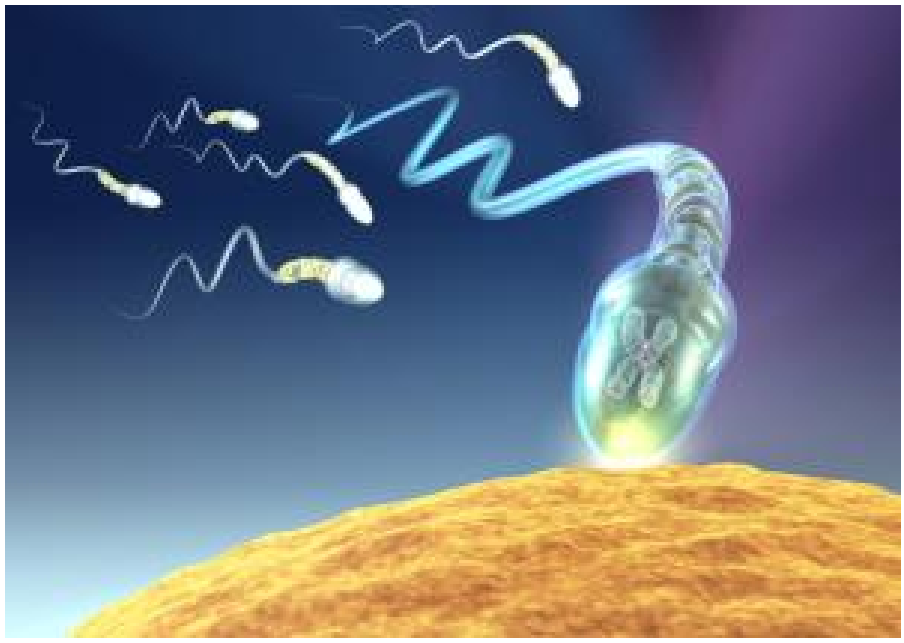
http://www.sciencedaily.com/releases/2009/09/090903163552.htm

Infertility And The Battle Of The Sexes: Evolutionary Explanation For Today's Fertility Problems?



Sperm meets egg. A researcher in Israel believes that high rates of human infertility may have an evolutionary cause. (Credit: iStockphoto/Axel Kock)

ScienceDaily (Sep. 10, 2009) — About 10% of all couples hoping for a baby have fertility problems. Environmentalists say pollution is to blame and psychiatrists point to our stressful lifestyles, but evolutionary biologist Dr. Oren Hasson of Tel Aviv University's Department of Zoology offers a different take. The reproductive organs of men and women are currently involved in an evolutionary arms race, he reports in a new study. And the fight isn't over yet.

"The rate of human infertility is higher than we should expect it to be," says Dr. Hasson. "By now, evolution should have improved our reproductive success rate. Something else is going on." Combining empirical evidence with a mathematical model developed in cooperation with Prof. Lewi Stone of the department's Biomathematics Unit, the researchers suggest that the bodies of men and women have become reproductive antagonists, not reproductive partners. The conclusions of this research were published recently in the journal *Biological Reviews*.

Favoring the "super-sperm"

Over thousands of years of evolution, women's bodies have forced sperm to become more competitive, rewarding the "super-sperm" — the strongest, fastest swimmers — with penetration of the egg. In response, men are over-producing these aggressive sperm, producing many dozens of millions of them to increase their chances for successful fertilization.

But these evolutionary strategies demonstrate the Law of Unintended Consequences as well, says Dr. Hasson. "It's a delicate balance, and over time women's and men's bodies fine tune to each other. Sometimes, during the fine-tuning process, high rates of infertility can be seen. That's probably the reason for the very high rates of unexplained infertility in the last decades."

The unintended consequences have much to do with timing. The first sperm to enter and bind with the egg triggers biochemical responses to block other sperm from entering. This blockade is necessary because a second penetrating sperm would kill the egg. However, in just the few minutes it takes for the

blockade to complete, today's over-competitive sperm may be penetrating, terminating the fertilization just after it's begun.

Sexual evolution explained

Women's bodies, too, have been developing defenses to this condition, known as "polyspermy." "To avoid the fatal consequences of polyspermy, female reproductive tracts have evolved to become formidable barriers to sperm," says Dr. Hasson. "They eject, dilute, divert and kill spermatozoa so that only about a single spermatozoon gets into the vicinity of a viable egg at the right time."

Any small improvement in male sperm efficiency is matched by a response in the female reproductive system, Dr. Hasson argues. "This fuels the 'arms race' between the sexes and leads to the evolutionary cycle going on right now in the entire animal world."

Advice for doctors and marriage counselors

Sperm have also become more sensitive to environmental stressors like anxious lifestyles or polluted environments. "Armed only with short-sighted natural selection," Dr. Hasson argues, "nature could not have foreseen those stressors. This is the pattern of any arms race. A greater investment in weapons and defenses entails greater risks and a more fragile equilibrium."

Dr. Hasson says that IVF specialists can optimize fertility odds by more carefully calculating the number of sperm placed near the female ova. And nature itself may have its say as well. Sexually adventurous women, like females of many birds and mammals who raise their offspring monogamously but take on other sexual partners, help create a more fertile future. But not always, says Hasson and Stone's mathematical model — certain types of infertile sperm race to the egg as competitively as any healthy sperm, and may block the sperm of a fertile lover.

But whatever the source of infertility, Dr. Hasson, who also works as a marriage counselor, can't recommend cheating, not even as an evolutionary psychologist. Infertile marriages can be stressful, but unlike birds, we have the capacity for rational thinking. He advises infertile couples to openly communicate about all their options, and seek counseling if necessary.

Adapted from materials provided by American Friends of Tel Aviv University.

http://www.sciencedaily.com/releases/2009/09/090908125137.htm

You Can Believe Your Eyes: New Insights Into Memory Without Conscious Awareness

New findings may shed light on the role of the hippocampus in memory and awareness, as they suggest that even when people fail to recollect a past event, the hippocampus might still support an expression of memory through eye movements. (Credit: iStockphoto)

ScienceDaily (Sep. 10, 2009) — Scientists may have discovered a way to glean information about stored memories by tracking patterns of eye movements, even when an individual is unable (or perhaps even unwilling) to report what they remember. The research, published by Cell Press in the September 10th issue of the journal *Neuron*, provides compelling insight into the relationship between activity in the hippocampus, eye movements, and both conscious and unconscious memory.

The hippocampus is a brain region that is critical for conscious recollection of past events but the precise role of this area in memory remains controversial. According to one theory, even if explicit retrieval fails, the hippocampus might still support expressions of relational memory (e.g., memory for the co-occurrence of items in the context of some scene or event) when sensitive, indirect testing methods are used.

To test this theory, Drs. Deborah Hannula and Charan Ranganath, both from the Center for Neuroscience at the University of California, Davis, used functional magnetic resonance imaging to examine participants' brain activity while they attempted to remember previously studied face-scene pairings. During scanning, participants were shown a previously studied scene along with three previously studied faces and were asked to identify the face that had been paired with that scene earlier. Eye movements were also monitored during the task and provided an indirect measure of memory.

During each test trial, participants frequently spent more time viewing the face that had been previously paired with the scene—an eye-movement-based memory effect. What is more surprising is that hippocampal activity was closely tied to participants' tendency to view the associated face, even when they failed to identify it. Activity in the prefrontal cortex, an area required for decision making, was sensitive to whether or not participants had responded correctly and communication between the prefrontal cortex and the hippocampus was increased during correct, but not incorrect, trials.

The findings may shed light on the role of the hippocampus in memory and awareness, as they suggest that even when people fail to recollect a past event, the hippocampus might still support an expression of memory through eye movements. Furthermore, the results suggest that even when the hippocampus is doing its job, conscious memory may depend on interactions between the hippocampus and the prefrontal cortex.

One implication of the results is that eye movements might be used to indirectly assess memory and hippocampal function in cognitively impaired patients, children, or others who might have difficulty with conventional memory tests. More intriguing is the possibility that these measures might also track memory in uncooperative individuals. "It is conceivable that eye-tracking could be used to obtain information about past events from participants who are unaware or attempting to withhold information," offers Dr. Hannula. "In other words, there may be circumstances in which eye movements provide a more robust account of past events or experiences than behavioral reports alone."

The researchers include Deborah E. Hannula and Charan Ranganath, of the University of California, Davis, Davis, CA.

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

http://www.sciencedaily.com/releases/2009/09/090909122056.htm

Changing The Course Of Nature: Are Fisheries Directing The Evolution Of Fish Populations?

Commercial fishing trawler. (Credit: iStockphoto/Frank Van Haalen)

ScienceDaily (Sep. 10, 2009) — For many of the types of fish we buy in stores or order in restaurants, the chance that an individual dies from fishing is several times higher than dying of natural causes. This may seem obvious to most (they had to get to our table somehow), but what may not be apparent is that the relentless pursuit of consumer-friendly fish product is having a massive impact on fish populations around the world. By repeatedly choosing only the biggest fish, or only those found in certain habitats, the fisheries industry may be permanently altering the genetic composition of fish populations.

What are the long-term evolutionary implications of prolonged fishing for the fish that humans and, perhaps more importantly, diverse ecosystems so depend on? A group of concerned international scientists convened at the 2008 American Fisheries Society Annual Meeting to address this issue, and contributions to the symposium are now available online in an August 2009 special issue of *Evolutionary Applications*.

Several groups of scientists focused on teasing apart how much of the shift in fish morphology, development and behavior that has been documented over the years is due to genetic versus non-genetic changes. Long-term genetic changes may be more problematic since these may not be reversible and they make predicting the composition of fish stocks in the future very difficult. Equally contentious among scientists was distinguishing between changes that were caused by artificial selection due to fishing per se, versus environmental influences such as habitat destruction or climate change.

The articles in the special issue use multiple approaches to address these concerns and together come to the conclusion that in many cases, fish stocks are indeed evolving in response to the artificial selection pressure imposed by fishing. Shifts in yield-determining traits such as growth and maturation are evident, and how quickly these changes manifest depends on the type of fishing gear and the rate of harvest.

Given the uncertainty surrounding the future sustainability of wild fish stocks, fisheries evolution scientists make several key recommendations: protect a portion of the stock through the creation of non-fished marine protected areas, protect late-maturing and slow-growing individuals, and perhaps the most difficult but most effective: fish less.

This Special Issue of *Evolutionary Applications*, 2:3, is available free online at http://www3.interscience.wiley.com/journal/119423602/home.

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

http://www.sciencedaily.com/releases/2009/09/090910091635.htm

Graffiti-free Historic Buildings: Breathable Coating Provides Protection

A polymer coating designed to protect historic buildings from graffiti: its water-vapor permeability allows the building to breathe despite the protective coating. (Credit: Copyright Fraunhofer IAP)

ScienceDaily (Sep. 10, 2009) — Many a historic landmark is defaced with graffiti, but the spray paint can only be removed – if at all – using caustic solutions which risk damaging the underlying surface. A new breathable coating provides efficient, all-round protection against attacks by taggers.

It takes seconds to spray on graffiti, but hours or weeks to remove – especially from porous natural stone or brickwork as found in the majority of historic monuments. The paint penetrates deep into the pores from which it is impossible to remove, even with a pressure hose or multi-component solvents. Often the only answer, other than living with the graffiti, is to etch away a part of the wall.

Special anti-graffiti polymer coatings have been on the market for several years. They create a hydrophobic seal that closes the pores, preventing the paint from adhering to the undersurface and allowing it to be wiped off. But as a result the building can no longer breathe, augmenting the risk of mold development or salt efflorescence. Because they cannot be removed easily, such coatings also run counter to the principles of conservation, which require that any changes must be reversible.

“There are conflicting requirements for this kind of polymer coating – it mustn’t seal the pores, because it is important that there should be a continuous exchange of air between the building and the external environment, and at the same time it has to prevent the spray paint from penetrating the pores. The coating needs to be sufficiently resistant to withstand both weathering and mechanical cleaning. Moreover, since we’re dealing with historic landmarks, it must be possible to completely remove the coating from the walls if required, to restore them to their original condition with little effort and without damaging the structure,” says Professor André Laschewsky, who heads the relevant research group at the Fraunhofer Institute for Applied Polymer Research IAP in Potsdam.

As part of an EU-sponsored project, Laschewsky's team and partners from the Center of Polymer and Carbon Materials of the Polish Academy of Sciences in Gliwice and Zabrze have developed a polymer coating that meets these requirements.

"Our innovative polymer film seals the pores in the substrate, so that graffiti paint doesn't penetrate. But its micro-porous structure also creates a hydrophobic barrier that allows water vapor to escape from the building while at the same time preventing the infiltration of rainwater," says Laschewsky. The coating can be removed from the surface using a diluted brine solution which modifies its chemical composition and allows it to be washed off.

Coordinated by the LABEIN Foundation in Spain and the german Federal Institute for Materials Research and Testing the partners have coated samples of ancient stone and brick and repeatedly covered them with graffiti – which was removed completely each time.

Adapted from materials provided by Fraunhofer-Gesellschaft.

http://www.sciencedaily.com/releases/2009/09/090910084445.htm

Memories Exist Even When Forgotten, Study Suggests

Jeff Johnson of the UCI Center for the Neurobiology of Learning & Memory and colleagues discovered that a person's brain activity while remembering an event is very similar to when it was first experienced, even if specifics can't be recalled. Johnson says brain imaging shines a "searchlight" into the brain. (Credit: Daniel A. Anderson / University Communications)

ScienceDaily (Sep. 10, 2009) — A woman looks familiar, but you can't remember her name or where you met her. New research by UC Irvine neuroscientists suggests the memory exists – you simply can't retrieve it.

Using advanced brain imaging techniques, the scientists discovered that a person's brain activity while remembering an event is very similar to when it was first experienced, even if specifics can't be recalled.

"If the details are still there, hopefully we can find a way to access them," said Jeff Johnson, postdoctoral researcher at UCI's Center for the Neurobiology of Learning & Memory and lead author of the study, appearing Sept. 10 in the journal *Neuron.*

"By understanding how this works in young, healthy adults, we can potentially gain insight into situations where our memories fail more noticeably, such as when we get older," he said. "It also might shed light on the fate of vivid memories of traumatic events that we may want to forget."

In collaboration with scientists at Princeton University, Johnson and colleague Michael Rugg, CNLM director, used functional magnetic resonance imaging to study the brain activity of students.

Inside an fMRI scanner, the students were shown words and asked to perform various tasks: imagine how an artist would draw the object named by the word, think about how the object is used, or pronounce the word backward in their minds. The scanner captured images of their brain activity during these exercises.

About 20 minutes later, the students viewed the words a second time and were asked to remember any details linked to them. Again, brain activity was recorded.

Utilizing a mathematical method called pattern analysis, the scientists associated the different tasks with distinct patterns of brain activity. When a student had a strong recollection of a word from a particular task, the pattern was very similar to the one generated during the task. When recollection was weak or nonexistent, the pattern was not as prominent but still recognizable as belonging to that particular task.

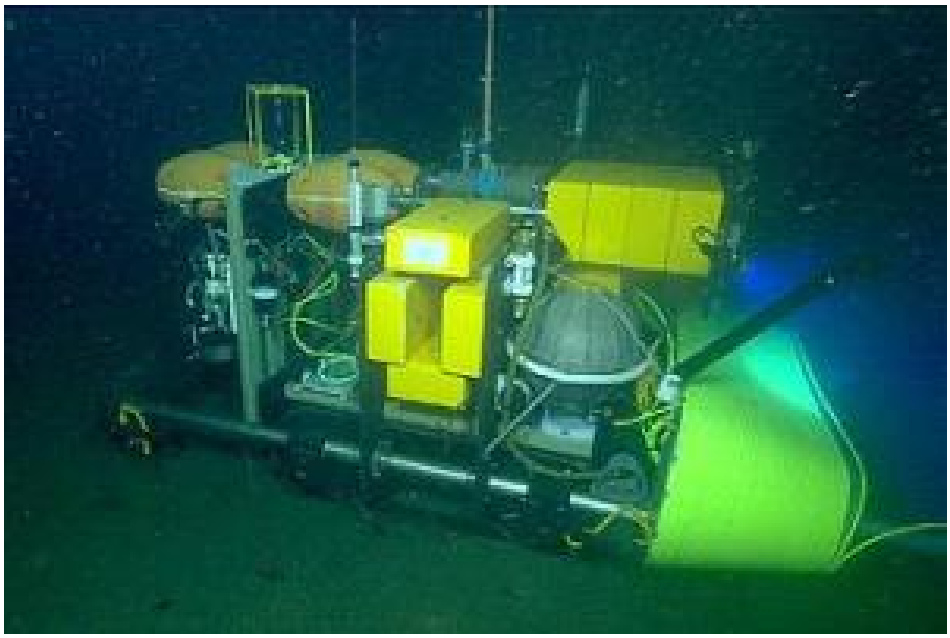
"The pattern analyzer could accurately identify tasks based on the patterns generated, regardless of whether the subject remembered specific details," Johnson said. "This tells us the brain knew something about what had occurred, even though the subject was not aware of the information."

In addition to Johnson and Rugg, Susan McDuff and Kenneth Norman of Princeton worked on the study, funded by the National Institutes of Health.

Adapted from materials provided by University of California - Irvine. Original article written by Jennifer Fitzenberger, University Communications.

http://www.sciencedaily.com/releases/2009/09/090909122100.htm

New Robot Travels Across The Seafloor To Monitor The Impact Of Climate Change On Deep-sea Ecosystems



During July 2009, the Benthic Rover traveled across the seafloor while hooked up to the MARS ocean observatory. This allowed researchers to control the vehicle in "real time." The yellow cable on the right side of the image is a long "extension cord" that unspools as the Rover moves. (Credit: Copyright 2009 MBARI)

ScienceDaily (Sep. 10, 2009) — Like the robotic rovers Spirit and Opportunity, which wheeled tirelessly across the dusty surface of Mars, a new robot spent most of July traveling across the muddy ocean bottom, about 40 kilometers (25 miles) off the California coast. This robot, the Benthic Rover, has been providing scientists with an entirely new view of life on the deep seafloor. It will also give scientists a way to document the effects of climate change on the deep sea. The Rover is the result of four years of hard work by a team of engineers and scientists led by MBARI project engineer Alana Sherman and marine biologist Ken Smith.

About the size and weight of a small compact car, the Benthic Rover moves very slowly across the seafloor, taking photographs of the animals and sediment in its path. Every three to five meters (10 to 16 feet) the Rover stops and makes a series of measurements on the community of organisms living in the seafloor sediment. These measurements will help scientists understand one of the ongoing mysteries of the ocean—how animals on the deep seafloor find enough food to survive.

Most life in the deep sea feeds on particles of organic debris, known as marine snow, which drift slowly down from the sunlit surface layers of the ocean. But even after decades of research, marine biologists have not been able to figure out how the small amount of nutrition in marine snow can support the large numbers of organisms that live on and in seafloor sediment.

The Benthic Rover carries two experimental chambers called "benthic respirometers" that are inserted a few centimeters into the seafloor to measure how much oxygen is being consumed by the community of organisms within the sediment. This, in turn, allows scientists to calculate how much food the organisms are consuming. At the same time, optical sensors on the Rover scan the seafloor to measure how much food has arrived recently from the surface waters.

MBARI researchers have been working on the Benthic Rover since 2005, overcoming many challenges along the way. The most obvious challenge was designing the Rover to survive at depths where the pressure of seawater is about 420 kilograms per square meter (6,000 pounds per square inch). To

withstand this pressure, the engineers had to shield the Rover's electronics and batteries inside custom-made titanium pressure spheres.

To keep the Rover from sinking into the soft seafloor mud, the engineers outfitted the vehicle with large yellow blocks of buoyant foam that will not collapse under extreme pressure. This foam gives the Rover, which weighs about 1,400 kilograms (3,000 pounds) in air, a weight of only about 45 kilograms (100 pounds) in seawater.

Other engineering challenges required less high-tech solutions. In constructing the Rover's tractor-like treads, the design team used a decidedly low-tech material—commercial conveyor belts. After watching the Benthic Rover on the seafloor using MBARI's remotely operated vehicles (ROVs), however, the researchers discovered that the belts were picking up mud and depositing it in front of the vehicle, where it was contaminating the scientific measurements. In response, the team came up with a low-tech but effective solution: they removed the heads from two push brooms and bolted them onto the vehicle so that the stiff bristles would clean off the treads as they rotated.

The team also discovered that whenever the Rover moved, it stirred up a cloud of sediment like the cloud of dust that follows the character "Pig-Pen" in the Charlie Brown comic strip. This mud could have affected the Rover's measurements. To reduce this risk, the engineers programmed the Rover to move very, very slowly—about one meter (3 feet) a minute. The Rover is also programmed to sense the direction of the prevailing current, and only move in an up-current direction, so that any stirred-up mud will be carried away from the front of the vehicle.

In its basic configuration, the Benthic Rover is designed to operate on batteries, without any human input. However, during its month-long journey this summer, the Rover was connected by a long extension cord to a newly-completed underwater observatory. This observatory, known as the Monterey Accelerated Research System (MARS), provided power for the robot, as well as a high-speed data link back to shore.

According to Sherman, "Hooking up the Rover to the observatory opened up a whole new world of interactivity. Usually when we deploy the Rover, we have little or no communication with the vehicle. We drop it overboard, cross our fingers, and hope that it works." In this case, however, the observatory connection allowed MBARI researchers to fine tune the Rover's performance and view its data, videos, and still images in real time. Sherman recalls, "One weekend I was at home, with my laptop on the kitchen table, controlling the vehicle and watching the live video from 900 meters below the surface of Monterey Bay. It was amazing!"Later this fall, the Rover will be sent back down to the undersea observatory site in Monterey Bay for a two-month deployment. Next year the team hopes to take the Rover out to a site about 220 km (140 miles) offshore of Central California. They will let the Rover sink 4,000 meters down to the seafloor, where it will make measurements on its own for six months. The team would also like to take the Rover to Antarctica, to study the unique seafloor ecosystems there. The Rover may also be hooked up to a proposed deep-water observatory several hundred miles off the coast of Washington state.

In addition to answering some key questions of oceanography, the Benthic Rover will help researchers study the effects of climate change in the ocean. As the Earth's atmosphere and oceans become warmer, even life in the deep sea will be affected. The Benthic Rover, and its possible successors, will help researchers understand how deep-sea communities are changing over time.Just as the rovers Spirit and Opportunity gave us dramatic new perspectives on the planet Mars, so the Benthic Rover is giving researchers new perspectives of a dark world that is in some ways more mysterious than the surface of the distant red planet.

Adapted from materials provided by Monterey Bay Aquarium Research Institute.

http://www.sciencedaily.com/releases/2009/09/090909181752.htm

Tornado Threat Increases As Gulf Hurricanes Get Larger

The study predicted exactly the number of hurricanes seen for Hurricane Ike, 33. (Credit: Photo courtesy of NOAA)

ScienceDaily (Sep. 10, 2009) — Tornadoes that occur from hurricanes moving inland from the Gulf Coast are increasing in frequency, according to researchers at the Georgia Institute of Technology. This increase seems to reflect the increase in size and frequency among large hurricanes that make landfall from the Gulf of Mexico.

The findings can be found in *Geophysical Research Letters* online and in print in the September 3, 2009 issue.

"As the size of landfalling hurricanes from the Gulf of Mexico increases, we're seeing more tornadoes than we did in the past that can occur up to two days and several hundred miles inland from the landfall location," said James Belanger, doctoral student in the School of Earth and Atmospheric Sciences at Georgia Tech and lead author of the paper.

Currently, it's well known that when hurricanes hit land, there's a risk that tornadoes may form in the area. Until now, no one has quantified that risk because observations of tornadoes were too sporadic prior to the installation of the NEXRAD Doppler Radar Network in 1995. Belanger along with co-authors Judith Curry, professor and chair of the School of Earth and Atmospheric Sciences at Tech and research scientist Carlos Hoyos, decided to see if they could create a model using the more reliable tornado record that's existed since 1995.

The model that they developed for hurricane-induced tornadoes uses four factors that serve as good predictors of tornado activity: size, intensity, track direction and whether there's a strong gradient of moisture at midlevels in the storm's environment.

"The size of a tropical cyclone basically sets the domain over which tornadoes can form. So a larger storm that has more exposure over land has a higher propensity for producing tornadoes than a smaller one, on average," said Belanger.

The team looked at 127 tropical cyclones from 1948 up to the 2008 hurricane season and went further back to 1920 modifying their model to account for the type of data collected at that time. They found that since 1995 there has been a 35 percent percent increase in the size of tropical cyclones from the Gulf compared to the previous active period of storms from 1948-1964, which has lead to a doubling in the number of tornadoes produced per storm. The number of hurricane-induced tornadoes during the 2004 and 2005 hurricane seasons is unprecedented in the historical record since 1920, according to the model.

"The beauty of the model is that not only can we use it to reconstruct the observational record, but we can also use it as a forecasting tool," said Belanger.

To test how well it predicted the number of tornadoes associated with a given hurricane, they input the intensity of the storm at landfall, it's size, track and moisture at mid-levels, and were able to generate a forecast of how many tornadoes formed from the hurricane. They found that for Hurricane Ike in 2008, their model predicted exactly the number of tornadoes that occurred, 33. For Hurricane Katrina in 2005, the model predicted 56 tornadoes, and 58 were observed.

The team's next steps are to take a look to see how hurricane size, not just intensity (as indicated by the Safir-Simpson scale), affects the damage experienced by residents.

"Storm surge, rain and flooding are all connected to the size of the storm," said Curry. "Yet, size is an underappreciated factor associated with damage from hurricanes. So its important to develop a better understanding of what controls hurricane size and how size influences hurricane damage. The great damage in Galveston from Hurricane Ike in 2008 was inconsistent with Category 2 wind speeds at landfall, but it was the large size that caused the big storm surge that did most of the damage."

Adapted from materials provided by Georgia Institute of Technology.

http://www.sciencedaily.com/releases/2009/09/090908103625.htm

Atlantic Yards
New Yards Design Draws From the Old

By NICOLAI OUROUSSOFF

To say that the 22-acre Atlantic Yards development project in Brooklyn is in disarray is not a major revelation. That it may still be possible to save — and may even be worth saving — comes as news.

When Bruce Ratner, the project's developer, fired Frank Gehry last year — after getting city approval on the basis of Mr. Gehry's design — and replaced him with Ellerbe Becket, a firm known for churning out generic stadiums, it seemed like a cynical double cross. Ellerbe Becket's bland proposal for a basketball arena replaced a much more ambitious scheme from Mr. Gehry, which cleverly integrated the arena into a surrounding group of residential and commercial towers. That design seemed destined to create a black hole at one of Brooklyn's most lively intersections. Many were appalled.

Chastened, Mr. Ratner quickly hired Shop Architects, a young New York firm, to spiff up the arena, and the results, unveiled on Wednesday, are somewhat more promising. Some of Mr. Gehry's original ideas, like opening views from the sidewalk into the arena, have been restored. Mr. Ratner has reduced the size of the structure, moving team offices to another site. And Shop has wrapped it in an appealing rust-colored steel skin, which will make it less harsh on the eye.

But it still falls short of the high architectural standards set by the design the city was originally promised. And too many questions remain unanswered about the overall plan — in particular, when and whether Mr. Ratner's company, Forest City Ratner, will ever build the surrounding buildings, and, assuming it does, who will design them. Without them the cohesion of the original plan falls apart.

The brilliance of Mr. Gehry's approach was not about the aesthetics of any particular building; it lay in the careful arrangement of diverse urban elements on a tight urban site. As in his design work on some of his early houses, Mr. Gehry began this project by breaking down the development program into a series of discrete forms — arena, residential and commercial towers, public zones — and then carefully reassembling them, a bit like a child playing with building blocks. The towers set around the arena became a way to hide its bulk. And the collisions among forms made for a number of startling urban moments: views between buildings that opened directly into the arena, a public park draped over the arena's roof.

The final design did not satisfy many local activists, who felt it was out of scale with the surrounding neighborhoods, but it was a work of genuine urban complexity, drawing strength from the tensions created by the vibrant mix of elements.

The design by Shop and Ellerbe Becket tries to recapture some of that energy and relate the building to the neighborhoods around it. That rust-colored skin, woven out of weathered-steel panels, has the look of worn snakeskin; it is perforated with small openings that will make it glow at night, and it has a toughness that should fit well into its gritty setting.

The architects have set back the upper portion of the facade to break down the structure's scale, and laid out a series of retail shops extending along Flatbush Avenue, the area's main commercial strip. They have also replicated Mr. Gehry's big glass windows along Flatbush, which will allow drivers to peer right through the lobby to the scoreboard suspended above the court.

Still, the larger project remains worrisome. In Mr. Gehry's original design, all of the structures were conceived as part of a single cohesive scheme. (All five of the buildings' foundations, for example, would have to have been built at the same time.) To defer additional costs, Mr. Ratner has divided up the design. The arena will be built first, and then, he says, the foundations for the residential and commercial buildings will be dug, once he is ready to start the next stage of construction.

This risks producing an oddly clunky composition. Although Mr. Ratner says he still plans to build the towers, possibly hiring an architect for the first one by the end of the year, the current design was clearly conceived to be able to stand alone, and it is hard to see how it would be integrated into a larger, convincing urban whole. Despite Mr. Ratner's reassurances, it is also possible that one or two of the towers will never be built, which would take us back to square one.

And then, of course, there is the arena itself. Mr. Gehry took great care to disguise the ubiquitous corporate suites to create a more intimate space, tucking them into the ends of the arena and draping balconies over them. He also designed a ceiling that seemed to press down into the room, focusing the energy onto the court.

The new stadium has fewer suites (they are harder to sell in a poor economy), but they have become more prominent. And the room feels more conventional.

It is probably the best Mr. Ratner can do, given time and money constraints. But his problems, sadly, are now our problems too. And they may force us to live for decades with what is ultimately a compromised design.

http://www.nytimes.com/2009/09/10/arts/design/10yards.html?_r=1&th&emc=th

'Monet's Water Lilies'
Serenade in Blue

By ROBERTA SMITH

Devotees of late Monet can rejoice. The Museum of Modern Art is putting all three of his beloved waterlily paintings on view for the first time since 2001, along with a relatively recent acquisition and two guests.

Beginning Sunday, you can immerse your senses in "Water Lilies," the triptych with the 40-foot-plus wing span, and "Water Lilies," the wide-angle, single-panel mural. On one wall the triptych rumbles forth its rich panoply of blues, greens, lavenders, creams and pinks, like a full-bodied symphony. Opposite, the lone panel responds, a glissando of violins, with a pale, silvered reiteration of the same palette shimmering into silence.

Both were worked on, again and again, with many others, during the last dozen years of Monet's long life, when the final phase of his innovative Impressionistic style opened the path to abstract painting after World War II. At his death in 1926, at 86, they remained in his studios at Giverny, France, near his elaborate aquatic gardens, their radical nature perplexing and even repulsing some of his most dedicated admirers.

Were they unfinished? Did the frequent lack of signature signify a final ambivalence about their worthiness? Did their blurry, edgeless forms and sometimes clumsy paint handling simply reflect Monet's eye problems?

Hardly. Over his last years Monet had assiduously negotiated an agreement with the French state to accept a large group of them as a gift to the nation, to be displayed in specially constructed galleries (with curved walls) in the Orangerie in Paris. The main liaison in this transaction was his dear friend Georges Clemenceau, prime minister of France, 1906-9 and 1917-20.

In the Modern's show the two big paintings are exhibited with the two other more manageable, easel-size late Monets from the collection. The fierce "Japanese Footbridge" from around 1920-22 is startling: its fiery oranges, browns and deep greens seem conversant with van Gogh, late Bonnard, Ensor and even Soutine. "Agapanthus," 1914-26, meanwhile, moves to dry land and a grassy green Art Nouveau swirl of the leaves and tiny, clustered mauve blooms of this plant, also known as the Lily of the Nile.

"Agapanthus," which entered the museum's collection in 1992, measures around 6 ½ by 6 feet. It is nonetheless a study, probably painted from life and then taken back to the studio to help in the execution of larger works that were in many ways less finished and descriptive.

This was also probably the case with two slightly smaller canvases on loan from the Metropolitan Museum of Art. Both are bluntly painted close-ups of waterlilies, quickly dashed off patches of the vistas of the larger paintings, with a nocturnal mien. Their unembellished urgency conveys Monet's obsession with his subject in unusually direct terms.

In front of nearly all the paintings here, and the triptych especially, the eye hovers and zooms over the surface like a dragonfly, exploring its horizontal recessions and watery depths, its intimations of reflection and mist and lily pad. Paralleling this experience is the consciousness of artifice and method: the incessant signs of Monet's hand. His brushwork is modest, notional, almost scriptlike. As with our dragon-fly gaze, it too skips across the surface — and skips and skips and skips again. Paint is applied in quick thatches of short lines of every orientation and every shade of blue; in trails of horizontal ellipses (the pads) that move from turquoise to bright green to dark green as they progress across the canvas, in and out of the shade; and in soft, cloudy pileups of mostly white figure eights (mist). It is all about accumulation: the layering of color, the build-up of texture.

As in the old days before the museum's most recent renovation, the waterlily paintings are sequestered in their own gallery some distance from the onward march of modernism according to MoMA. This always felt right: isolation emphasizes the meditative, immersive quality of these works, which are really a world unto themselves.

In addition these paintings are too adamantly ahead of their time to fit quietly into any linear chronology. After the Modern reopened in 2004, it was actually a bit jarring to encounter the triptych in a room between galleries devoted to Russian Constructivism and Mondrian's crisp scaffoldings of line and color, even though the works dated from the same period.

Even today, as revered and familiar as they are, the basic data of the biggest canvases can be difficult to compute. They were made in the first quarter of the 20th century by an octogenarian who had already played a central role in one of Western painting's great revolutions 50 years earlier. And well past the second quarter of the 20th century these paintings were still challenging contemporary artists. Put another way, as Monet was setting up for this last project — using quite a bit of his wealth and the services of six gardeners to get his garden up to speed — Cubism, Constructivism and Futurism were just beginning to reverberate across the globe. And yet here he was, working on a scale and in a manner that postwar advocates of Jackson Pollock and the Abstract Expressionists would come to call "all-over painting," "action painting" and "American-type painting."

Yet nothing had really changed. Monet was simply following his early work to its logical conclusion, giving little or no thought to abstraction. Right to the end he remained engrossed in the challenge of looking and painting, painting and looking, never wavering in his dedication to the task of translating his perception of the visible world into oil on canvas, bringing the natural and the artificial into hand-wrought balance. Perhaps he knew that painting, like poetry or music, was one of the few human endeavors that stood any chance of equaling some of nature's experiential richness, if you just kept at it long enough.

This exhibition has been organized by Ann Temkin, curator of painting and sculpture. It is in many ways a model of its kind: a small, tightly-focused, collection-based display that more museums should do and

that many, in these lean times, probably will be doing more often. It is accompanied by a slim booklet with an essay by Ms. Temkin that encapsulates Monet's career and zeroes in on the late paintings and their importance in accessible layman's terms. Ms. Temkin does not push the envelope of the accepted view of these works as postwar painting's precursors. No mention is made, for example, of the importance of Japanese screens on Monet's sense of scale, frontality and infinite space extending far beyond the canvases' edges.

But her essay has a refreshing openness. It charts the growing admiration of Alfred H. Barr Jr., the museum's founding director, for late Monet, and quotes his carefully worded letters to trustees who might pay for them. And it provides fascinating details. Regarding the growing stature of Monet's late works in the 1950s, to which the Modern's attention contributed: The museum bought its first large waterlily painting — at 18 feet across, the widest painting to enter the collection up to that point — in 1955, for the equivalent of $11,500. A mere three years later it paid the equivalent of $150,000 for the triptych, acquiring it as a replacement for the first work, which was destroyed in a fire at the museum.

Arriving at the museum in poor condition, the triptych was extensively restored and put on new stretchers. Dorothy Miller, one of the museum's early curators, gave Monet's original stretchers to three young New York painters: Ellsworth Kelly, Jack Youngerman and Fred Mitchell. Those were the days.

"Monet's Water Lilies" is on view Sunday through April 12 at the Museum of Modern Art, (212) 708-9400, moma.org.

http://www.nytimes.com/2009/09/11/arts/design/11monet.html?ref=design

'William Blake's World'
The Palace of Excess Imagination
By HOLLAND COTTER

William Blake — artist, poet and irritated ecstatic — listed as his primary residence the Imagination, a combination of creative command post and psychological refuge where, as he put it, the eternal and the real meet.

The place you might actually run into him, though, was London, where he was born in 1757 and spent nearly his whole life. Within the city he changed homes many times but found that each new one was much like the last. Wherever he ended up, it seemed he knew the neighbors.

Always there was the old man upstairs with a Jehovah beard and a voice like a whirlwind, and always the young rebel in the basement with no good on his mind. All pubs he frequented had the same clientele. Socrates would drop in one day, Michelangelo the next. John Milton and the prophet Isaiah were regulars. Blake would sit, take notes and sketch portraits until the archangel Gabriel showed up and nudged him back home to work.

Blake didn't mind the nudges. He lived to work, and he produced a lot: engravings, drawings, watercolors and handmade books of a gemlike funkiness. A substantial selection of this material is in the show "William Blake's World: 'A New Heaven Is Begun' " at the Morgan Library & Museum. Drawn entirely from the Morgan's collection, it gets the fall season off to a transporting start.

There are many ways to think of Blake, probably none completely right, none entirely wrong. He was one of art's great visionaries; he was an ingeniously quirky small-time illustrator. He was a political radical who despised politics and a social reformer who verged on being a sociopath. His moral thinking could be prescriptive but also munificent: all power was corrupting, no form of sexual love was a sin. His empathy with the sentient world was profound and interconnective:

A dog starv'd at his master's gate

Predicts the ruin of the state.

A horse misus'd upon the road

Calls to heaven for human blood.

Each outcry of the hunted hare

A fiber from the brain doth tear.

These words appear in the poem "Auguries of Innocence." A copy of it, written in Blake's hand, is in the show. So are the epic books in which he presents spiritual allegories of staggering breadth and impenetrable detail. Are they the work of a systematic thinker, or a cosmic improviser, or a chronic self-mythologizer? He gave one answer when he wrote, "Without contraries is no progression." Progression — change — is the energy that drives his art, keeps it surprising, and there are a few surprises in the Morgan show.

One is the discovery that his earliest works, dated 1782, are two very un-

Blakean prints based on paintings by Jean-Antoine Watteau. They were the first professional engravings Blake made after completing a long printer's apprenticeship. He clearly hoped that they would catch the public's fancy, sell well and give him a foothold in the market.

In the same year he made another practical move: he married Catherine Boucher, a woman who would become his collaborator when he began to print books of his own writings and images. She shared his nonconformist beliefs, managed the meager household finances and sustained an unwavering faith in his brilliance.

Blake needed that faith: his attempts to be normal — to build a career, save money — proved to be a bust. The Watteau prints didn't sell.

A later, high-profile, potentially lucrative commission to create designs for a popular poem by Robert Blair, "The Grave," ended in a battle with the publisher and with Blake's designs being critically savaged.

Even more devastating was the response to his first and only solo show, which he arranged himself. The single critic who reviewed it called him a pretentious lunatic. That Blake had written an exhibition catalog — a copy is at the Morgan — railing against oil painters as demons (he worked in watercolor) and implying that he had a personal relationship with the Holy Ghost did not help. Even his few supporters thought he was nuts. When the show ended, he stayed out of public view for a decade.

But crazy is a real-world term. What does it mean in art? Not much. Blake worked where he lived, in the Imagination. Even as a child he saw things: God's face in a window, angels sitting in trees — he assumed everyone could. His parents, religious dissenters, at first tried to bring him down to earth, then gave him art lessons so he could turn his visions into something. More help came, posthumously, from his favorite brother, Robert, who was also an artist. After Robert died in 1787, Blake stayed in close touch with him, taking suggestions on what kind of art he should make and how.

By that point he had printed his first book, "Poetical Sketches," using regular type and minimal illustration. He already knew that books in some elaborated hands-on form would be his chief medium. What direction that elaboration would take was the question, and you get a sense of experimentation under way in the show, as Blake moves from "Poetical Sketches" (1783) through the great 1790s prophetic books about Euro-American revolution to a copy of his longest book, "Jerusalem," printed in 1827, the year he died.

He did all his printing on his own home press, though some of his techniques are still imperfectly understood. After "Poetical Sketches" he invented a form of relief etching, which involved drawing words and designs on the printing plates — making image and text an integrated unit — and scraping away the surface around them. He printed in black and white and hand-

colored the prints. But he made color prints by applying viscous paint to the plates to produce a kind of monoprint, to which more color could be added by hand. In these prints — like one in the show from "Visions of the Daughters of Albion" — the color looks mottled and mossy, slightly raised from the paper's surface.

Such printing took forever. If you were interested in buying a book you would knock on Blake's door, give your order and wait for months. My guess is that even in Blake's day the results were valued more for their visual appeal than for their content.

The two "Songs of Innocence and of Experience" books, from 1789 and 1794, are accessible enough. But the longer, later books must have been as difficult to decode then as now: "Daughters of Albion," with its message of social and sexual liberation; "The Continental Prophecies," with its myths of nation building; "The Book of Urizen," with its glum Genesis rewrite; and "Jerusalem," with its utopian vision told in Christian terms.

Far easier to parse, because they're not based on Blake texts, are two series of watercolors that are glories of the show, which has been organized by Charles Ryskamp, a former director of the Morgan, and two curators, Anna Lou Ashby and Cara Denison. The first series illustrates the Book of Job, beginning with a placid tableau of Job and his family, moving on through his trials and returning to where he started, with the family transformed through suffering into a celestial orchestra hot to play.

If Blake's emblems of contentment often tend to look bland and boneless, his images of evil — a rock-star Satan in this case — are vivid and sexy. But the second watercolor series, for Milton's mood poems "L'Allegro" and "Il Penseroso" — "the cheerful man" and "the melancholic" — offers exceptions. Here happiness is a strapping English rose of a ballerina named Mirth, and joy is a nude sun god wreathed in flames, one toe touching a mountaintop and looking perilously vivacious, as if he could ignite the earth.

Blake was happy at the end of his life. Irritations and disappointments faded. A long isolation ended when a group of young artists, some in their teens, adopted him as a guru and hung out in his tiny ink-spattered apartment. They surely knew "Auguries of Innocence":

To see a World in a Grain of Sand

And a Heaven in a Wild Flower

Hold Infinity in the palm of your hand

And Eternity in an hour.

No doubt they would have liked the idea of God in the attic and the Devil downstairs, and of Blake bumping into illustrious old — meaning ancient — neighbors. As for Blake himself, he had entered hallelujah country. He wrote to a friend that he was growing weaker and weaker in body but not "in spirit and life, not in the real man, the Imagination, which liveth forever."

"William Blake's World: 'A New Heaven Is Begun' " continues through Jan. 3 at the Morgan Library & Museum, 225 Madison Avenue, at 36th Street; (212) 685-0008, themorgan.org

http://www.nytimes.com/2009/09/11/arts/design/11blake.html?ref=design

Vermeer
A Humble Domestic Crosses the Sea

By KAREN ROSENBERG

New York has been celebrating its Dutch ancestry in grand style, with a weeklong festival of free bicycles, royal visits and ceremonial flotillas along the Hudson. But the city's best 400th-anniversary present comes in a small, discreet package: Vermeer's painting "The Milkmaid," on loan from the Rijksmuseum in Amsterdam.

"The Milkmaid" has been to New York before, for the 1939 World's Fair. This time she's the star of a small, contextual show at the Metropolitan Museum of Art. "Vermeer's Masterpiece 'The Milkmaid' " includes all five of the Met's Vermeers and a smattering of domestic scenes by other 17th-century masters, among them Pieter de Hooch, Gabriel Metsu and Nicolaes Maes.

All have been chosen by Walter Liedtke, a curator in the department of European paintings who also organized the 2001 blockbuster "Vermeer and the Delft School."

The 18-inch-high "Milkmaid" (1657-58) is one of Vermeer's strangest and best works. There's nothing quite like it in New York, even with the eight Vermeers spread between the Met and the Frick Collection.

In this arresting treatment of a prosaic subject — a young woman laboring in the kitchen — Vermeer forsakes his well-known optical sensations for earthier pleasures. And in unprecedented fashion, he endows this domestic worker with traits typically reserved for higher-class women: virtue, diligence and a rich interior life.

In the painting the maid pours milk from a jug into a wide, two-handled bowl. Intense light streams from the window on the left side of the canvas. The kitchen table is heaped with crusty bread, possibly the ingredients for a porridge. In the background, a foot-warming oven rests on the floor.

The maid is a young woman of sturdy build and inscrutable disposition. She wears a crisp linen cap, a blue apron and work sleeves pushed up to reveal thick forearms. Half of her face is in shadow, making it impossible to tell whether her downcast eyes and pursed lips express wistfulness or concentration.

As Mr. Liedtke notes in accompanying text, the painting is startlingly illusionistic, almost photographic. The figure and the table have an architectural heft. The light, though bright, doesn't wash out the rough texture of the bread crusts or flatten the volumes of the maid's thick waist and rounded shoulders.

The extraordinary gravity of "The Milkmaid" is enhanced by Vermeer's use of rare, costly pigments. He had already secured a patron for the painting (the Delft collector Pieter van Ruijven) and was therefore able to purchase ultramarine blue, made from ground lapis lazuli. It gives the maid's apron the brilliance of the robes on quattrocento Madonnas.

A side gallery of prints by other artists makes clear that the milkmaid was a vehicle of sexual humor in 17th-century Dutch art. (The wall text explains, rather squeamishly, that the act of milking a cow was code for "grabbing a man's ... attention.")

Kitchen maids, too, were suspect. In Peter Wtewael's painting of a young cook evidently distracted by a farmhand, the symbolism is laughably aggressive. He proffers a dead bird; she fusses with a chicken impaled on a spit.

The crudeness of these images makes Vermeer's gentle treatment of the milkmaid seem all the more remarkable. She isn't drunk, lazy or easy. A barely perceptible Cupid on a Delft tile just behind the foot warmer is the painting's only concession to amorous distraction.

Vermeer's "Maid Asleep," painted a year or so before "The Milkmaid," isn't quite as subtle. Here a woman nods off beside an empty glass and beneath a painting of the love god.

The more polite precedents for "The Milkmaid" are mostly wives or young ladies of means. They include Vermeer's "Woman With a Lute" and, in a small panel by Metsu, a rosy-cheeked housewife who coyly plucks an apple from a bowl on a window ledge. (Golden Age viewers would have taken the fruit to imply a harmonious marriage.)

The show's final gallery is a reminder that every prop in Vermeer's interiors is loaded with meaning. It contains one of his largest and least interesting paintings, the doctrinaire "Allegory of the Catholic Faith" (1670-72). Also here are two renderings of whitewashed Delft cathedrals, by Hendrick van Vliet and Emanuel de Witte, which show that Vermeer shared the Protestants' preference for clean, light-flooded spaces.

The visit of "The Milkmaid" is the first real test for Thomas P. Campbell, director of the Met since the beginning of the year. He is emphasizing so-called budget blockbusters, smaller shows that revolve around a few highly contextualized works by big-name artists and lean heavily on the permanent collection. The strategy is well suited to Vermeer, since only 36 paintings by him are known to exist.

Mr. Campbell's hand can also be discerned in the multimedia projects that accompany the exhibition. For the first time, the museum has made an audio tour available as a free download on its Web site. The Met has also produced two podcasts: a discussion of Vermeer's patronage by Mr. Liedtke and a "TweenCast" (for viewers ages 10 to 12) that extrapolates a story about a young maid in 17th-century Holland from Maes's painting "Young Woman Peeling Apples." (Think of it as the Met's answer to the popular novel "Girl With a Pearl Earring.")

Making room for hordes of visitors with headphones, the installation creates ample space around each painting. The result is a Vermeer show that isn't as intimate as it might have been.

More puzzling is the distance between "The Milkmaid" and its logical counterpoint, Vermeer's "Young Woman With a Water Pitcher" (1662). This painting, one of the artist's mature works, shows an elegant woman with one hand on a silver-gilt vessel and the other on an open window. The light is pure and crystalline; it renders her skin as transparent as her white linen head scarf.

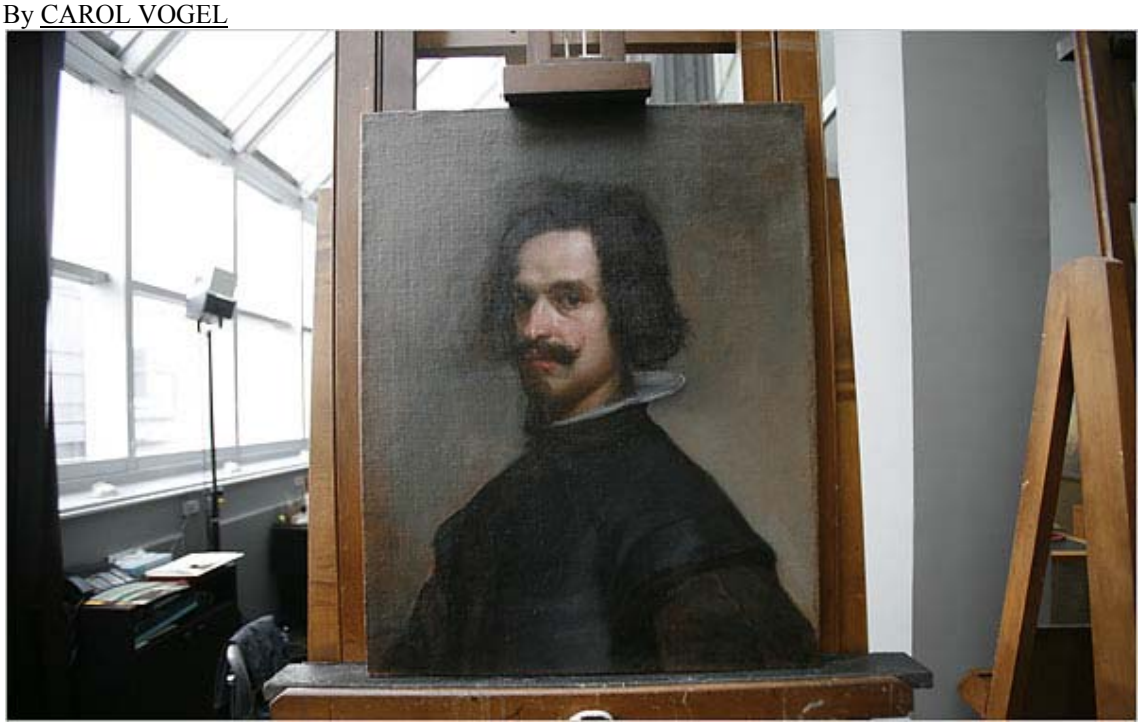
Water and milk: Vermeer purified both — the housewife and the woman in her employ.

"Vermeer's Masterpiece 'The Milkmaid' " continues through Nov. 29 at the Metropolitan Museum of Art; (212) 535-7710, metmuseum.org.

http://www.nytimes.com/2009/09/11/arts/design/11vermeer.html?ref=design

An Old Spanish Master Emerges From Grime

By CAROL VOGEL



For years the Metropolitan Museum of Art displayed the painting of a mustached man in his mid-30s on the same wall as famous portraits of Juan de Pareja and Maria Teresa, infanta of Spain by the 17th-century Spanish master Velázquez.

But was the canvas of the figure with the mustache, "Portrait of a Man," also painted by Velázquez, as thought when it was bequeathed to the museum in 1949? Or was it merely from "the workshop of" Velázquez, as experts concluded a few decades later? After revisiting a painting that had raised nagging questions, a Met curator and a conservator finally have the answer.

"It's bugged me for 25 years," said Keith Christiansen, the Met's newly appointed chairman of European paintings. "The quality has always been there. And I had a hard time believing that a work of quality was the product of a generic workshop."

Experts had reason to doubt the authorship: Decades of varnish had discolored the canvas so much that its palette looked far darker than that of other paintings by Velázquez. The painting had been heavily restored and cleaned in the 1920s and revarnished in 1953 and again in 1965. In 1960s a leading scholar demoted it to the workshop of Velázquez and by 1979, the museum had downgraded the painting as well.

Still, when the museum recently started to catalog the Spanish paintings in its collection, Mr. Christensen asked Michael Gallagher, chief of the Met's paintings conservation department, to take another look. He ended up not only studying the painting but also carefully cleaning and conserving it. As details like the individual brushstrokes of a collar emerged, he concluded that Mr. Christiansen's instincts were on target. Buried beneath decades of yellowed varnish and poor retouching were all the marks of Velázquez's hand.

Convinced that the picture was indeed by the master, he and Mr. Christiansen showed it to Jonathan Brown, this country's leading Velázquez expert, who agreed.

"One glance was all it took," Mr. Brown said, adding later, "The picture had been under my nose all my life. It's a fantastic discovery. It suddenly emerges Cinderella-like."

The painting was so dull before it was cleaned that Mr. Brown said he didn't think it was a Velázquez. But after the varnish and the layers of paint — additions made centuries later to make the canvas look more old-masterish and entice buyers — were removed, "all the liveliness of the artist's brushstrokes and all the subtleties that for decades had been covered over were revealed."

The discovery, he added, is particularly significant because "Velázquez was a painter who measured out his genius in thimblefuls." His output was so small that, depending on who's counting, Mr. Brown estimates, there are only 110 to 120 known canvases by the artist.

To a conservator, Mr. Gallagher said, the prospect of working on the painting was daunting. The canvas was so dark, "it was like looking at the bottom of a murky pond." The synthetic varnish had deteriorated, as had some of the layers painted over the original.

He began gingerly, performing a test on a tiny portion, removing varnish with an organic solvent. The murky green background suddenly became gray after it was cleaned. The densely painted face showed a vibrancy that had been obscured as had the small number of brushstrokes needed to evoke the man's detailed white collar. His eyes turned out to be haunting and his brow bushy.

The painting's history is fairly well documented: It was left to the museum by Jules Bache, a collector who headed an American brokerage firm before World War II and who was a major benefactor to the Met. Bache bought the painting from Joseph Duveen, the legendary dealer, in 1926 with the understanding that it was a self-portrait by Velázquez. Bache paid $1.125 million for the work, a huge sum back then (about $13 million in today's dollars), although experts today say the canvas is worth about $40 million.

Its royal provenance added to the value. Before Duveen, it belonged to Count Johann Ludwig von Wallmoden-Gimborn, the illegitimate son of George II of Britain, and later to the last king of Hanover, George V.

When Duveen had the painting, Mr. Christiansen and Mr. Gallagher said, the portrait's informal quality was not necessarily considered as commercial as a full-blown old master so the dealer "tidied it up," as Mr. Gallagher put it, or painted over parts to make it look old-masterish.

"The picture was thinly painted and never intended to be finished," said Mr. Christiansen, who says he believes it was actually a study. "It was a sitting done from life, which gives it great immediacy. The figure of the man is more finished than the costume or the background."

The figure's face, tired eyes and nose bear an eerie resemblance to the man looking out at the viewer from the far right of Velázquez's "Surrender of Breda" (1634-35), which he painted to commemorate the Spanish victory over the Dutch. That painting, which is in the Prado Museum in Madrid, dates from around the same time as "Portrait of a Man," made when Velázquez was 35.

But at this point nobody knows for sure if the figure in "The Surrender of Breda" or the man in the Met's canvas is the artist himself. Other depictions of Velázquez, in "La Meninas" at the Prado, for instance, were painted when he was 57.

"Why not be a self-portrait?" Mr. Christiansen said. "It might be fun to put it on a blog on the museum's Web site and ask people to take a vote."

http://www.nytimes.com/2009/09/10/arts/design/10velazquez.html?ref=design

Who Are You Calling *Genius*?

It's time to retire the term.

By Ron Rosenbaum

I've been thinking about the question of genius lately. I received an invite to an early screening of Richard Linklater's new film, *Me and Orson Welles*, which is in one sense a meditation on genius. It re-creates a turning point in Welles' rise to genius-dom: his triumphant struggle to put his sensationally received Mercury Theater production of *Julius Caesar*—done in modern dress, as if set in Mussolini's Rome—on Broadway in 1937.

And then, by chance, just before I saw the film, I'd found myself reading a curious—or anyway contrarian—take on genius in Lionel Trilling's 1952 introduction to Orwell's *Homage to Catalonia*, which argues that we should admire Orwell precisely because he's *not* a genius.

Orwell, Orson Welles—one fighting fascists in Catalonia, the other putting fascists onstage in New York the same year: freaky.

And then there's director Richard Linklater. One of the great satisfactions of my writing life is that my essay on his film *Slacker* is included in the booklet that accompanies the Criterion boxed DVD set of that offhandedly brilliant, deceptively philosophical (or is it philosophically deceptive) work of … genius? Do I think it's a work of genius? By a genius? It's not totally clear who we consider genius, these days.

Has the term been applied somewhat—or wildly (Tarantino?)—indiscriminately of late? And have the prerogatives of genius too often been used to excuse transgressions or mediocrity? ("Not his best work, but he's a genius!")

Those are precisely the questions—the nature of genius, the profligacy of genius, the questionable allowances made for genius—that are at the heart of *Me and Orson Welles,* which is perhaps Linklater's most ambitious film and is scheduled to be released this Thanksgiving. I think it will cause a stir. Oh, let's not be restrained: When I saw it, I found it amazing and moving.

Chiefly because of Welles, his genius and his tragedy. The film celebrates the triumph of Welles' genius, but it also gives us a Welles who abuses the prerogatives of genius in ways we know will eventually cost him. The future casts a melancholy shadow over the proceedings.

Linklater's film, which is a loose adaptation of a fact-based novel about Welles by Robert Kaplow, is the rare piece of cinema that centers on a Grecian urn of the sort that inspired Keats' "Ode on a Grecian Urn." (Linklater gets respect for that alone.) But I think the film suggests a relationship between Keats and his urn that's parallel to the one between Welles and Shakespeare. Welles (in his version of *Caesar*) and Keats (in his ode) celebrate Shakespeare and the urn, respectively: genius celebrating genius. Does that mean there is such a thing as primary and secondary genius? Though I can't see Keats as secondary in any way. The whole thing is complicated.

But that Keatsian urn shouldn't give you the wrong impression of Linklater's achievement. The movie is a full-blown, full-blooded, skillfully, noisily executed carnivalesque reincarnation of '30s New York. Linklater brings to this frenetic chaos an almost seamless sense of complex, multilevel storytelling. And it's an important story, not just for Welles but for theater and for Shakespeare.

Welles was on a mission. One senses he wanted to shake the world's theatergoers by the shoulders and make them aware of how urgent, how unimaginable, Shakespeare's genius was. One of the questions I asked in both my Hitler and Shakespeare books was the "exceptionalist question," which is at the heart of the genius question: On whom do we bestow the name? How profoundly must a "genius" transform our world?

Was Shakespeare on the continuum of other great writers, just at the furthest extreme of ordinary genius? Or was he in a realm of genius all his own that transcended the accomplishments of others? Was Hitler on the continuum of other evildoers, again on the extreme? Or did he occupy a hellish category of his own? Did he deserve the title "evil genius" for his satanic sculpting of history? I've sometimes thought that what separates the genius from the merely brilliant is just that: the creation of a realm apart.

But you could also argue that true geniuses transform the realm we live in. We never see the same way again after we see Picasso. How he creates, or re-creates, the world like a god.

Linklater's Welles flatters his actors by telling them, "You're a God-created actor." (One suspects the god he was referring to was as much himself as any Big Guy in the Sky.)

I was ready to concede Welles' genius the first time I saw it. I make the argument in my book that his production of *Chimes at Midnight*, his conflation of the two Henry IV plays (in which he plays Falstaff with a melancholy, Lear-like overtone), exemplifies how filmed Shakespeare can, anachronistically, in the hands of a genius, be more Shakespearean than most staged Shakespeare.

But needless to say I'd never seen Welles-*staged* Shakespeare. And his *Caesar* was said to be a turning point in his boy-genius career: He was only 22 at the time.

Linklater has found a British actor, Christian McKay, who conveys the brusque impatience and urgency of genius convincingly, the blithe and utter self-confidence of it. His performance convinces you that one aspect of genius is never really doubting one's own genius.

Recently, the writer Ron Radosh told me a story about a visit he had from Bob Dylan when the newly de-Zimmerman-ized Dylan was making his first journey from Minnesota's iron mines to the irony minefields of New York City in the early '60s.

Dylan stopped off to visit Radosh, who was then a leading student activist at the University of Wisconsin, and over the course of the visit he confided, Radosh says, that he was going to be "bigger than Elvis." He just knew.

This was pretty amazing for the early '60s, because who even knew how big Elvis was going to be then, and Dylan at the time was a totally unknown purveyor of cover versions of Woody Guthrie songs and imitations of other folk imitators.

And there's an eerily similar story, told to me by Steven Zipperstein, author of the recent *Rosenfeld's Lives*, a book about the early promise and early termination of Isaac Rosenfeld. Rosenfeld was a tormented near-genius and close friend—and childhood rival—of Saul Bellow in Chicago. Rosenfeld died before he reached 40, leaving people to wonder what might have been.

Zipperstein told me how Bellow and Rosenfeld used to talk, *when they were teenagers*, about how one of them would win the Nobel Prize for literature. They just knew.

Which brings me to that Trilling essay I read before I saw Linklater's Welles: It's got to be considered in any consideration of genius. It's a somewhat tortured meditation that goes to considerable lengths to argue that the one reason we should value Orwell is that he was *not* a genius.

While this sounds like a negative virtue, not one you'd put on a résumé, Trilling gives it a positive spin: "Not being a genius" means "fronting the world with nothing more than one simple direct undeceived intelligence and a respect for the powers one does have. … We admire geniuses, we love them, but they discourage us. … They are great concentrations of intellect and emotion, we feel they have soaked up all the available power, monopolizing it and leaving none for us. *We feel that if we cannot be as they, we can be nothing*." (The italics are mine.)

Who knew that being a genius could be so contentious? And yet it's a worthy sentiment: We should not use lack of genius as an *excuse* for ourselves to do nothing because we won't do anything geniuslike.

Trilling then compares Orwell's talent—his ability to give simplistic, if not invalid, moral lessons, to voice worthy sentiments—to the genius of Byron. Of Byron it was famously said he was "mad—bad—dangerous to know." (Check out Irish novelist Edna O'Brien's recent irresistible portrait of his insanely complicated mad and bad and dangerous affairs in the recent *Byron in Love*.)

By contrast, to Trilling, Orwell is explicitly anti-Byronic, even a bit pedestrian: "He seems to be serving not some dashing daimon but the plain solid Gods of the Copybook Maxims. He is not a genius—what a relief! What an encouragement: For he communicates to us a sense that what he has done, any one of us could do."

I have some problems with this idea that our only choice is between mad, bad genius and servitude to copybook maxims about a well-ordered life. Do we really admire Orwell because he kept his room neat? I also don't think copybook maxims are all that Orwell embodied at his best. Or that anyone else could have done what Orwell did.

I have a few more thoughts on literary genius, but first I thought it might be interesting to see what the current thinking on the matter of genius is in a realm I was unfamiliar with. How high is the bar of genius set in the art world, for instance? I e-mailed my polymathic friend Charlie Finch, a noted columnist for Artnet.com, and asked him which modern artist deserved the appellation *genius*.

He replied with a satisfyingly definitive answer and an interesting theory on our distrust of the word these days:

Ron, There have been only three geniuses in fine art since 1900: Pablo Picasso, Marcel Duchamp and Andy Warhol. All art praxis flows from them. Picasso freed artists from perspective and representation; Duchamp made the concept rather than the visual the purpose of art; Warhol merged art with modern culture. In Western Art genius is associated with radical transformation of art-making by one individual artist. Leonardo introduced technology, Michelangelo added naturalism, Caravaggio brought in the beauty of the lower classes, Rembrandt introduced art images to the common home, Manet eliminated the mythological basis of art and reified "street" experience, Monet revolutionized the portrayal of light and Van Gogh did the same for color. Genius is the transformation of collective experience by one individual for the common good. It must be, by definition, the antithesis of evil, although evil may be one of its subjects. Postmodernism precludes genius because it assumes that artistic creation is a constant recycling of previous work, so that someone like David Foster Wallace could not be labeled a genius because modern Western culture denies the role. Postmodernism, indeed, adjudges genius as fundamentally reactionary, because the domination of culture by one individual denies the historical power of the collective. Postmodernism is a deadly vise which restricts creative people from transcending it, yet the challenge of artists and writers today remains to crush the postmodern paradigm. Hasn't yet been done.

Charlie made another interesting point: "It would be better to define 'genius' rather than 'a genius,' as in 'Pynchon has frittered away his genius' or '*Tristram Shandy* is a work of genius.' … Genius is what has never quite been done before, quicksilver in the hands of its progenitors."

I have my own strong feelings about the question of genius in literature. I've always felt that if we look at the past century, Nabokov was a game-changer, as the academic phrase has it. Nabokov showed there is a place you can go, a place that the alchemy of words can transport reader and writer to, that no one had gone before. And Nabokov went there, with ease, in *Lolita* and *Pale Fire*. So it's hard to call any other writer in the past century a genius of the same order. Which in part accounts for my ambivalence about the decision to publish, against his wishes, an unfinished draft of his last incomplete work, *The Original of Laura*: No one was more aware than he of when a work of his had reached its zenith of genius. He didn't feel this one had. Perhaps, though, we'll learn some valuable lessons about the degrees of ascent to genius. Is it all or nothing?

I'd say the only work of genius in the past half-century to come close may have been Pynchon's *The Crying of Lot 49*. (*Gravity's Rainbow* was to be his *Ulysses* but turned out to be his Finnegans mistake.)

Maybe genius must give the feeling of effortlessness as well as utter confidence and transcendence. *Ulysses* and *Gravity's Rainbow* both show the palpable sweaty strain to become encyclopedic works of genius: Always screaming across the sky: "This is a work of genius!"So who is a living genius? Let's set aside physicists and cosmologists who are all, technically, geniuses (even though every five years they seem to admit they were wrong, as iconic physicist genius Stephen Hawking recently did about essential aspects of his black-hole theory, for instance).

I asked people around the ***Slate*** office who they think qualifies as a living genius and got a remarkable array of nominees. What was fascinating was the variation in number. There were those who would bestow the honor on only one person (Bob Dylan or Werner Herzog), there were those who named two (pairing Steve Reich and Philip Glass), and there were those who named two *dozen.* How high should we raise the bar? Should we limit it to work in the traditional fine arts, excluding ***Slate*** nominees R. Crumb; or Shigeru Miyamoto, the Mario Bros. game designer; or David Chang, the chef at the New York restaurant Momofuku?

Some raised the question of collaborative genius. (Lennon, yes; McCartney, no?) And what about Jobs, Gates, the Google founders, others who have sculpted an entire culture, made it their art forms. I found myself thinking: I see lots of works of genius but not a landscape crowded with *figures* of genius. Can one pass through a period of geniuslike inspiration and then return to earth on broken wings, as Joni Mitchell (genius?) wrote about Amelia Earhart (genius?) in the song "Amelia" (genius!).

Maybe this is good. Maybe genius has been, if not democratized, more widely and thinly distributed, rather than concentrated in the hands of a precious few. Maybe there are more "one-hit wonders," no less wondrous for being so. Maybe it's been "crushed by postmodernism" as Charlie Finch suggests, or undermined by irony (see: *A Heartbreaking Work of Staggering Genius*). Maybe we no longer live in the kind of romantic age that created Byron, the template of genius.Maybe it's time to discard the Byronic caricature and the questions it brings entirely. We don't have to abolish the notion of genius, but we can discard the cult of the genius as person and pour our adulation into the cult of the work.

Farewell, genius.

Got a nomination for a living genius or a contemporary work of genius? Post your submissions in the Fray and we'll append some to this article.

Ron Rosenbaum is the author of The Shakespeare Wars *and* Explaining Hitler.

Article URL: http://www.slate.com/id/2227801/

Fairy tales have ancient origin

Popular fairy tales and folk stories are more ancient than was previously thought, according research by biologists.

By Richard Gray, Science Correspondent
Published: 9:00PM BST 05 Sep 2009

Dr Jamie Tehrani, a cultural anthropologist at Durham University, studied 35 versions of Little Red Riding Hood from around the world Photo: GETTY

They have been told as bedtime stories by generations of parents, but fairy tales such as Little Red Riding Hood may be even older than was previously thought.

A study by anthropologists has explored the origins of folk tales and traced the relationship between varients of the stories recounted by cultures around the world.

The researchers adopted techniques used by biologists to create the taxonomic tree of life, which shows how every species comes from a common ancestor.

Dr Jamie Tehrani, a cultural anthropologist at Durham University, studied 35 versions of Little Red Riding Hood from around the world.

Whilst the European version tells the story of a little girl who is tricked by a wolf masquerading as her grandmother, in the Chinese version a tiger replaces the wolf.

In Iran, where it would be considered odd for a young girl to roam alone, the story features a little boy.

Contrary to the view that the tale originated in France shortly before Charles Perrault produced the first written version in the 17th century, Dr Tehrani found that the varients shared a common ancestor dating back more than 2,600 years.

He said: "Over time these folk tales have been subtly changed and have evolved just like an biological organism. Because many of them were not written down until much later, they have been misremembered or reinvented through hundreds of generations.

"By looking at how these folk tales have spread and changed it tells us something about human psychology and what sort of things we find memorable.

"The oldest tale we found was an Aesopic fable that dated from about the sixth century BC, so the last common ancestor of all these tales certainly predated this. We are looking at a very ancient tale that evolved over time."

Dr Tehrani, who will present his work on Tuesday at the British Science Festival in Guildford, Surrey, identified 70 variables in plot and characters between different versions of Little Red Riding Hood.

He found that the stories could be grouped into distinct families according to how they evolved over time.

The original ancestor is thought to be similar to another tale, The Wolf and the Kids, in which a wolf pretends to be a nanny goat to gain entry to a house full of young goats.

Stories in Africa are closely related to this original tale, whilst stories from Japan, Korea, China and Burma form a sister group. Tales told in Iran and Nigeria were the closest relations of the modern European version.

Perrault's French version was retold by the Brothers Grimm in the 19th century. Dr Tehrani said: "We don't know very much about the processes of transmission of these stories from culture to culture, but it is possible that they may being passed along trade routes or with the movement of people."

Professor Jack Zipes, a retired professor of German at the University of Minnesota who is an expert on fairy tales and their origins, described the work as "exciting". He believes folk tales may have helped people to pass on tips for survival to new generations.

He said: "Little Red Riding Hood is about violation or rape, and I suspect that humans were just as violent in 600BC as they are today, so they will have exchanged tales about all types of violent acts.

"I have tried to show that tales relevant to our adaptation to the environment and survival are stored in our brains and we consistently use them for all kinds of reference points."

http://www.telegraph.co.uk/science/science-news/6142964/Fairy-tales-have-ancient-origin.html

DNA fingerprinting 25 years old

The scientist behind DNA fingerprinting has called for a change to the law governing DNA databases on the 25th anniversary of his discovery.

Professor Sir Alec Jeffreys uncovered the process by chance in his laboratory at Leicester University.

The technique has since been used to solve crimes and identity cases.

But it has also led to controversy over profiles kept on the national DNA database. "Innocent people do not belong on that database," he said. The scientist stumbled across the groundbreaking development on 10 September, 1984.

He realised that variable patterns in the structure of DNA could be used to distinguish one person from another.

'Blue skies research'

It led to the development of DNA fingerprinting, which has been used to solve a range of crimes. Last year, 17,614 offences were solved using a DNA match, including 83 killings and 184 rapes.

It has also been developed to help solve unanswered questions and disputes over personal identity, paternity, immigration, conservation and cloning. In an interview to mark the anniversary of his discovery, Professor Jeffreys spoke of the importance of allowing academics freedom to research.

" **Innocent people do not belong on that database - branding them as future criminals is not proportionate response in the fight against crime** "
Professor Jeffreys

He said academics should be able to pursue "unfettered, fundamental, curiosity-driven" research.

"Blue skies" research, which led to discoveries such as his own, was "the ultimate engine of all scientific and technological evolution," he said, warning: "You lose that at your peril."

He renewed his calls for the government to change the law governing the UK's DNA databases - particularly the practice in England and Wales of keeping the DNA profiles of thousands of people who have neither been charged nor convicted. There are now more than five million profiles on the national DNA database, a rise of 40% in two years.

He told the BBC: "My view is very, very simple, has been right from the outset.

"Innocent people do not belong on that database. Branding them as future criminals is not proportionate response in the fight against crime.

"And I've met a fair number of these people and some of these people are very, very upset and are distressed by the fact that their DNA is on that database. They cannot get it off and they feel as if they're branded as criminals."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/uk_news/8247641.stm

Published: 2009/09/10 01:35:34 GMT

Killer genes cause potato famine

By Sudeep Chand
Science reporter, BBC News, Guildford

The killer mould behind potato blight has a giant genome, say scientists.

Potato blight was a major cause of the mid-19th Century Irish famine, when starvation killed a million people and drove a million more to emigrate.

The water mould *Phytophthora infestans* still destroys crops worldwide worth $6bn each year. In 2003 it wiped out the entire crop of Papua New Guinea.

Scientists hope the genome, published in the journal Nature, will help in developing new defences to the blight.

The mould thrives in cool, wet weather and can infect potatoes and tomatoes, causing a "late blight" that can destroy entire fields in just a few days.

The problem appears to be getting worse as the organism continues to evolve.

" **We will aim to breed a potato that is more durable; but don't bet against the pathogen** "
Sophien Kamoun

Potato farmers have to spray chemicals each week to keep the mould at bay, but even then it can come back with a vengeance.

In recent years, growers in the UK have been forced to increase chemical spraying by up to 30%.

In Ireland, farmers have described this season as the worst in living memory.

Dangerous genes

How the mould adapts so rapidly and becomes resistant to chemical attack has long puzzled scientists.

"This pathogen has an exquisite ability to adapt and change, and that's what makes it so dangerous", said Dr Chad Nusbaum, a lead scientist on the project from the Broad Institute in Cambridge, US.

The international scientific team mapped the genome of the mould, and found it contained at least twice as much DNA as its relatives.

The genome is a mixture of gene-dense regions and much bigger gene-light regions.

The scientists found 700 key genes in the gene-light regions. Some of them are known to help the mould attack the immune systems of potatoes.

Brian Haas, co-lead author of the study, said: "The regions change rapidly over time, acting as a kind of incubator to enable the rapid birth and death of genes that are key to plant infection.

"As a result, these critical genes may be gained and lost so rapidly that the hosts simply can't keep up."

Paul Birch from the Scottish Crop Research Institute, another of the scientists involved, said that modern farming techniques were part of the problem.

He said: "There is a real epidemic in Europe.

"In the EU we grow certain types of potato for mass production, forcing natural selection.

"But the Maris Piper that you find in Sainsbury's or Tesco has certain traits that people want."

Fighting back

The "invader mould" remains a critical threat to global food supplies.

It is hoped that the information will help researchers devise new ways of protecting crops.

However, one of the researchers doubted that the potato could win its arms race against the old enemy.

"We now know our enemy and may find an Achilles' heel," said Sophien Kamoun from the Sainsbury Laboratory in Norwich, UK.

"We will aim to breed a potato that is more durable; but don't bet against the pathogen," he told BBC News.

Douglas Kell, chief executive of the Biotechnology and Biological Sciences Research Council (BBSRC), said: "I am delighted that several UK and BBSRC-funded institutes and laboratories have been able to participate in the experiments leading to this important milestone."

Professors Kamoun and Birch were speaking at a presentation of the genome at the British Science Festival.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8246944.stm

Published: 2009/09/09 17:03:25 GMT

Smart tech reconnects Colombians
By Dave Lee
BBC World Service

"Semantic web technology" is being used to reconnect Colombians displaced in the country's civil conflict.

The international team aim to use smart technology to allow people to search currently incompatible databases of missing persons.

By the end of 2008, it was estimated that there were 4.3 million displaced people in Colombia - around 10% of the country's population.

The researchers also hope to use online social networks to help unite people.

"The displaced population in Colombia is the most vulnerable because their fundamental rights are massively violated," Juan Sequeda, who works on the project, told the BBC World Service's Digital Planet programme.

"Their [physical] social networks are weakened."

He believes the online tools can also help rebuild physical relationships.

"The displaced population lose their 'social tissue' at the moment they are separated," he said.

Semantic web

Many of Colombia's displaced people have been caught up in the country's violent conflicts involving armed guerrilla groups or the drug cartels.

Many have lost all of their assets, belongings and land, ending up in slums outside the cities.

- It is broadcast on Tuesday at 1232GMT and repeated at 1632GMT, 2032GMT and on Wednesday at 0032GMT
- It is also available as a

Often families are split up in the process. When this happens, they are told to register their details on a national database - known as the unique registry of displaced persons - set up by the Colombian government.

However, other registries have been set up by NGO groups - such as the Red Cross - meaning the displaced millions are spread over several databases.

Frustratingly for those who have lost connection with their families, these databases don't "talk" to each other or share information.

So, while one brother may be on one database, the other may be registered elsewhere, reducing their chances of being reunited.

This means for many Colombians, being displaced from their home can mean losing contact with friends and relatives for years, even if they live in the same city.

Researchers aim to solve this problem by creating a "semantic knowledge layer", which will link crucial information (such as names, addresses, age, etc.) across all the databases.

Semantic technology is seen by some as the next step for the world wide web, as it allows a much richer understanding of huge data sets.

In Colombia, this should mean that searching for specific people will be more effective and allow people to ask complex queries such as "how many cousins do I have in Bogota?".

"It's all about how you integrate data," said Mr Sequeda.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/technology/8246032.stm

Published: 2009/09/09 12:59:09 GMT

Road noise link to blood pressure

People living near noisy roads are at greater risk of developing high blood pressure, a Swedish study suggests.

A Lund University team found risk rose above an average daily exposure of 60 decibels, which accounts for about one in four people in western Europe.

They said it was likely noise caused stress - and maybe sleep disruption - leading to blood pressure problems.

But UK experts questioned the findings, saying other factors such as diet and smoking were more important.

Researchers analysed questionnaires completed by nearly 28,000 people as well as analysing neighbourhood traffic noise.

" **I think what we have found is probably linked to the noise triggering stress** "
Theo Bodin

They found that at above 60 decibels the risk of high blood pressure rose by more than 25%.

Above 64 decibels the risk rose by more than 90% although the team cautioned that the low numbers in this group could have skewed the findings.

The report, published in the Environmental Health journal, said the findings were worrying as high blood pressure increased the chances of heart disease and stroke.

However, the link was not apparent for people above 60 years old. The researchers said this was either because they had become desensitised to the noise or already had high blood pressure.

Report author Theo Bodin said: "Road traffic noise is the most important source of community noise so we felt it was important to look at this.

"I think what we have found is probably linked to the noise triggering stress. Previous research has found this, although we need to look at this issue further before we make firm conclusions."

But Professor Alan Maryon-Davis, president of the UK's Faculty of Public Health, said: "It seems to me that they have found an association rather than a cause. Other factors, such as smoking, diet and deprivation, are likely to be playing more of a role.

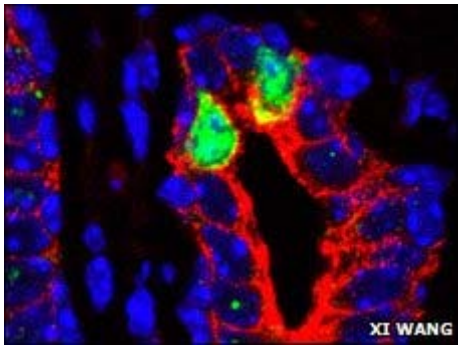
"However, it is an area of research which merits further work."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8247217.stm

Published: 2009/09/10 00:13:11 GMT

Stem cell link to prostate cancer

A newly identified type of stem cell may cause some cases of prostate cancer, research on mice suggests.



The cells, found among those which line the inner cavity of the prostate gland, can produce copies of themselves, and other, more mature cell types.

But researchers showed that when the cells were deliberately mutated by switching off a tumour suppressor gene they rapidly formed tumours.

The Columbia University study appears in the journal Nature.

" **Cancers arising from these particular stem cells might be naturally resistant to therapy, which raises the possibility of the development of new prostate cancer treatments targeted against them** "
Dr Owen Sansom Cancer Research UK

Prostate cancer is the most common cancer in men in the UK.

Each year around 34,000 men are diagnosed with the disease, and around 10,000 die from it.

Stem cells, the body's master cells which can form many different types of tissue, have previously been implicated in other forms of cancer, such as leukaemia.

Their possible role in prostate cancer has been the subject of speculation for many years.

The cells have a long lifespan in the prostate and exist to generate new tissue, so in theory if they mutate and start to grow in an unregulated way they have the potential to be very damaging.

The newly identified cells - a type of luminal epithelial stem cell - do not rely on androgens - the male sex hormones that control prostate growth - to thrive.

Drug resistance

This may give a clue as to why prostate cancer often becomes resistant to treatments designed to regulate these androgens in the later stages of the disease.

However, researcher Dr Michael Shen stressed more work was needed to establish whether the cells existed in humans, and could trigger cancer.

He said: "While there does appear to be increasing evidence suggesting that normal stem cells may serve as an origin for cancer, the 'cancer stem cell' model remains far from proven, especially in solid tumours such as prostate.

"In principle, therapies directed at putative cancer stem cells may be beneficial, but this field is still at a very early stage."

Dr Helen Rippon, of The Prostate Cancer Charity, said: "It will be some time before we know if or how these findings apply to humans.

"However, understanding the very earliest stages of prostate cancer development and the cells involved is critical if we are to develop better ways to detect and treat the disease."

Dr Owen Sansom, a stem cell researcher from Cancer Research UK's Beatson Institute for Cancer Research, said the study raised the possibility of developing new treatments to tackle prostate cancer that was resistant to hormone-based therapy.

Sex disease link

In a separate study, a team from Harvard School of Public Health has found a strong association between a common sexually transmitted infection, Trichomonas vaginalis, and advanced lethal prostate cancer.

The National Cancer Institute study suggests the infection could be a source of inflammation which might trigger the cancer.

Trichomonas vaginalis infects an estimated 174 million people globally each year, but in up to three-quarters of infected men it produces no obvious symptoms.

Researchers analysed blood samples from 673 men with prostate cancer, comparing them with a similar number of samples from men who were free from the disease.

They found Trichomonas vaginalis infection was associated with a more than two-fold increase in the risk of prostate cancer that was advanced stage at diagnosis, and a nearly three-fold increase in prostate cancer that would result in death.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8241877.stm

Published: 2009/09/10 00:33:09 GMT

New malaria 'poses human threat'

An emerging new form of malaria poses a deadly threat to humans, research has shown.

It had been thought the parasite Plasmodium knowlesi infected only monkeys.

But it has recently been found to be widespread in humans in Malaysia, and the latest study confirms that it can kill if not treated quickly.

The work, by an international team, appears in the journal Clinical Infectious Diseases.

" **The increase in tourism in Southeast Asia may mean that more cases are detected in the future, including in Western countries** "
Professor Balbir Singh University Malaysia Sarawak

Although the new form of the disease has so far been concentrated in South East Asia, the researchers warn that tourism to the region could soon see cases appearing in Western countries too.

Malaria kills more than a million people each year.

It is caused by malaria parasites, which are injected into the bloodstream by infected mosquitoes.

Of the four species of malaria parasite that often cause disease in humans, P. falciparum, found most commonly in Africa, is the most deadly.

Another parasite, P. malariae, found in tropical and sub-tropical regions across the globe, has symptoms that are usually less serious.

P. knowlesi had been thought only to infect monkeys, in particular long-tailed and pig-tailed macaques found in the rainforests of South East Asia.

But following work by a team at the University Malaysia Sarawak it has now been recognised as a significant cause of disease in humans.

The latest study shows that P. knowlesi can easily be confused with P. malariae under the microscope.

Speedy reproduction

However, unlike its cousin, P. knowlesi has the ability to reproduce every 24 hours in the blood - meaning infection is potentially deadly.

Researcher Professor Balbir Singh said this meant early diagnosis and treatment were crucial.

The researchers carried out tests on over 150 patients admitted to hospital in Sarawak, Malaysian Borneo, between July 2006 and January 2008 with malaria infection.

They found that P. knowlesi accounted for more than two-thirds of the infections, resulting in a wide spectrum of disease.

Most cases of infection were uncomplicated and easily treated with drugs, including chloroquine and primaquine.

However, around one in ten patients had developed complications, such as breathing difficulties and kidney problems, and two died.

Although the fatality rate was just under 2%, that made P. knowlesi as deadly as P. falciparum malaria.

And the researchers stress it is hard to determine an accurate fatality rate given the small number of cases so far studied.

Low platelet count

All of the P. knowlesi patients had a low blood platelet count, significantly lower than that usually found for other types of malaria.

However, even though blood platelets are essential for blood clotting, no cases of excessive bleeding or problems with clotting were identified.

The researchers believe the low blood platelet count could be used as a potential way to diagnose P. knowlesi infections.

Professor Singh said: "The increase in tourism in South East Asia may mean that more cases are detected in the future, including in Western countries.

"Clinicians assessing a patient who has visited an area with known or possible P. knowlesi transmission should be aware of the diagnosis, clinical manifestations, and rapid and potentially serious course of P. knowlesi malaria."

Dr Kevin Baird, a malaria expert at the University of Oxford, said the study discredited the long-standing theory that malaria does not cross from species to species.

However, he said it was unclear what proportion of all malaria cases were likely to be due to P. knowlesi infection in the future.

He said: "We just do not know the scale of the problem."

Dr Baird added that the P. knowlesi parasite has previously been used as a therapy for advanced syphilis.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8246063.stm

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Cement's Basic Molecular Structure Finally Decoded

Concrete being poured from a cement truck chute on a new sidewalk construction project. (Credit: iStockphoto/Mike Clarke)

ScienceDaily (Sep. 12, 2009) — In the 2,000 or so years since the Roman Empire employed a naturally occurring form of cement to build a vast system of concrete aqueducts and other large edifices, researchers have analyzed the molecular structure of natural materials and created entirely new building materials such as steel, which has a well-documented crystalline structure at the atomic scale.

Oddly enough, the three-dimensional crystalline structure of cement hydrate -- the paste that forms and quickly hardens when cement powder is mixed with water -- has eluded scientific attempts at decoding, despite the fact that concrete is the most prevalent man-made material on earth and the focus of a multibillion-dollar industry that is under pressure to clean up its act. The manufacture of cement is responsible for about 5 percent of all carbon dioxide emissions worldwide, and new emission standards proposed by the U.S. Environmental Protection Agency could push the cement industry to the developing world.

"Cement is so widely used as a building material that nobody is going to replace it anytime soon. But it has a carbon dioxide problem, so a basic understanding of this material could be very timely," said MIT Professor Sidney Yip, co-author of a paper published online in the *Proceedings of the National Academy of Sciences* (PNAS) during the week of Sept. 7 that announces the decoding of the three-dimensional structure of the basic unit of cement hydrate by a group of MIT researchers who have adopted the team name of Liquid Stone.

"We believe this work is a first step toward a consistent model of the molecular structure of cement hydrate, and we hope the scientific community will work with it," said Yip, who is in MIT's Department of Nuclear Science and Engineering (NSE). "In every field there are breakthroughs that help the research frontier moving forward. One example is Watson and Crick's discovery of the basic structure of DNA. That structural model put biology on very sound footing."

Scientists have long believed that at the atomic level, cement hydrate (or calcium-silica-hydrate) closely resembles the rare mineral tobermorite, which has an ordered geometry consisting of layers of infinitely long chains of three-armed silica molecules (called silica tetrahedra) interspersed with neat layers of calcium oxide.

But the MIT team found that the calcium-silica-hydrate in cement isn't really a crystal. It's a hybrid that shares some characteristics with crystalline structures and some with the amorphous structure of frozen liquids, such as glass or ice.

At the atomic scale, tobermorite and other minerals resemble the regular, layered geometric patterns of kilim rugs, with horizontal layers of triangles interspersed with layers of colored stripes. But a two-dimensional look at a unit of cement hydrate would show layers of triangles (the silica tetrahedra) with every third, sixth or ninth triangle turned up or down along the horizontal axis, reaching into the layer of calcium oxide above or below.

And it is in these messy areas - where breaks in the silica tetrahedra create small voids in the corresponding layers of calcium oxide - that water molecules attach, giving cement its robust quality. Those erstwhile "flaws" in the otherwise regular geometric structure provide some give to the building material at the atomic scale that transfers up to the macro scale. When under stress, the cement hydrate has the flexibility to stretch or compress just a little, rather than snapping.

"We've known for several years that at the nano scale, cement hydrates pack together tightly like oranges in a grocer's pyramid. Now, we've finally been able to look inside the orange to find its fundamental signature. I call it the DNA of concrete," said Franz-Josef Ulm, the Macomber Professor in the Department of Civil and Environmental Engineering (CEE), a co-author of the paper. "Whereas water weakens a material like tobermorite or jennite, it strengthens the cement hydrate. The 'disorder' or complexity of its chemistry creates a heterogenic, robust structure.

"Now that we have a validated molecular model, we can manipulate the chemical structure to design concrete for strength and environmental qualities, such as the ability to withstand higher pressure or temperature," said Ulm.

CEE Visiting Professor Roland Pellenq, director of research at the Interdisciplinary Center of Nanosciences at Marseille, which is part of the French National Center of Scientific Research and Marseille University, pinned down the exact chemical shape and structure of C-S-H using atomistic modeling on 260 co-processors and a statistical method called the grand canonical Monte Carlo simulation.

Like its name, the simulation requires a bit of gambling to find the answer. Pellenq first removed all water molecules from the basic unit of tobermorite, watched the geometry collapse, then returned the water molecules singly, then doubly and so on, removing them each time to allow the geometry to reshape as it would naturally. After he added the 104th water molecule, the correct atomic weight of C-S-H was reached, and Pellenq knew he had an accurate model for the geometric structure of the basic unit of cement hydrate.

The team then used that atomistic model to perform six tests that validated its accuracy.

"This gives us a starting point for experiments to improve the mechanical properties and durability of concrete. For instance, we can now start replacing silica in our model with other materials," said Pellenq.

Other team members are graduate student Rouzbeh Shahsavari of CEE and Markus Buehler, MIT's Esther and Harold E. Edgerton Career Development Associate Professor of Civil and Environmental Engineering; Krystyn Van Vliet, MIT's Thomas Lord Associate Professor of Materials Science and Engineering; and NSE postdoctoral associate Akihiro Kushima.

This research was funded by the Portuguese cement manufacturer, Cimpor Corp., enabled through the MIT-Portugal Program.

Adapted from materials provided by Massachusetts Institute of Technology, Department of Civil and Environmental Engineering. Original article written by Denise Brehm, Civil & Environmental Engineering.

http://www.sciencedaily.com/releases/2009/09/090909141639.htm#

New Method Monitors Early Sign Of Oxidative Stress In Cancer

ScienceDaily (Sep. 12, 2009) — The growth of cancerous tumors is fueled, at least in part, by the buildup of free radicals—highly reactive oxygen-containing molecules.

It stands to reason, then, that cancer should respond to treatment with antioxidants, which inhibit the rogue radicals, or with pro-oxidants, which go the opposite direction, increasing "oxidative stress" on cancer cells to the point of vanquishing them. But experiments with such treatments have had mixed results, possibly because patients differ in their "redox profiles," or oxidative stress levels. Being able to monitor a marker of oxidative stress that is associated with the activation of tumor cell growth pathways, particularly at an early stage, and then tailor treatments accordingly would allow for more targeted studies and might improve the odds of success with antioxidants and pro-oxidants, said University of Michigan chemical biologist Kate Carroll.

A new method developed by Carroll and postdoctoral research fellow Young Ho Seo makes such monitoring possible and reveals that different individuals and even different tumor types have different redox profiles. The method and the research behind it are described in a paper scheduled for online publication in the *Proceedings of the National Academy of Sciences* during the week of Sept. 7.

The new method detects sulfenic acid in proteins—a tipoff to early oxidative stress and to a specific protein modification associated with cell growth pathways. Sulfenic acid is produced when a particular oxidant, hydrogen peroxide, reacts with the protein building block cysteine. But because the chemical modification involved is so small and transient, it has been difficult to detect. To get around that problem, Carroll and Seo used a chemical probe that "traps" sulfenic acid and tags it for recognition by an antibody. The antibody is labeled with a fluorescent dye that glows when observed with a fluorescence microscope.

The researchers then used the method to assess sulfenic acid levels as a marker of oxidative stress in several systems, including a panel of breast cancer cell lines.

"For each line, we saw a very distinct pattern of sulfenic acid modifications," indicating different oxidative stress levels and hinting at differences in the underlying molecular events associated with tumor growth," said Carroll, assistant professor of chemistry and a research assistant professor in the Life Sciences Institute. "Whether the patterns we see will correlate with response to antioxidant treatment or other therapies that modulate oxidative stress level remains to be seen, but now we at least have a way to investigate that question."Next, Carroll's group wants to determine which specific proteins in the cell are being modified and what roles, if any, those proteins play in the disease process. "Some of the modified proteins may not play any role, but I'm sure it will turn out that many of them do," Carroll said. "Once we find out which proteins are involved, we can target them directly rather than using global treatments like antioxidants."

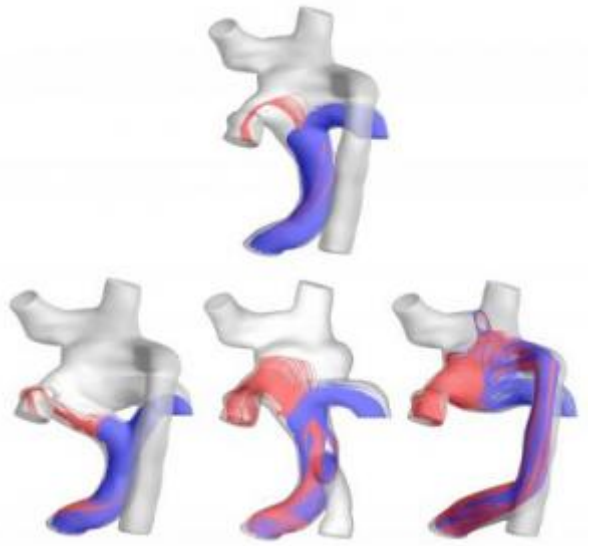
The U-M Office of Technology Transfer is working on commercialization of the technology. Patent protection has been applied for, and the compounds used in this research soon will be commercially available.

The researchers received funding from the Life Sciences Institute, the Leukemia & Lymphoma Society and the American Heart Association.

Adapted from materials provided by University of Michigan.

http://www.sciencedaily.com/releases/2009/09/090911114306.htm#

MRI Simulation Of Blood Flow Helps Plan Child's Delicate Heart Surgery



Top: This is a 3-D model of hepatic flow distribution pre-surgery. Bottom: These are post-surgery hepatic flow distribution options. The surgeon ultimately selected the third option, which exhibited the best performance with regard to hepatic factor distribution to the left and right lungs. (Credit: Georgia Tech Image by Ajit Yoganathan)

ScienceDaily (Sep. 12, 2009) — Researchers at the Georgia Institute of Technology, collaborating with pediatric cardiologists and surgeons at The Children's Hospital of Philadelphia, have developed a tool for virtual surgery that allows heart surgeons to view the predicted effects of different surgical approaches.

By manipulating three-dimensional cardiac magnetic resonance images of a patient's specific anatomy, physicians can compare how alternative approaches affect blood flow and expected outcomes, and can select the best approach for each patient before entering the operating room.

"This tool helps us to get the best result for each patient," said co-author Mark A. Fogel, M.D., an associate professor of cardiology and radiology, and director of Cardiac MRI at The Children's Hospital of Philadelphia. "The team can assess the different surgical options to achieve the best blood flow and the optimum mixture of blood, so we can maximize the heart's energy efficiency."

In the August issue of the *Journal of the American College of Cardiology: Cardiovascular Imaging*, the researchers describe the surgical planning methodology, detailing how the tool helped them to plan the surgery of a four-year-old girl who was born with just one functional ventricle, or pumping chamber, instead of two.

Two in every 1,000 babies in the United States are born with this type of single ventricle heart defect. These children typically suffer from low levels of oxygen in their tissues because their oxygen-rich and oxygen-poor blood mix in their one functional ventricle before being redistributed to their lungs and body.

To correct this, the children undergo a series of three open-heart surgeries – called the staged Fontan reconstruction – to reshape the circulation in a way that allows oxygen-poor blood to flow from the limbs directly to the lungs without going through the heart. While these vascular modifications can eliminate

blood mixing and restore normal oxygenation levels, surgeons and cardiologists must ensure that the lungs will receive proper amounts of blood and nutrients after the surgery so that normal development occurs.

"Preoperatively determining the Fontan configuration that will achieve balanced blood flow to the lungs is very difficult and the wide variety and complexity of patients' anatomies requires an approach that is very specific and personalized," said Ajit Yoganathan, Ph.D., Regents' Professor in the Wallace H. Coulter Department of Biomedical Engineering at Georgia Tech and Emory University. "With our surgical planning framework, the physicians gain a better understanding of each child's unique heart defect, thus improving the surgery outcome and recovery time."

The patient described in this paper, Amanda Mayer, age four, of Staten Island, N.Y., had previously undergone all three stages of the Fontan procedure at The Children's Hospital of Philadelphia, but developed severe complications. Her oxygen saturation was very low – only 72 percent, compared to normal levels of at least 95 percent – which indicated the possibility of abnormal connections between the veins and arteries in one of her lungs. Normally, the liver releases hormonal factors that prevent these abnormal connections, so the presence of the malformations indicated a low supply of hepatic blood to the lung.

To improve the distribution of these hormonal factors to both lungs, the surgeons needed to re-operate and reconfigure the patient's cardiovascular anatomy. Georgia Tech's surgical planning framework helped Thomas L. Spray, M.D., chief of the Division of Cardiothoracic Surgery at Children's Hospital, to determine the optimal surgical option.

"MRI acquires images of the child's heart without using radiation," said Spray. "Then we use the computerized technology to model different connections to simulate optimum blood flow characteristics, before we perform the surgery."

The image-based surgical planning consisted of five major steps: acquiring magnetic resonance images of the child's heart at different times in the cardiac cycle, modeling the preoperative heart anatomy and blood flow, performing virtual surgeries, using computational fluid dynamics to model the proposed postoperative flow, and measuring the distribution of liver-derived hormonal factors and other clinically relevant parameters as feedback to the surgeon.

Fogel collected three different types of magnetic resonance images, and Yoganathan, along with graduate students Kartik Sundareswaran and Diane de Zélicourt, generated a three-dimensional model of the child's cardiovascular anatomy. From the model they reconstructed the three-dimensional pre-operative flow fields to understand the underlying causes of the malformations.

For this particular patient, the team saw a highly uneven flow distribution – the left lung was receiving about 70 percent of the blood pumped out by the heart, but only five percent of the hepatic blood. Both observations suggested left lung malformations, but closer examination of the flow structures in that particular patient revealed that the competition between different vessels at the center of the original Fontan connection effectively forced all hepatic factors into the right lung even though a vast majority of total cardiac output went to the left lung.

To facilitate the design of the surgical options that would correct this problem, Jarek Rossignac, Ph.D., a professor in Georgia Tech's School of Interactive Computing, developed Surgem, an interactive geometric modeling environment that allowed the surgeon to use both hands and natural gestures in three-dimensions to grab, pull, twist and bend a three-dimensional computer representation of the patient's anatomy. After analyzing the three-dimensional reconstruction of the failing cardiovascular geometry, the team considered three surgical options.

The research team then performed computational fluid dynamics simulations on all three options to investigate for each how well blood would flow to the lungs and the amount of energy required to drive blood through each connection design. These measures of clinical performance allowed the cardiologists and surgeons to conduct a risk/benefit analysis, which also included factors such as difficulty of completion and potential complications.

Of the three choices, Spray favored the option that showed a slightly higher energy cost but exhibited the best performance with regards to hepatic factor distribution to the left and right lungs. Five months after the surgery, Mayer showed a dramatic improvement in her overall clinical condition and oxygen saturation levels, which increased from 72 to 94 percent. Mayer is breathing easier and is now able to play actively like other children, according to her cardiologist, Donald Putman, M.D., of Staten Island, N.Y.

"The ability to perform this work is a team effort," Fogel added. "State-of-the-art three-dimensional cardiac MRI married to modern biomedical engineering and applied anatomy and physiology enabled this approach. With the advanced pediatric cardiothoracic surgery we have here at The Children's Hospital of Philadelphia, patients can benefit from this new method."

Additional authors on the paper include Shiva Sharma from Pediatric Cardiology Services, Kirk Kanter from the Division of Cardiothoracic Surgery at Emory University, and Fotis Sotiropoulos from the Department of Civil Engineering at the University of Minnesota.

This work was funded by grant number HL67622 from the National Heart, Lung and Blood Institute (NHLBI) of the National Institutes of Health (NIH). The content is solely the responsibility of the authors and does not necessarily represent the official view of the NHLBI or the NIH.

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

http://www.sciencedaily.com/releases/2009/08/090810174211.htm

New WHO Data Underscores Global Threat Of World's Leading Child Killer: Pneumonia

ScienceDaily (Sep. 12, 2009) — New World Health Organization data to be published in this week's edition of the Lancet will shed new light on two leading causes of pneumonia, the world's leading killer of children under age 5, both globally and within specific countries. The results, which are the first ever available at the country level, are expected to serve as a clarion call to developing country governments to invest in pneumonia prevention programs.

According to the studies, *Streptococcus pneumoniae* and *Haemophilus influenzae* type b [Hib] infections take the lives of an estimated 1.2 million children under age 5 each year. Safe and effective vaccines exist to provide protection against both diseases. However, use of Hib vaccine has only recently expanded to low-income countries and pneumococcal vaccine is not yet included in national immunization programs in the developing world, where children bear the highest risk for pneumonia and where most pneumonia-related child deaths occur.

Streptococcus pneumoniae **(Pneumococcal Disease)**

Data from the study show that in 2000, there were an estimated 14.5 million cases of pneumococcal disease worldwide, and 826,000 children under 5 years of age died of the disease. Of the 14.5 million pneumococcal cases, 95% were attributable to pneumonia. While the majority of pneumococcal cases (51%) were found in Asia due to the high population, an estimated 54% of pneumococcal deaths occurred in Africa, where the lack of vaccines, a high prevalence of HIV infection and lack of access to medical care contributed to the death toll.

"Our findings underscore the urgent need for prevention efforts throughout the developing world," said Kate O'Brien, primary author of the pneumococcal study and Associate Professor of International Health at the Johns Hopkins Bloomberg School of Public Health. "The need for vaccination and improved treatment is particularly urgent in Africa and Asia, which together account for 95% of all pneumococcal deaths."

The ten countries with the greatest number and greatest proportion of global pneumococcal cases were in Asia and Africa, and taken together account for 66% of cases worldwide. These countries include India (27%), China (12%), Nigeria (5%), Pakistan (5%), Bangladesh (4%), Indonesia (3%), Ethiopia (3%), Democratic Republic of the Congo (3%), Kenya (2%) and the Philippines (2%).

"In areas of the world where access to quality care is limited, the use of pneumococcal vaccine is particularly necessary to limit disease and save lives," said Thomas Cherian, Coordinator of the WHO Expanded Programme on Immunization. "Implementing pneumococcal vaccine is critical if developing countries are to achieve United Nations Millennium Development Goal 4 for child mortality reduction."

In 2000, only the USA had initiated routine use of pneumococcal vaccine. By August 2008, this expanded to include 24 high and two upper-middle income countries but did not include any from Africa or Asia, the regions with the highest numbers of pneumococcal deaths and cases. According to the study, these 26 countries accounted for less than 0.2% of global childhood pneumococcal deaths in 2000 and the children in these countries, on average, had a 40-fold lower risk of pneumococcal death than the children in countries not yet using the vaccine.

Through the GAVI Alliance (http://www.gavialliance.com), low income countries can access existing and future pneumococcal vaccines with only a small self-financed contribution of as little as US $0.15 per dose. By February 2009, 11 countries had received GAVI Alliance approval for support to introduce pneumococcal conjugate vaccine (PCV), including 8 in Africa and Asia. Two of these, Rwanda and the Gambia, have now initiated the use of PCV in their routine infant immunization schedules.

"If fully rolled out in GAVI-eligible countries, the pneumococcal vaccine could save the lives of more than 440,000 children by 2015," said Dr. Julian Lob-Levyt, CEO of the GAVI Alliance. "We encourage all developing countries to apply for this support as an important first step to saving children's lives."

***Haemophilus influenzae* type b (Hib)**

Findings from the Hib study indicate that in 2000, Hib caused approximately 8.1 million serious illnesses worldwide and caused 371,000 child deaths. As with pneumococcal disease, the greatest burden of Hib disease lies in Asia and Africa. The ten countries with the highest estimated number of Hib deaths in 2000 include India (72,000), Nigeria (34,000), Ethiopia (24,000), Democratic Republic of the Congo (22,000), China (19,000), Afghanistan (14,000), Pakistan (13,000), Bangladesh (12,000), Angola (9,000) and Niger (8,000).

"The burden of Hib disease is substantial and almost entirely vaccine preventable," said James Watt, Associate in International Health at the Johns Hopkins Bloomberg School of Public Health. "Expanded use of Hib vaccine could reduce the global burden of childhood pneumonia and meningitis and reduce child mortality."

Highly effective and safe protein-polysaccharide conjugate Hib vaccines have been available for almost 20 years. These vaccines have virtually eliminated serious Hib disease in the developed and developing countries in which they are in routine use. Widespread use of Hib vaccines was found to have a significant impact on the burden of Hib disease in the United States and Europe. The study indicates that among children born in 2000, approximately 338,000 Hib cases and 12,500 Hib deaths were averted by Hib vaccination.

The World Health Organization and the GAVI Alliance, which is supporting the Hib Initiative, have been working to expand supplies of Hib vaccine, reduce vaccine cost and assist countries with vaccine introduction. There is substantial regional variability in vaccine use, and the study suggests that expanded use of Hib vaccines could have considerable benefit in reducing child mortality worldwide.

"Prevention of pneumococcal and Hib cases and deaths is imminently achievable, but countries must demonstrate the political will to prioritize prevention," said Orin Levine, Executive Director of PneumoADIP at the Johns Hopkins Bloomberg School of Public Health. "Together with financial assistance now available through the GAVI Alliance, these findings give countries the information they need and should now provide a mandate for local and regional policymakers to prioritize investment in pneumonia prevention."

"These estimates provide the missing link for country policy makers seeking justification for investments in lifesaving vaccines," said Anne Schuchat, Director of the National Center for Immunization and Respiratory Diseases at the U.S. Centers for Disease Control and Prevention.

Both studies were funded by the World Health Organization, GAVI Alliance and the Vaccine Fund, undertaken through a collaboration between scientists at the Johns Hopkins Bloomberg School of Public Health, the London School of Hygiene and Tropical Medicine and the World Health Organization, Geneva, and will be published in the *Lancet* (http://www.thelancet.com) on September 12. For more information and country-specific estimates, visit http://www.who.int/immunization_monitoring/burden/en/.

Adapted from materials provided by GAVI's PneumoADIP, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/09/090911095406.htm

A Boy For Every Girl? Not Even Close: Scientists Trace Evolution Of Butterflies Infected With Deadly Bacteria

A male Great Eggfly (Hypolimnas bolina). (Credit: Courtesy of Wikimedia Commons)

ScienceDaily (Sep. 11, 2009) — In a perfect world, for every boy there would of course be a girl, but a new study shows that actual sex ratios can sometimes sway very far from that ideal. In fact, the male-to-female ratio of one tropical butterfly has shifted rapidly over time and space, driven by a parasite that specifically kills males of the species, reveals a report published online on September 10th in *Current Biology*, a Cell Press publication.

"We were surprised at the speed with which change in sex ratio could occur," said Emily Hornett of the University of Liverpool. "Between 1886 and 1894 in Fiji, the male-killing bacterium rose from 50 percent to over 90 percent frequency, changing the sex ratio from 2:1 to 10:1."

The researchers made their discovery by applying modern tools to aging museum collections of the butterfly known as *Hypolimnas bolina*. Between the 1870s and 1930s, these insects' highly variable female wing color pattern led traveling entomologists to intensively collect them. Many specimens were later deposited in museums along with detailed field notes.

The researchers examined the variation in the butterflies' sex ratios and their infection with the male-killing *Wolbachia* bacterium by assaying museum specimens, inferring from that what historical populations must have been like. Comparison of contemporary and museum samples revealed profound change in four of five populations examined, the researchers report.

Two populations became extremely female-biased as the male-killing bacterium spread. One population evolved from extremely female-biased to a sex ratio near 50:50 after the infection lost its male-killing activity. The final population fluctuated widely in sex ratio, along with changes in the frequency of the male-killer.

These findings give new insight into the reproductive ecology of the butterflies. More importantly, they show how scientists can literally watch evolution in action by comparing museum specimens to contemporary populations, highlighting the incredible value of such collections as "silent witnesses" to such change.

"Evolution can be observed by comparing fossil and current species, or inferred from variation between extant species placed on a phylogeny," the researchers wrote. "However, it is rare to directly observe

evolution over short time periods. Traditionally, direct observation of evolution has required records over time from long-term study populations. Resurrection ecology, where viable propagule stages of known age are retrieved from sediment cores and compared to current specimens, represents a new technique with which to observe evolution directly. However, both of these approaches are obviously limited to the few species for which this type of data or sample is available.

"We predict that the increasing availability of methods that make DNA from museum specimens accessible will lead to an escalating use of such collections to answer evolutionary questions. With the advent of high-throughput DNA sequencing, the worth of museum collections to future generations of evolutionary biologists is invaluable and inestimable."

The researchers include Emily A. Hornett, University of Liverpool, Liverpool, UK; Sylvain Charlat, University of Lyon, Villeurbanne, France; Nina Wedell, University of Exeter, Penryn, UK; Chris D. Jiggins, University of Cambridge, Cambridge, UK; and Gregory D.D. Hurst, University of Liverpool, Liverpool, UK.

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

http://www.sciencedaily.com/releases/2009/09/090910121801.htm#

Two Genes Identified As Potential Therapeutic Targets For Multiple Sclerosis

ScienceDaily (Sep. 11, 2009) — A Mayo Clinic study has found that two genes in mice were associated with good central nervous system repair in multiple sclerosis (MS). These findings give researchers new hope for developing more effective therapies for patients with MS and for predicting MS patients' outcomes.

This study will be presented at the Congress of the European Committee for Treatment and Research in Multiple Sclerosis in Dusseldorf, Germany, on Sept. 11, 2009.

"Most MS genetic studies have looked at disease susceptibility -- or why some people get MS and others do not," says Allan Bieber, Ph.D., a Mayo Clinic neuroscientist and author of this study. "This study asked, among those who have MS, why do some do well with the disease while others do poorly, and what might be the genetic determinants of this difference in outcome."

Mayo Clinic provides care for nearly 2,500 patients with MS each year. MS is a disease of the central nervous system that includes the brain, spinal cord and nerves. MS is called a demyelinating disease because it results from damage to myelin, the insulating covering of nerves. It occurs most commonly in those between the ages of 20 and 40, and is the most frequent neurological disorder in young adults in North America and Europe. Approximately 330,000 people in the United States have MS. Symptoms include loss of muscle coordination, strength, vision, balance and cognition.

Dr. Bieber and a team of Mayo Clinic researchers used two different strains of mice with a chronic, progressive MS-like disease. One strain progressed to paralysis and death. The other underwent the initial damage induction phase of the disease and then spontaneously repaired the damage to the central nervous system and retained most neurologic function. Using the powerful genetic mapping techniques that are available for mice, the team mapped two strong genetic determinants of good disease outcome.

"It's possible that the identification of these genes may provide the first important clue as to why some patients with MS do well, while others do not," says Dr. Bieber. "The genetic data indicates that good central nervous system repair results from stimulation of one genetic pathway and inhibition of another genetic pathway. While we're still in the early stages of this research, it could eventually lead to the development of useful therapies that stimulate or inhibit these genetic pathways in patients with MS."

According to Dr. Bieber, the research suggests that there may be a small number of strong genetic determinants for central nervous system repair following demyelinating disease, rather than a larger number of weak determinants.

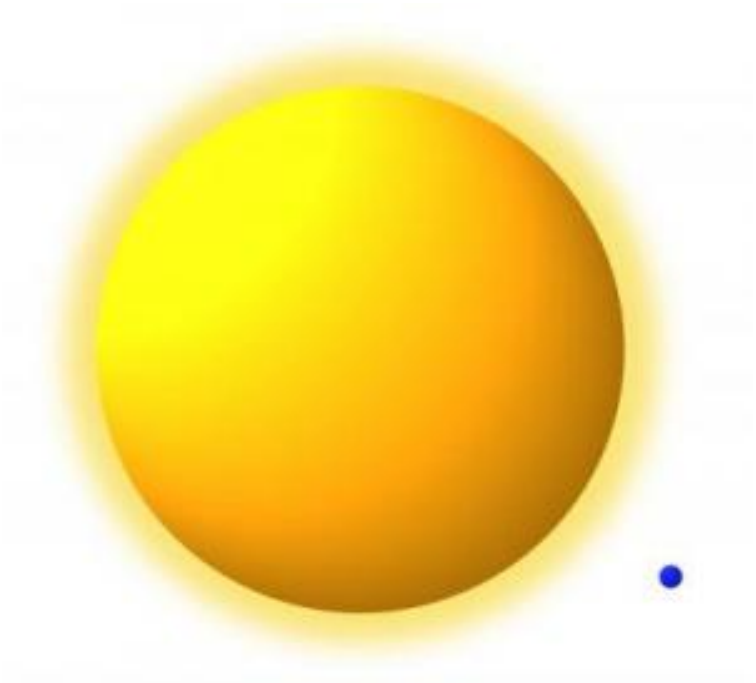
"If that's true, it may be possible to map the most important genetic determinants of central nervous system repair in patients with MS and define a reparative genotype that could predict patients' outcomes," says Moses Rodriguez, M.D., a Mayo Clinic neurologist and director of Mayo Clinic's Center for Multiple Sclerosis and Central Nervous System Demyelinating Diseases Research and Therapeutics. "Such a diagnostic tool would be a great benefit to patients with MS and is consistent with the concepts of 'individualized medicine.'"

Also on the Mayo Clinic research team was Kanitta Suwansrinon, M.D.

Adapted from materials provided by Mayo Clinic.

http://www.sciencedaily.com/releases/2009/09/090911083327.htm#

High In Sodium: Highly Charged Tungsten Ions May Diagnose Fusion Energy Reactors



Sodium-like tungsten ions (blue) are far smaller than neutral sodium atoms (orange) -- the ion's 11 electrons are pulled in very tightly by the 74 protons in the tungsten nucleus, making their energy jumps far more expensive than in neutral sodium and causing them to emit high-energy ultraviolet wavelengths of light, rather than visible light, as is the case with ordinary sodium.

ScienceDaily (Sep. 11, 2009) — Just as health-food manufacturers work on developing the best possible sodium substitutes for low-salt diets, physicists at the National Institute of Standards and Technology (NIST) have acquired new knowledge on a promising sodium alternative of their own. Sodium-like tungsten ions could pepper—and conveniently monitor—the hot plasma soup inside fusion energy devices, potential sources of abundant, clean power.

Tungsten—having the highest melting point of any metal—will be used in some high-strength structural components in the experimental ITER fusion reactor under construction in France (see "NIST Light Source Illuminates Fusion Power Diagnostics," NIST Tech Beat, Oct. 11, 2007.). When ITER cooks up its hot, dense fusion plasma, it could erode trace amounts of tungsten from its structures and strip away many of its electrons in the process. When 63 of tungsten's 74 electrons are removed, it becomes chemically analogous to sodium atoms, which have 11 electrons as well.

Ordinary sodium gas radiates bright yellow-orange light, which has proven useful for everything from mundane streetlamps to exotic atom lasers. Sodium radiates approximately 99 percent of its visible light in two shades of orange, which scientists have termed the "D" spectral lines.

Sodium-like tungsten ions emit intense light in analogous "D" spectral lines, but they are at far higher energy levels than sodium, and so are shifted out of the visible spectrum to the extreme ultraviolet. Measuring the wavelengths and relative intensities of lines in the spectrum of light released by a population of tungsten ions in the plasma can provide information about the fusion plasma conditions, such as its temperature, density and magnetic fields. Yet it has been challenging to measure light in this portion of the electromagnetic spectrum.

NIST's John Gillaspy and his colleagues have now provided the first measurement* of both "D" lines in sodium-like tungsten, confirming theoretical predictions of their energies and intensities. The NIST

scientists further checked their knowledge by measuring the spectrum of light from other sodium-like ions of hafnium, tantalum and gold. The researchers used NIST's electron beam ion trap (EBIT), which employs an electron beam to make, catch and study highly charged ions. To measure the spectra, they used an extreme ultraviolet (EUV) spectrometer, originally developed to study 13.5 nanometer wavelength light emitted from plasma sources for next-generation microelectronics applications, but they discovered they could push it to detect radiation as low as about 2 nanometers, where tungsten's lower-wavelength "D" line resides. With this experimental knowledge of tungsten's lines, researchers may now have a robust new ingredient for measuring fusion reactor conditions.

Journal reference:

1. J.D. Gillaspy, I.N. Draganic, Y. Ralchenko, J. Reader, J.N. Tan, J.M. **Pomeroy and S.M. Brewer Measurement of the D-line doublet in high-Z highly charged sodiumlike ions**. *Physical Review A*, Published online 8 July 2009 DOI: 10.1103/PhysRevA.80.010501

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

http://www.sciencedaily.com/releases/2009/09/090909111623.htm#

How Do You Analyse A Criminal?

ScienceDaily (Sep. 11, 2009) — The use of digital data analysis within law enforcement is not simple. For example, how can you predict if somebody is a terrorist? Dutch researcher Stijn Vanderlooy has developed a model that makes digital data analysis more reliable.

In recent years there has been a rapid increase in the storage of digital data within the field of law enforcement. However, this data must be analysed to extract knowledge. For example, where does the perpetrator of a crime live? How great is the chance that somebody shall commit several crimes and therefore become a repeat offender? Within law enforcement the reliability of the data is, however, vitally important. And that is where the problem lies: the available computer models are not considered to be reliable enough.

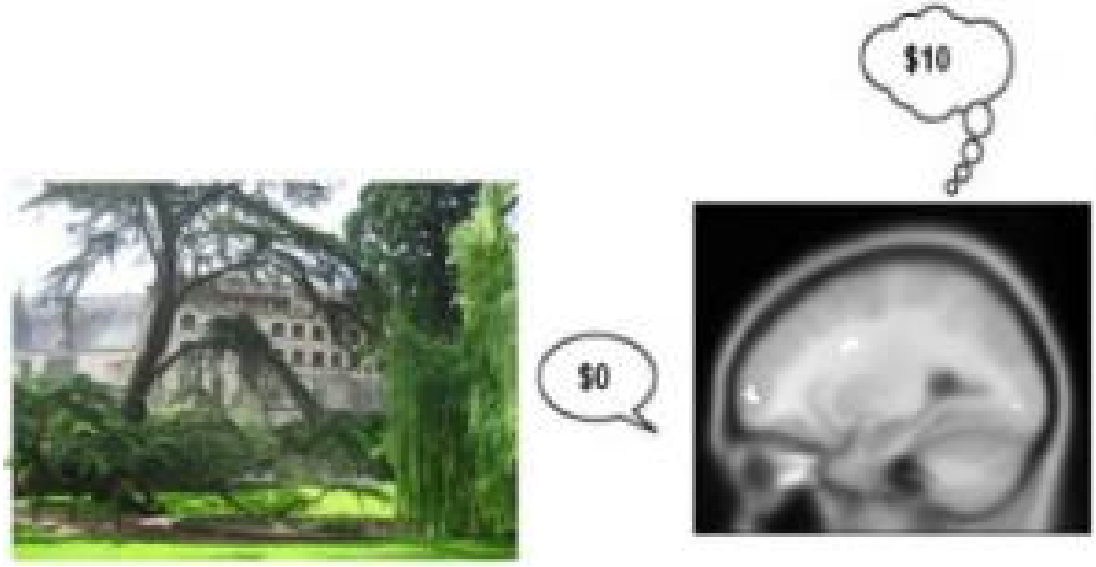
The three highly promising stages for data analysis that Vanderlooy has identified, consist of different steps. First of all the data (for example persons) are no longer divided into classes but are organised according to the likelihood that they belong in a class. This approach opens up a large number of new applications, for example tracing organised credit card fraud or drawing up suspect profiles. Subsequently, if a classification of probability is used then the quality of the computer model can be guaranteed up to a desired level. Finally, an optimal computer model is designed for the reliable classification of data in more than two classes.

Vanderlooy's research falls within the research discipline of Machine learning, an aspect of artificial intelligence that provides effective and efficient models for the analysis of data. This project was part of the NWO programme ToKeN (Access To Knowledge and its enhancement Netherlands), which focuses on fundamental problems in the interaction between a human user and knowledge and information systems.

Adapted from materials provided by NWO (Netherlands Organization for Scientific Research), via AlphaGalileo.

http://www.sciencedaily.com/releases/2009/09/090902122441.htm#

Scientists Develop Novel Use Of Neurotechnology To Solve Classic Social Problem



Information from fMRI measurements can help give people an incentive to be truthful about how much they value public goods like this park in France. Groups can use this information to decide when to spend limited resources on public goods, as well as the best way to share the costs. (Credit: Caltech/Ian Krajbich)

ScienceDaily (Sep. 11, 2009) — Economists and neuroscientists from the California Institute of Technology (Caltech) have shown that they can use information obtained through functional magnetic resonance imaging (fMRI) measurements of whole-brain activity to create feasible, efficient, and fair solutions to one of the stickiest dilemmas in economics, the public goods free-rider problem—long thought to be unsolvable.

This is one of the first-ever applications of neurotechnology to real-life economic problems, the researchers note. "We have shown that by applying tools from neuroscience to the public-goods problem, we can get solutions that are significantly better than those that can be obtained without brain data," says Antonio Rangel, associate professor of economics at Caltech and the paper's principal investigator.

The paper describing their work was published today in the online edition of the journal *Science*.

Examples of public goods range from healthcare, education, and national defense to the weight room or heated pool that your condominium board decides to purchase. But how does the government or your condo board decide which public goods to spend its limited resources on? And how do these powers decide the best way to share the costs?

"In order to make the decision optimally and fairly," says Rangel, "a group needs to know how much everybody is willing to pay for the public good. This information is needed to know if the public good should be purchased and, in an ideal arrangement, how to split the costs in a fair way."

In such an ideal arrangement, someone who swims every day should be willing to pay more for a pool than someone who hardly ever swims. Likewise, someone who has kids in public school should have more of her taxes put toward education.

But providing public goods optimally and fairly is difficult, Rangel notes, because the group leadership doesn't have the necessary information. And when people are asked how much they value a particular public good—with that value measured in terms of how many of their own tax dollars, for instance, they'd be willing to put into it—their tendency is to lowball.

Why? "People can enjoy the good even if they don't pay for it," explains Rangel. "Underreporting its value to you will have a small effect on the final decision by the group on whether to buy the good, but it can have a large effect on how much you pay for it."

In other words, he says, "There's an incentive for you to lie about how much the good is worth to you."

That incentive to lie is at the heart of the free-rider problem, a fundamental quandary in economics, political science, law, and sociology. It's a problem that professionals in these fields have long assumed has no solution that is both efficient and fair.

In fact, for decades it's been assumed that there is no way to give people an incentive to be honest about the value they place on public goods while maintaining the fairness of the arrangement.

"But this result assumed that the group's leadership does not have direct information about people's valuations," says Rangel. "That's something that neurotechnology has now made feasible."

And so Rangel, along with Caltech graduate student Ian Krajbich and their colleagues, set out to apply neurotechnology to the public-goods problem.

In their series of experiments, the scientists tried to determine whether functional magnetic resonance imaging (fMRI) could allow them to construct informative measures of the value a person assigns to one or another public good. Once they'd determined that fMRI images—analyzed using pattern-classification techniques—can confer at least some information (albeit "noisy" and imprecise) about what a person values, they went on to test whether that information could help them solve the free-rider problem.

They did this by setting up a classic economic experiment, in which subjects would be rewarded (paid) based on the values they were assigned for an abstract public good.

As part of this experiment, volunteers were divided up into groups. "The entire group had to decide whether or not to spend their money purchasing a good from us," Rangel explains. "The good would cost a fixed amount of money to the group, but everybody would have a different benefit from it."

The subjects were asked to reveal how much they valued the good. The twist? Their brains were being imaged via fMRI as they made their decision. If there was a match between their decision and the value detected by the fMRI, they paid a lower tax than if there was a mismatch. It was, therefore, in all subjects' best interest to reveal how they truly valued a good; by doing so, they would on average pay a lower tax than if they lied.

"The rules of the experiment are such that if you tell the truth," notes Krajbich, who is the first author on the Science paper, "your expected tax will never exceed your benefit from the good."

In fact, the more cooperative subjects are when undergoing this entirely voluntary scanning procedure, "the more accurate the signal is," Krajbich says. "And that means the less likely they are to pay an inappropriate tax."

This changes the whole free-rider scenario, notes Rangel. "Now, given what we can do with the fMRI," he says, "everybody's best strategy in assigning value to a public good is to tell the truth, regardless of what you think everyone else in the group is doing."

And tell the truth they did—98 percent of the time, once the rules of the game had been established and participants realized what would happen if they lied. In this experiment, there is no free ride, and thus no free-rider problem.

"If I know something about your values, I can give you an incentive to be truthful by penalizing you when I think you are lying," says Rangel.

While the readings do give the researchers insight into the value subjects might assign to a particular public good, thus allowing them to know when those subjects are being dishonest about the amount they'd be willing to pay toward that good, Krajbich emphasizes that this is not actually a lie-detector test.

"It's not about detecting lies," he says. "It's about detecting values—and then comparing them to what the subjects say their values are."

"It's a socially desirable arrangement," adds Rangel. "No one is hurt by it, and we give people an incentive to cooperate with it and reveal the truth."

"There is mind reading going on here that can be put to good use," he says. "In the end, you get a good produced that has a high value for you."

From a scientific point of view, says Rangel, these experiments break new ground. "This is a powerful proof of concept of this technology; it shows that this is feasible and that it could have significant social gains."

And this is only the beginning. "The application of neural technologies to these sorts of problems can generate a quantum leap improvement in the solutions we can bring to them," he says.

Indeed, Rangel says, it is possible to imagine a future in which, instead of a vote on a proposition to fund a new highway, this technology is used to scan a random sample of the people who would benefit from the highway to see whether it's really worth the investment. "It would be an interesting alternative way to decide where to spend the government's money," he notes.

In addition to Rangel and Krajbich, other authors on the Science paper, "Using neural measures of economic value to solve the public goods free-rider problem," include Caltech's Colin Camerer, the Robert Kirby Professor of Behavioral Economics, and John Ledyard, the Allen and Lenabelle Davis Professor of Economics and Social Sciences. Their work was funded by grants from the National Science Foundation, the Gordon and Betty Moore Foundation, and the Human Frontier Science Program.

Adapted from materials provided by California Institute of Technology.

http://www.sciencedaily.com/releases/2009/09/090910142358.htm#

'Lost seabird' returns to ocean

by Matt Walker
Editor, Earth News

One of the world's rarest and most elusive birds has finally been seen flying in its natural habitat.

The Fiji petrel, a seabird that once "went missing" for 130 years, has been sighted flying at sea, near the island of Gua in the Pacific Ocean.

The culmination of a meticulously planned bird hunt, Birdlife International researchers sighted the birds 25 nautical miles south of Gua.

Up to eight individuals were seen and photographed over 11 days.

The 30cm tall dark-brown Fiji petrel (*Pseudobulweria macgillivrayi*) is one of the most elusive of all birds.

To see such a little-known bird at such close range was magical
Expedition member Mr Tony Pym

Originally, the species was known from just a single immature specimen, collected in 1855 on Gau Island, Fiji.

But then the bird "went missing" with no further confirmed sightings of it for almost 130 years.

Then in 1984, an adult was caught and photographed on Gua, then released.

Since then, there have been a handful of reports of "grounded" birds that had crashed onto village roofs on the island. Most were immature birds, of which a few died.

Due to the extremely limited number of sightings, the bird is also inferred to be one of the rarest of all bird species.

It is one of 192 bird species which are list as Critically Endangered by the International Union for the Conservation of Nature.

Stinky lure

But while there have been ten unconfirmed reports of the bird at sea, with the latest a possible Fiji Petrel sighted around 400km north of Bougainville Island, until now there has been no confirmed sightings.

That was until in May, when scientists and volunteers working with Birdlife International and NatureFiji-MareqetiViti, a partner conservation organisation based in Fiji, set out to find the bird in its natural habitat.

The search for the elusive petrel is described in a paper in the latest Bulletin of the British Ornithologists' Club.

The researchers lured the bird with a specially made food, made from finely cut fish offal mixed with very dense fish oil.

These were then frozen into 10kg blocks, which persist for over an hour in the water, creating a pungent oil slick which attracts petrels from some miles away.

On the second day of the expedition, the first Fiji Petrel appeared, approaching the chum slick from downwind, slowly zigzagging over the slick, and suddenly changing direction to drop onto a floating morsel.

In all, the expedition team believe they saw eight individuals over eleven days of observations.

"Finding this bird and capturing such images was a fantastic and exhilarating experience," says ornithologist Hadoram Shirihai, who lead the search team.

In 2008, Mr Shirihai also rediscovered the Critically Endangered Beck's Petrel (*Pseudobulweria becki*) a bird that was also only known from two sightings in the Pacific made in the 1920s.

"To see such a little-known bird at such close range was magical," added fellow expedition member Mr Tony Pym, describing his joy at seeing the Fiji petrel flying over the waves.

More surveys in 2010 are now planned to to locate the breeding area of the Fiji Petrel, says Dick Watling of NatureFiji-MareqetiViti.

"Once we know the location, we can assess what needs to be done to turn around the fortunes of this species," he says.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/earth/hi/earth_news/newsid_8250000/8250215.stm

Published: 2009/09/11 10:06:33 GMT

Because They Believe
By LEON WIESELTIER

WHY ARE JEWS LIBERALS?

By Norman Podhoretz

337 pp. Doubleday. $27

"There are four types of people," teaches an ancient rabbinical text. "The one who says: What is mine is mine and what is yours is yours — this is the common type, but there are some who say that this is the type of Sodom. What is mine is yours and what is yours is mine — this is a boor. What is mine is yours — a saint. What is yours is mine — a villain."
Brothers and sisters, is this liberal or conservative? The legitimacy of private property is certainly championed, but that is both a liberal conviction and a conservative one; and the tradition sees fit to record also the remarkable opinion that this elementary and uncontroversial norm — a scholar many years ago called it "possessive individualism" — was the custom of the most wicked city on earth. Moreover, legitimacy does not confer sanctity: the rabbis entertain the prospect of different distributions of wealth, and prudently contemplate the extremes of selflessness and selfishness.
So liberals and conservatives, and socialists too, and even the Club for Growth, will all find a use for this text, which is to say that the text is useless, I mean, for establishing the liberalism or the conservatism of the Jewish tradition.
It is only what it is: a terse rabbinical discussion that, historically but also conceptually, exists antecedently, and in sovereign indifference, to modern politics. Judaism is not liberal and it is not conservative; it is Jewish. But this is the beginning of the matter, not the end. For Judaism is immense and various: it holds within itself an oceanic plenitude of opinions and tendencies, developed over 2,000 years of philosophical and legal deliberation, and they do not all go together. To say that a view is Jewish is to claim a provenance more than an essence.
It is precisely a provenance that many American Jewish intellectuals seek. Deceived by the contemporary ideology of identity into the simplifying aspiration that all their parts may be unified into a seamless and shining whole, they rummage through the Jewish tradition to find prooftexts for social and economic and political views that they have already established on other grounds. It is not enough that their views be true; they must also be authentic.
The spectacle of all this tendentiousness is sometimes comic. In his new book, Norman Podhoretz has some fine exasperated fun with the wildness of interpretation on the Jewish left, and of course spares the Jewish right any culpability for the same sin. So it is worth recalling that a few years ago he published a book about the prophets in which they emerged as the neoconservatives of ancient Israel. Their castigations of the sacrifice of children prompted a reflection on the "pagan practice" of the entry of women into the work force.
Norman Podhoretz loves his people and loves his country, and I salute him for it, since I love the same people and the same country. But this is a dreary book. Its author has a completely axiomatic mind that is

quite content to maintain itself in a permanent condition of apocalyptic excitation. His perspective is so settled, so confirmed, that it is a wonder he is not too bored to write. The veracity of everything he believes is so overwhelmingly obvious to him that he no longer troubles to argue for it. Instead there is only bewilderment that others do not see it, too. "Why Are Jews Liberals?" is a document of his bewilderment; and there is a Henry Higgins-like poignancy to his discovery that his brethren are not more like himself. But the refusal of others to assent to his beliefs is portrayed by Podhoretz not as a principled disagreement that is worthy of respect, but as a human failing. Jews are liberals, he concludes, as a consequence of "willful blindness and denial." He has a philosophy. They have a psychology.

"Why Are Jews Liberals?" is a potted history followed by a re-potted memoir. The first half of the book, which tells the story of "how the Jews became liberals," is narrated in "the impersonal voice of a historian — an amateur, to be sure, but one who has relied on a variety of professional authorities for help and guidance." These chapters are mainly anthologies of congenial quotations. There is something a little risible about the solemnity with which Podhoretz presents encyclopedia articles as evidence of his erudition ("I relied most heavily on one of the great works of 20th-century Jewish scholarship, the Encyclopaedia Judaica"); there is even a reference, slightly embarrassed, to Wikipedia. From his footnotes you would think that the most significant Jewish historian of our time is Paul Johnson. And there is a decidedly insular reliance upon the pages of Commentary, the magazine he edited for 35 years. His parochialism can be startling: Samuel ha-Nagid, the astounding poet, warrior, statesman and scholar in Granada in the 11th century, reminds him of Henry Kissinger! Podhoretz seems to be living the Vilna Gaon's adage — maybe he can find it in some encyclopedia — that the best way for a man to preserve his purity is never to leave his house.

Podhoretz's historical narrative is a trite but more or less accurate rehearsal of the inhospitability of Europe, in its religious centuries and its secular ones, to the Jews. He understands that there was no home for the Jews of modern Europe on the European right, and he is correct to assert that there was little or no home for them on the European left; but he is oddly lacking in historical imagination, he is mean, when he reduces all of Jewish enlightenment and assimilationism and socialism to a dishonorable loathing of origins. Is alienation from tradition really so hard to comprehend? Is a life lived entirely within "the four cubits of the law" really all that a Jew may dream of? (Podhoretz's book is punctuated with a voyeuristic admiration for the Orthodox.)

There was a time, though it was not a long time, when there was a basis in reality for the Jewish hope in a liberalizing society and a secularizing culture. What else should the Jews of modernity have done — -chanted the Psalms and waited for Reagan? It is curious that Podhoretz neglects to discuss Zionism in his account of the emergence of Jewish liberalism, since it was born of the same repudiation of inherited circumstances and the same recovery of historical agency, and it proceeded to create a Jewish society in the Middle East that was designed to fulfill the progressive ideals of Europe. Podhoretz grasps the European tragedy, but without a tragic sense. All that matters to him is who was wrong.

When they lost their hopes for equality and decency in Europe and Russia, many of the Jews who kindled to the mobility of history responded with mobility of their own — some of them to the land of Israel, most of them to America. In America, of course, their destinies were hugely bettered, as individuals and as a group, by the dispensations of 20th-century liberalism. And so they became Democrats. "The reason Jews had been attracted to the Democratic Party in the first place," Podhoretz writes, "was that it represented the closest American counterpart to the forces on the left that had favored Jewish emancipation in Europe." What baffles him, what pains him, is that their attraction to the Democratic Party has never waned. "In every presidential election since 1928 — with the single exception of Jimmy Carter in 1980 — the Democratic candidate has scored a landslide among Jewish voters even when defeated by a landslide among the electorate as a whole (George McGovern in 1972). No Democratic candidate in all those elections . . . has attracted less than 60 percent of the vote, and the overall average since 1928 is a stunning 75 percent." This steadfast allegiance to the Democratic Party, Podhoretz insists, now flies in the face of Jewish interests.

It is more in the name of Jewish interests than of Jewish ideas that Podhoretz makes his complaint about the Jewish rejection of the Republicans. But nowhere in his book does he explain precisely how the interests of Jews are served by the Republican positions on government, health care, tax policy, gun control, abortion, gay rights, the environment, and so on. Affirmative action is a genuinely excruciating question, and the ideal of color-blindness has been treated too harshly and too sloppily in recent decades; but surely this is a matter about which good people may disagree. It is, in any event, a matter about which liberals differ not only with conservatives, but also among themselves. Like conservatives, like Jews,

liberals squabble. I share Podhoretz's concern that the American Jewish attitude toward Christian conservatives too often looks like contempt, but not his view, which seems to me preposterous, that the American public square has been stripped of religious expressions. I run into Jesus all the time. And I pity the religion that requires politics and politicians for its validation.

The Jewish interest that makes Podhoretz most desperate for a Jewish defection to the Republicans is Israel. While the abandonment of Israel by an American government seems to me unimaginable, and not only for reasons of politics, Podhoretz is not mistaken when he declares that the enthusiasm for Israel among conservatives is real and new and deep. He is also correct that what sympathy there is for the Palestinians in American politics is to be found largely among Democrats. The problem is that he cannot suppose that sympathy for the Palestinians may coexist with sympathy, and even love, for Israel.

If you think that the survival of Israel requires the establishment of Palestine, because the absorption of millions of Palestinians into Israel, in an annexation or an occupation, will destroy the Jewish character or the democratic character of the state, then Podhoretz's scorn for the peace process will not suffice as an account of Israel's situation. If you think that the establishment of Palestine threatens the survival of Israel, because the Palestinians desire only the abolition of the Jewish state and will never be satisfied with a territorial compromise, then Podhoretz's suspicion of any American president who does not merely comply with the demands of the Israeli government will strike you as the apotheosis of fidelity. What counts is your analysis of the problem — of security and morality, of Israelis and Palestinians. Podhoretz does not provide an analysis; he assumes one, doctrinally. He is justified in his view that the left, or a lot of it, now regards Israel coldly. Indeed, it is in many quarters cruelly engaged in the revival of the "one-state solution," which for demographic reasons is nothing other than Greater Palestine. But the intellectual confrontation with these poisons has frequently been the work of liberals. After all, you cannot denounce a one-state solution unless you believe in a two-state solution.

In the absence of arguments, Podhoretz offers memories. "Why Are Jews Liberals?" is yet another one of his autobiographies; his life is a gift that keeps on giving. It is a delight to read again of the anti-Jewish depravities of Gore Vidal and Pat Buchanan, though it should be noted that only Buchanan currently finds work as a commentator on American politics. And when he comes to the end of the chronicle of his own opinions, Podhoretz at last turns to "the question of why." What explains the stubborn affinity of American Jews for liberalism and the Democratic Party? Not "Jewish values," he instructs. I concur: There are many values in Judaism and not all of them are Democratic, or even democratic. Podhoretz also considers the influence, "even unto the fourth generation," of Menshevik Jews who fled to America, and the gradual attenuation of Marxism into social democracy and of social democracy into liberalism; but even he cannot persuade himself that the blame for Barack Obama's success among American Jews belongs to Martov.

Instead he decides that American Jews believe in liberalism because they believe in liberalism. Really, this is his finding. "To most American Jews, then, liberalism is not, as has often been said, merely a necessary component of Jewishness: it is the very essence of being a Jew. Nor is it a 'substitute for religion': it is a religion in its own right, complete with its own catechism and its own dogmas and, Tertullian-like, obdurately resistant to facts that undermine its claims and promises." Tertullian was the Christian apologist of the early third century who notoriously remarked that he believed what he believed precisely because it was senseless or impossible. In this vein of anti-intellectual spite, Podhoretz invents "the Torah of liberalism": if it were not absurd, then they would not believe it. And if he does not believe it, then it is absurd. As if from the pulpit, he scolds that "where the Torah of contemporary liberalism conflicts with the Torah of Judaism, it is the Torah of liberalism that prevails and the Torah of Judaism that must give way."

So American Jewish liberals are not only bad Americans, they are also bad Jews. And their stubbornness is owed to their stubbornness. They are stiff-necked. The explanatory power of this notion is obviously very limited. It is, in fact, another kind of sputtering. The alternative, of course, would be to consider the possibility that liberalism is not just an undifferentiated darkness, and that there may be some substance to what some liberals believe about some principles and some policies. But those would be heretical thoughts, which are unlikely in a heresy hunter. He knows exactly what "the Torah of Judaism" is, and what it is not. For the Torah of contemporary conservatism never conflicts with the Torah of Judaism, and conservatism is never thoughtlessly or dogmatically held.

Podhoretz's book was conceived as the solution to the puzzle that Milton Himmelfarb wittily formulated many years ago: "Jews earn like Episcopalians and vote like Puerto Ricans." I have never understood the reputation of this joke. Why should Jews vote like Episcopalians? We are not Episcopalians. The

implication of the joke is that political affiliation should be determined by social position, by levels of affluence. In living rich but voting poor, the Jews of America have failed to demonstrate class solidarity. Never mind that parties of the right in many Western countries have always counted on the poor to make the same betrayal, and support causes and candidates that will do nothing to relieve their economic hardship but will exhilarate them culturally or religiously or nationally.

It is not a delusion, not a treason, to vote against your own economic interest. It is a recognition of the multiplicity of interests, the many purposes, that make up a citizen's life. When, in the Torah of Judaism, Moses commands the Jews to perform acts of social welfare, he sometimes adds the admonition that they were themselves strangers and slaves. The purpose of this refreshment of their memory is plain. The fact that we are no longer strangers and slaves is not all we need to know. We may not regard the world solely from the standpoint of our own prosperity, our own safety, our own contentment. We are proven by the other, not by the same. The question of whether liberalism or conservatism does more for the helpless and the downtrodden, for the ones who are not like us, will be endlessly debated, and it is not a Jewish debate; but if the answer is liberalism, then the political history of American Jewry is neither a mystery nor a scandal.

Leon Wieseltier is the literary editor of The New Republic.

http://www.nytimes.com/2009/09/13/books/review/Wieseltier-t.html?_r=1&nl=books&emc=booksupdateema1

Grrr, Sniff, Arf
By CATHLEEN SCHINE

INSIDE OF A DOG

What Dogs See, Smell, and Know

By Alexandra Horowitz

353 pp. Scribner. $27

The literature about dogs is not quite the same as the literature about, say, Norwegian rats. Dogs get the literary respect: there are brilliant memoirs about dogs like J. R. Ackerley's "My Dog Tulip" and Elizabeth von Arnim's "All the Dogs of My Life"; there's James Thurber and Virginia Woolf and Jack London; there's Lassie and Clifford and, of course, Marley. White rats, on the other hand, get most of the scientific attention. Alexandra Horowitz's "Inside of a Dog: What Dogs See, Smell, and Know" attempts to rectify that situation, exploring what science tells us about dogs without relegating our pets, emotionally, to lab rats. As a psychologist with a Ph.D. in cognitive science, as well as an ardent dogophile, Horowitz aims "to take an informed imaginative leap inside of a dog — to see what it is like to be a dog; what the world is like from a dog's point of view."

Her work draws on that of an early-20th-century German biologist, Jakob von Uexküll, who proposed that "anyone who wants to understand the life of an animal must begin by considering what he called their umvelt . . . : their subjective or 'self-world.' " Hard as we may try, a dog's-eye view is not immediately accessible to us, however, for we reside within our own umwelt, our own self-world bubble, which clouds our vision.

Consider one of Horowitz's examples: a rose. A human being experiences a rose as a lovely, familiar shape, a bright, beautiful color and a sublime scent. That is the very definition of a rose. But to a dog? Beauty has nothing to do with it; the color is irrelevant, barely visible, the flowery scent ignored. Only when it is adorned with some other important perfume — a recent spray of urine, perhaps — does the rose come alive for a dog. How about a more practical object? Say, a hammer? "To a dog," Horowitz

points out, “a hammer doesn’t exist. A dog doesn’t act with or on a hammer, and so it has no significance to a dog. At least, not unless it overlaps with some other, meaningful object: it is wielded by a loved person; it is urinated on by the cute dog down the street; its dense wooden handle can be chewed like a stick.” Dogs, it seems, are Aristotelians, but with their own doggy teleology. Their goals are not only radically different from ours; they are often invisible to us. To get a better view, Horowitz proposes that we humans get down intellectually on all fours and start sniffing.

Dogs, as anyone who has ever met one knows, sniff a lot. They are, says Horowitz, “creatures of the nose.” To help us grasp the magnitude of the difference between the human and the canine olfactory umwelts, she details not only the physical makeup of a dog nose (a beagle nose has 300 million receptor sites, for example, compared with a human being’s six million), but also the mechanics of the canine snout. People have to exhale before we can inhale new air. Dogs do not. They breath in, then their nostrils quiver and pull the air deeper into the nose as well as out through side slits. Specialized photography reveals that the breeze generated by dog exhalation helps to pull more new scent in. In this way, dogs not only hold more scent in at once than we can, but also continuously refresh what they smell, without interruption, the way humans can keep “shifting their gaze to get another look.”

Dogs do not just detect odors better than we can. This sniffing “gaze” also gives them a very different experience of the world than our visual one gives us. One of Horowitz’s most startling insights, for me, was how even a dog’s sense of time differs from ours. For dogs, “smell tells time,” she writes. “Perspective, scale and distance are, after a fashion, in olfaction — but olfaction is fleeting. . . . Odors are less strong over time, so strength indicates newness; weakness, age. The future is smelled on the breeze that brings air from the place you’re headed.” While we mainly look at the present, the dog’s “olfactory window” onto the present is wider than our visual window, “including not just the scene currently happening, but also a snatch of the just-happened and the up-ahead. The present has a shadow of the past and a ring of the future about it.” Now that’s umwelt.

A dog’s vision affects its sense of time, too. Dogs have a higher “flicker fusion” rate than we do, which is the rate at which retinal cells can process incoming light, or “the number of snapshots of the world that the eye takes in every second.” This is one of the reasons dogs respond so well to subtle human facial reactions: “They pay attention to the slivers of time between our blinks.”) It also helps explain those - eerily accurate balletic leaps after tennis balls and Frisbees, but Horowitz lets us see the implications beyond our human-centric fascination with our pets. This is more than a game of fetch; it is a profound, existential realization: “One could say that dogs see the world faster than we do, but what they really do is see just a bit more world in every second.”

Humans are good at seeing things right in front of us, Horowitz explains, because our photoreceptors are centrally located in an area of the retina called the fovea. Dogs do not have foveae and so are not as good at seeing things right in front of them. Those breeds, like pugs, that have retinas more like ours and can see close up, tend to be lap dogs that focus on their owners’ faces, making them seem “more companionable.” In dogs with long noses, often bred for hunting or herding, however, the photoreceptors cluster along a horizontal band spanning the middle of the eye. This is called a visual streak, and those dogs that have it “have better panoramic, high-quality vision, and much more peripheral vision than humans.”

As for their hearing, despite a talent for detecting those high-pitched whistles that are inaudible to us, dogs’ ability to “pinpoint where a sound is coming from is imprecise” compared with ours. Instead, their auditory sense serves to help them find the general direction of a sound, at which point their more acute sight and smell take over. As for dogs’ ability to respond to language, it has more to do with the “prosody” of our utterances than the words themselves. “High-pitched sounds mean something different than low sounds; rising sounds contrast with falling sounds,” Horowitz writes. Dogs respond to baby talk “partially because it distinguishes speech that is directed at them from the rest of the continuous yammering above their heads.”

Horowitz also discusses the natural history of dogs, their evolutionary descent from the wolves, but she cautions the reader to pay attention to those wolf traits dogs have discarded along the way. “Dogs do not form true packs,” she writes. “They scavenge or hunt small prey individually or in parallel,” rather than cooperatively, as wolves do. Countering the currently fashionable alpha dog “pack theories” of dog training, Horowitz notes that “in the wild, wolf packs consist almost entirely of related or mated animals. They are families, not groups of peers vying for the top spot. . . . Behaviors seen as ‘dominant’ or ‘submissive’ are used not in a scramble for power; they are used to maintain social unity.”

The idea that a dog owner must become the dominant member by using jerks or harsh words or other kinds of punishment, she writes, "is farther from what we know of the reality of wolf packs and closer to the timeworn fiction of the animal kingdom with humans at the pinnacle, exerting dominion over the rest. Wolves seem to learn from each other not by punishing each other but by observing each other. Dogs, too, are keen observers — of our reactions."

In one enormously important variation from wolf behavior, dogs will look into our eyes. "Though they have inherited some aversion to staring too long at eyes, dogs seem to be predisposed to inspect our faces for information, for reassurance, for guidance." They are staring, soulfully, into our umwelts. It seems only right that we try a little harder to reciprocate, and Horowitz's book is a good step in that direction. But she can be a bit coy and overly stylish in her attempt not to sound too scientific, and to the particular choir to which she is preaching, much of her material will be familiar.

In that same vein, the tone of the book is sometimes baffling — an almost polemical insistence on the value of dogs, as if they'd long been neglected by world opinion. But then Horowitz will drop in some lovely observation, some unlikely study, some odd detail that causes one's dog-loving heart to flutter with astonishment and gratitude. When researchers, she notes in one of these fine moments, studied the temporal patterns of dogs interacting with people, they found the patterns to be "similar to the timing patterns among mixed-sex strangers flirting."

Cathleen Schine's most recent novel is "The New Yorkers." Her next book, "The Three Weissmanns of Westport," will be published in February.

http://www.nytimes.com/2009/09/13/books/review/Schine-t.html?ref=books

Urban Is Good
By ELIZABETH ROYTE

GREEN METROPOLIS

Why Living Smaller, Living Closer, and Driving Less Are the Keys to Sustainability

By David Owen

357 pp. Riverhead Books. $25.95

Monty Python used to do a sketch in which the host of a children's television show taught such broad lessons as "how to play the flute." Breezily, the host would suggest blowing through one end of the instrument and wiggling one's fingers over the holes. In "Green Metropolis," David Owen sets out in similar vein to show how people can "permanently reduce energy use, water consumption, carbon output and many other environmental ills." The answer, in short, is to live in densely populated cities. Would that it were so easy.

Owen, a staff writer for The New Yorker, makes a convincing case that Manhattan, Hong Kong and large, old European cities are inherently greener than less densely populated places because a higher percentage of their inhabitants walk, bike and use mass transit than drive; they share infrastructure and civic services more efficiently; they live in smaller spaces and use less energy to heat their homes (because those homes tend to share walls); and they're less likely to accumulate a lot of large, energy-sucking appliances. People in cities use about half as much electricity as people who don't, Owen reports, and the average New Yorker generates fewer greenhouse gases annually than "residents of any other American city, and less than 30 percent of the national average."

And the carbon footprint of the hybrid-driving country dweller with her triple-paned windows, backyard composter and geothermal heat pump? Fuhgeddaboudit, Owen practically shouts: she's still driving to work, to school, to shops and the post office. He doesn't care if she's powered by French fry grease or the juice of photovoltaic panels: "Wasted energy is wasted energy no matter how it's generated."
Even worse than the car itself is the sprawl and the energy-inefficient lifestyle that it enables — the duplication of infrastructure, larger houses with fertilized, irrigated yards, two-hour commutes. Spreading people thinly across the countryside may seem to decrease environmental impact (it certainly looks and

smells better), but in fact it substantially increases that impact "while also making the problems . . . harder to see and to address."

"Green Metropolis" challenges many cherished assumptions about easy-on-the-earth country living, though many of its revelations may not be revelatory to hardcore carbon counters, or to anyone who read Owen's 2004 New Yorker article from which this book sprouted. Still, it contains some surprises (for example: it takes less energy and infrastructure to move people vertically, in counterweighted elevators, than horizontally). Pugnacious and contrarian, the book has a lot of fun at the expense of sentimental pastoralists, high-minded environmentalists and rich people trying to buy their way into higher green consciousness with expensive "eco-friendly" add-ons (photovoltaic panels on their suburban McMansions, say).

More generally, Owen attacks the anti-urban bias of the American environmental movement, from Thomas Jefferson through John Muir to the modern Sierra Club. He delineates how the movement has encouraged sprawl — by demonizing cities and exalting open space — and argues that they need to shift emphasis toward making urban living more "appealing and life enhancing." According to Owen, the most critical environmental issues in dense urban cores aren't carbon footprints but "old-fashioned quality of life concerns": crime rates, bad smells, education. The more pleasant the city, the more people will stay in it, rather than fleeing to car-dependent suburbs — as Owen and his wife did when they left Manhattan for a leafy Connecticut town more than 20 years ago.

Of course, many environmental groups do work on building livable and affordable cities, even while others embrace a "buy it to preserve it" strategy (condemned by Owen as "Nature Conservancy brain"). Environmental groups, the author writes, should focus on "intelligently organizing the places where people are," instead of where they aren't. I would argue that if no one defends the places people are not, they won't be people-free for long. Not only will we lose the idea of wilderness — which some consider essential to our human identity — but we'll lose its invaluable services, like the protection of drinking water and the sequestration of carbon. (In general, concerns about clean water and air get scant shrift here, and New Yorkers are told they needn't fret about conserving electricity, since they already use far less per capita than the national average. This reviewer, who is always looking for something new to unplug, is shocked. And doubtful.)

Waxing crankier, Owen takes some digs at solar power, net metering (which gives people credit for wind or solar power they deliver back to the grid) and distributed generation: he claims they spur growth and consumption in the 'burbs, though he doesn't give their proponents a chance to rebut his charges, and many of his assertions have a "just so" flavor. He briefly disses locavorism as "arithmetical sleight of hand." Yes, fruit trucked from California to Connecticut has a much lower "fuel per berry" expenditure than fruit Owen buys after making a special trip to a farm 20 miles away, but he ignores the value of supporting farmers so they don't sell out to developers — not to mention common-sense route planning. Owen applauds the Leadership in Energy and Environmental Design (LEED) program for raising awareness of environmentally responsible construction but condemns it for encouraging high-priced, high-visibility add-ons (argon-filled windows) instead of non-sexy, lower cost, simpler measures (hand-cranked awnings and better insulation). He correctly notes the perversity of a system that rewards points for "maximizing open space" to companies that build on the corners of large lots in auto-dependent exurbs. Erecting a tower near a downtown bus stop would do significantly less environmental harm. After laying out what's wrong with the car-dependent lifestyle, Owen offers some nifty but politically challenging prescriptions. For mass transit to work, he writes, cities must not only achieve a threshold of mixed-use density, but driving must become an exceedingly unpleasant alternative. Bring on the double--parked Fed-Ex trucks, the jaywalkers, potholes and scaffolding; reduce road capacity, banish free parking and raise bridge and road tolls. Traffic jams, he writes, "actually generate environmental benefits, because they urge drivers (and cab riders) either into the subways or onto the sidewalks."

And don't get Owen started on high-occupancy-vehicle (H.O.V.) lanes: they mostly just ease traffic! (The author considers anything that makes driving more agreeable, whether hands-free cellphones or recorded books or drive-through Starbucks, an environmental negative.) The real way to make an H.O.V. lane work, he says, is to eliminate regular lanes, increase the number of occupants required to enter the H.O.V.

lane, and then charge those single-occupant cars, forced into slow-moving lanes, tolls. Then pray they'll give up and join a carpool.

Manhattan may be able to teach the country about true sustainability, but where will those lessons assume bricks-and-mortar shape? We aren't about to tear down our suburbs and force their inhabitants into dense urban areas. Owen admits that "how to apply that template remains a frustrating mystery." Before giving up entirely, however, he hops in a jet to see if rapidly urbanizing China or India is doing any better (nope).

Ultimately, almost all of Owen's potential solutions for treading more lightly on the planet rely on economics ("Environmental solutions that depend solely on will power are doomed to fail," he notes). Raise the price of doing bad, while making good more attractive. Tax energy consumption and emissions. Enact policy measures that lead consumers to feel they have no choice but to find or create alternatives to solo automobile use.

It sounds good on paper, but there's always going to be a sticking point: human nature. We all yearn for our own personal space, a little fresh air and elbow room. Owen doesn't want to give up his charming but energy-inefficient house in rural Connecticut any more than I would (if I had one). And so he does what anyone with some extra cash and a conscience must: he buys and installs more insulation.
Elizabeth Royte is a frequent contributor to the Book Review. Her most recent book is "Bottlemania: Big Business, Local Springs, and the Battle Over America's Drinking Water."

http://www.nytimes.com/2009/09/13/books/review/Royte-t.html?ref=books

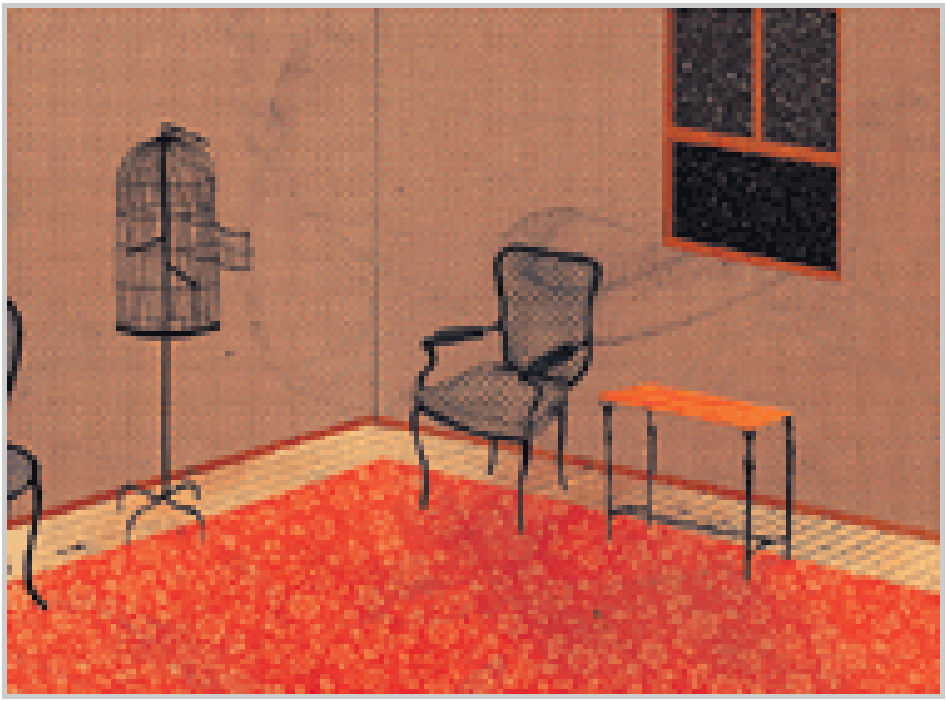
Far From the Madding Crowd

By DOMINIQUE BROWNING

A BOOK OF SILENCE

By Sara Maitland

311 pp. Counterpoint. $25



We live in noise. The world is a booming, rustling, buzzing place to begin with (though many of us have shut out nature's clamor), and to that we have added every conceivable vibration of our own making and every possible means of assault, whether it's the vast, thrumming climate-controlling systems of our sealed buildings or the tiny earbuds nestled against our cochleae. What chance does quiet have against all this?

Plenty, it turns out. Sara Maitland has scaled the heights (or is it depths?) of what might be the only frontier humankind will never conquer and cannot, in spite of itself, destroy — silence. Infinite, fathomless, terrifying, uplifting, unknowable, gorgeous silence. It's difficult to convey the thrill of "A Book of Silence," an adventure story that doesn't involve roaring crowds or screaming headlines, doesn't depict a heroine climbing high mountains or sailing vast oceans, doesn't chronicle racing pulses or sweaty palms, and yet is every bit as awe-inspiring, death-defying and mind-blowing as any trip up Everest. Rarely have I been so amazed at the splendor of a new landscape unfolding before my eyes, and felt so tense wondering what was going to happen as this intrepid writer pushed her way across the pages.

"A Book of Silence" is a brilliant exploration of something — or is it a nothing? — that right at the start is impossible to define precisely. Is silence the absence of words? Or is it the absence of sound altogether? Is there even such a thing as silence that we can experience? Isn't there always the swoosh of blood through the body? Is silence dependent on external conditions? Or is it a quality of mind? What would you call the visual effect of something like a Rothko painting?

For her own purposes, Maitland decides, silence is that which is broken up by "words and speech particularly." Her journey into silence began around the time she turned 50. Her marriage had disintegrated, her youngest child had left home, she had begun gardening (we know where that leads) and

she found herself alone, free to do anything she pleased: “What I . . . wanted was to forge a life with silence at the very center of it.” Maitland had been a practicing Christian for 30 years, but during this time of change her spiritual life began to intensify. “I find praying difficult, challenging and very hard work,” she confides, “but I also find it necessary, surpassingly lovely and crucially important.”

Maitland set out with many questions about the nature of silence and its companion, solitude. The most urgent was posed in reaction to a letter from a respected friend, who argued against silence as “the place of death, of nothingness.” Yet Maitland became convinced that silence was not a “negative condition” but “a positive presence.” So she set out to prove this radical proposition — one that, as it happens, caused alarm and concern among her friends and family. People who spend a great deal of their time quiet and alone are often considered selfish, if not misanthropic, although nothing could be further from the truth. Maitland sets out from a place of loving concern, full of tenderness for the human condition and hope that we might fulfill our best destinies.

She begins her life-changing adventure by spending 40 days and 40 nights alone in a tiny house set high on a ridge on the Isle of Skye. There she experiences “a group of sensations, most of them oddly physical,” including disinhibition, auditory hallucinations and “ineffability and bliss.” Later, she visits the silence of the Sinai Desert and the windswept hills of the Scottish borders. And eventually she has a new house built for herself in a remote place, far from her old life.

Surprisingly, Maitland’s journey provokes a crisis in her work. A successful novelist, she had long depended on her ability to imagine alternate worlds. But the deeper she went into silence, the more her fiction eluded her. “This gave me the idea,” she explains, “that there might be something profoundly different between the silence of the hermits and the silence of creative artists.” The first kind of silence requires an emptying out of the self in order to be receptive to God; the other fortifies the self in order to be inventively godlike. “Silence has no narrative,” she concludes. “Silence intensifies sensation, but blurs the sense of time.” Building on this speculation, Maitland’s ambitious, wide-ranging book investigates the varied nature of creativity and dives into considerations of both madness and joy.

Maitland introduces the reader to the Great Chthonic Terror of the earliest human societies — “that the dark may swallow the light. . . . That the cold will triumph; and we will all be dead.” This was not an abstract fear; people invented rituals to urge the sun to rise every day. Now, she argues, that terror has shifted its shape, becoming symbolic: “We are terrified of silence and so we banish it from our lives.” This, I think she is saying, is why we cling, for example, to a sort of magical thinking about the impending ecological disaster; we are in noisy denial. It’s incontrovertible that if more of us cared to experience the natural world unmediated by anything at all — to simply sit, quietly, open to its sublime beauty — we might take better care of it. But that cherishing of her surroundings is only one of the many pleasures Maitland finds in her new solitary life.

This is not a silent book, intimate and generous as it is. We even hear Maitland strike matches to light her cigarettes under a canopy of stars. To my mind, it’s an open question whether reading can be part of any experience of silence. Nor did Maitland’s book leave me speechless. Instead, I found myself arguing, conversing, exclaiming at every page. I wanted to be with her every step of the way. And I can hardly wait to see what comes next from this marvelous writer, thinker and seeker. I only hope it isn’t . . . silence.

Dominique Browning’s most recent memoir is “Paths of Desire.” Her new one, “Slow Love,” will be published next spring.

http://www.nytimes.com/2009/09/13/books/review/Browning-t.html?ref=books

Quantum Leap

By LOUISA GILDER

THE STRANGEST MAN

The Hidden Life of Paul Dirac, Mystic of the Atom

By Graham Farmelo

Illustrated. 539 pp. Basic Books. $29.95

This biography is a gift. It is both wonderfully written (certainly not a given in the category Accessible Biographies of Mathematical Physicists) and a thought-provoking meditation on human achievement, limitations and the relations between the two. Here we find a man with an almost miraculous apprehension of the structure of the physical world, coupled with gentle incomprehension of that less logical, messier world, the world of other people.

At Cambridge University in 1930, Subrahmanyan Chandrasekhar took a class in quantum mechanics from the 28-year-old Paul Dirac. Three years later, Dirac would become the youngest theoretician to receive the Nobel Prize in Physics up to that time (50 years after that, Chandrasekhar would become one of the older ones). Chandrasekhar described Dirac as a "lean, meek, shy young 'Fellow' " (i.e., of the Royal Society) "who goes slyly along the streets. He walks quite close to the walls (like a thief!), and is not at all healthy." Dirac's class — which Chandrasekhar took in its entirety four times, even though Dirac taught it by repeating material from his recently published textbook word for word — was "just like a piece of music you want to hear over and over again."

Dirac is the main character of a thousand humorous tales told among physicists for his monosyllabic approach to conversation and his innocent, relentless application of logic to everything. Listening to a Dirac story is like slipping into an alternate universe: Dirac reads "Crime and Punishment" and reports it "nice" but notes that in one place the sun rises two times in a day; Dirac eats his dinner in silence until his companion asks, "Have you been to the theater or cinema this week?" and Dirac replies, "Why do you wish to know?"

His work was as sui generis as his social skills. "The great papers of the other quantum pioneers were more ragged, less perfectly formed than Dirac's," explained Freeman Dyson, who took Dirac's course as a precocious 19-year-old. Dirac's discoveries "were like exquisitely carved marble statues falling out of the sky, one after another. He seemed to be able to conjure laws of nature from pure thought." (Most notably, Dirac predicted the existence of antimatter in 1928 because his just discovered relativistic electron equation required it.) "It was this purity that made him unique."

In 1990, Helge Kragh wrote "Dirac: A Scientific Biography," a useful resource comprising physics, a little history and a dessert of Dirac stories in a chapter entitled "The Purest Soul." And indeed, what else besides quantum mechanics and amusing anecdotes did this great and single-minded physicist's life hold? "The purest soul" is a quotation about Dirac from Niels Bohr, as is Graham Farmelo's title. ("Dirac is the strangest man," Bohr said, "who ever visited my institute.") But purity and strangeness were not the whole story. Kragh's book offers a collage of a brilliant and peculiar man seen from the outside; Farmelo's is a tapestry, and he provides glimpses of the inside.

A senior research fellow at the Science Museum in London, Farmelo gives us the texture of Dirac's life, much of it spent outdoors — from long Sunday walks as a young man, looking like "the bridegroom in an Italian wedding photograph," "dressed in the suit he wore all week, his hands joined behind his back, both

feet pointing outwards as he made his way around the countryside in his metronomic stride"; to late-life canoeing trips with Leopold Halpern, a physicist even stranger than he, "through forests of sassafras and American beech trees, draped with Spanish moss. The alligators made scarcely a sound: the silence was broken only by the rhythmic sloshing of the paddles, the cry of a circling osprey, the occasional shuffling of wind passing through shoreline gaps in the forest." (After lunch, they swam and paddled back, "scarcely exchanging a word.")

We follow Dirac from his pinched and chilly childhood in Bristol (a few blocks away from the two-years-younger Archie Leach, a k a Cary Grant); through his discovery, visiting the Bohrs in Copenhagen, of what a happy family was like; his fiercely loyal friendship with Werner Heisenberg; his joyful beach honeymoon, still in a three-piece suit; his careful fatherhood (constructing for his daughters' cat a door wider than its whiskers); to his death in Florida — "a place where recreational walkers are regarded as perverse" — in 1984.

The science writing in "The Strangest Man" isn't glib, but neither does it require problem-solving on the part of the reader. In most cases, Farmelo presents the technical matter clearly and efficiently, and in all cases — one of the great joys of the book — Dirac's scientific insights are placed within the circumstances in which they were born: e.g., the "sweltering July" of 1926 when Dirac, sitting at his college desk, produced his paper on what became Fermi-Dirac statistics.

In a prologue, Farmelo describes a visit to the elderly Dirac paid by his biologist colleague Kurt Hofer. Through the eyes of Hofer, we see Dirac suddenly break out of monosyllables to talk for two hours with increasing vehemence about his monstrous father. This represents the author's careful decision to keep the tale Dirac told about his childhood separate from — even as it overshadows — the rest of the book, and it ends with Hofer's thoughts, not Dirac's: " 'I simply could not conceive of any childhood as dreadful as Dirac's.' . . . Could it be that Dirac — usually as literal-minded as a computer — was exaggerating? Hofer could not help asking himself, over and again: 'Why was Paul so bitter, so obsessed with his father?' "

The conflict between this prologue (which gives ample reason for Dirac to be bitter about his father) and the seemingly warm family life that emerges in the first chapter casts a tension over the rest of the book very similar to that felt when reading a mystery. And as in a mystery, the penultimate chapter sheds new light. There Farmelo delves into a sensitive exploration of the possibility that Dirac was autistic, and of the ways in which his lack of facility in reading the emotions of others affected their perceptions of him and his perceptions of them. The emphasis on Dirac's childhood as a story — one Farmelo (along with me) believes to be true — usefully reinforces the importance of point of view.

In a memorable episode, Dirac and his wife visit their closest friends, Peter and Anna Kapitza, in Russia. In 1934, the long arm of the Soviet state had wrenched Kapitza, despite his devoted long-distance fellow-traveling, away from his lab at Cambridge under Ernest Rutherford and back into the Soviet Union. In 1937 the friends reunited at the Kapitzas' summer house in the piney woods of Bolshevo, "with wild strawberries ripe for gathering and a fast-flowing river close by." They arrived only "days before Stalin authorized the torture of suspected enemies of the people," Farmelo writes. "On the roads around Bolshevo, some of the trucks marked 'Meat' and 'Vegetables' hid prisoners on their way to be shot and buried in the forests to the north of the city which Dirac admired through his binoculars."

Farmelo handles such scenes with a refreshing, cleareyed understanding of how complicated the world actually is. Dirac did not — probably could not — know what the Soviet Union really was; he also could not know who his father really was, and his father could not really know him. These complexities and unresolvably cubist perspectives make, paradoxically, for the most satisfying and memorable biography I have read in years.

Louisa Gilder is the author of "The Age of Entanglement: When Quantum Physics Was Reborn," which will be published in paperback in November.

http://www.nytimes.com/2009/09/13/books/review/Gilder-t.html?ref=books

Def Poetry
By BAZ DREISINGER

BOOK OF RHYMES

The Poetics of Hip Hop

By Adam Bradley

248 pp. Basic Civitas Books. Paper, $16.95

Are you a hip-hop fan who can't tell assonance from alliteration? An English major who doesn't know Biggie from Tupac? Adam Bradley's "Book of Rhymes" is the crash course for you. The book — essentially English 101 meets Hip-Hop Studies 101 — is an analysis of what Bradley calls "the most widely disseminated poetry in the history of the world": rap, which he rightly says "is poetry, but its popularity relies in part on people not recognizing it as such."
Bradley, who teaches literature at Claremont McKenna College in California, distinguishes himself from the growing glut of hip-hop scholars by writing a book about rap, as opposed to hip-hop: not a study of the culture or a history of the movement, but a formalist critique of lyrics — almost an anachronistic effort in the era of cultural studies. Like so much work in the genre, though, it's by and for the already-sold: those interested enough to care whether 50 Cent's rhymes are monosyllabic or disyllabic, invested enough to wonder why rappers prefer similes to metaphors (because similes "shine the spotlight on their subject more directly than do metaphors," Bradley says).
To that end, the first half of the book is a triumph of jargon-free scrutiny. Bradley takes on rhythm — from the Greek rheo, meaning "flow," which is apt: flow is what rappers possess — and dissects rap's "dual rhythmic relationship," its marriage of rhymes and beats (with the beat defined as "poetic meter rendered audible"). Next comes rhyme: "the music M.C.'s make with their mouths." "A skillfully rendered rhyme strikes a balance between expectation and novelty" — e.g., "My grammar pays like Carlos Santana plays," per Lauryn Hill — and for rappers, rhyme "provides the necessary formal constraints on their potentially unfettered poetic freedom." The chapter entitled "Wordplay" is the strongest, and that's appropriate, since play is what hip-hop does best. We're treated to lyric upon juicy

lyric — not just from the usual suspects, to Bradley's credit — filled with similes, conceits, personification, even onomatopoeia ("Woop! Woop! That's the sound of da police," KRS-One rapped). But the rest of the book disappoints. There are labored discussions of style, that mélange of voice, technique and content; of storytelling (rap has its screenwriters, investigative reporters, memoirists, children's authors and spiritualists, Bradley notes); and of signifying, otherwise known as swagger, derived from African-American oral traditions like the dozens and the toasts. The author delivers unrevelatory revelations: "All rappers are poets; whether they are good poets or bad poets is the only question." And he asks questions — "Can rap be both good business and good poetry?" "Why is braggadocio so vital to the art form?" — that have long since been answered by others.

Throughout, Bradley draws surprising connections. Langston Hughes's 1931 poem "Sylvester's Dying Bed" is set alongside Ice-T's classic gangsta track "6 'n the Mornin' "; they employ the same form, and both make ample use of the vernacular. Coleridge's "Rime of the Ancient Mariner" is analogous in structure and storytelling style to the Sugarhill Gang's landmark "Rapper's Delight." Robert Browning's portentous dramatic monologues are akin to Eminem's. And the Brooklyn rapper Fabolous's brusque style earns comparisons to John Skelton's chain rhyming — which might as well be hip-hop, 16th-century style: "Tell you I chyll, / If that ye wyll / A whyle be styll, / Of a comely gyll / That dwelt on a hyll." Such parallels are vital to Bradley's central claim: "The best M.C.'s . . . deserve consideration alongside the giants of American poetry. We ignore them at our own expense."

But who's the "we" here? Bradley wants to legitimize rap by setting it in a canonical context, but aren't we past the point of justifying it? True, CNN is clueless enough to ask, as it did on a 2007 program, "Hip-Hop: Art or Poison?" But no one is really still debating whether hip-hop is a bona fide art form. "Rap rhymes are often characterized as simplistic," writes Bradley, who admits to finding himself "in the position of defending the indefensible, of making the case to excuse the coarse language and the misogynistic messages." He needn't try so hard; in his tone of unwarranted protectiveness, he seems to forget that hip-hop now earns highbrow props worldwide. After three decades, it doesn't require a defense attorney.

Baz Dreisinger, an assistant professor of English at John Jay College of Criminal Justice, is the author of "Near Black: White-to-Black Passing in American Culture."

http://www.nytimes.com/2009/09/13/books/review/Dreisinger-t.html?ref=books

Friends, Not Allies
By MARK ATWOOD LAWRENCE

THE HAWK AND THE DOVE

Paul Nitze, George Kennan, and the History of the Cold War

By Nicholas Thompson

Illustrated. 403 pp. Henry Holt & Company. $27.50

The end of the cold war brought relief, even joy, for most Americans. With the crumbling of the Eastern bloc in 1989, more than four decades of anxiety seemed to be over. One of the few discordant voices came, surprisingly, from George Kennan, the former United States diplomat who had devised the "containment" policy widely considered responsible for the Western triumph. "I believe it would have happened earlier," Kennan lamented less than a month after Germans began chipping holes in the Berlin Wall, "if we had not insisted on militarizing the rivalry."
Kennan did not specify who was responsible for making the cold war longer and more dangerous than it needed to be. But Paul Nitze, a onetime State Department colleague who had helped shape foreign policy under every president from Roosevelt to the first Bush, surely ranked high on his list of culprits.
It was Nitze, after all, who had argued most strongly for a huge buildup of American military power. And it was Nitze who had frequently led the charge to assure that Washington kept adding to its arsenal.
Looking back in 1995, his appraisal of American management of the cold war could hardly have been more different from Kennan's. "I've come to the conclusion we did it pretty goddam well," he boasted.
Who was right? Did the United States put too much stock in military preparedness, unnecessarily antagonizing the Soviets while guaranteeing that the East-West rivalry would play out in the sole arena where Moscow could compete? Or did Americans act sensibly in response to a clear and present danger of Soviet aggression? Nicholas Thompson insists in "The Hawk and the Dove," his thoroughly engrossing, if not altogether satisfying, dual biography of Nitze and Kennan, that both men had valid points.
"Each was profoundly right at some moments and profoundly wrong at others," Thompson asserts of their long, intertwined careers as statesmen, policy makers and public intellectuals. The two men "pulled in different directions" but "complemented each other" and, Thompson suggests, contributed in distinct ways to America's victory in the cold war. They even managed to remain friends despite their differences.
Thompson, an editor at Wired magazine, undertook the book partly for personal reasons. One of Nitze's 11 grandchildren, he enjoyed privileged access to his grandfather's papers, not to mention to Nitze himself before his death in 2004. Thompson possessed an obvious motive for shining a spotlight on a highly influential figure who never became a household name outside policy-making circles.
Yet the book is no mere tribute to a family patriarch. On the contrary, Thompson treats both his subjects critically, at times harshly, and recounts their lives with the broader purpose of illuminating the core debates that drove American policy making. Thompson succeeds admirably in blending biography and intellectual history, painting colorful portraits of complicated men who embodied conflicting strains of American thinking about foreign policy.
Kennan rose to prominence in 1946, when the Truman administration urgently wanted to understand the reasons for Soviet hostility to the West. The senior United States diplomat at the embassy in Moscow, Kennan offered eloquent and forcefully argued answers. Soviet belligerence sprang from a mix of Marxist

ideology and old-fashioned power-mongering, he said. He then proposed that Washington adopt a policy not of directly confronting Moscow but of frustrating it by opposing Communists wherever they threatened to expand their influence beyond their borders. Over the long term, Kennan predicted, constant frustration would cause the Soviet system to mellow and then collapse.

Thus was born the policy of containment, which became the cornerstone of national security for the rest of the cold war. Enthusiasm for Kennan's ideas catapulted him to public prominence and won him a job as head of the State Department's Policy Planning Staff, the group responsible for brainstorming about the broad contours of American diplomacy. Indeed, Kennan's achievements opened the way to a diverse career as ambassador to Moscow and Belgrade, government adviser, memoirist and Pulitzer-winning scholar of Russian history.

Yet, as Thompson emphasizes, acceptance of containment also brought Kennan disappointments that haunted him until his death in 2005. Kennan believed that the Soviet Union, however repugnant, posed little military threat to the West and urged that the United States rely mostly on economic and political means to resist Communist expansion. Other officials, above all Nitze, who succeeded Kennan as chief of policy planning, saw things differently, especially after the outbreak of the Korean War in 1950. Kennan watched with regret as the United States subsequently poured enormous resources into weaponry and military bases.

Taking a darker view of Soviet intentions, Nitze tirelessly advocated that the United States maintain a sufficient edge in military hardware to deter attack or, in the worst case, to win a war. "Nitze became," Thompson writes, "something like a coach on the sidelines of a never-ending race, exhorting his athlete to run faster each time he completed a lap, whether ahead or behind." In the early 1950s, that meant supporting development of the hydrogen bomb. In the crisis-filled 1960s, it meant expanding the American arsenal to counter advances in Soviet weaponry. In the aftermath of the Vietnam War, it meant sounding the alarm about perceived American passivity.

Thompson is at his best in connecting these positions to the personalities of his two subjects. Kennan's wariness of military options sprang from deep pessimism about the capacity of technology to solve human problems and the ability of his fellow Americans to use power wisely. Nitze's policy preferences flowed from a far rosier outlook, a characteristic that Thompson attributes partly to a childhood much happier than Kennan's. Nitze possessed boundless faith in material progress and confidence in Americans' ability to effect constructive change abroad.

Thompson falters only in some of his attempts to step back from his rich detail and sum it all up. Curiously, the "hawk" and "dove" labels do not encapsulate the key differences between Nitze and Kennan especially well. Though Kennan feared nuclear weapons, he was no dove when it came to assessing Stalinist Russia in the 1940s. For his part, Nitze sometimes acted less than hawkish. Like Kennan, he opposed American intervention in Vietnam, and in 1982 he shocked his colleagues by tentatively agreeing with a Soviet counterpart to eliminate an entire category of nuclear weapons, a deal so dovish for its time that it was quickly rejected by both Washington and Moscow. Better labels would be "realist" and "liberal internationalist," which, though hardly the stuff of a catchy title, capture the core distinction between Kennan's insistence on the limits of American capabilities and Nitze's more optimistic view.

It is also difficult to accept Thompson's too pat argument that the rivals achieved a productive symbiosis that helped end the cold war, Kennan by providing the basic strategy and Nitze by helping make the tactical decisions that brought victory. Such a judgment naturally necessitates discussion of decision making on the Soviet side. Did American military buildups provoke Moscow, as Kennan worried, or deter it, as Nitze maintained? Might the Soviets have responded positively to a different mix of American policies? Without answers to such questions, any claim about Kennan's and Nitze's impact must remain speculative.

Mark Atwood Lawrence teaches history at the University of Texas at Austin. His latest book is "The Vietnam War: A Concise International History."

http://www.nytimes.com/2009/09/13/books/review/Lawrence-t.html?ref=books

The Unnameable
By WILLIAM GIRALDI

IN THE VALLEY OF THE KINGS

Stories

By Terrence Holt

223 pp. W. W. Norton & Company. $23.95

"I do not know a better training for a writer than to spend some years in the medical profession," Somerset Maugham once wrote, describing how his training at St. Thomas's Hospital in London presented him with "life in the raw" — the substance from which fiction writers educe their stories. Our shame and humiliation, our dread, our useless grasping after the divine: indeed, much of modern literature suggests that God is himself infirm, in dire need of eyeglasses and a hearing aid.

American short fiction in particular — from Poe and Hawthorne to the present — unfurls at midnight: a dark affair emphasizing our want of health in a civilization gone sick. Terrence Holt's first story collection, "In the Valley of the Kings," now joins the brigade. Holt works as a physician at the University of North Carolina School of Medicine, and he understands the nexus between disease and dejection, between corporeal damage and spiritual ruin. He understands that storytelling rises from that ruin.

God's absence is nowhere stated but everywhere felt in Holt's terrifying fiction. His stories seem an amalgam of Lovecraft and Poe, Barthelme and Beckett, unsatisfied with mining human relationships for quotidian truths or with a mere reworking of E.R. melodrama. Most of the dates and locales are indefinite or unfamiliar: Everytime, Everyplace. Dialogue is scarce and the plotlines often enigmatic or apocalyptic. Settings include a spacecraft to Jupiter — "Jupiter speaks syllables, sibilants, subsides" — and a ring of Saturn, a plague-ravaged land and a New England fishing community visited by a cryptic force nobody can describe. Holt's people are beyond help, and medicine has only an ancillary role in this forsaken world: science can devise no potion for malaise, for hubris, for the disintegration of God. One of his

unnamed narrators — they are all unnamed; to have a name is to have a place — puts it plainly: "Science is a consolation only to the ignorant."

What do we clutch at in place of science? What sustained and deceived us long before science, and what will we return to once modernity becomes an antiquated future? Mystery, magic, myth; the allegories and fables that crowbarred open our psyche. In shunning the minutiae of human relationships, Holt's fiction pivots inward to face that psyche, and then far outward, into the cosmos, into history. His narratives become expert, horrifying explorations of sentience, at times Jungian, at others Kantian. In the title story, an unhinged archaeologist, dying of a disease brought on by curse, attempts to uncover the tomb of an Egyptian pharaoh eradicated from the historical record, a tomb his colleagues contend does not exist: "What I feel, what I know, I cannot speak outright; only sidelong, only glancingly can I tell you what will never be the thing itself." Obsession becomes melancholia, then psychosis, and this literal Underground Man must now tell his story in awe of the terrible sublime, in darkness and in blood.

Writers should know the names of things, and Holt knows more than most: purpura, glossolalia, vena cava, leukocyte, medulla, occiput. His narrators fear the might of words, their frightening ability to assemble and destroy. They assert "emphasis on the physicality of the word, its translation from thought to sound to durable object." The population in the opening story, " 'Ολογος," perish gruesomely when a disease appears in the form of a single incomprehensible term that writes itself in bruises, in stigmata, on the victims' bodies — shades of Kafka — and then spreads to anyone who beholds it. The story is creepier than satanic sacrifice, thoroughly horrific, an allegorical masterpiece about the potency of religious texts, of literature, of language.

The three narratives told from space become, in their radical inwardness, pieces of theology, nights of the soul so dark that St. John of the Cross would shudder. One astronaut reflects, "I had not known how much emptiness we fall through, how far we have to fall." Our postlapsarian condition has reached into the depths of space: we are each of us fallen, the knowledge we ate of useless. And this, finally, is what unites Holt not only with Kafka (we've made poor Franz the yardstick against which we measure all existential oddities) but also with another writer who reveres the Word, his prose style as mellifluous and interior as Holt's own: Bruno Schulz, whose mythical, surrealist, ultimately religious vision could not be contained and so forged its own realms outside the scope of ordinary existence.

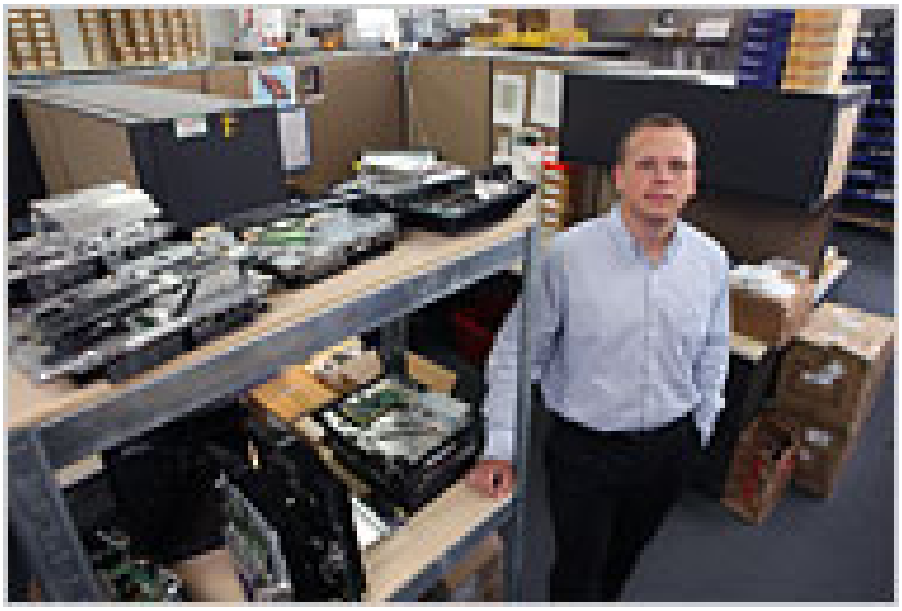
"In the Valley of the Kings," faithful in myriad ways to Maugham's "life in the raw," will take its rightful place beside those works of genius — fiction, philosophy, theology — unafraid of axing into our iced hearts. These stories will endure for as long as our hurt kind remains to require their truth.

William Giraldi teaches in the writing program at Boston University and is senior fiction editor for the journal Agni.

http://www.nytimes.com/2009/09/13/books/review/Giraldi-t.html?ref=books

Repair Options for Ailing Electronics

By ALINA TUGEND



FOR months, I had been trying to ignore it. Like an ailing relative, my desktop computer was becoming increasingly frail. With each passing day, it took longer and longer to boot up. It sent endless "connecting" messages as I tried to get on the Internet. It froze in confusion if I clicked away too quickly.

My first assumption was that it was time for a new computer. Ours was about five years old, relatively ancient in technological years.

But then I started thinking — should I be so quick to assume that computers and the other gadgets of modern life, like iPods and game systems, are always ready to retire after two years, or three or four? For economic and environmental reasons (repairing is better than replacing), shouldn't I look into the possibility that we could salvage our computer?

I decided to call Adam Sanderson, chief executive of Computer Overhauls, based in Manhattan. I interviewed Mr. Sanderson about four years ago for a column and have since hired him occasionally for emergency computer problems.

Mr. Sanderson remotely peeked into my computer and confirmed my worst fears — the hard drive was dying.

We could go out and buy a new one. Or, he suggested, we could ship or bring in the tower that contains the hard drive and he would replace it for about $150 — far less than the cheapest desktop we could buy. Prices can be higher for more powerful hard drives and up to about $200 for laptops.

"We would clean out the whole machine, reinstall everything fresh and it would be like a brand-new computer," he told me.

But then my software wouldn't be upgraded, would it?

No, Mr. Sanderson told me, but you may not really need to.

"It depends on what you're using the computer for," he said. "If you're surfing the Internet and doing e-mail, which is what the bulk of people do, then you're only using 5 to 10 percent of the actual power of your computer anyhow. Most people don't need upgraded software."

The turnaround is about 48 hours, he said, and comes with a three-year guarantee.

On the other hand, he said, if you are going to work on video editing or movie production, you probably want the newest software available. Also, any computer older than seven years should probably be replaced if it's having difficulties, he added.

Mr. Sanderson also repairs iPods and iPhones, and his business is booming.

"There's definitely a huge surge in the amount of repairs" in this economic climate, he said, as people choose to keep what they have rather than spend twice as much on the newest model.

Once I started looking into it, I found a surprising array of repair options, ranging from specialized experts to a community of techies who offer free advice online.

Rapid Repair, for example, based in Kalamazoo, Mich., "tries to serve an underserved population," by fixing game systems like Nintendo Wiis, PlayStations, Zune MP3 players, iPods and iPhones, said Aaron Vronko, service manager for Rapid Repair.

The company, which does not repair computers, was founded in 2004 and fields about 500 requests a week, Mr. Vronko said. In general, he advised, repairs make sense if they can be done for less than half the cost of a new item.

"If you have a $200 gadget and you can repair it for $80 or $90, the customers sees value in saving over $100," he said. "There's a certain feeling you get buying something new, but saving money is also good."

Suppose, for example, that your 30-gigabyte iPod with video has some problems. If the device is still under warranty, you send it back to Apple. If the warranty has lapsed, you can still send it to Apple and it will cost $129 to repair or $59 for a new battery, which is often the problem.

At Rapid Repair, the highest repair cost would $90, but often runs less if the trouble is minor. The company also offers to replace batteries for $20.

"About half our customers buy the parts and do their repairs themselves," Mr. Vronko said. He suggests, though, that once the item is about five years old, it's probably not worth fixing.

What if the product is still under warranty, but something that isn't covered breaks, and you want to get someone to fix it for less than the manufacturer will charge? You need to check if the repair company is authorized by the manufacturer. If it is, then typically the repair can be done and the warranty remains valid if other problems crop up.

Here is another option. Let's say you have a technologically savvy friend who is willing to help you figure out your computer's problem. But she lives in California and you live in London.

There are a variety of services and software that allow you to remotely control a computer. I checked out a company called CrossLoop, which offers two options. You can download software from the company's Web site that allows you to remotely gain access to another computer system — either MacIntosh or Microsoft Windows — and diagnose the difficulty.

To protect security, said Mrinal Desai, co-founder of CrossLoop, each time you and your friend use the software, you must type in a randomly generated 12-digit code that is changed for each use. And both of you have to do it within two minutes.

Or, if you don't have a friend willing or able to help, you can hire one of the 14,000 experts listed on CrossLoop's site. They are posted with their experience, prices, customer ratings and where they are located — which can be anywhere in the world. CrossLoop takes 15 percent of the experts' fees.

Mr. Desai says that his company does not vet the experts, but rather, like eBay, the online community weeds out the bad ones through reviews and ratings.

And if you like your expert, you can return to him again and again. "He becomes your I.T. guy," Mr. Desai said.

Want an even broader base to draw on for repairing just about anything? Try FixYa.com. If you have a problem with your lawn mower, computer, toaster or car, you can tap for free into the 250,000 "enthusiasts," as FixYa's founder, Yaniv Bensadon, calls them.

And if one of the enthusiasts is especially helpful, and well, enthusiastic, that person can be promoted to premium expert. For $20 you can have a live chat with your expert; for $13, you can have a one-time e-mail exchange; or, if you have a lot of fixing to do, you can sign up for a $10 monthly unlimited e-mail exchange.

So, back to me and my failing computer. In the end, we decided that because the computer was five years old — with a sticky keyboard and a few other problems as well — we would opt for a new one.

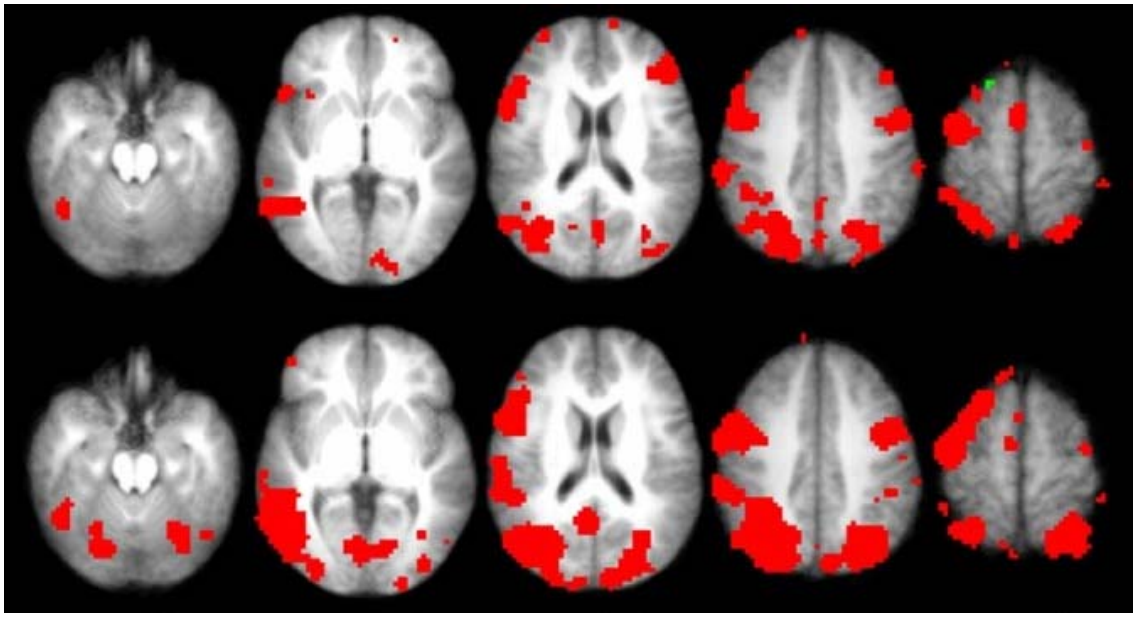
I'm still getting used to it, so it's nice to know that there's a world of experts at my fingertips, just waiting to help.

E-mail: shortcuts@nytimes.com

http://www.nytimes.com/2009/09/12/technology/12shortcuts.html?th&emc=th

Forgotten Memories Are Still in Your Brain

- By Brandon Keim



For anyone who's ever forgotten something or someone they wish they could remember, a bit of solace: Though the memory is hidden from your conscious mind, it might not be gone.

In a study of college students, brain imaging detected patterns of activation that corresponded to memories the students thought they'd lost.

"Even though your brain still holds this information, you might not always have access to it," said neurobiologist Jeffrey Johnson of the University of California, Irvine. His remarks appeared in the study he co-authored, published Wednesday in *Neuron*.

That recalling a memory triggers the neurological patterns encoded when the memory was formed is a tenet of cognitive science. Less understood, however, is what becomes of those patterns at moments of incomplete recall.

Maybe you remember breakfast at a certain restaurant, but not what you ate; perhaps you recall a particular conversation, but not what you said. It's not known whether those details vanish from the mind altogether, or are subsumed by some larger pattern, or remain intact but inaccessible.

"It wasn't quite clear what happens to them," said Johnson of lost details. "But even when people claim that there are no details attached to their memories, we could still pick some of those details out."

Of the the forgotten breakfast, he said that "we might still be able to pick up information about what you ate from brain activity, though you can't access it consciously."

Johnson's team put eleven female and five male college students inside an fMRI machine, which measures real-time patterns of blood flow in the brain. Each student was shown a list of words, then asked to say each word backwards, think of how it could be used, and imagine how an artist would draw it.

Twenty minutes later, the researchers showed them the list again, and asked the students to remember what they could of each word.

Recollection triggered the original learning patterns, a process known technically as reinstatement; the stronger the memory, the stronger the signal.

"What I think is cool about the study is that the degree of cortical reinstatement is related to the strength of our subjective experience of memory," said Anthony Wagner, a Stanford University memory researcher who wasn't involved in the experiment.

But at the weak end of the gradient, where the students' conscious recall had faded to zero, the signal was still there.

It's possible that the students lied about what they remembered. But if not, then memory may truly persist. The question then is how long memories could last — weeks, months, even years.

"We can only speculate that this is the case," said Johnson, who plans to run brain-imaging studies of memory degradation over days and weeks.

As for whether those memories could be intentionally guided to the surface, Johnson says that "at this stage, we're just happy to be able to find evidence of reinstatement at a weak level. That would be something down the line."

http://www.wired.com/wiredscience/2009/09/forgottenmemories/

Nicotine Creates Stronger Memories, Cues To Drug Use

New research shows that nicotine, the addictive component in cigarettes, "tricks" the brain into creating memory associations between environmental cues and smoking behavior. (Credit: iStockphoto/Kutay Tanir)

ScienceDaily (Sep. 10, 2009) — Ever wonder why former smokers miss lighting up most when they are in a bar or after a meal with friends?

Researchers at Baylor College of Medicine say nicotine, the addictive component in cigarettes, "tricks" the brain into creating memory associations between environmental cues and smoking behavior. The findings appear in the current issue of the journal *Neuron*.

"Our brains normally make these associations between things that support our existence and environmental cues so that we conduct behaviors leading to successful lives. The brain sends a reward signal when we act in a way that contributes to our well being," said Dr. John A. Dani, professor of neuroscience at BCM and co-author of the study. "However, nicotine commandeers this subconscious learning process in the brain so we begin to behave as though smoking is a positive action."

Dani said that environmental events linked with smoking can become cues that prompt the smoking urge. Those cues could include alcohol, a meal with friends, or even the drive home from work. To understand why these associations are so strong, Dani and Dr. Jianrong Tang, instructor of neuroscience at BCM and co-author of the report, decided to record brain activity of mice as they were exposed to nicotine, the addictive component of tobacco.

The mice were allowed to roam through an apparatus with two separate compartments. In one compartment, they received nicotine. In the other, they got a benign saline solution. Later, the researchers recorded how long the mice spent in each compartment. They also recorded brain activity within the hippocampus, an area of the brain that creates new memories.

"The brain activity change was just amazing," Dani said. "Compared to injections of saline, nicotine strengthened neuronal connections – sometimes up to 200 percent. This strengthening of connections underlies new memory formation."

Consequently, mice learned to spent more time in the compartment where the nicotine was administered compared to the one where saline was given to them.

"We found that nicotine could strengthen neuronal synaptic connections only when the so called reward centers sent a dopamine signal. That was a critical process in creating the memory associations even with bad behavior like smoking."

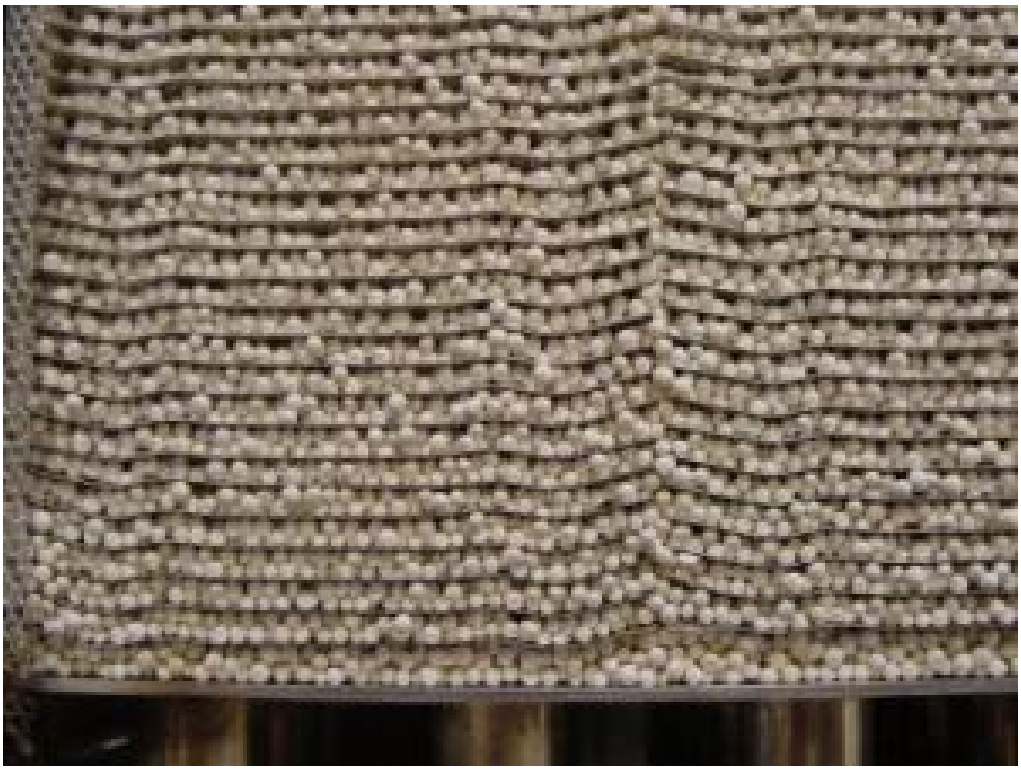
Dani said understanding mechanisms that create memory could have implications in future research and treatments for memory disorders, such as Alzheimer's disease, and for dopamine signaling disorders, such as Parkinson's disease.

This study was supported by the National Institute of Neurology Disorders and Stroke and the National Institute of Drug Abuse.

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

http://www.sciencedaily.com/releases/2009/09/090909122052.htm#

Environmentally 'Green' Beer: Munich Brewing Engineers Research Energy Savings



One gram of zeolite has an internal surface of about 500 square meters. The pores absorb water to full saturation. When heated, the spheres dry up -- the storage system is charged. Once water is added again, the zeolite spheres release heat of up to 250 degrees C. Such a system plays a central role in a new, energy-saving production chain proposed by brewing engineers at the Technische Universitaet Muenchen. (Credit: Courtesy Birger Klitzing, RWTH Aachen)

ScienceDaily (Sep. 10, 2009) — A cool, freshly drawn beer has a dark side: it is among the most energy-intensive foodstuffs during production. Brewing engineers from the Technische Universitaet Muenchen (TUM) are working hard to improve the energy balance of the amber beverage. They are looking into a new process combination that would allow energy savings of up to 20% during brewing.

The Weihenstephan scientists will be exhibiting the heart of their energy-saving idea at the drinktec trade fair in Munich (14 – 19 September).

For over one hundred years one fundamental technical precept has applied to all breweries: You can't brew beer without a kettle. Only a mighty boil kettle is capable of generating the temperatures of 110 to 160 degrees centigrade required to boil down "crude beer," the so-called wort. This process consumes substantial amounts of energy: Almost half of the overall energy consumption of a classical brewery – 45 percent, to be exact – goes into wort processing. That is why engineers have been working on solutions to reduce heat and electricity consumption in brewing for years now.

One approach was to use combined heat and power (CHP) stations, which are highly energy efficient and environmentally friendly due their cogeneration of power and heat. This technology, however, has proven to be unsuitable for breweries: CHP stations do indeed generate heat in addition to power, but only achieve temperatures up 90 degrees centigrade. Boiling down wort requires at least 110 degrees centigrade. To remedy this deficit, engineers from the Institute for Resource and Energy Technology at the TU Muenchen have been following a hot trail since August 2008: They have combined the CHP station with a so-called "zeolite storage system."

Such storage systems work thermo-chemically with zeolite spheres 2-3 mm in diameter. These porous pellets are made of silicate minerals and have excellent heat storage properties. One gram of zeolite has an internal surface of about 500 square meters. The pores absorb water to full saturation. When zeolite is heated, the spheres dry up – the storage system is charged. Once water is added again, the zeolite spheres release heat of up to 250 degrees centigrade. The brewing engineers at the TUM want to take advantage of this thermo-chemical principle to add on the missing 20 degrees to the 90 degrees centigrade from the CHP station of the brewery.

To this end, they intend to use an empty time slot in the production process. “At night a medium-sized brewery needs little energy,” says project leader Dr. Winfried Russ. “In this time we can feed unused heat from the CHP station into the zeolite storage system.” During the day, when high temperatures are required to boil the wort, additional heat can be fed into the overall system almost instantaneously with the “heat boosting” press of a button. This places resource-efficient, low-energy beer within drinkable reach.

The newly combined production chain works perfectly already in computer simulations, and practical tests are just getting under way. Researchers from the TU Muenchen, in collaboration with colleagues from the RWTH Aachen, have now, for the first time, set up a test station at Weihenstephan that uses the new equipment combination to simulate brewery processes. Winfried Russ is eager to see the results: “We already know that it will work. What we don’t know is just how much energy can be saved.” The researchers are counting on at least ten percent.

In a second step, the TUM engineers intend to model the energy balance of an entire brewery. The cleaning system, the brewing facilities, the fermenting room and storage cellar, as well as the bottling facilities will all be heated at only 90 degrees centigrade instead of using steam of up to 160 degrees. The researchers are counting on this, taken together with the additional waste heat utilization, to result in energy savings of altogether 20 percent. “This is more than the total savings from all energy efficiency measures taken in the brewing industry during the last ten years,” according to Russ. The experiment will have run its course by mid-2011. Both small and medium-sized breweries are eagerly awaiting the results: Potential takers are already showing interest in the pilot project that will follow.

It is reasonable to expect that in a few years we will be drinking real “energy-efficient beer” – and enjoying it with a green conscience. The underlying technology will be on display at the drinktec 2009 trade fair from 14 to 19 September, where the Weihenstephan researchers from the TU Muenchen will exhibit a model of the zeolite storage system.

Adapted from materials provided by Technische Universität München.

http://www.sciencedaily.com/releases/2009/09/090907142347.htm#

Pioneering Research Forms Basis For First-Ever Pediatric Hypertension Guidelines

ScienceDaily (Sep. 10, 2009) — Comprehensive guidelines for the treatment and management of hypertension in children and adolescents are being published for the first time in the latest issue of the *Journal of Hypertension*.

Prepared by a Task Force established by the European Society of Hypertension, the guidelines will prove to be an invaluable source of information for physicians, nurses and families dealing with hypertension in young people.

The necessity for the guidelines has become increasingly clear to physicians in light of growing evidence that cases of mild hypertension in children and adolescents are much more common than previously thought. In addition, progress made in pathophysiological and clinical research has made clear links between paediatric hypertension and cardiovascular disease later in life, highlighting the need for improved cardiovascular prevention strategies for pre-adult individuals.

The Task Force, set up by the European Society of Hypertension and headed by Dr Empar Lurbe of the University of Valencia, has combined considerable amounts of scientific data with clinical experience in order to represent a consensus among specialists involved in the detection and control of high blood pressure (BP) in children and adolescents. It is hoped that the publication of these guidelines will call attention to the burden of hypertension in children and adolescents, and encourage public policy makers to develop a global effort to improve identification and treatment of high BP among young people. Primarily, however, these guidelines provide practical strategies for diagnosing and treating hypertension in children and adolescents. They include:

- Definition and classification of hypertension
- Diagnostic evaluation
- Preventative measures
- Evidence for therapeutic management
- Therapeutic strategies and approaches under special conditions
- Treatment of associated risk factors
- Screening for secondary forms of hypertension

The Task Force also suggests strategies for long term follow up, and make recommendations for future research in the field.

The guidelines will certainly prove vital in combating the growing epidemic of cardiovascular disease in adults, by emphasising the need for preventative strategies to be implemented from an early age. As Dr Lurbe comments, "Action is required to address this problem in one of the most vulnerable and precious sectors of our society: children and adolescents."

Journal reference:

1. Lurbe, Empar; Cifkova, Renata; et al. **Management of high blood pressure in children and adolescents: recommendations of the European Society of Hypertension**. *Journal of Hypertension*, 2009; 27 (9): 1719 DOI: 10.1097/HJH.0b013e32832f4f6b

Adapted from materials provided by Wolters Kluwer Health / Lippincott Williams & Wilkins, via AlphaGalileo.

http://www.sciencedaily.com/releases/2009/08/090826073550.htm#

How Manuka Honey Helps Fight Infection

ScienceDaily (Sep. 10, 2009) — Manuka honey may kill bacteria by destroying key bacterial proteins. Dr Rowena Jenkins and colleagues from the University of Wales Institute - Cardiff investigated the mechanisms of manuka honey action and found that its anti-bacterial properties were not due solely to the sugars present in the honey.

The work was presented this week (7-10 September), at the Society for General Microbiology's meeting at Heriot-Watt University, Edinburgh.

Meticillin resistant Staphylococcus aureus (MRSA) was grown in the laboratory and treated with and without manuka honey for four hours. The experiment was repeated with sugar syrup to determine if the effects seen were due to sugar content in honey alone. The bacterial cells were then broken and the proteins isolated and separated on a system that displayed each protein as an individual spot.

Many fewer proteins were seen from the manuka honey-treated MRSA cells and one particular protein, FabI, seemed to be completely missing. FabI is a protein that is needed for fatty acid biosynthesis. This essential process supplies the bacteria with precursors for important cellular components such as lipopolysaccarides and its cell wall. The absence of these proteins in honey-treated cells could help explain the mode of action of manuka honey in killing MRSA.

"Manuka and other honeys have been known to have wound healing and anti-bacterial properties for some time," said Dr Jenkins, "But the way in which they act is still not known. If we can discover exactly how manuka honey inhibits MRSA it could be used more frequently as a first-line treatment for infections with bacteria that are resistant to many currently available antibiotics."

Adapted from materials provided by Society for General Microbiology, via EurekAlert!, a service of AAAS

http://www.sciencedaily.com/releases/2009/09/090907013759.htm

K-12 Education Should Include Engineering, Experts Say

ScienceDaily (Sep. 10, 2009) — The introduction of K-12 engineering education has the potential to improve student learning and achievement in science and mathematics, increase awareness about what engineers do and of engineering as a potential career, and boost students' technological literacy, according to a new report from the National Academy of Engineering and the National Research Council. The report examines the status and nature of efforts to teach engineering in U.S. schools."The problem solving, systems thinking, and teamwork aspects of engineering can benefit all students, whether or not they ever pursue an engineering career," said Linda Katehi, chancellor of the University of California, Davis, and chair of the committee that wrote the report. "A K-12 education that does not include at least some exposure to engineering is a lost opportunity for students and for the nation."Engineering education at the K-12 level should emphasize engineering design and a creative problem-solving process, the committee said. It should include relevant concepts in mathematics, science, and technology, as well as support the development of skills many believe essential for the 21st century, including systems thinking, collaboration, and communication.While science, technology, engineering, and mathematics instruction is collectively referred to as "STEM education," the report finds that the engineering component is often absent in policy discussions and in the classroom. In fact, engineering might be called the missing letter in STEM, the report says.In preparing the report, the committee conducted an in-depth analysis of 15 K-12 engineering curricula; reviewed scientific literature related to learning engineering concepts and skills; evaluated evidence on the impact of K-12 engineering education initiatives; and collected preliminary information about pre-collegiate engineering education programs in other countries.The committee found that engineering education opportunities in K-12 schools have expanded considerably in the past 15 years. Since the early 1990s, the report estimates, about 6 million children have been exposed to some formal engineering coursework. However, this number is still small compared with the overall number of students in K-12 schools (approximately 56 million in 2008). The committee noted that many challenges remain to expanding the availability and improving the quality of these programs, including the absence of content standards to guide development of instructional materials, limited pre-service education for engineering teachers, and structural and policy impediments to including this new subject in an already crowded school curriculum. With these challenges in mind, the committee recommended that:

- the National Science Foundation or U.S. Department of Education fund research to determine how science inquiry and mathematical reasoning can be connected to engineering design in curricula and professional development;
- foundations and federal agencies with an interest in K-12 engineering education conduct long-term research to confirm and refine findings of studies of the impacts of engineering education;
- the American Society of Engineering Education begin a national dialogue on preparing K-12 engineering teachers, and on the pros and cons of establishing a formal credentialing process; and
- philanthropic foundations or federal agencies with an interest in STEM education and school reform identify models of implementation for K-12 engineering education that will work for different American school systems.

The committee also noted the importance of clarifying the meaning of "STEM literacy" and of developing curricula that would particularly appeal to groups typically underrepresented in engineering, such as girls, African Americans, and Hispanics.The study was sponsored by Stephen D. Bechtel, Jr., chairman (ret.) and director, Bechtel Group Inc., with additional support from the National Science Foundation and Parametric Technology Inc. The National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council make up the National Academies. They are independent, nonprofit institutions that provide science, technology, and health policy advice under an 1863 congressional charter. A committee roster follows.

Adapted from materials provided by National Academy of Sciences.

http://www.sciencedaily.com/releases/2009/09/090908125129.htm#

Ancient Oceans Offer New Insight Into Origins Of Animal Life

In prehistoric times, Earth experienced two periods of large increases and fluctuations in the oxygen level of the atmosphere and oceans. These fluctuations also led to an explosion of multicellular organisms in the oceans, which are the predecessors for life as we know it today. (Credit: iStockphoto/Sebastian Meckelmann)

ScienceDaily (Sep. 10, 2009) — Analysis of a rock type found only in the world's oldest oceans has shed new light on how large animals first got a foothold on Earth.

A scientific team led by Professor Robert Frei at the University of Copenhagen in Denmark, and including scientists from Newcastle University, UK, and universities in Uruguay and Southern Denmark, have for the first time managed to plot the rise and fall of oxygen levels in the Earth's atmosphere over the last 3.8 billion years.

By analysing the isotopes of chromium in iron-rich sediments formed in the ancient oceans, the team has found that a rise in atmospheric oxygen levels 580 million years ago was closely followed by the evolution of animal life.

Published today in the academic journal Nature, the data offers new insight into how animal life – and ultimately humans – first came to roam the planet.

"Because animals evolved in the sea, most previous research has focussed on oceanic oxygen levels," explains Newcastle University's Dr Simon Poulton, one of the authors of the paper.

"Our research confirms for the first time that a rise in atmospheric oxygen was the driving force for oxygenation of the oceans 580 million years ago, and that this was the catalyst for the evolution of large complex animals."

The study

Distinctive chromium isotope signals occur when continental rocks are altered and weathered as a result of oxygen levels rising in the atmosphere.

The chromium released by this weathering is then washed into the seas and deposited in the deepest oceans - trapped in iron-rich rocks on the sea bed.

Using this new data, the research team has not only been able to establish the trigger for the evolution of animals, but have also demonstrated that oxygen began to pulse into the atmosphere earlier than previously thought.

"Oxygen levels actually began to rise 2.8 billion years ago" explains Dr Poulton.

"But instead of this rise being steady and gradual over time, what we saw in our data was a very unstable situation with short-lived episodes of free oxygen in the atmosphere early in Earth's history, followed by plummeting levels around 2 billion years ago.

"It was not until a second rise in atmospheric oxygen 580 million years ago that larger complex animals were able to get a foothold on the Earth."

Journal reference:

1. Robert Frei, Claudio Gaucher, Simon W. Poulton & Don E. Canfield. **Fluctuations in Precambrian atmospheric oxygenation recorded by chromium isotopes**. *Nature*, 2009; 461 (7261): 250 DOI: 10.1038/nature08266

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

http://www.sciencedaily.com/releases/2009/09/090909133020.htm#

Britain's First Dual Fuel Bus Will Cut Emissions By Half

A new dual-fuel diesel-biomethane powered bus is expected to reduce pollutant emissions and greenhouse gas emissions by around a half. (Credit: Image courtesy of University of East Anglia)

ScienceDaily (Sep. 10, 2009) — A consortium brought together by low carbon experts at the University of East Anglia (UEA) is today launching the first bus in the UK to run on clean, biomethane gas.

The innovative dual-fuel diesel-biomethane powered bus will reduce pollutant emissions and greenhouse gas emissions by around a half. It is hoped the technology will be rolled out to bus fleets across the country and further afield.

The bus will make its first public showing at LCV 2009, the UK's leading exhibition of low carbon vehicle technology. The event takes place at the Millbrook Proving Ground in Bedfordshire on September 9 and 10.

The event has been organised by Cenex (Centre of Excellence for low carbon and fuel cell technologies) and is expected to attract around 2000 specialists in low carbon technologies from around the world.

The consortium behind the new bus is led by UEA's Low Carbon Innovation Centre (LCIC) and includes leading independent bus operator Anglian Bus, bus manufacturer Optare plc, and engine conversion specialists Hardstaff Group of Nottingham.

The dual-fuel vehicle is a standard Optare Solo single-deck diesel midibus from the Anglian Bus fleet. Originally powered entirely by diesel, the Mercedes-Benz engine has been adapted to run for 60-80 per cent of the time on clean, low-carbon biomethane.

Biomethane is chemically identical to the methane in natural gas but it is made by bacterial action on biowastes. Biomethane is extracted from landfill sites or from biogas produced in purpose-built anaerobic digestion facilities.

Project leader Dr Bruce Tofield, of UEA's Low Carbon Innovation Centre, said: "Dual-fuel use is a very attractive option. The vehicle can still run on diesel, providing flexibility, but most of the time is running on biomethane gas which is a much cleaner and less polluting fuel.

"In particular, the cost of conversion of a diesel bus to dual-fuel use is a small fraction of the cost of a new natural gas bus. Conversion to dual-fuel use is potentially a viable option for most if not all diesel buses in the UK and, indeed, across Europe and more widely."

Funding for the project came partly from an EU-sponsored Civitas programme in which UEA and Anglian Bus were partners with Norwich, Norfolk County Council and cities across Europe. The Civitas Initiative exists to promote cleaner and better transport in Europe's cities.

LCIC scientists have been monitoring air pollution in Norwich since 2005 as part of the Civitas programme. In Norwich, as in many UK cities, emissions from buses are of particular concern. They noticed how the buses in Malmo in Sweden, a partner city in the Civitas programme, were powered by

clean natural gas (methane), resulting in significantly lower levels of harmful emissions. Of special interest was the fact that Malmo was beginning to use biomethane rather than natural gas to reduce greenhouse gas emissions as well as pollutant emissions.

"This conversion shows just how important EU projects can be in helping us learn from what cities elsewhere have done," said Dr Tofield. "Now we are going one step further and showing how existing bus fleets can be economically converted to low-carbon, low-emissions running. The potential for reducing traffic pollution and greenhouse gas emissions from buses and other fleet vehicles in cities in Britain, Europe, and across the world is very exciting."

Benefits of using biomethane as a fuel include:

- A reduction in particulate and NOx emissions levels of around half compared with diesel leading to cleaner air in towns and cities.
- Reduced operating costs on a cost per mile basis
- A reduction in greenhouse gas emissions of around half as a result of using methane from landfill sites, food and agricultural waste.

Replacing an entire bus fleet with new vehicles is extremely expensive but the LCIC staff realised that a lower-cost solution was already at hand in the UK. Nottinghamshire engineering company Hardstaff Group are world leaders in the provision of natural gas refuelling stations and in the conversion of large vehicles to dual-fuel diesel-gas use. Hardstaff's own fleet of heavy goods vehicles, converted to dual-fuel use, have now successfully covered in excess of 40 million kilometres and now run on biomethane.

Working with local bus company Anglian Bus, the LCIC organised for one of Anglian's Optare Solo buses to be converted to dual-fuel use. The fuel tanks have been installed at Optare's Leeds plant and the engine conversion undertaken at Hardstaff's Nottinghamshire headquarters. In addition, Hardstaff is supplying a gas refuelling station to Anglian Bus and will keep it supplied with biomethane.

David Pursey, chairman of Anglian Bus, said: "Anglian has always tried to be a leader in environmental matters and worked with UEA to demonstrate the benefits of biodiesel in the Civitas programme. We are really pleased to have the first gas-powered dual-fuel bus in the UK in our fleet and look forward to working with our partners to demonstrate the benefits of dual-fuel operation on biomethane."

Trevor Fletcher, managing director of Hardstaff Group, said: "Hardstaff Group's dual-fuel trucks have covered nearly 40 million kilometres and we are really pleased to be working with UEA's Low Carbon Innovation Centre, with Anglian Bus and with Optare to demonstrate our technology on buses for the first time."

Jim Sumner, CEO of Optare, said: "Improving the environmental performance and fuel efficiency of our products is central to our development strategy as shown by the recent announcement of the Optare Eco Drive programme. We see gas-power, and biomethane in particular, as an important and viable option for buses in UK cities and elsewhere around the world. We have pioneered zero emissions buses with our Solo EV electric model. Now we are able to give operators another choice by offering the first dual-fuel conversion in the country."

Adapted from materials provided by University of East Anglia, via AlphaGalileo.

http://www.sciencedaily.com/releases/2009/09/090908203750.htm

Improving Hardiness In Grapes: Research Probes Day Length Sensing

Finding the genes that control day length sensitivity in riverbank grapes may help make commercial grapes more cold hardy. (Credit: Photo courtesy of the Natural Resources Conservation Service, USDA.)

ScienceDaily (Sep. 10, 2009) — Agricultural Research Service (ARS) scientists are a step closer to improving the hardiness of grape varieties that can be damaged and destroyed by fall frosts and cold winters in North American vineyards.

Grapes, like many other woody plants, stop growing and drop their leaves in the fall, entering a dormant phase that allows them to prepare for and survive the winter. Understanding the timing of this seasonal growth cessation in grapes is a key objective for scientists. If they can find genes that control it, they can help breeders develop more marketable cold-tolerant grapes.

The wild grape species Vitis riparia is unusual among wild grapes because it stops growing when the day length drops below 13 hours, which occurs in late August in upstate New York, according to Amanda Garris, a geneticist at the ARS Grape Genetics Research Unit in Geneva, N.Y. Most other grape species are not sensitive to day length.

Garris, ARS molecular biologist Christopher Owens, James Luby of the University of Minnesota, and Anne Fennel of South Dakota State University want to identify genes for day length sensitivity in V. riparia.

The researchers crossed V. riparia with Seyval, a hybrid grape insensitive to day length. They raised some of the offspring in fields, with natural fluctuations of day length, rainfall and temperature. Others they raised in greenhouses where water and temperature levels remained constant, but artificial "day" lengths were gradually reduced to mimic conditions outside.

They evaluated growth cessation patterns and mapped differences found in 120 DNA markers and six genes. They discovered that in greenhouse-grown grapevines, a region of chromosome 13 is responsible for day-length-induced growth cessation. But in the field, the interaction of multiple cues such as day length, rainfall and temperature fluctuations is more likely to explain the timing of growth cessation.

The study, considered a preliminary step toward identification of genes for day length sensitivity and growth cessation, was recently published in the Journal of the American Society of Horticultural Science.

Adapted from materials provided by USDA/Agricultural Research Service.

http://www.sciencedaily.com/releases/2009/08/090830100306.htm#

War, Genocide 'Difficult Knowledge' To Teach Younger Students

ScienceDaily (Sep. 10, 2009) — Whether they're found in a museum or a textbook, historical narratives about traumatic events such as war and genocide are better left to older students, who have typically developed a more refined historical consciousness, says a University of Illinois professor who studies and teaches historical instruction.

According to Brenda M. Trofanenko, a professor of curriculum and instruction in the College of Education at Illinois, the "difficult knowledge" of such events as the Holocaust, the Ukranian Holodomor and the genocides in Rwanda and Srebrenica should be the province of high school history classes, not elementary and upper-elementary classes.

"It's curricular creep in the sense that subjects that were once considered relevant only to high school kids previously are now filtering down to elementary and upper-elementary school students," Trofanenko said.

In public schools in California, Illinois and Massachusetts, the study of genocide is a mandatory unit of instruction in every elementary and high school.

Although those states are "quite forward-thinking" in mandating genocide education as a distinct subject, Trofanenko believes elementary school is too young to begin a serious discussion about such a weighty historical topic.

"I've heard of children as young as grade three are being taught about the Holocaust," she said. "That's far too young, to my mind."

Trofanenko, who presented a paper about teaching difficult knowledge at the Curating Difficult Knowledge conference at Concordia University in Montreal last April, says elementary school students lack the baseline historical knowledge and critical sensibility necessary to understand the various implications of state-sponsored mass murder.

"Younger students don't have the ability to capture all the information and knowledge necessary to understand both the historical and emotional context of difficult knowledge like genocide. They don't understand the big picture yet. Once they have an understanding of concepts such as significance, continuity and change, cause and consequence, and moral judgment, students can logically think through and ask questions about why events have happened."

To critics who would argue that educators can't shield younger students from the difficult topics of history, Trofanenko says that high school students are better equipped, both emotionally and intellectually, to deal with traumatic events in world history.

"It's called 'difficult knowledge' by educators and historians for a reason," Trofanenko said. "How do you portray death and dying to a 12-year-old? How do you properly convey the gravity of certain historical situations to a sixth- or seventh-grader? In order to deal with the emotional aspects of it, students have to be able to logically understand what was happening at the time. Elementary school students aren't ready for that yet. It's easier to talk to a 16-year-old about how people died because of their religious or political beliefs than it is a sixth grader."

A fact-based, fill-in-the-blank approach to learning about genocide – a teaching staple of virtually all elementary school history classes – isn't the best pedagogical approach to teaching historically difficult subjects, Trofanenko says.

"When you do that, when you turn the Holocaust or the Holodomar into a "Jeopardy!"-type game in order to drill facts into students' heads, you trivialize it," she said. "Looking only at facts or the raw data of how many people were killed discounts a lot of significant aspects, including the emotional toll. This is not to

say that students don't need to know the extent of genocide, but it's not the only element within the larger picture."

Teaching difficult knowledge not only requires educators to think carefully about their own theories of learning, but it also necessitates a pedagogical willingness to approach the limits of a young learner's knowledge of history.

"This requires more than satisfying standards," she said. "It means a better understanding of how young people deal with emotion and emotional issues associated with world events."

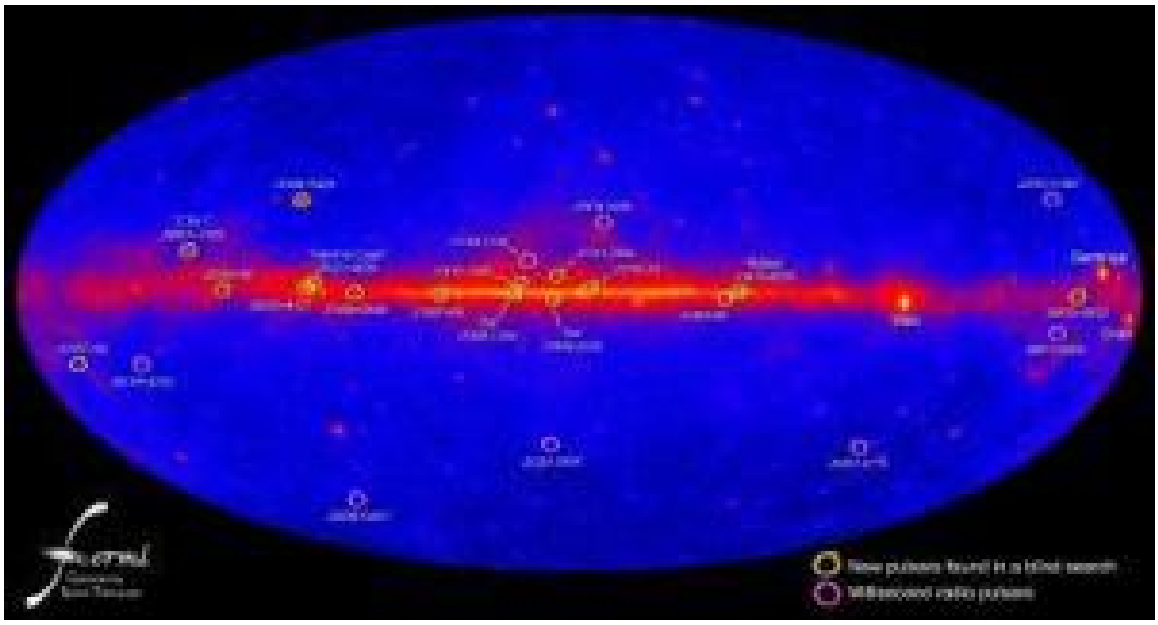
Trofanenko says teachers need to get back to engaging in historical inquiry – asking questions about what genocide is, why it was allowed to happen, and how it's occurred even during their lifetime.

"Teachers need to look at genocide generally and not treat it as an isolated, discrete event," she said. "It needs to be taught as something that has happened during our students' lifetimes. They need to know why these terrible events occurs, not just the information that results from it."

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

http://www.sciencedaily.com/releases/2009/09/090908125142.htm#

Fermi Large Area Telescope Reveals Pulsing Gamma-ray Sources



This image from the Fermi Gamma-ray Space Telescope displays newly found pulsars (circled in yellow) and millisecond pulsars (circled in magenta). (Credit: NASA/DoE/Fermi LAT Collaboration)

ScienceDaily (Sep. 9, 2009) — Scientists at the Naval Research Laboratory (NRL) Space Science Division and a team of international researchers have positively identified cosmic sources of gamma-ray emissions through the discovery of 16 pulsating neutron stars.

Using the Large Area Telescope (LAT), the primary instrument on NASA's Fermi Gamma-ray Space Telescope satellite, the discoveries were made by conducting blind frequency searches on the sparse photon data provided by the LAT. The photons had energies between 20 Mega-electron-volts (MeVs) and 300 Giga-electron-volts (GeVs)— tens of millions to hundreds of billions of times more energetic than the photons we see with the human eye.

A second study, published at the same time, announced the detection of gamma-ray pulsations from eight Galactic millisecond pulsars (MSPs). Millisecond pulsars spin hundreds of times per second, but have magnetic fields 10,000 times lower than normal pulsars. These discoveries confirm that they, too, can produce powerful gamma-ray emissions.

"Fermi has truly unprecedented power for discovering and studying gamma ray pulsars," said Paul Ray astrophysicist, Naval Research Laboratory. "Since the demise of the Compton Gamma Ray Observatory a decade ago, we've wondered about the nature of unidentified gamma-ray sources it detected in our galaxy. These studies from Fermi lift the veil on many of them."

Pulsars are rapidly rotating, highly magnetized neutron stars that can emit radiation across the electromagnetic spectrum. Prior to the launch of Fermi, gamma-ray pulsations were only detected from pulsars previously discovered using radio or X-ray telescopes. Radio telescopes can detect pulsars only if one of the narrow radio beams is directly aimed at the telescope; otherwise the pulsar can remain hidden. The much broader gamma-ray beams allowed the new pulsars to be discovered as part of a comprehensive search for periodic gamma-ray emission using five months of Fermi LAT data and new computational techniques.

The newly discovered pulsars, with rotation periods that range from 48 to 444 milliseconds, help reveal the geometry of emission from rotation-powered pulsars and provide valuable information on population statistics, the energetics of pulsar wind nebulae and supernova remnants. A wide variety of astrophysical phenomena, such as pulsars, active galactic nuclei, gamma-ray bursts and some binary star systems are known to produce photons exceeding many MeVs.

"The Fermi LAT makes it possible for us to pinpoint neutron stars," said Eric Grove, astrophysicist and LAT Commissioner, NRL Space Science Division. "The combination of a very large collecting area, large field of view, and precision timing from an on-board Global Positioning System receiver enables the LAT to see sources that were far beyond the reach of previous gamma-ray telescopes."

Results of the two studies were published on July 2, 2009 in *Science Express*.

The LAT project is funded in the United States by NASA and developed in collaboration with the Department of Energy and by academic institutions and government agencies in France, Italy, Japan, and Sweden.

Journal references:

1. Abdo et al. **Detection of 16 Gamma-Ray Pulsars Through Blind Frequency Searches Using the Fermi LAT**. *Science*, 2009; 325 (5942): 840 DOI: 10.1126/science.1175558
2. Abdo et al. **A Population of Gamma-Ray Millisecond Pulsars Seen with the Fermi Large Area Telescope**. *Science*, 2009; 325 (5942): 848 DOI: 10.1126/science.1176113

Adapted from materials provided by Naval Research Laboratory, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/09/090909103006.htm#

Regular Aerobic Exercise Reduces Health Concerns Associated With Fatty Liver

ScienceDaily (Sep. 9, 2009) — Researchers from the University of Sydney, Australia determined that patients with a sedentary lifestyle who engage in routine physical activities lower their risk of nonalcoholic fatty liver disease (NAFLD). The lower risk of problems associated with fatty liver was not contingent upon weight loss, but a direct result from the increased aerobic exercise.

The results of this study are published in the October issue of *Hepatology*, a journal of the American Association for the Study of Liver Diseases.

Nonalcoholic fatty liver disease affects 30% of the adult population and the majority of obese individuals. The condition, where fat accumulates in the liver of those people who drink little or no alcohol, can cause inflammation or scarring of the liver with more serious cases, known as nonalcoholic steatohepatitis, possibly progressing to liver failure.

A study, led by Jacob George, M.D. from Westmead Hospital at the University of Sydney, included 19 obese adults who had a body mass index >30 kg/m2 and reported a sedentary lifestyle. Baseline measurements were performed to determine hepatic triglyceride concentration (HTGC) and hepatic lipid saturation index (SI), intramyocellular triglyceride (IMTG) levels, visceral adipose tissue (VAT) or amount of fat stores in the abdomen, cardiorespiratory fitness, blood biochemistry, and measurements for body height and weight. Volunteers either received 4 weeks of aerobic cycling exercise (12 subjects) or a placebo (7 participants), which involved regular stretching.

At the end of the 4-week period, measurements were again taken from each participant. Body weight and body mass index (BMI) remained unchanged, but cardiorespiratory fitness significantly improved in the exercise group versus placebo. Researchers noted a 21% reduction of HTGC and 12% VAT volume in those participants who were subject to regular exercise. "Our data provides the first direct experimental evidence that regular aerobic exercise reduces fatty liver in obesity without concurrent changes in body weight or abdominal fat," explained researchers.

Individuals who are obese are at risk for a number of cardiovascular and metabolic health concerns, including heart disease and diabetes. "Our observation of the beneficial effect of regular exercise itself on liver and abdominal fat should refocus the debate on the role of physical activity in the prevention and management of obesity and NAFLD," concluded Dr. George. Past studies have shown that exercise adherence appears to be more sustainable over time than weight loss. "Further studies of the long-term benefit of routine physical activity on lowering HTGC and its impact on obesity and NAFLD should be explored," recommended Dr. George.

Journal reference:

1. A. Johnson, Toos Sachinwalla, David W. Walton, Kate Smith, Ashley Armstrong, Martin W. Thompson, Jacob George. **Aerobic exercise training reduces hepatic and visceral lipids in obese individuals without weight loss**. *Hepatology*, 2009; NA DOI: 10.1002/hep.23129

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

http://mail.google.com/mail/?hl=es&shva=1#inbox/123a344c26b00d2d

Accurate Predictions In A Limited Calculation Time

ScienceDaily (Sep. 9, 2009) — Air, road traffic and water flows can only be accurately predicted with computer simulations if the computers can automatically focus on important changes in an area, says Dutch researcher Arthur van Dam.

A wide variety of flows around us can be modelled, such as traffic flows on motorways, water flows in canals, and gas flows in the atmosphere. A computer can calculate these flows with the help of physics formulae. But even computers have difficulty in calculating, for example, how the air pressure develops over a longer period of time and in large areas.

That is because an area is divided into conceptual pieces for which, for example, the average air pressure and flow rate are calculated. The accuracy of the calculation increases if smaller pieces are used. The downside, however, is that the computer has to calculate for longer because more pieces are needed for the same area.

In his doctoral thesis Van Dam describes a method that automatically reduces the pieces in an ingenious manner. This happens for more complex changes in particular, for example during rapid changes in air pressure, or a rapid increase in traffic density (upon joining a traffic jam). The human eye can easily identify these locations, whereas a computer finds it difficult to find these and to assess their level of complexity. The new method does this in a balanced manner. This automatic focus on interesting areas enables computer simulations to provide highly accurate results within a limited calculation time.

The research was carried out at Utrecht University and funded within the programme Mathematics Applied from NWO Physical Sciences and Technology Foundation STW. This programme aims to strengthen mathematical research that is oriented to social needs.

Adapted from materials provided by NWO (Netherlands Organization for Scientific Research), via AlphaGalileo.

http://www.sciencedaily.com/releases/2009/09/090902122438.htm

Hubble Opens New Eyes On The Universe

Butterfly emerges from stellar demise in Planetary Nebula NGC 6302. (Credit: NASA, ESA, and the Hubble SM4 ERO Team)

ScienceDaily (Sep. 9, 2009) — NASA's Hubble Space Telescope is back in business, ready to uncover new worlds, peer ever deeper into space, and even map the invisible backbone of the universe.

The first snapshots from the refurbished Hubble showcase the 19-year-old telescope's new vision. Topping the list of exciting new views are colorful multi-wavelength pictures of far- flung galaxies, a densely packed star cluster, an eerie "pillar of creation," and a "butterfly" nebula.

With the release of these images, astronomers have declared Hubble a fully rejuvenated observatory. Sen. Barbara A. Mikulski, D-Md., unveiled the images at NASA Headquarters in Washington, D.C., on Sept. 9, 2009.

With its new imaging camera, Hubble can view galaxies, star clusters, and other objects across a wide swath of the electromagnetic spectrum, from ultraviolet to near-infrared light. A new spectrograph slices across billions of light-years to map the filamentary structure of the universe and trace the distribution of elements that are fundamental to life.

The telescope's new instruments also are more sensitive to light and can observe in ways that are significantly more efficient and require less observing time than previous generations of Hubble instruments.

NASA astronauts installed the new instruments during the space shuttle servicing mission in May 2009. Besides adding the instruments, the astronauts also completed a dizzying list of other chores that included performing unprecedented repairs on two other science instruments.

Now that Hubble has reopened for business, it will tackle a whole range of observations. Looking closer to Earth, such observations will include taking a census of the population of Kuiper Belt objects residing at the fringe of our solar system, witnessing the birth of planets around other stars, and probing the composition and structure of the atmospheres of other worlds.

Peering much farther away, astronomers have ambitious plans to use Hubble to make the deepest-ever portrait of the universe in near-infrared light. The resulting picture may reveal never-before-seen infant galaxies that existed when the universe was less than 500 million years old. Hubble also is now significantly more well-equipped to probe and further characterize the behavior of dark energy, a mysterious and little-understood repulsive force that is pushing the universe apart at an ever-faster rate.

Adapted from materials provided by NASA.

http://www.sciencedaily.com/releases/2009/09/090909103507.htm#

LED Light And Green Tea Cream Smooth Facial Wrinkles

A combination of LED light exposure and green tea extract significantly reduces skin wrinkles (right image) when compared to treatment with LED light alone, scientists are reporting.

ScienceDaily (Sep. 9, 2009) — Scientists in Germany are reporting a major improvement in their potential new treatment for facial wrinkles that could emerge as an alternative to Botox and cosmetic surgery. The non-invasive technique combines high-intensity light from light-emitting diodes (LEDs) and a lotion made of green tea extract. It works ten times faster than a similar anti-wrinkle treatment that uses LEDs alone, the researchers say.

Andrei P. Sommer and Dan Zhu point out that researchers have used light-therapy, or phototherapy, for more than 40 years to help heal wounds. Recently the scientists showed that use of high-intensity LEDs, similar to those used in automotive tail lights and computers, could help reduce skin wrinkles when applied daily for several months. But exposure to intense LED light is also involved in generating high levels of reactive oxygen species as byproducts that can potentially damage cells. To combat that effect, the researchers combined the LED with a potent antioxidant in green tea extract called epigallocatechin gallate.

They applied a daily combination of LED light and green tea extract to the facial wrinkles of a human volunteer one month. The combination treatment resulted in smoother skin, including "less pronounced wrinkle levels, shorter wrinkle valleys, and juvenile complexion," the scientists say. The treatment showed promising results in only one-tenth of the time it took for LED therapy alone to reduce wrinkles. The study could form the basis of "an effective facial rejuvenation program," and lead to a new understanding of the effect reactive oxygen species on cellular aging, they note.

Journal reference:

1. Sommer et al. **Facial Rejuvenation in the Triangle of ROS**. *Crystal Growth & Design*, 2009; 090818163352086 DOI: 10.1021/cg900688g

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

http://www.sciencedaily.com/releases/2009/09/090909103013.htm#

Some Mysteries Of Neonatal Seizures Explained

ScienceDaily (Sep. 9, 2009) — A study led by MassGeneral Hospital for Children (MGHfC) investigators is providing new insight into the mechanism of neonatal seizures, which have features very different from seizures in older children and adults. In their report in the Sept. 10 issue of *Neuron*, the researchers describe finding how neurons in different parts of the brains of newborn mammals respond differently to the neurotransmitter GABA, an observation that may explain why seizure activity in the neonatal brain often does not produce visible convulsions and why the common antiseizure drug phenobarbital can exacerbate the invisible nature of neonatal seizures.

"The incidence of seizures is higher in the newborn period than at any other stage of life," says Kevin Staley, MD, MGHfC chief of Neurology, senior author of the *Neuron* paper. "This is a time of transition when brain cells begin to switch the way they respond to the neurotransmitter GABA, which increases the activity of immature brain cells but decreases the activity of mature cells. Many of our most powerful seizure medicines work by enhancing the action of GABA, but this treatment may backfire for brain cells that have not yet made that transition."

GABA acts by mediating the flow of chloride ions into and out of neurons, and previous research has shown that neurons in structures deep within the developing mammalian brain change the expression of proteins that pump ions in or out of cells at an earlier stage than do neurons in the neocortex, the outer part of the brain that matures last and where seizures originate. The current study was designed to investigate whether the different expression of chloride pumps in specific regions of the brain might explain why newborns often have seizures not accompanied by convulsions.

The researchers first confirmed in newborn mice that chloride levels in deep-brain structures like the thalamus are much lower than cortical levels, a difference that decreases as the animals mature and cortical chloride levels drop. They then showed that GABA inhibits the activity of thalamic neurons but stimulates cortical neurons in neonatal rats, a difference that was enhanced by the induction of seizures.

Treatment with phenobarbital suppressed seizure activity in subcortical structures but not in the neocortex. That finding could explain the suppression of convulsions, which require the passage of seizure signals from the cortex through subcortical structures and out to the muscles, while a cortical seizure persists. Adding the diuretic bumetanide, which blocks the chloride pump responsible for immature neurons' excitatory response to GABA, to phenobarbital treatment successfully suppressed seizure activity in both cortical and subcortical regions.

"Our study provides a logical mechanism for the clinical invisibility of many neonatal seizures, information that may help determine the best way to monitor newborns with brain injuries for seizures and select the best strategies for anticonvulsant treatment," Staley explains. "For example, by blocking the protein responsible for immature brain cells' excitatory response to GABA, bumetanide essentially converts that immature response to a mature response and allows antiseizure medicines to work properly. We are excited to be participating in a trial of bumetanide as an adjunctive treatment of neonatal seizures currently being carried out in collaboration with colleagues at Childrens Hospital Boston and Brigham and Women's Hospital."Staley is the Joseph P. and Rose F. Kennedy Professor of Neurology at Harvard Medical School. Co-first authors of the Neuron paper are Joseph Glykys, MD, PhD, MGHfC, and Volodymyr Dzhala, PhD, MassGeneral Institute for Neurodegenerative Disease (MIND). Additional co-authors are Kishore Kuchibhotla and Brian Bacskai, PhD, MIND; Guoping Fang, PhD, and George Augustine, PhD, Duke University; and Thoma Kuner, PhD, University of Heidelberg, Germany. The study was supported by grants from the National Institute of Health and the Epilepsy Foundation.

Adapted from materials provided by Massachusetts General Hospital, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/09/090909122058.htm#

Electrical Circuit Runs Entirely Off Power In Trees

Electrical engineers Babak Parviz and Brian Otis and undergraduate student Carlton Himes (right to left) demonstrate a circuit that runs entirely off tree power. (Credit: University of Washington)

ScienceDaily (Sep. 9, 2009) — You've heard about flower power. What about tree power? It turns out that it's there, in small but measurable quantities. There's enough power in trees for University of Washington researchers to run an electronic circuit, according to results to be published in an upcoming issue of the Institute of Electrical and Electronics Engineers' *Transactions on Nanotechnology*.

"As far as we know this is the first peer-reviewed paper of someone powering something entirely by sticking electrodes into a tree," said co-author Babak Parviz, a UW associate professor of electrical engineering.

A study last year from the Massachusetts Institute of Technology found that plants generate a voltage of up to 200 millivolts when one electrode is placed in a plant and the other in the surrounding soil. Those researchers have since started a company developing forest sensors that exploit this new power source.

The UW team sought to further academic research in the field of tree power by building circuits to run off that energy. They successfully ran a circuit solely off tree power for the first time.

Co-author Carlton Himes, a UW undergraduate student, spent last summer exploring likely sites. Hooking nails to trees and connecting a voltmeter, he found that bigleaf maples, common on the UW campus, generate a steady voltage of up to a few hundred millivolts.

The UW team next built a device that could run on the available power. Co-author Brian Otis, a UW assistant professor of electrical engineering, led the development of a boost converter, a device that takes a low incoming voltage and stores it to produce a greater output. His team's custom boost converter works for input voltages of as little as 20 millivolts (a millivolt is one-thousandth of a volt), an input voltage lower than any existing such device. It produces an output voltage of 1.1 volts, enough to run low-power sensors.

The UW circuit is built from parts measuring 130 nanometers and it consumes on average just 10 nanowatts of power during operation (a nanowatt is one billionth of a watt).

"Normal electronics are not going to run on the types of voltages and currents that we get out of a tree. But the nanoscale is not just in size, but also in the energy and power consumption," Parviz said.

"As new generations of technology come online," he added, "I think it's warranted to look back at what's doable or what's not doable in terms of a power source."

Despite using special low-power devices, the boost converter and other electronics would spend most of their time in sleep mode in order to conserve energy, creating a complication.

"If everything goes to sleep, the system will never wake up," Otis said.

To solve this problem Otis' team built a clock that runs continuously on 1 nanowatt, about a thousandth the power required to run a wristwatch, and when turned on operates at 350 millivolts, about a quarter the voltage in an AA battery. The low-power clock produces an electrical pulse once every few seconds, allowing a periodic wakeup of the system.

The tree-power phenomenon is different from the popular potato or lemon experiment, in which two different metals react with the food to create an electric potential difference that causes a current to flow.

"We specifically didn't want to confuse this effect with the potato effect, so we used the same metal for both electrodes," Parviz said.

Tree power is unlikely to replace solar power for most applications, Parviz admits. But the system could provide a low-cost option for powering tree sensors that might be used to detect environmental conditions or forest fires. The electronic output could also be used to gauge a tree's health.

"It's not exactly established where these voltages come from. But there seems to be some signaling in trees, similar to what happens in the human body but with slower speed," Parviz said. "I'm interested in applying our results as a way of investigating what the tree is doing. When you go to the doctor, the first thing that they measure is your pulse. We don't really have something similar for trees."

Other co-authors are Eric Carlson and Ryan Ricchiuti of the UW. The research was funded in part by the National Science Foundation.

Adapted from materials provided by University of Washington.

http://www.sciencedaily.com/releases/2009/09/090908151330.htm#

Bacteria Used To Make Radioactive Metals Inert

Judy Wall, a professor of biochemistry at the University of Missouri, is working with bacteria that convert toxic radioactive metal to inert substances.

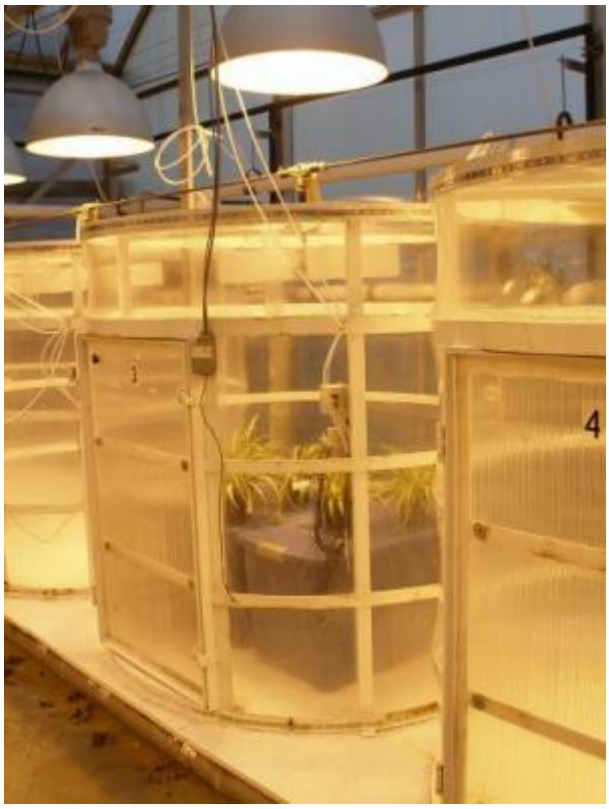
ScienceDaily (Sep. 9, 2009) — The Lost Orphan Mine below the Grand Canyon hasn't produced uranium since the 1960s, but radioactive residue still contaminates the area. Cleaning the region takes an expensive process that is only done in extreme cases, but Judy Wall, a biochemistry professor at the University of Missouri College of Agriculture, Food and Natural Resources, is researching the use of sulfate-reducing bacteria to convert toxic radioactive metal to inert substances, a much more economical solution.The bacteria Wall is studying are bio-corrosives and can change the solubility of heavy metals. They can take uranium and convert it to uraninite, a nearly insoluble substance that will sink to the bottom of a lake or stream. Wall is looking into the bacteria's water cleansing ability and how long the changed material would remain inert.Wall's research could also be beneficial to heavy metal pollution from storage tanks and industrial waste. The bacteria are already present in more than 7,000 heavy metal contaminated sites, but they live in a specific range of oxygen and temperature, making them difficult to control.

"Our research must be done in the absence of air," Wall said. "Obviously, none but the most committed – and stubborn – will work with them."Even if an oxygen-tolerant strain were developed, there are still multiple factors that would make applying the bacteria challenging, and these microbes can contribute to massive iron corrosion."Knowledge of the way bacteria live in the environment, in microbial communities, is still in its infancy," Wall said. "We just don't know a lot about the communication systems among microbes."Wall and researchers from the Lawrence Berkley National Laboratory in California are investigating the bacterium's basic genetics and hope to determine its growth limits and activity in natural settings, including how to make its interactions with metals sustainable. They have already identified a few genes that are critical to converting uranium.Wall's research has been published in Applied and Environmental Microbiology, Nucleic Acids Research and Environmental Microbiology.

Adapted from materials provided by University of Missouri-Columbia, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/09/090908193444.htm#

Houseplants Cut Indoor Ozone



Experimental chambers in a Penn State University greenhouse were equipped with a charcoal filtration air supply system to measure ozone depletion rates.

ScienceDaily (Sep. 9, 2009) — Ozone, the main component of air pollution, or smog, is a highly reactive, colorless gas formed when oxygen reacts with other chemicals. Although ozone pollution is most often associated with outdoor air, the gas also infiltrates indoor environments like homes and offices. Ozone can be released by ordinary copy machines, laser printers, ultraviolet lights, and some electrostatic air purification systems, all of which contribute to increased indoor ozone levels.

Topping the extensive list of toxic effects of ozone on humans are pulmonary edema, hemorrhage, inflammation, and reduction of lung function.

Because people in industrialized countries spend as much of 80% to 90% of their time indoors, indoor air pollution has been ranked as one of the world's greatest public health risks. The United Nations Development Program estimated (1998) that more than two million people die each year due to the presence of toxic indoor air, while other studies estimate that 14 times as many deaths occur globally from poor indoor air quality compared with outdoor air pollution. The economic consequences of polluted indoor air can't be ignored either; one Australian study estimated that the cost of unhealthy indoor air in that country exceeds $12 billion annually, measured in losses of worker productivity, higher medical costs, and increased absenteeism.

As indoor air pollution poses new concerns worldwide, cost effective and easy-to-implement methods are needed to eliminate or reduce ozone concentrations. Activated charcoal filters reduce air pollutants, but installation and maintenance costs can be high. Now, researchers are investigating alternatives—including the use of common houseplants—to improve indoor air quality and health.

A research team from the Pennsylvania State University published the results of a new study of the effects of three common houseplants on indoor ozone levels in a recent issue of the American Society of Horticultural Science's journal *HortTechnology*. The scientists chose snake plant, spider plant, and golden pothos for the experiment because of the plants' popularity (primarily due to their low cost, low maintenance, and rich foliage) and their reported ability to reduce other indoor air pollutants. The plants were studied to determine their effectiveness in reducing ozone concentrations in a simulated indoor environment.

To simulate an indoor environment, the researchers set up chambers in a greenhouse equipped with a charcoal filtration air supply system in which ozone concentrations could be measured and regulated. Ozone was then injected into the chambers, and the chambers were checked every 5 to 6 minutes. The data revealed that ozone depletion rates were higher in the chambers that contained plants than in the control chambers without plants, but there were no differences in effectiveness among the three plants.

"Because indoor air pollution extensively affects developing countries, using plants as a mitigation method could serve as a cost-effective tool in the developing world where expensive pollution mitigation technology may not be economically feasible", concluded the authors.

Journal reference:

1. Papinchak, Heather L., Holcomb, E. Jay, Best, Teodora Orendovici, Decoteau, Dennis R. **Effectiveness of Houseplants in Reducing the Indoor Air Pollutant Ozone**. *HortTechnology*, 2009 19: 286-290 [link]

Adapted from materials provided by American Society for Horticultural Science.

http://www.sciencedaily.com/releases/2009/09/090908103634.htm#

Colleges find juicy titles swell enrollment

Many opt for courses like 'Economics of Sin'

By Peter Schworm, Globe Staff | September 8, 2009

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Boston College German studies professor Michael Resler went searching for a way to boost flagging interest in his "German Literature of the High Middle Ages'' class a few years ago, and settled on the idea of simply giving the course a sexier name. The resulting "Knights, Castles, and Dragons'' nearly tripled enrollment.

Resler then replaced his class on "The Songs of Walter von der Vogelweide,'' a great German lyric poet, with "Passion, Politics, and Poetry in the Middle Ages.'' Again, enrollment swelled.

"I suppose the moral of the story is that we live in an age where everything has to be marketed in order to find a willing audience,'' Resler mused.

As schools compete for students and faculty come under pressure to boost enrollment in their classes, colleges from the University of Massachusetts at Amherst to Wellesley are jazzing up course catalogs to entice a generation of students drawn to the dramatic. This year's offerings include crowd-pleasing topics like massacres, superheroes, and sin.

"The titles are much more playful than before, no doubt about it,'' said Bob Cluss, a biochemistry professor and dean of curriculum at Middlebury College. "I think it has to do with a younger generation of faculty who understand it's an opportunity to catch students' eyes.''

Jessica Holmes, a 38-year-old economics professor at Middlebury, is part of the younger wave. This fall, she will teach Economics of Sin, a titillating title that has sparked sharp interest, with even faculty, staff, and community members looking to audit the class.

“In what other economics class will they have the opportunity to explore pornography, prostitution, crime and punishment, drugs and drug legalization, the sale of human organs, and gambling?’’ Holmes asked.

The trend toward more inventive, provocative course names reflects a broader movement of professors using more creative teaching methods to capture students’ interest, Holmes and other academics say.

“As you can imagine, it is a lot easier to get students to debate the economic arguments for and against the legalization of prostitution than to discuss the latest employment estimates,’’ Holmes said.

In that way, the catchy titles go beyond savvy marketing, a shorthand way to show students raised on text messaging and Facebook that the course has a contemporary edge. They also signal a shift away from stuffy lectures and abstruse textbooks to discussion-based, multimedia classes, and winkingly suggest the class might be entertaining.

“The title is just to be fun because the course is supposed to be,’’ Alice Cheung, a biochemistry professor at UMass-Amherst, said of her forthcoming course, The Light Fantastic: Wonders of Biology Under the Microscope.

As a freshman seminar, the class is designed to be general, and Cheung said an overly scientific name might scare students off.

Cheung isn’t the only UMass-Amherst professor to indulge in a bit of whimsy. Future economists, along with poets and paleontologists, are invited to the freshman seminar Dinosaur Tracks, Communes, Massacres & Poets, and a classics course is dubbed Achilles to Batman: Where are the Heroes?

Not to be outdone, Suffolk University offers freshmen an array of tantalizingly titled seminars, including the sprawling Sacred Hoops, Sneaker Pimps, and Hoop Dreams: Race, Gender, and Consumerism in 20th Century American Basketball.

The professor, Rich Miller, said the course has filled up quickly, and that several students told him it was the intriguing title that grabbed their attention.

“It creates a buzz,’’ he said. “It gives it some street cred.’’

Miller, 40, said that while teaching English 101 is his “bread and butter,’’ the seminar gives him a chance to experiment a bit. Students pick up on that, he said.

While the class takes a serious look at basketball’s cultural influence, Miller said the trendy title has drawn a bit of good-natured derision from his scholarly colleagues.

“You definitely get a little razzing in the hallways,’’ he said.

Yet many professors are following Miller’s lead in hopes of coaxing more students into their classrooms. Students have a lot of options, faculty members say, and a little sparkle doesn’t hurt.

“The dean’s office monitors enrollment, and humanities tend to suffer,’’ said Nicolas de Warren, philosophy professor at Wellesley College who is coteaching The Stars and the Sages: Philosophy and the Cosmos. “With such a rich offering of courses, there’s a kind of competition, and titles that speak immediately to students can make a difference.’’

Naming courses is a delicate craft, de Warren and others say. Ideally, they are catchy but not campy, fun but not frivolous. They can't be overly long, to fit in the course catalog and student transcripts, but still have to convey the gist of the subject matter.

When it came time to name his philosophy seminar last year, Jeffrey Bernstein, an associate professor of philosophy at the College of the Holy Cross, went the highbrow route with Iconoclasm and Theogony: A Tale of Two Transgressions. Like Miller, he got some chuckles, but for the opposite reason. "They all said, 'Students are really going to flock to that one,' '' he recalled with a laugh. Searching for a peppier, pithier tone, he chose Images of Divinity: Limits. This year, he went further, naming a similar course about concepts of divinity Oh God 1: Concepts.

"It's an invitation,'' he said. "And it will allow me to elaborate.'' ■

http://www.boston.com/news/education/higher/articles/2009/09/08/colleges_find_juicy_course_titles_swell_enrollment/?page=full

Infections 'speed memory loss'

Infections outside the brain may speed memory decline in Alzheimer's disease, UK researchers say.

In a study of 222 elderly people with Alzheimer's they found that getting infections in places like the chest or urinary tract could double memory loss.

The Southampton University researchers think this leads to higher levels of an inflammatory protein called tumour necrosis factor (TNF) in the blood.

They say better care to prevent infections is very important.

Cognitive decline

The study published in the journal Neurology followed the Alzheimer's patients for six months.

Between them 110 of the 222 subjects developed a total of 150 infections, in areas such as the chest, stomach and intestines and the urinary tract, which led to the production of TNF proteins.

These are collectively known as acute systemic inflammation events (SIEs).

" **The worse the infection the worse the affect on the memory** "
Professor Clive Holmes, University of Southampton

Subjects with one or more SIEs during the six months follow-up had two times the rate of cognitive decline from their baseline score at the start of the study compared with those who had no SIE.

And those patients who had high baseline levels of TNF and then suffered an SIE over the following six months had a 10 fold increase in the rate of cognitive decline compared to those who were SIE free.

Further work

Professor Clive Holmes at the University of Southampton, who led the research, said they had looked at patients with mild, moderate and severe Alzheimer's disease.

"The worse the infection the worse the affect on the memory, but this is only an association at the moment.

'"One might guess that people with a more rapid rate of cognitive decline are more susceptible to infections or injury, but we found no evidence to suggest that people with more severe dementia were more likely to have infections or injuries at the beginning of the study.

" **It's important that older people, people with dementia and carers treat any infection seriously and seek medical help** "
Dr Susanne Sorensen, Alzheimer's Society

"If further work proves that TNF is causing more brain inflammation it may be possible to use drugs that block TNF to help dementia sufferers."

Professor Holmes said although common illnesses like colds and slight wounds could also set up an inflammatory response in the body, the data from his study did not support the idea that even these could cause memory loss.

Inflammatory processes

Dr Susanne Sorensen, Head of Research, Alzheimer's Society said: "This study is an important step towards understanding the processes that occur during the onset of Alzheimer's disease.

"We know there might be a link between inflammatory processes and Alzheimer's but this is not yet fully understood.

"These findings are helping us to understand more about possible reasons for this link.

"In the meantime it's important that older people, people with dementia and carers treat any infection seriously and seek medical help. "

Rebecca Wood, Chief Executive of the Alzheimer's Research Trust said: "This fascinating study shows that infections and inflammation may be linked to memory loss in Alzheimer's.

"We need to do more research into this and all aspects of the disease to understand its causes."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8241833.stm

Published: 2009/09/07 23:52:10 GMT

Surgical Scrub Solution: Chlorhexidine Bathing Is Cheap And Effective Means Of Protecting Patients From Superbugs

Surgeon washing his hands before an operation. (Credit: iStockphoto)

ScienceDaily (Sep. 8, 2009) — Giving critically ill hospital patients a daily bath with a mild, soapy solution of the same antibacterial agent used by surgeons to "scrub in" before an operation can dramatically cut down, by as much as 73 percent, the number of patients who develop potentially deadly bloodstream infections, according to a new study by patient safety experts at The Johns Hopkins Hospital and five other institutions.

Bloodstream infections, they say, strike as many as one in five patients in hospital intensive care units and up their chances of dying by as much 25 percent. Even when they are not fatal, such infections have been reported to lengthen hospital stays by an average of a full week and add as much as $40,000 in costs.

The new study, described this summer in the June issue of the journal *Critical Care Medicine*, tracked daily neck-to-toe sponge baths with a mild, 4 percent solution of chlorhexidine glutonate, given to 2,650 ICU patients at six different U.S. hospitals. Chlorhexidine glutonate is the same antibacterial agent used by surgeons while scrubbing in for an operation and by dentists as a potent mouthwash to guard against gum disease. Weekly swab testing found 32 percent fewer patients colonized with methicillin-resistant Staphylococcus aureus (MRSA) and 50 percent fewer cases of vancomycin-resistant Enterococci (VRE), when compared to a similar number of ICU patients (2,670) at the same hospitals who were washed with just plain soap and water. MRSA and VRE are the two most common so-called hospital superbugs.

"Doing everything possible to ward of bloodstream infections and halt the spread of these dangerous bacteria is essential to safeguarding our patients' well-being, encouraging their speedy recovery and

sparing valuable hospital resources," says study co-investigator Trish Perl, M.D., director of hospital epidemiology and infection control at Johns Hopkins.

"It's just as important to find the right soap to prevent infection as it is to find the right drug to treat patients who develop an infection," says Perl, a professor of medicine and pathology at the Johns Hopkins University School of Medicine.

"Our results show that using chlorhexidine [glutonate] as a daily washing agent is a simple, effective and relatively cheap way to protect the health of our most vulnerable patients," she adds, noting that various products cost very little. A 320-ounce bottle of the scrub solution costs as little as $6 a bottle, while 15 milliliter packets cost 33 cents each. It is also available as either a solid reddish-colored bar or an even milder baby-wipe type cloth containing a 2 percent chlorhexidine glutonate solution (at a cost of $2.57 for a pack of two.)

Perl says the goal is to "actively remove" bacteria that may be harmful to the patient or other patients in the hospital, people at greater risk of infection because of a weakened immune system or from use of medical devices that may offer a route for bacteria to enter the body.

"Because these bacteria have built up resistance to many of the most common antibiotic drugs used to kill them, our goal is to stop them from infecting patients or from spreading from patient to patient, as we are left with few options for treatment after they colonize and then infect a patient," says Perl, who points out that the chemical's antibacterial effects can last from six to 48 hours, depending on the strength of the solution.

"And altering the daily bathing routine is a simple and effective means of doing so because it involves no additional workload for nurses," she says.

The study showed no skin rashes or adverse events during the test period, between December 2004 and January 2006. Each critically ill patient was tested for infectious bacteria within 48 hours of admission and then weekly thereafter with either nasal or buttock swabs, and for the remainder of their hospital stay.

Among some 500 patients whose stay in hospital was long (at least 10 days), 11 who were washed with chlorhexidine had MRSA and five developed bloodstream infections. By contrast, MRSA was detected in 27 of a similar group who were bathed with plain soap, with eight developing bloodstream infections. Similarly, with VRE, nine patients in the chlorhexidine group had bloodstream infections, while 33 were infected in the plain-soap group.

As part of routine hospital procedures, any patients found to be infected or to be a carrier before infection has set in are placed in isolation for the remainder of their stay. Wound care is done only in designated, confined treatment spaces or separate rooms, and hospital staff must take special precautions between treatments, such as cleaning equipment and furniture with strong disinfectants and wearing disposable gloves, masks and gowns.

Perl says chlorhexidine has been in use since the 1950s, but its practical value had "not been appreciated" until now, citing the chemical's occasional use as a treatment for recurrent pimples as the main reason why the multicenter research team conducted the latest study.

"Our research is particularly important for preventing MRSA and other drug-resistant infections in children," she adds. Her team's previous research in 2007 showed that children admitted to Hopkins are increasingly identified as harboring MRSA or VRE, with four times as many children admitted to the pediatric ICU with MRSA and twice as many with VRE than five years ago.

In 2006, the Joint Commission estimated that 70 percent of the bacteria that cause infections for 2 million hospitalized Americans each year are resistant to at least one of the drugs most commonly used to treat them.

Perl's only caution is the need for long-term monitoring to make sure that hampering the growth of one kind of bacteria -- both S. aureus and Enterococci or so-called gram-positive bacteria -- does not promote the growth of other kinds, specifically, gram-negative bacteria.

Funding for the study was provided by the U.S. Centers for Disease Control and Prevention (CDC). Besides Perl, another Hopkins researcher involved in this survey was Kathleen Speck. Investigators elsewhere included lead investigator Michael Climo, M.D., Jaime Robles, Ph.D., and Edward Wong, M.D., all at the Commonwealth University Medical Center, in Richmond, Va., with Climo and Wong also based at the Hunter Holmes McGuire Veteran Affairs Medical Center, also in Richmond; Kent Sepkowitz, M.D., and Gianna Zuccotti, M.P.H., at Memorial Sloan-Kettering Cancer Center in New York; Victoria Fraser, M.D., and David Warren, M.D., at Washington University School of Medicine in St. Louis, Mo.; and John Jernigan, M.D., at the CDC.

For additional information, please go to:

The Johns Hopkins Hospital's Office of Hospital Epidemiology and Infection Control:
http://www.hopkinsmedicine.org/heic

Adapted from materials provided by Johns Hopkins Medical Institutions.

http://www.sciencedaily.com/releases/2009/09/090904103351.htm#

Prevent Periodontitis To Reduce The Risk Of Head And Neck Cancer

ScienceDaily (Sep. 8, 2009) — Chronic periodontitis, a form of gum disease, is an independent risk factor for head and neck squamous cell carcinoma. This suggests the need for increased efforts to prevent and treat periodontitis as a possible means to reduce the risk of this form of cancer.

"Prevent periodontitis; if you have it already, get treatment and maintain good oral hygiene," said Mine Tezal, D.D.S., Ph.D., assistant professor in the Department of Oral Diagnostic Sciences, School of Dental Medicine, University at Buffalo, and NYS Center of Excellence in Bioinformatics and Life Sciences at the University of Buffalo. She is also a research scientist in the Department of Dentistry and Maxillofacial Prosthetics at Roswell Park Cancer Institute, which is where the study was conducted.

Results of this study are published in *Cancer Epidemiology, Biomarkers & Prevention*, a journal of the American Association for Cancer Research.

Chronic periodontitis is characterized by progressive loss of the bone and soft tissue attachment that surround the teeth. The researchers assessed the role of chronic periodontitis on head and neck squamous cell carcinoma, as well as the individual roles on three subsites: oral cavity, oropharyngeal and laryngeal. They used radiographic measurement of bone loss to measure periodontitis among 463 patients; 207 of whom were controls.

Findings showed that chronic periodontitis might represent a clinical high-risk profile for head and neck squamous cell carcinoma. The strength of the association was greatest in the oral cavity, followed by the oropharynx and larynx, according to Tezal.

When they stratified the relationship by tobacco use, they found that the association persisted in those patients who never used tobacco. The researchers did not expect the periodontitis-head and neck squamous cell carcinoma association to be weaker in current smokers compared to former and never smokers, according to Tezal. However, this interaction, although statistically significant, was not very strong.

"Confirmatory studies with more comprehensive assessment of smoking, such as duration, quantity and patterns of use, as well as smokeless tobacco history are needed," she said.

"Our study also suggests that chronic periodontitis may be associated with poorly differentiated tumor status in the oral cavity. Continuous stimulation of cellular proliferation by chronic inflammation may be responsible for this histological type. However, grading is subjective and we only observed this association in the oral cavity. Therefore, this association may be due to chance and needs further exploration," Tezal added.

Andrew Olshan, Ph.D., said these results lend further support to the potential importance of poor oral health in this form of cancer. Olshan is professor and chair of the Department of Epidemiology at the Gillings School of Global Public Health, and professor in the Department of Otolaryngology/Head and Neck Surgery, School of Medicine, University of North Carolina at Chapel Hill.

"The study of poor oral health including the possible carcinogenic role of microorganisms is part of a rapidly growing interest in how a community of microbes that live in the various environments of the human body can affect health," Olshan said. "Although the study is comparatively small, the researchers were able to also see an association between bone loss and the risk of head and neck cancer."

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

http://www.sciencedaily.com/releases/2009/09/090908023642.htm#

Money Won't Buy Happiness, Study Finds; Poverty-reduction Programs Need To Also Look At Improving People's Well-being

ScienceDaily (Sep. 8, 2009) — There is more to life satisfaction than money, and public policy programs aiming to tackle poverty need to move beyond simply raising people's income to also improving their quality of life in other areas.

These findings by Professor Mariano Rojas from Mexico's Facultad Latinoamericana de Ciencias Sociales are published online in Springer's journal, *Applied Research in Quality of Life*.

The reduction of poverty is one of the main considerations in the design of both domestic and foreign-aid programs. To date, the focus of these programs has been to get people out of poverty by increasing their buying power and there has been an assumption that raising people's income translates into greater well-being. Professor Rojas challenges this assumption and argues that measures of life satisfaction should also be taken into account when designing and evaluating poverty-abatement programs.

Professor Rojas used data from a yearly national survey run by the University of Costa Rica covering the years 2004-2006. In addition to questions about household income and dependency on household income, he added more subjective questions about life satisfaction in general, as well as satisfaction with health, job, family relations, friendship and self, as well as the community environment.

The majority of people rated their lives as satisfactory or more than satisfactory. Not all people who were considered ‘poor' experienced low life satisfaction and not all people who were not considered ‘poor' were happy with their lives. Professor Rojas observed that only 24 percent of people classified as ‘poor' rated their life satisfaction as low. Furthermore, 18 percent of people in the ‘non-poor' category also reported low life satisfaction. It is therefore clear that poverty alone does not define an individual's overall well-being and it is possible for someone to come out of poverty and remain less than satisfied with his life. On the other hand, a person can be satisfied with his life even if his income is low, as long as he is moderately satisfied in other areas of life such as family, self, health, job and economic.

Professor Rojas argues that social programs need to recognize that well-being depends on satisfaction in many domains of life, and that many qualities and attributes need to be considered when designing these programs, including leisure, education, the community and consumer skills (learning to spend higher income sensibly).

Professor Rojas concludes: "This paper has shown that it is possible to jump over the income poverty line with little effect on life satisfaction. Income is not an end but a means to an end. There is a big risk of neglecting and underestimating the importance of well-being-enhancing factors when focusing only on income poverty. It is important to worry about getting people out of income poverty, but it is more beneficial to also worry about the additional skills people need to have a more satisfying life."

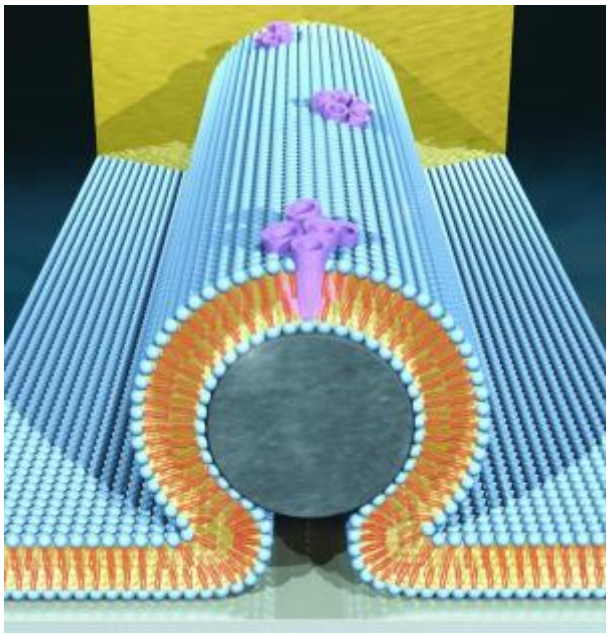
Journal reference:

1. Rojas M. **Enhancing Poverty-Abatement Programs: a Subjective Well-Being Contribution**. *Applied Research in Quality of Life*, 2009; 4 (2): 179 DOI: 10.1007/s11482-009-9071-0

Adapted from materials provided by Springer Science+Business Media, via AlphaGalileo.

http://www.sciencedaily.com/releases/2009/09/090907142345.htm#

Nanoelectronic Transistor Combined With Biological Machine Could Lead To Better Electronics



An artist's representation of a nanobioelectronic device incorporating alamethycin biological pore. In the core of the device is a silicon nanowire (grey), covered with a lipid bilayer (blue). The bilayer incorporates bundles of alamethicin molecules (purple) that form pore channels in the membrane. Transport of protons though these pore channels changes the current through the nanowire. (Credit: Image by Scott Dougherty, LLNL)

ScienceDaily (Sep. 7, 2009) — If artificial devices could be combined with biological machines, laptops and other electronic devices could get a boost in operating efficiency.

Lawrence Livermore National Laboratory researchers have devised a versatile hybrid platform that uses lipid-coated nanowires to build prototype bionanoelectronic devices.

Mingling biological components in electronic circuits could enhance biosensing and diagnostic tools, advance neural prosthetics such as cochlear implants, and could even increase the efficiency of future computers.

While modern communication devices rely on electric fields and currents to carry the flow of information, biological systems are much more complex. They use an arsenal of membrane receptors, channels and pumps to control signal transduction that is unmatched by even the most powerful computers. For example, conversion of sound waves into nerve impulses is a very complicated process, yet the human ear has no trouble performing it.

“Electronic circuits that use these complex biological components could become much more efficient,” said Aleksandr Noy, the LLNL lead scientist on the project.

While earlier research has attempted to integrate biological systems with microelectronics, none have gotten to the point of seamless material-level incorporation.

“But with the creation of even smaller nanomaterials that are comparable to the size of biological molecules, we can integrate the systems at an even more localized level,” Noy said.

To create the bionanoelectronic platform the LLNL team turned to lipid membranes, which are ubiquitous in biological cells. These membranes form a stable, self-healing,and virtually impenetrable barrier to ions and small molecules.

"That's not to mention that these lipid membranes also can house an unlimited number of protein machines that perform a large number of critical recognition, transport and signal transduction functions in the cell," said Nipun Misra, a UC Berkeley graduate student and a co-author on the paper.

Julio Martinez, a UC Davis graduate student and another co-author added: "Besides some preliminary work, using lipid membranes in nanoelectronic devices remains virtually untapped."

The researchers incorporated lipid bilayer membranes into silicon nanowire transistors by covering the nanowire with a continuous lipid bilayer shell that forms a barrier between the nanowire surface and solution species.

"This 'shielded wire' configuration allows us to use membrane pores as the only pathway for the ions to reach the nanowire," Noy said. "This is how we can use the nanowire device to monitor specific transport and also to control the membrane protein."

The team showed that by changing the gate voltage of the device, they can open and close the membrane pore electronically.

The research appears Aug. 10 in the online version of the *Proceedings of the National Academy of Sciences*.

Adapted from materials provided by DOE/Lawrence Livermore National Laboratory.

http://www.sciencedaily.com/releases/2009/08/090811091834.htm#

How To Boost Value Of Alzheimer's-fighting Compounds

The polyphenols found in red wine are thought to help prevent Alzheimer's disease, and new research has shown that some of those compounds in fact reach the brain. (Credit: iStockphoto/Denis Pepin)

ScienceDaily (Sep. 7, 2009) — The polyphenols found in red wine are thought to help prevent Alzheimer's disease, and new research from Purdue University and Mount Sinai School of Medicine has shown that some of those compounds in fact reach the brain.

Mario Ferruzzi, a Purdue associate professor of food science; Connie Weaver, Purdue's head of foods and nutrition; and Elsa Janle, a Purdue associate professor of foods and nutrition, found that the amount of polyphenols from grapeseed extract that can reach a rat's brain is as much as 200 percent higher on the 10th consecutive day of feeding as compared to the first. Many previous experiments, in which absorption was measured after single or sporadic doses, often found very little, if any, of the bioactive polyphenols reaching brain tissues. However, more chronic exposure appears to improve absorption.

"This shows that reasonable and chronic consumption of these products may be the way to go, rather than single, high doses, similar to drugs," said Ferruzzi, who collaborated on the research with Mount Sinai's Dr. Giulio Pasinetti. "It's like eating an apple a day, not a case of apples over two days every month."

A paper detailing the findings was published in the early online version of the September issue of the *Journal of Alzheimer's Disease.*

Polyphenols, compounds found in the skins and seeds of grapes, are thought to prevent the formation of beta-amyloid protein, which creates the plaque in the brain that causes Alzheimer's disease. Alzheimer's is a progressive brain disease that destroys memory and cognitive skills and affects as many as 4.5 million Americans, according to the National Institute on Aging.

Pasinetti, the Aidekman Family Professor in Neurology and director of the Center of Excellence for Novel Approaches to Neurotherapeutics, said discovering how polyphenols are absorbed and distributed

to the brain can impact researchers' understanding of the amount of grape products or red wine a person would need to consume to most effectively combat Alzheimer's disease.

"The most important thing is that when we follow the repetitive administration of this compound, we were able to observe the transfer of the compound to the brain," Pasinetti said. "This may help us figure out the proper concentration necessary to get these chemicals to the brain."

Ferruzzi said the study dealt with polyphenols, but also could be important for determining proper doses of other compounds or drugs for patients. Testing of a pharmaceutical, for example, could show that the drug is too potent when given repetitively; whereas that might not be apparent if the drug is administered on non-consecutive days or weeks.

"It could become important in terms of side effects," Ferruzzi said. "You could be overdosing because the body is adapting and absorbing or metabolizing these compounds differently over time."

Pasinetti is the principal investigator for the Center of Excellence for Research and Complementary and Alternative Medicine in Alzheimer's Disease grant from the National Institutes of Health that funded the work. Ferruzzi said further studies will focus on the mechanisms that control absorption of compounds during chronic consumption.

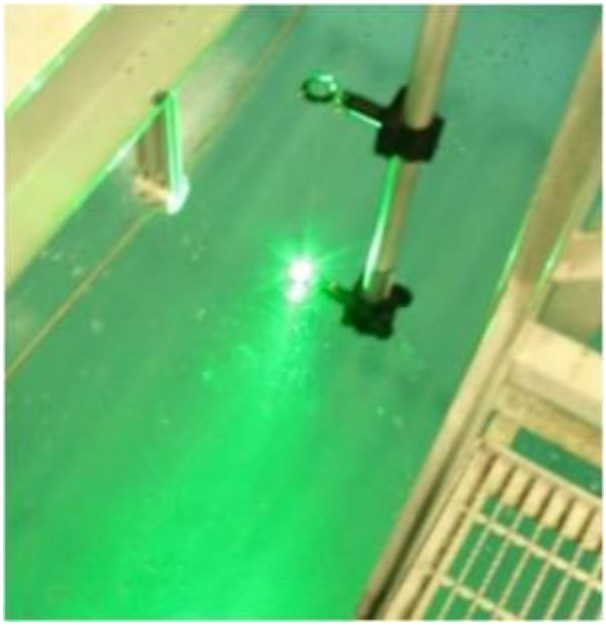
Journal reference:

1. Mario G. Ferruzzi, Jessica K. Lobo, Elsa M. Janle, Naomi Whittaker, Bruce Cooper, James E. Simon, Qing-Li Wu, Cara Welch, Lap Ho, Connie Weaver and Giulio M. Pasinetti. **Bioavailability of Gallic Acid and Catechins from Grape Seed Polyphenol Extract is Improved by Repeated Dosing in Rate: Implications for Treatment in Alzheimer's Disease**. *Journal of Alzheimer's Disease*, September 2009

Adapted from materials provided by Purdue University.

http://www.sciencedaily.com/releases/2009/08/090817143604.htm#

Lasers Generate Underwater Sound: Potential For Naval And Commercial Underwater Acoustic Applications



Scattered light from a 532 nm laser pulse can be seen as it enters the water in the Salt Water Tank Facility, and ionizes a small volume of water for acoustic generation. Air bubblers and controlled water and air temperatures can create ocean-like conditions in the laboratory. (Credit: Image courtesy of Naval Research Laboratory)

ScienceDaily (Sep. 7, 2009) — Scientists at the Naval Research Laboratory are developing a new technology for use in underwater acoustics. The new technology uses flashes of laser light to remotely create underwater sound. The new acoustic source has the potential to expand and improve both Naval and commercial underwater acoustic applications, including undersea communications, navigation, and acoustic imaging.

Dr. Ted Jones, a physicist in the Plasma Physics Division, is leading a team of researchers from the Plasma Physics, Acoustics, and Marine Geosciences Divisions in developing this acoustic source.

Efficient conversion of light into sound can be achieved by concentrating the light sufficiently to ionize a small amount of water, which then absorbs laser energy and superheats. The result is a small explosion of steam, which can generate a 220 decibel pulse of sound. Optical properties of water can be manipulated with very intense laser light to act like a focusing lens, allowing nonlinear self-focusing (NSF) to take place.

In addition, the slightly different colors of the laser, which travel at different speeds in water due to group velocity dispersion (GVD), can be arranged so that the pulse also compresses in time as it travels through water, further concentrating the light. By using a combination of GVD and NSF, controlled underwater compression of optical pulses can be attained.

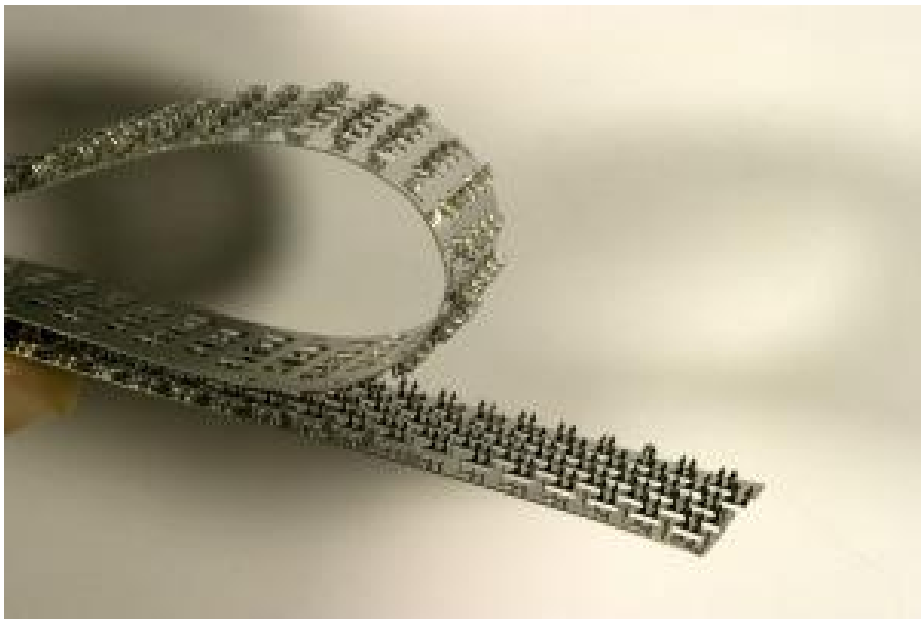
The driving laser pulse has the ability to travel through both air and water, so that a compact laser on either an underwater or airborne platform can be used for remote acoustic generation. Since GVD and NSF effects are much stronger in water than air, a properly tailored laser has the ability to travel many hundreds of meters through air, remaining relatively unchanged, then quickly compress upon entry into the water. Atmospheric laser propagation is useful for applications where airborne lasers produce underwater acoustic signals without any required hardware in the water, such as undersea communications from aircraft.

Also, commercially available, high-repetition-rate pulsed lasers, steered by a rapidly movable mirror, can generate arbitrary arrays of phased acoustic sources. On a compact underwater platform with an acoustic receiver, such a setup can rapidly generate oblique-angle acoustic scattering data, for imaging and identifying underwater objects. This would be a significant addition to traditional direct backscattering acoustic data.

Adapted from materials provided by Naval Research Laboratory.

http://www.sciencedaily.com/releases/2009/09/090904165241.htm#

Metaklett, A Steely Hook And Loop Fastener



A steely hook and loop fastener holds up to 35 tonnes per square meter. (Credit: Image courtesy of Technische Universitaet Muenchen)

ScienceDaily (Sep. 7, 2009) — Hook and loop fasteners have become commonplace features of both industry and households. However, they have one snag: they are too weak for many applications. Hook and loop fasteners made of spring steel have now been developed at the Institute of Metal Forming and Casting of the Technische Universitaet Muenchen. These fasteners are resistant to chemicals and can withstand a tensile load of up to 35 tonnes per square meter at temperatures as high as 800°C.

Over 60 years ago when the Swiss engineer and inventor George de Mestral was painstakingly removing burrs from his dog's coat after a hunting excursion, he stumbled on an ingenious idea. Based on the model he had observed in nature, he constructed a fastener from numerous small hooks and loops, which he subsequently named "velcro." "The unbeatable advantage of a hook and loop fastener is that it is easy to close and open again," explains Josef Mair, a scientist from the Institute of Metal Forming and Casting (utg) at the TU Muenchen. Because of this, the hook and loop principle is put to a very wide range of uses, e.g. as an alternative to shoe laces, to secure medical bandages and prostheses, and for the cable boots used in automotive and aviation electronics.

Unfortunately, standard synthetic hook and loop fasteners are not very resistant to heat and aggressive chemicals. "Things can get very hot, for example, in the automotive sector. A car parked in direct sunlight can reach temperatures of 80 °C, and temperatures of several hundred degrees centigrade can arise around the exhaust manifold. Aggressive disinfectants are used for cleaning purposes in hospitals, and traditional hook, and loop fasteners are too weak for use in the construction of building façades," explains Mair. Under the leadership of Professor Hartmut Hoffmann and as part of a joint project launched in 2005 with the Federal Ministry of Education and Research (BMBF) in close cooperation with partners from industry, the utg has developed a solution to this problem: the result is Metaklett, the hook and loop fastener made of steel.

Temperatures in excess of 800 °C and aggressive chemical solutions do not pose any problem for Metaklett, which also offers adhesive strength of up to 35 tonnes per square meter when tensile force is applied parallel to the fastener surface. When it is applied perpendicular to the fastener surface, Metaklett can still withstand a force of seven tonnes per square meter. Moreover, like a standard Velcro® fastener on a child's shoe, it can be opened and closed again without the help of any tools.

The researchers opted to use spring steel, which unites high ductility with high strength, as the material for their fastener. They created various three-dimensional models for the optimum interlocking of the fastener elements on the computer. They then built the most promising candidates as prototypes and subjected them to comprehensive tests. Around 40 variations of the geometry referred to as "Flamingo" alone were tested on the computer. The researchers studied its adhesive strength and reaction to extreme temperatures to establish the limits of its resilience.

Two of the tested models ultimately made the grade: a spring lock, the Flamingo, and a hook and loop system known as the "Entenknopf" ("duck's head"). Both consist of 0.2-mm-thick hook tape and loop or perforated tape of the same thickness. The "duck's head" model is based on the traditional synthetic hook and loop system. Numerous delicate steel hooks can attach at any angle to the loops in the perforated metal loop tape.

The second variant, the Flamingo, is even more stable. It consists of wider hook elements that snap into the openings in a perforated tape. They are bent in such a way that they deform elastically under light pressure and glide into the holes like the synthetic buckles on backpack straps. Once inserted, they return immediately to their original form and, thanks to their sprung splaying arms, they resist back pull like an expanding rivet.

In order for the hooks to be able to snap into place, they must first, however, be positioned at the correct angle, that is parallel or perpendicular to the perforated tape. Depending on the direction of the applied force, this fastener can withstand a load of 7 to 35 Newtons per square meter. Following an initial loss of around 20 percent during the first ten tests, the adhesive strength remained constant in the numerous repetitions.

"The animal names arose as a way of differentiating between the multifaceted models. The hook forms of the two systems are vaguely reminiscent of a duck's head and a flamingo standing on one leg," explains Mr. Mair. The scientists have also come up with a third alternative, the "hybrid" model which combines a steel hook tape with a synthetic loop tape and is suitable for the secure and reversible fastening of textiles.

Metaklett is basically suitable for use in all areas that require easily opened but stable fasteners, for example air-conditioning and ventilation systems in building services engineering and automotive construction. As the Jury of the German Stahl-Innovationspreis (Steel Innovation Award) noted in its appraisal of the project: "Metaklett is suitable for a wide variety of applications, in which the combination of simple production and a high level of resilience in the fastener is crucial." The metal hook and loop fastener succeeded in overcoming over 100 competing projects on June 30, 2009, to take third place in this award process, which only takes place every three years.

Adapted from materials provided by Technische Universitaet Muenchen.

http://www.sciencedaily.com/releases/2009/09/090903163904.htm#

For Peat's Sake: Alternative Growing Media

These are colorful camellias which were used in the study. (Credit: Photo by Federica Larcher)

ScienceDaily (Sep. 7, 2009) — Peat, or semi-decayed vegetation matter, has been used by commercial growers and amateur gardeners since the middle of the 20th century. Peat is added to potting soil to help retain moisture and provide additional nutrients. As the demand for peat grew, acres of peat bogs were being drained and destroyed.

Now, concerns about the environmental impact of extracting peat from wetlands are mounting. And as peat supplies are reduced, the cost naturally increases. Diminishing supplies and environmental and economical concerns are encouraging researchers to find viable alternatives to this popular growing medium.

A recent research study led by Federica Larcher and Valentina Scariot of the University of Turin's Department of Agronomy evaluated five materials as partial peat substitutes. The results, published in *HortScience*, show these alternatives have potential.

The study focused on growing camellia, a woody plant that prefers acidic soils and is often grown in containers for decorative purposes. Three varieties of camellia ('Charles Cobb's', 'Nuccio's Pearl', and 'Dr. Burnside') were tested using a combination of peat and the following peat alternatives: green compost such as grass clippings and leaves, pumice, coconut husks broken down into fibers, composted coconut "peat", and pine bark. Each variety was also grown using the standard commercial Sphagnum peat as a control.

Plant growth and the ornamental quality of each plant was evaluated during each phase of cultivation, potting, before repotting, before and after branching and at the end of the experiment. "The alternative growing media tested…performed as well or better than the standard substrate," the study reports. However, green compost was the exception. Plants grown in green compost had the lowest evaluations in all categories. Green compost also increased pH levels with negative effects on plants.

The impact of the different growing media seemed to be most notable during the first 2 months. After that time, no relevant differences were noticed. "Overall, coconut fibers and pine bark resulted in being the most suitable partial peat substitutes," stated Larcher, adding that none of the plants grown in any mixture showed signs of malnutrition or toxicity at any point during the study.

Coconut fibers are recommended as the best option considering technical and economic factors. The study recommends that adjusting fertilization and irrigation practices to make the most of coconut fiber and peat mixtures will help reduce the costs and losses for nurseries.

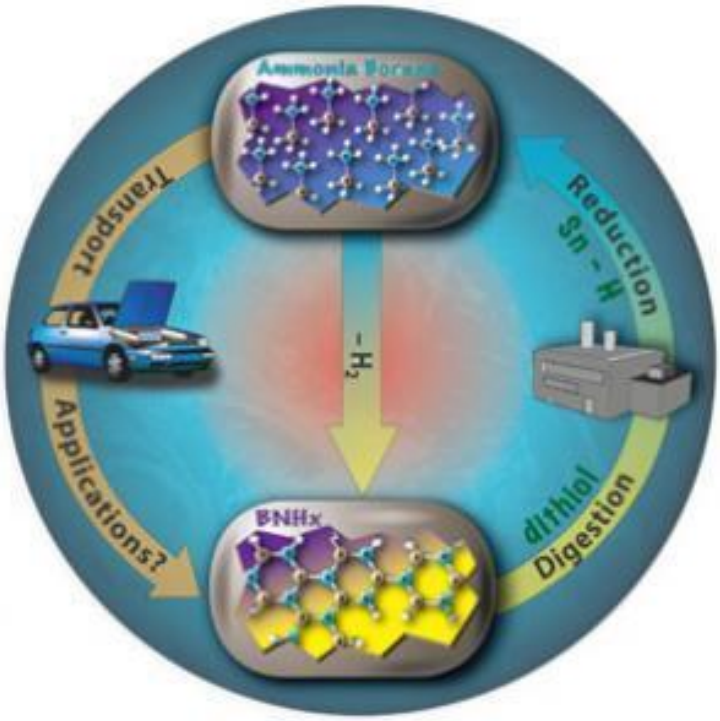
Journal reference:

1. Larcher, Federica, Scariot, Valentina. **Assessment of Partial Peat Substitutes for the Production of Camellia japonica**. *HortScience*, 2009; 44: 312-316 [link]

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

http://www.sciencedaily.com/releases/2009/09/090904165253.htm#

Hydrogen Storage Gets New Hope



Ammonia borane (AB) is a potential hydrogen releasing fuel. In this Los Alamos National Laboratory graphic, the AB would be used on-board the vehicle to run a fuel cell. Once hydrogen is released, the AB could then be regenerated and reused. In the scheme shown, the recycle of dehydrogenated fuel back into AB would take place off-board the vehicle. (Credit: Image courtesy of DOE/Los Alamos National Laboratory)

ScienceDaily (Sep. 7, 2009) — A new method for "recycling" hydrogen-containing fuel materials could open the door to economically viable hydrogen-based vehicles.

In an article appearing in *Angewandte Chemie*, Los Alamos National Laboratory and University of Alabama researchers working within the U.S. Department of Energy's Chemical Hydrogen Storage Center of Excellence describe a significant advance in hydrogen storage science.

Hydrogen is in many ways an ideal fuel for transportation. It is abundant and can be used to run a fuel cell, which is much more efficient than internal combustion engines. Its use in a fuel cell also eliminates the formation of gaseous byproducts that are detrimental to the environment.

For use in transportation, a fuel ideally should be lightweight to maintain overall fuel efficiency and pack a high energy content into a small volume. Unfortunately, under normal conditions, pure hydrogen has a low energy density per unit volume, presenting technical challenges for its use in vehicles capable of travelling 300 miles or more on a single fuel tank—a benchmark target set by DOE.

Consequently, until now, the universe's lightest element has been considered by some as a lightweight in terms of being a viable transportation fuel.

In order to overcome some of the energy density issues associated with pure hydrogen, work within the Chemical Hydrogen Storage Center of Excellence has focused on using a class of materials known as chemical hydrides. Hydrogen can be released from these materials and potentially used to run a fuel cell. These compounds can be thought of as "chemical fuel tanks" because of their hydrogen storage capacity.

Ammonia borane is an attractive example of a chemical hydride because its hydrogen storage capacity approaches a whopping 20 percent by weight. The chief drawback of ammonia borane, however, has been the lack of energy-efficient methods to reintroduce hydrogen back into the spent fuel once it has been released. In other words, until recently, after hydrogen release, ammonia borane couldn't be adequately recycled.

Los Alamos researchers have been working with University of Alabama colleagues on developing methods for the efficient recycling of ammonia borane. The research team made a breakthrough when it discovered that a specific form of dehydrogenated fuel, called polyborazylene, could be recycled with relative ease using modest energy input. This development is a significant step toward using ammonia borane as a possible energy carrier for transportation purposes.

"This research represents a breakthrough in the field of hydrogen storage and has significant practical applications," said Dr. Gene Peterson, leader of the Chemistry Division at Los Alamos. "The chemistry is new and innovative, and the research team is to be commended on this excellent achievement."

The Chemical Hydrogen Storage Center of Excellence is one of three Center efforts funded by DOE. The other two focus on hydrogen sorption technologies and storage in metal hydrides. The Center of Excellence is a collaboration between Los Alamos, Pacific Northwest National Laboratory, and academic and industrial partners.

Referring to the work described in the Angewandte Chemie article, Los Alamos researcher John Gordon, corresponding author for the paper, stated, "Collaboration encouraged by our Center model was responsible for this breakthrough. At the outset there were myriad potential reagents with which to attempt this chemistry."

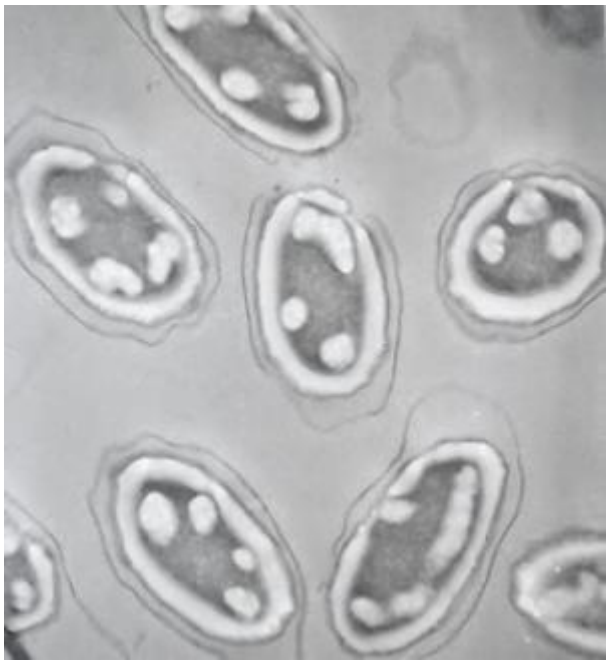
"The predictive calculations carried out by University of Alabama professor Dave Dixon's group were crucial in guiding the experimental work of Los Alamos postdoctoral researcher Ben Davis," Gordon added. "The excellent synergy between these two groups clearly enabled this advance."

The research team currently is working with colleagues at The Dow Chemical Company, another Center partner, to improve overall chemical efficiencies and move toward large-scale implementation of hydrogen-based fuels within the transportation sector.

Adapted from materials provided by DOE/Los Alamos National Laboratory.

http://www.sciencedaily.com/releases/2009/09/090901143317.htm#

Scientists Move Closer To A Safer Anthrax Vaccine



Electron microscope image of Bacillus anthracis. (Credit: Image courtesy of Albert Einstein College of Medicine)

ScienceDaily (Sep. 7, 2009) — Researchers at Albert Einstein College of Medicine of Yeshiva University have identified two small protein fragments that could be developed into an anthrax vaccine that may cause fewer side effects than the current vaccine.

The research is significant because anthrax is considered a major bioterrorism threat. The current anthrax vaccine is intended mainly for members of the armed forces serving in areas considered high risk and for individuals involved in homeland biosecurity.

"Our research was motivated by the fact that the current anthrax vaccine has significant limitations and there is great need for a better one," says lead author Nareen Abboud, Ph.D., an Einstein postdoctoral fellow and lead author of the study, which appears in the current issue of The Journal of Biological Chemistry. The study's senior author is Arturo Casadevall, M.D., Ph.D., Leo and Julia Forchheimer Professor and chairman of microbiology & immunology.

Anthrax, a disease caused by the bacterial species Bacillus anthracis, occurs when anthrax spores (the microbe's dormant stage) are inhaled, ingested or enter the body through an open wound. Anthrax is a common disease among grazing animals such as cows, goats, and sheep but can also result from bioterrorism.

"Our research was motivated by the fact that the current anthrax vaccine has significant limitations and there is a great need for a better one."

Nareen Abboud, Ph.D.Eighty to 90 percent of people infected through inhalation will die if not treated, according to the U.S. Department of Health and Human Services. In 2001, five people died after inhaling anthrax spores contained in envelopes mailed to U.S. lawmakers and media personnel. Typical treatment post-exposure includes the antibiotics ciprofloxacin, doxycycline and penicillin.

Anthrax results in part from toxic proteins, or toxins, that the multiplying bacteria secrete. The current anthrax vaccine employs one of these proteins, which elicits protective antibodies when injected into people.

While this 40-year-old vaccine can prevent disease, it has significant drawbacks. Immunity is temporary, and five injections over the course of 18 months are needed to sustain it. One in five vaccine recipients develop redness, swelling or pain at the injection site, and a small number develop severe allergic reactions. A recent article in the journal Clinical Infectious Diseases states that nearly seven million doses of the anthrax vaccine were administered to more than 1.8 million Americans between 1998 and 2008.

In their study, the Einstein scientists focused on the protein toxin used in the current vaccine, looking for the smallest protein sections (known as peptides) that could trigger the production of protective antibodies when injected into animals.

spores at a magnification of 54,000.The researchers injected the current vaccine into mice and recovered six different "pure" strains of antibodies known as monoclonal antibodies. They then mixed each type of antibody with the 145 peptides formed by chopping up the vaccine protein. The researchers looked for peptides that were "recognized by" (became bound to) an antibody — an indication that those particular peptides might themselves be able to stimulate the production of protective antibodies on their own.

Ultimately, the researchers found that two of the 145 peptides fit the bill: Each peptide elicited antibodies when injected into mice, and these antibodies protected macrophages from death that would normally have occurred when the macrophages were exposed to anthrax toxin. (Macrophages are protective white blood cells involved in the body's immune response to foreign invaders.) The next step in the Einstein research will be to inject the peptides into an animal model to see if the peptides can protect against anthrax infection.

"An ideal anthrax vaccine contains only the proteins needed to provide protection against disease, and none of the extraneous protein material that triggers the adverse reactions caused by the current vaccine," says Dr. Abboud. "We're hopeful that the two peptides that we have identified in this study can offer these benefits."

The simple structure of these peptides — one is only five amino acids in length, the other six — means it should be easy to synthesize the peptides and inexpensive to produce a vaccine containing them, Dr. Abboud notes.

Einstein will be applying for a patent for the use of the two peptides in an anthrax vaccine.

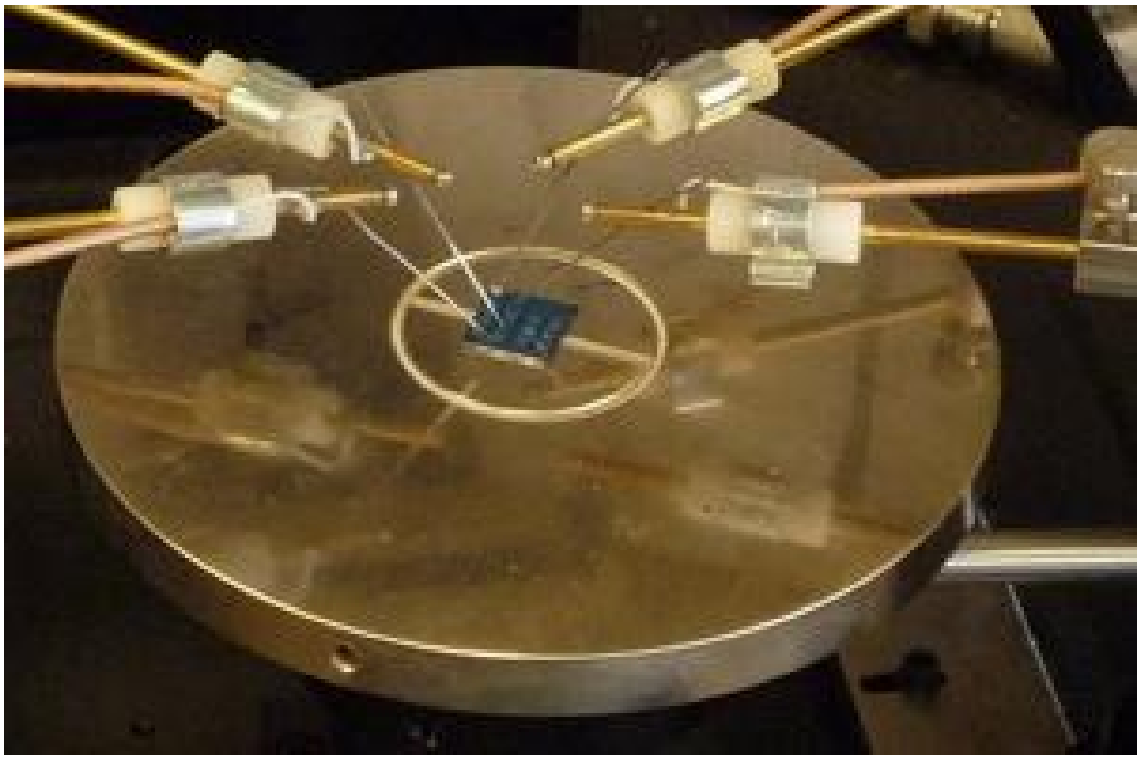
Journal reference:

1. Abboud et al. **Identification of Linear Epitopes in Bacillus anthracis Protective Antigen Bound by Neutralizing Antibodies**. *Journal of Biological Chemistry*, 2009; 284 (37): 25077 DOI: 10.1074/jbc.M109.022061

Adapted from materials provided by Albert Einstein College of Medicine.

http://www.sciencedaily.com/releases/2009/09/090904103342.htm#

Organic Electronics A Two-way Street, Thanks To New Plastic Semiconductor



The organic circuit developed at the University of Washington that transmits positive and negative charges. Here it is undergoing a test. (Credit: Image courtesy of University of Washington)

ScienceDaily (Sep. 7, 2009) — Plastic that conducts electricity holds promise for cheaper, thinner and more flexible electronics. This technology is already available in some gadgets -- the new Sony walkman that was introduced earlier this summer and the Microsoft Zune HD music player released last week both incorporate organic light-emitting electronic displays.

Until now, however, circuits built with organic materials have allowed only one type of charge to move through them. New research from the University of Washington makes charges flow both ways. The cover article in an upcoming issue of the journal Advanced Materials describes an approach to organic electronics that allows transport of both positive and negative charges.

"The organic semiconductors developed over the past 20 years have one important drawback. It's very difficult to get electrons to move through," said lead author Samson Jenekhe, a UW professor of chemical engineering. "By now having polymer semiconductors that can transmit both positive and negative charges, it broadens the available approaches. This would certainly change the way we do things."

Co-authors are Felix Kim, a doctoral student working with Jenekhe, and graduate student Xugang Guo and assistant professor Mark Watson at the University of Kentucky. The research was funded by the National Science Foundation, the Department of Energy and the Ford Foundation.

Silicon Valley got its name for a reason: Silicon is the "workhorse" of today's electronics industry, Jenekhe said. Silicon is fairly expensive and requires costly manufacturing, however, and because its rigid crystal form does not allow flexible devices.

About 30 years ago it was discovered that some plastics, or polymers, can conduct electricity. Since then researchers have been working to make them more efficient. Organic, or carbon-based, electronics are now used in such things as laptop computers, car audio systems and mp3 players.

A major drawback with existing organic semiconductors is most transmit only positive charges (called "holes" because the moving areas of positive charge are actually places where an electron is missing). In the last decade a few organic materials have been developed that can transport only electrons. But making a working organic circuit has meant carefully layering two complicated patterns on top of one another, one that transports electrons and another one that transports holes.

"Because current organic semiconductors have this limitation, the way they're currently used has to compensate for that, which has led to all kinds of complex processes and complications," Jenekhe said.

For more than a decade Jenekhe's lab has been a leader in developing organic semiconductors that can transmit electrons. Over the past few years the group has created polymers with a donor and an acceptor part, and carefully adjusted the strength of each one. In collaboration with Watson's lab, they have now developed an organic molecule that works to transport both positive and negative charges.

"What we have shown in this paper is that you don't have to use two separate organic semiconductors," Jenekhe said. "You can use one material to create electronic circuits."

The material would allow organic transistors and other information-processing devices to be built more simply, in a way that is more similar to how inorganic circuits are now made.

The group used the new material to build a transistor designed in the same way as a silicon model and the results show that both electrons and holes move through the device quickly.

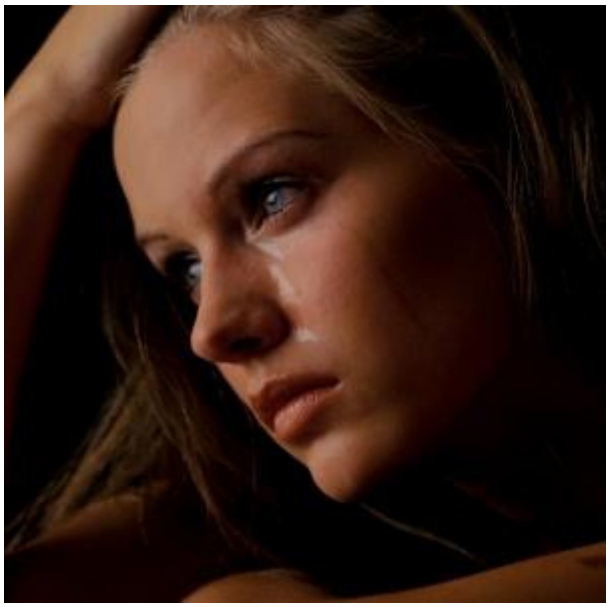
The results represent the best performance ever seen in a single-component organic polymer semiconductor, Jenekhe said. Electrons moved five to eight times faster through the UW device than in any other such polymer transistor. A circuit, which consists of two or more integrated devices, generated a voltage gain two to five times greater than previously seen in a polymer circuit.

"We expect people to use this approach," Jenekhe said. "We've opened the way for people to know how to do it."

Adapted from materials provided by University of Washington.

http://www.sciencedaily.com/releases/2009/08/090817143606.htm#

Why Cry? Evolutionary Biologists Show Crying Can Strengthen Relationships



Medically, crying is known to be a symptom of physical pain or stress. But now an evolutionary biologist looks to empirical evidence showing that tears have emotional benefits and can make interpersonal relationships stronger. (Credit: iStockphoto)

ScienceDaily (Sep. 7, 2009) — Medically, crying is known to be a symptom of physical pain or stress. But now a Tel Aviv University evolutionary biologist looks to empirical evidence showing that tears have emotional benefits and can make interpersonal relationships stronger.

New analysis by Dr. Oren Hasson of TAU's Department of Zoology shows that tears still signal physiological distress, but they also function as an evolution-based mechanism to bring people closer together.

"Crying is a highly evolved behavior," explains Dr. Hasson. "Tears give clues and reliable information about submission, needs and social attachments between one another. My research is trying to answer what the evolutionary reasons are for having emotional tears.

"My analysis suggests that by blurring vision, tears lower defences and reliably function as signals of submission, a cry for help, and even in a mutual display of attachment and as a group display of cohesion," he reports.

His research, published recently in *Evolutionary Psychology*, investigates the different kinds of tears we shed — tears of joy, sadness and grief — as well as the authenticity or sincerity of the tears. Crying, Dr. Hasson says, has unique benefits among friends and others in our various communities.

For crying out loud (and behind closed doors)

Approaching the topic with the deductive tools of an evolutionary biologist, Dr. Hasson investigated the use of tears in various emotional and social circumstances. Tears are used to elicit mercy from an antagonistic enemy, he claims. They are also useful in eliciting the sympathy — and perhaps more importantly the strategic assistance — of people who were not part of the enemy group.

"This is strictly human," reasons Dr. Hasson. "Emotional tears also signal appeasement, a need for attachment in times of grief, and a validation of emotions among family, friends and members of a group."

Crying enhances attachments and friendships, says Dr. Hasson, but taboos are still there in certain cases. In some cultures, societies or circumstances, the expression of emotions is received as a weakness and the production of tears is suppressed. For example, it is rarely acceptable to cry in front of your boss at work — especially if you are a man, he says.

Streets awash with tears?

Multiple studies across cultures show that crying helps us bond with our families, loved ones and allies, Dr. Hasson says. By blurring vision, tears reliably signal your vulnerability and that you love someone, a good evolutionary strategy to emotionally bind people closer to you.

"Of course," Dr. Hasson adds, "the efficacy of this evolutionary behavior always depends on who you're with when you cry those buckets of tears, and it probably won't be effective in places, like at work, when emotions should be hidden."

Dr. Hasson, a marriage therapist, uses his conclusions in his clinic. "It is important to legitimize emotional tears in relationships," he says. "Too often, women who cry feel ashamed, silly or weak, when in reality they are simply connected with their feelings, and want sympathy and hugs from their partners."

Adapted from materials provided by Tel Aviv University.

http://www.sciencedaily.com/releases/2009/08/090824141045.htm#

Molecular Decay Of Enamel-specific Gene In Toothless Mammals Supports Theory Of Evolution

Extinct baleen whales, such as Aetiocetus weltoni (top; ~25 million years old) possessed teeth with enamel. Living baleen whales (bottom) lack teeth and feed on minute organisms with their brush-like baleen filters. Despite the absence of teeth, modern baleen whales retain copies of tooth-specific genes, such as enamelin, in their genomes; these unnecessary genes, which were inherited from toothed ancestors, show evidence of mutational decay, as predicted by evolutionary theory.

ScienceDaily (Sep. 7, 2009) — Biologists at the University of California, Riverside report new evidence for evolutionary change recorded in both the fossil record and the genomes (or genetic blueprints) of living organisms, providing fresh support for Charles Darwin's theory of evolution.

The researchers were able to correlate the progressive loss of enamel in the fossil record with a simultaneous molecular decay of a gene, called the enamelin gene, that is involved in enamel formation in mammals.

Enamel is the hardest substance in the vertebrate body, and most mammals have teeth capped with it.

Examples exist, however, of mammals without mineralized teeth (e.g., baleen whales, anteaters, pangolins) and of mammals with teeth that lack enamel (e.g., sloths, aardvarks, and pygmy sperm whales). Further, the fossil record documents when enamel was lost in these lineages.

"The fossil record is almost entirely limited to hard tissues such as bones and teeth," said Mark Springer, a professor of biology, who led the study. "Given this limitation, there are very few opportunities to examine the co-evolution of genes in the genome of living organisms and morphological features preserved in the fossil record."

In 2007, Springer, along with Robert Meredith and John Gatesy in the Department of Biology at UC Riverside, initiated a study of enamelless mammals in which the researchers focused on the enamelin gene. They predicted that these species would have copies of the gene that codes for the tooth-specific enamelin protein, but this gene would show evidence of molecular decay in these species.

"Mammals without enamel are descended from ancestral forms that had teeth with enamel," Springer said. "We predicted that enamel-specific genes such as enamelin would show evidence in living organisms of molecular decay because these genes are vestigial and no longer necessary for survival."

Now his lab has found evidence of such molecular "cavities" in the genomes of living organisms. Using modern gene sequencing technology, Meredith discovered mutations in the enamelin gene that disrupt how the enamelin protein is coded, resulting in obliteration of the genetic blueprint for the enamelin protein.

Results of the study appear in the Sept. 4 issue of the open-access journal *PLoS Genetics.*

Darwin argued that all organisms are descended from one or a few organisms and that natural selection drives evolutionary change. The fossil record demonstrates that the first mammals had teeth with enamel. Mammals without enamel therefore must have descended from mammals with enamel-covered teeth.

"We could therefore predict that nonfunctional vestiges of the genes that code for enamel should be found in mammals that lack enamel," Springer said. "When we made our predictions, however, we did not have sequences for the enamelin gene in toothless and enamelless mammals. Since then my lab worked on obtaining these sequences so we could test our prediction."

Previous studies in evolutionary biology have provided only limited evidence linking morphological degeneration in the fossil record to molecular decay in the genome. The study led by Springer takes advantage of the hardness of enamel and teeth to provide more robust evidence for the linkage.

"The molecular counterpart to vestigial organs is pseudogenes that are descended from formerly functional genes," Springer explained. "In our research we clearly see the parallel evolution of enamel loss in the fossil record and the molecular decay of the enamelin gene into a pseudogene in representatives of four different orders of mammals that have lost enamel."

Broadly, the research involved the following steps: First, Meredith collected the DNA sequences for the enamelin gene in different mammals. Next, the researchers analyzed sequences using a variety of molecular evolutionary methods, including new approaches developed by Springer's group. Finally, the group used the results of their analyses to test previous hypotheses and generate new ones.

"Currently, we are actively engaged in deciphering the evolutionary history of other genes that are involved in enamel formation," Springer said.

Authors of the study are Springer; Meredith, a postdoctoral scholar in Springer's lab; Gatesy, an associate professor of biology; William Murphy of Texas A&M University; and Oliver Ryder of the San Diego Zoo's Institute for Conservation Research, Calif. Meredith, the first author of the research paper, performed all the lab work and, under guidance from Springer and Gatesy, ran most of the computer analyses.

The research was supported in part by an Assembling the Tree of Life grant to Springer and Gatesy from the National Science Foundation.

Adapted from materials provided by University of California - Riverside.

http://www.sciencedaily.com/releases/2009/09/090904071650.htm#

Natural Compounds, Chemotherapeutic Drugs May Become Partners In Cancer Therapy

New research shows that chlorophyllin -- a water-soluble derivative of chlorophyll, the green pigment found in most plants -- may be 10 times more potent at killing colon cancer cells than hydroxyurea, a chemotherapeutic drug commonly used in cancer treatment. (Credit: iStockphoto/Aleksandar Milosevic)

ScienceDaily (Sep. 7, 2009) — Research in the Linus Pauling Institute at Oregon State University suggests that some natural food compounds, which previously have been studied for their ability to prevent cancer, may be able to play a more significant role in treating it – working side-by-side with the conventional drugs that are now used in chemotherapy.

A new study just published in the International *Journal of Cancer* examined the activity of chlorophyllin and found that, on a dose-by-dose basis, it was 10 times more potent at causing death of colon cancer cells than hydroxyurea, a chemotherapeutic drug commonly used in cancer treatment.

Beyond that, chlorophyllin kills cancer cells by blocking the same phase of cellular division that hydroxyurea does, but by a different mechanism. This suggests that it – and possibly other "cocktails" of natural products – might be developed to have a synergistic effect with conventional cancer drugs, helping them to work better or require less toxic dosages, researchers said.

"We conclude that chlorophyllin has the potential to be effective in the clinical setting, when used alone or in combination with currently available cancer therapeutic agents," the researchers wrote in their study.

The concept of combining conventional or new cancer drugs with natural compounds that have been shown to have anti-cancer properties is very promising, said Rod Dashwood, professor and director of the Cancer Chemoprotection Program in the Linus Pauling Institute.

"Most chemotherapeutic approaches to cancer try to target cancer cells specifically and do something that slows or stops their cell growth process," Dashwood said. "We're now identifying such mechanisms of action for natural compounds, including dietary agents. With further research we may be able to make the two approaches work together to enhance the effectiveness of cancer therapies."

Chlorophyllin is a water-soluble derivative of chlorophyll – the green pigment found in most plants and many food products that makes possible the process of photosynthesis and plant growth from the sun's energy. Chlorophyllin is inexpensive, and animal studies plus human clinical data suggest that it can be ingested at relatively high levels without toxicity.

In the new study, researchers found that pharmacologic doses of chlorophyllin caused colon cancer cells to spend more time than normal in their "synthesis phase" in which DNA is duplicated. Timing is critical to the various phases of cell growth, researchers said, and this disruption started a process that ultimately led to cell death, the study found.

In particular, the presence of high levels of chlorophyllin caused a major reduction in the level of ribonucleotide reductase, an enzyme critical to DNA synthesis, researchers found. This is also the mechanism of action of hydroxyurea, one drug already being used for cancer chemotherapy.

"In cancer research right now there's interest in approaches that can reduce ribonucleotide reductase," Dashwood said. "At the doses used in our experiments, chlorophyllin almost completely stops the activity of this enzyme."

Further research is needed both in laboratory and animal studies, with combinations of chlorophyllin and existing cancer drugs, before it would be appropriate for human trials, Dashwood said. Chlorophyllin, in general, is poorly absorbed from the human gastrointestinal tract, so it's unclear what levels might be needed for therapeutic purposes or how well they would work.

Other dietary agents also might have similar potential. Work just published by LPI researchers in the journals Carcinogenesis and Cancer Prevention Research explored the role of organic selenium compounds in killing human prostate and colon cancer cells. Colorectal and prostate cancers are consistently among the leading causes of cancer mortality in the United States, and will account respectively for 18 percent and 9 percent of all cancer deaths in 2009, according to estimates from the American Cancer Society.

In the recent studies, a form of organic selenium found naturally in garlic and Brazil nuts was converted in cancer cells to metabolites that acted as "HDAC inhibitors" – a promising field of research in which silenced tumor suppressor genes are re-activated, triggering cancer cell death.

"Whether it's HDAC inhibition leading to one manner of cancer cell growth arrest, or loss of ribonucleotide reductase activity leading to another, as seen with chlorophyllin, there's significant promise in the use of natural products for combined cancer therapies," Dashwood said. "These are areas that merit continued research."

These studies were supported by the National Cancer Institute and the National Institute of Environmental Health Sciences. Other collaborators included researchers from the New York Medical College and the Penn State College of Medicine. Further information on chlorophylls and selenium compounds can be found on the web at: http://lpi.oregonstate.edu/infocenter

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Adapted from materials provided by Oregon State University.

http://www.sciencedaily.com/releases/2009/08/090831130808.htm#

Humans Causing Erosion Comparable To World's Largest Rivers And Glaciers, Study Finds

A formerly agricultural area that has had its topsoil eroded away. Researchers found large-scale farming eroded lowland agricultural fields at rates comparable to glaciers and rivers in the most tectonically active mountain belts. (Credit: iStockphoto)

ScienceDaily (Sep. 7, 2009) — A new study finds that large-scale farming projects can erode the Earth's surface at rates comparable to those of the world's largest rivers and glaciers.

Published online in the journal *Nature Geoscience,* the research offers stark evidence of how humans are reshaping the planet. It also finds that - contrary to previous scholarship - rivers are as powerful as glaciers at eroding landscapes.

"Our initial goal was to investigate the scientific claim that rivers are less erosive than glaciers," says Michele Koppes, a professor of geography at the University of British Columbia (UBC) and lead author of the study.

"But while exploring that, we found that many of the areas currently experiencing the highest rates of erosion are being caused by climate change and human activity such as modern agriculture," says Koppes, who conducted the study with David Montgomery of the University of Washington.

In some cases, the researchers found large-scale farming eroded lowland agricultural fields at rates comparable to glaciers and rivers in the most tectonically active mountain belts.

"This study shows that humans are playing a significant role in speeding erosion in low lying areas," says Koppes. "These low-altitude areas do not have the same rate of tectonic uplift, so the land is being denuded at an unsustainable rate."

Koppes says other significant causes of low-altitude erosion include glacier melting caused by climate change and volcanic eruptions.

The highest erosion rates have typically been seen at high altitudes where tectonic forces pit rising rock against rivers and glaciers, says Koppes, who with Montgomery created with an updated database of erosion rates for more than 900 rivers and glaciers worldwide, documented over the past decade with new geologic measuring techniques.

Contrary to previous scholarship, they found that rivers and glaciers in active mountain ranges are both capable of eroding landscapes by more than one centimetre per year. Studies had previously indicated that glaciers could erode landscapes as much as 10 times faster than rivers, Koppes says.

Journal reference:

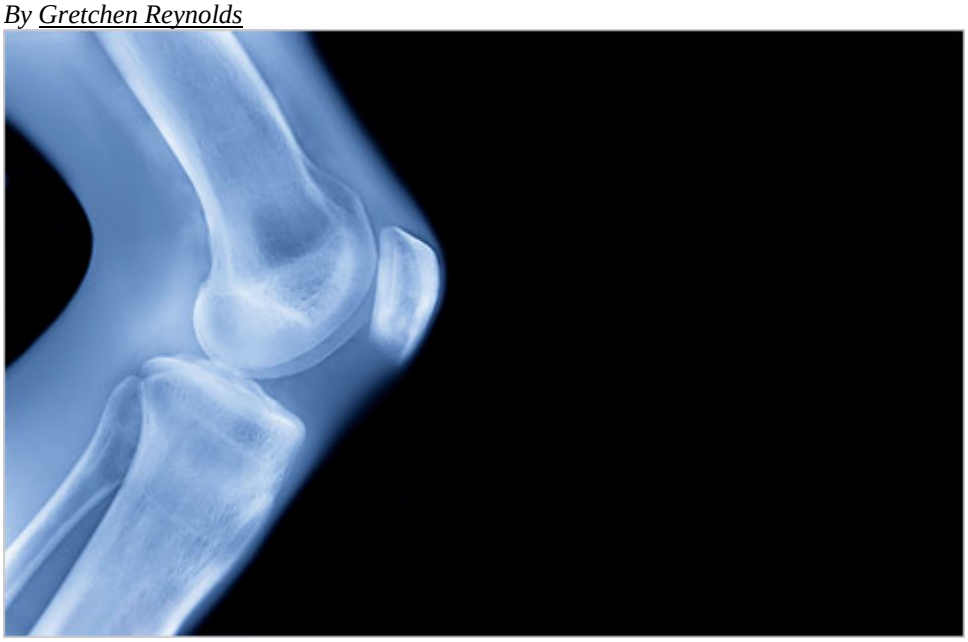
1. Koppes et al. **The relative efficacy of fluvial and glacial erosion over modern to orogenic timescales**. *Nature Geoscience*, 2009; 2 (9): 644 DOI: 10.1038/ngeo616

Adapted from materials provided by University of British Columbia.

http://www.sciencedaily.com/releases/2009/09/090902112105.htm#

Phys Ed: Preventing ACL Injuries in Girls

By Gretchen Reynolds



Peter Dazeley/Getty Images

Earlier this year, researchers at Cincinnati Children's Hospital published the most detailed and revealing case study to date of an anterior cruciate ligament rupture waiting to happen in a young girl. The study grew out of the researchers' ongoing, large-scale examination of ACL-tear risk factors, which had enrolled hundreds of young, female athletes, measured and monitored them, and assigned some to prevention training programs. The girl in the case report hadn't received training. She was 11 when she joined the study, a small, skinny, prepubescent basketball player. Each year, the researchers noted her height, weight, joint looseness, muscle strength, and biomechanics, using sophisticated motion-capture technology to study how she leaped and landed. At each session, as might have been expected, she'd lengthened, developing coltish legs and a slight but noticeable tendency to wobble and land knock-kneed when she hopped off of a box.

At age 14, charging down the line during a game, she felt her knee pop and collapse. Her ACL had ripped. ACL tears, especially in young female athletes, have hardly lacked for notice in recent years, including in this newspaper.

Scientists have argued about the injury's causes and best treatments. Different exercise programs have aimed at prevention. But despite the attention and training, "the incidence of ACL tears hasn't been declining," says Scott McLean, PhD, assistant professor in the School of Kinesiology at the University of Michigan and a member of Michigan's Bone and Joint Injury Prevention and Rehabilitation Center.

In part, he and many other researchers agree, this is because no scientist yet has pinned down just what causes most ACL injuries. There are theories, including the possibility that women's knee anatomy is to blame. "Orthopedic surgeons insist that the problem is the 'Q' angle at women's knees," says Timothy Hewett, PhD, a professor of pediatrics and orthopedic surgery at the University of Cincinnati and the Cincinnati Children's Hospital and the lead investigator of the girl's case study. "They think the problem begins because women's hips are wider" than men's. Other researchers have looked at the role of female hormones on tendon looseness in the knee.

But in the past few months, and just in time for the start of fall sports seasons, several new studies have been published that look at ACL tears in novel and provocative ways, focusing not just on the

structure of the knee but on the role of the rest of the body. Perhaps the most ambitious was led, like the case report, by Hewett and colleagues at Cincinnati Children's Hospital. They solicited videos from surgeons and coaches showing the exact moment when athletes, male and female, suffered an ACL tear. They also gathered videos of female basketball players performing similar movements — foot plants, pivots, and so on — without tearing their ACLs. Using computer software, they marked and triangulated exactly how the athletes were positioned. What they found, according to the results made available online in April in the British Journal of Sports Medicine, was that young women whose ACLs had popped exhibited more trunk sway than the men or the uninjured women; when they landed, or planted a knee to switch directions, their upper bodies wobbled to one side. This placed great pressure on their planted knee, collapsing it inward and overloading the ACL. "Our research suggests that the issue in injured female athletes," Hewett says, "is a lack of high-level ability to control deceleration and acceleration at the center of their mass in three-dimensional space."

In other words, they don't adequately steady their upper bodies as they move. Typically, he says, the problem blossoms in puberty. "Prepubescent athletes move alike, boys and girls," Hewett says. But then, although maturing girls sprout in height, they add comparatively little strength, unlike boys. "Their center of mass moves higher and they add weight, but not the power to control it," he says. They've primed themselves for knee damage.

Happily, if Hewett's theory holds, they can train away some of that risk. Specific exercise programs that target strength and balance or proprioceptive deficiencies could "reduce female athletes' risks until they're almost comparable" to the risks for male athletes, Hewett says. Parents and coaches can begin with a few, simple, at-home diagnostics to find girls who are most at risk, he says. Set up a foot-high box. Have the athlete stand on it and hop down lightly, then immediately leap straight up as high as she can and land back on the ground. Watch closely or videotape her. Did her knees move toward each other as she landed the first time? Did they seem to collapse inward as she exploded back up? Did she lean forward or to the side as she landed back on the ground? Those are each probable hallmarks of high risk, Hewett says.

Hewett hopes to have more support for his theory after he tabulates the results of an ongoing intervention he's begun among schoolchildren in Kentucky. Some of the participants are being taught how to balance and control their midsections with exercises that concentrate on core muscle stability, one-leg balance training, and so on. Others are participating in a more-standard, ACL-injury-prevention program of strength and speed training. "We think that the group" receiving trunk management instruction "will have fewer ACL injuries," he says. The final tallies won't be available for several years, however.

In the meantime, McLean, at the University of Michigan wonders whether all of the current theories about ACL injuries in girls are reductionist. For a study made available online in May in the journal The Knee, he attached ACL-damaged knees from male and female cadavers to a machine that applied loads similar to those experienced during various athletic movements and found that, "really, no two knees respond alike," he says. Some ACLs from male cadavers readily tore; some from women held fast under every tension. "I think we need to move away from this tight focus on gender-based and rather generic risk factors," he says, "and start finding ways to make our recommendations specific to each person." At his lab, he tests boys and girls, beginning at age ten, on measures of strength, balance, bodily proprioception, and so on. "The ideal situation," he says, "is for parents to bring young athletes to a lab, run them through the tests, and send them home with a personalized prescription for how to reduce their individual risk."

Since that's not practical for most young athletes outside of university towns, he agrees that some basic principles make sense, and are in line with Hewett's prescriptions. "Teach kids, boys and girls, to land softly," McLean says. "Teach them to control their trunks and work on body alignment." And start early. "Don't wait until high school," Hewett says. "Begin when kids are 11 or 12."

http://well.blogs.nytimes.com/2009/09/09/phys-ed-preventing-acl-injuries-in-girls/?ref=magazine

Wall Street's Math Wizards Forgot a Few Variables
By STEVE LOHR

IN the aftermath of the great meltdown of 2008, Wall Street's quants have been cast as the financial engineers of profit-driven innovation run amok. They, after all, invented the exotic securities that proved so troublesome.

But the real failure, according to finance experts and economists, was in the quants' mathematical models of risk that suggested the arcane stuff was safe.
The risk models proved myopic, they say, because they were too simple-minded. They focused mainly on figures like the expected returns and the default risk of financial instruments. What they didn't sufficiently take into account was human behavior, specifically the potential for widespread panic. When lots of investors got too scared to buy or sell, markets seized up and the models failed.
That failure suggests new frontiers for financial engineering and risk management, including trying to model the mechanics of panic and the patterns of human behavior.
"What wasn't recognized was the importance of a different species of risk — liquidity risk," said Stephen Figlewski, a professor of finance at the Leonard N. Stern School of Business at New York University.
"When trust in counterparties is lost, and markets freeze up so there are no prices," he said, it "really showed how different the real world was from our models."
In the future, experts say, models need to be opened up to accommodate more variables and more dimensions of uncertainty.
The drive to measure, model and perhaps even predict waves of group behavior is an emerging field of research that can be applied in fields well beyond finance.
Much of the early work has been done tracking online behavior. The Web provides researchers with vast data sets for tracking the spread of all manner of things — news stories, ideas, videos, music, slang and popular fads — through social networks. That research has potential applications in politics, public health, online advertising and Internet commerce. And it is being done by academics and researchers at Google, Microsoft, Yahoo and Facebook.
Financial markets, like online communities, are social networks. Researchers are looking at whether the mechanisms and models being developed to explore collective behavior on the Web can be applied to financial markets. A team of six economists, finance experts and computer scientists at Cornell was recently awarded a grant from the National Science Foundation to pursue that goal.
"The hope is to take this understanding of contagion and use it as a perspective on how rapid changes of behavior can spread through complex networks at work in financial markets," explained Jon M. Kleinberg, a computer scientist and social network researcher at Cornell.

At the Massachusetts Institute of Technology, Andrew W. Lo, director of the Laboratory for Financial Engineering, is taking a different approach to incorporating human behavior into finance. His research focuses on applying insights from disciplines, including evolutionary biology and cognitive neuroscience, to create a new perspective on how financial markets work, which Mr. Lo calls "the adaptive-markets hypothesis." It is a departure from the "efficient-market" theory, which asserts that financial markets always get asset prices right given the available information and that people always behave rationally. Efficient-market theory, of course, has dominated finance and econometric modeling for decades, though it is being sharply questioned in the wake of the financial crisis. "It is not that efficient market theory is wrong, but it's a very incomplete model," Mr. Lo said.

Mr. Lo is confident that his adaptive-markets approach can help model and quantify liquidity crises in a way traditional models, with their narrow focus on expected returns and volatility, cannot. "We're going to see three-dimensional financial modeling and eventually N-dimensional modeling," he said.

J. Doyne Farmer, a former physicist at Los Alamos National Laboratory and a founder of a quantitative trading firm, finds the behavioral research intriguing but awfully ambitious, especially to build into usable models. Instead, Mr. Farmer, a professor at the interdisciplinary Sante Fe Institute, is doing research on models of markets, institutions and their complex interactions, applying a hybrid discipline called econophysics.

To explain, Mr. Farmer points to the huge buildup of the credit-default-swap market, to a peak of $60 trillion. And in 2006, the average leverage on mortgage securities increased to 16 to 1 (it is now 1.5 to 1). Put the two together, he said, and you have a serious problem.

"You don't need a model of human psychology to see that there was a danger of impending disaster," Mr. Farmer observed. "But economists have failed to make models that accurately model such phenomena and adequately address their couplings."

When a bridge over a river collapses, the engineers who built the bridge have to take responsibility. But typically, critics call for improvement and smarter, better-trained engineers — not fewer of them. The same pattern seems to apply to financial engineers. At M.I.T., the Sloan School of Management is starting a one-year master's in finance this fall because the field has become too complex to be adequately covered as part of a traditional M.B.A. program, and because of student demand. The new finance program, Mr. Lo noted, had 179 applicants for 25 places.

In the aftermath of the economic crisis, financial engineers, experts say, will probably shift more to risk management and econometric analysis and concentrate less on devising exotic new instruments. Still, the recent efforts by investment banks to create a trading market for "life settlements," life insurance policies that the ill or elderly sell for cash, suggest that inventive sales people are browsing for new asset classes to securitize, bundle and trade.

"Good or bad, moral or immoral, people are going to make markets and trade via computers, and this is a natural area of financial engineers," says Emanuel Derman, a professor at Columbia University and a former Wall Street quant.

http://www.nytimes.com/2009/09/13/business/13unboxed.html?ref=science

Doctors warn on climate failure
By Richard Black
Environment correspondent, BBC News website

Failure to agree a new UN climate deal in December will bring a "global health catastrophe", say 18 of the world's professional medical organisations.

Writing in The Lancet and the British Medical Journal, they urge doctors to "take a lead" on the climate issue.

In a separate editorial, the journals say that people in poor tropical nations will suffer the worst impacts.

They argue that curbing climate change would have other benefits such as more healthy diets and cleaner air.

December's UN summit, to be held in Copenhagen, is due to agree a new global climate treaty to supplant the Kyoto Protocol.

But preparatory talks have been plagued by lack of agreement on how much to cut greenhouse gas emissions and how to finance climate protection for the poorest countries.

" **Effects of climate change on health will... put the lives and wellbeing of billions of people at increased risk** "
Lancet/UCL report

"There is a real danger that politicians will be indecisive, especially in such turbulent economic times as these," according to the letter signed by leaders of 18 colleges of medicine and other medical disciplines across the world.

"Should their response be weak, the results for international health could be catastrophic."

Rising risk

Earlier in the year, The Lancet, together with University College London (UCL), published a major review on the health impacts of climate change.

Some of the headline findings were that rising temperatures are likely to increase transmission of many infectious diseases, reduce supplies of food and clean water in developing countries, and raise the number of people dying from heat-related conditions in temperate regions.

But it also acknowledged some huge gaps in research - for example, that "almost no reliable data for heatwave-induced mortality exist in Africa or south Asia".

Nevertheless, the main conclusion was that in a world likely to have three billion new inhabitants by the second half of this century: "Effects of climate change on health will affect most populations in the next decades and put the lives and wellbeing of billions of people at increased risk".

The current Lancet and BMJ editorial that accompanies the letter from doctors' organisations argues that climate change strengthens the cases that health and development charities are already championing.

"Even without climate change, the case for clean power, electric cars, saving forests, energy efficiency, and new agriculture technology is strong.

"Climate change makes it unanswerable."

Written by Lord Michael Jay, who chairs the health charity Merlin, and Professor Michael Marmot of UCL, the editorial argues that there are plenty of "win-win solutions" available.

"A low-carbon economy will mean less pollution. A low carbon-diet (especially eating less meat) and more exercise will mean less cancer, obesity, diabetes, and heart disease.

"Opportunity, surely, not cost."

Richard.Black-INTERNET@bbc.co.uk

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8257766.stm

Published: 2009/09/15 23:31:43 GMT

Complication risk for older mums

UK scientists have produced further evidence to suggest delaying becoming a mother may be risky.

They found women who start their periods early were more likely to require medical assistance such as forceps, or a Caesarean section.

The effect was neutralised if these women had their first baby at an early age - but not for older mothers.

The University of Cambridge study features in BJOG: An International Journal of Obstetrics and Gynaecology.

" **The current finding sheds light on why advanced maternal age at the time of first birth might be associated with increased risks** "
Professor Gordon Smith University of Cambridge

The research was based on an analysis of data on 3,739 first-time mothers.

The Cambridge team found that the average age for the start of menstruation was 13.

An earlier start was more common among shorter girls and those with a higher body mass index.

Just over one in four (26.9%) women who did not start their periods until at least the age of 15 required medical assistance during delivery.

But for those who started menstruation early, from the age of 12 onwards, the rate of medical assistance was closer to one in three (32.4%).

Sex hormones

The researchers believe that the key is that women who start menstruation earlier are exposed to the sex hormones oestrogen and progesterone for a longer time.

Both hormones are thought to impair the way the uterus contracts during labour.

The theory is bolstered by the finding that women who had their first child at an early age were not at a higher risk of requiring medical assistance during birth even if they started menstruation - known technically as menarche - early.

Previous studies have also shown that the risk of a medically-assisted delivery increases with a woman's age at the time of her first birth.

Researcher Professor Gordon Smith stressed that while the age at which women started having periods showed little variation, the age at which they started a family did.

He said: "The main significance of this study is not that menarche is usefully predictive of the risk of complications, but that the current finding sheds light on why advanced maternal age at the time of first birth might be associated with increased risks."

Professor Philip Steer, BJOG editor-in-chief, said there was evidence to suggest that women were starting to menstruate at an earlier age - with rising obesity rates a possible factor.

He said the potentially damaging effect of too much - or too little - oestrogen on the female body was something that doctors had noticed over the years.

However, he stressed more, larger scale research was required before firm conclusions could be drawn about the impact of early menstruation.

Evolution

In the meantime, he said women who have had early periods should not worry.

But he added: "It is particularly important for them to ensure they lead healthy lifestyles and maintain a normal body weight, as a high BMI during pregnancy is itself associated with poor uterine contractions and an increased need for operative delivery."

Scientists suspect that a woman's body is designed to have children shortly after becoming fertile.

In evolutionary terms, a long gap between puberty and childbirth was not desirable as life expectancy among our ancestors was short.

The early onset of menstruation has previously been linked to a raised risk of breast and womb cancer.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8254703.stm

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