



# *Infoteca's E-Journal*



An Electronic Compilation of Scientific and Cultural Information by  
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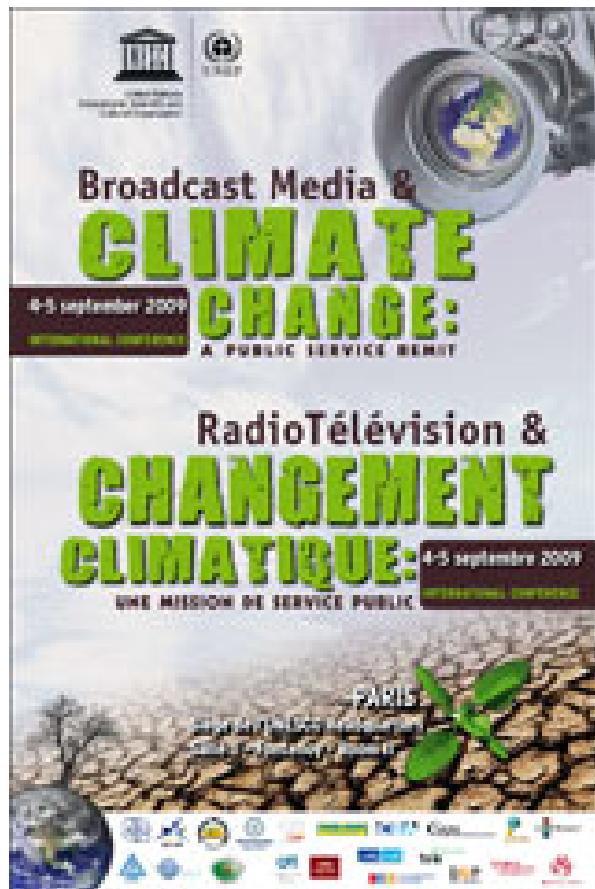
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***Declaration for an increased public awareness of climate change***

09-09-2009 (Paris)



Regional broadcasting unions, international broadcasting associations and other stakeholders decided to increase regional and international cooperation, with the support of UN, and step up their efforts to give media exposure to climate change so as to help mitigate its impact and avert potential human suffering. This decision is part of a declaration adopted at the end of a two-day conference at UNESCO Headquarters on 4 and 5 September.

The International Conference on Broadcast Media and Climate Change, organized by UNESCO in partnership with the United Nations Environment Programme (UNEP), brought together some 250 representatives of national broadcasters from both developing and developed countries, regional broadcasting unions, key international broadcasting associations, scientific organizations and climate-related agencies, who examined major perspectives on reporting on climate change today.

In their declaration, the participants stressed that “access to relevant information on climate change is vital to sustain a living planet and for the survival of human beings.” Regional broadcasting unions and associations committed to partner with international development agencies to improve the quality and quantity of content relating to climate change through capacity-building, networking and programme exchange.

Equally pressing was the Secretary-General of the United Nations, Ban Ki-moon, who sent a message to the participants highlighting the importance of public awareness of the issue. “Climate change, he said, is one of the most fundamental threats ever to confront humankind. It exacerbates all of the problems we face: poverty, disease, hunger and insecurity. It impedes progress toward the Millennium Development Goals. It deepens the food and energy crises.”

“That is the harsh reality,” the Secretary-General said. “But there is an upside: if we combat climate change with a sustainable, low-emissions approach, we can change the way countries develop. We can foster green growth. We can fight hunger and poverty while protecting the environment.”

The Director-General of UNESCO, Koïchiro Matsuura, echoed the Secretary-General’s pressing exhortations to address the issue of climate change ahead of the United Nations Climate Change Conference (Copenhagen, Denmark, 7-18 December 2009). He stressed UNESCO’s longstanding involvement with the issue, notably through its Intergovernmental Oceanographic Commission (IOC), which conducts scientific research and assessments of the climate system.

The Director-General also stressed the importance of capacity building through education in tackling the issue. “Climate change will affect not only us, said Mr Matsuura, but future generations to come. It is therefore essential that we lay the groundwork for future generations to understand and effectively confront this challenge.”

**[http://portal.unesco.org/ci/en/ev.php-URL\\_ID=29099&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://portal.unesco.org/ci/en/ev.php-URL_ID=29099&URL_DO=DO_TOPIC&URL_SECTION=201.html)**

## Climate change could swamp Venice's flood defence

▪ 12:42 24 August 2009 by **Shanta Barley**

Italy's City of Water could be flooded more often (Image: Ghislain & Marie David de Lossy/Getty)

Rarely was a city so aptly named. By the end of the century, Venice – Italy's City of Water – could face daily floods, and according to a new study, the costly and controversial flood barriers now being built might not be able to protect it.

Laura Carbognin at the Institute of Marine Sciences in Venice and colleagues combined data on land subsidence in the city with the Intergovernmental Panel on Climate Change's forecasts of global sea level rise. They then calculated how this "personalised" sea-level forecast would change the city's daily tides.



When the tide rises above 110 centimetres, Venetians call it *acqua alta* ("high water"). This currently happens about four times a year, but Carbognin's team found that by the end of the century high water could swamp the city between 30 and 250 times a year. The impact on the local environment would be considerable – Carbognin calls it an "unsustainable aggression".

### Waterworld

High water events will require MOSE, the city's system of flood barriers due for completion in 2014, to be raised, with pollution and untreated sewage trapped within the confines of the city's lagoon.

Carbognin's estimates of high water events are conservative scenarios and the reality could be much worse, says NASA climatologist Vivien Gornitz, a contributor to the IPCC's Fourth Assessment Report. Sea levels are already rising faster than forecast in the IPCC's estimates, Gornitz says, and if sea levels rise more than 26-53 cm by 2100, as Carbognin conservatively estimates, MOSE, which can only cope with 60 cm of sea level rise, may be insufficient to save the city.

Carbognin concludes that Venice needs to quickly look into alternatives. Pumping sea water into a 700-metre-deep aquifer below the lagoon could buoy the city by as much as 30 cm over a decade, for example.

Journal reference: *Climate Dynamics*, DOI: 10.1007/s00382-009-0617-5

<http://www.newscientist.com/article/dn17668-climate-change-could-swamp-venues-flood-defence.html?DCMP=OTC-rss&nsref=online-news>

### **Faux Better or Worse**

To save water, some cities let residents replace grass lawns with artificial turf. Environmentalists call for xeriscaping. Aesthetes wince.

- By: Nate Berg | August 27, 2009



To save water, some cities let residents replace grass lawns with artificial turf. Environmentalists call for xeriscaping. Aesthetes wince.

It's the largest irrigated crop in the United States, with more than 32 million acres in production, according to a 2005 study from the journal *Environmental Management*. But this crop isn't eaten by people or, usually, animals. It's the front lawn, and cities across America are trying to save water by encouraging homeowners — through rebates and tax benefits — to get rid of it.

People, though, are stubborn things, and they still want their lawns. "I think it's safe to say that by far the lion's share of new homes have lawns," said Walter Molony, a senior public affairs specialist at the National Association of Realtors. "It would be a small, single-digit percentage that do not."

In the face of this demand for green, cities across the country are trying to find a middle ground, and for some, it is artificial turf. The current crop of synthetic lawn is several steps up from the AstroTurf of old; it looks and feels like real blades of grass but, of course, doesn't need mowing.

Based on what it says is increasing demand, the Southern California city of Garden Grove recently lifted a citywide ban on artificial turf on residential properties. Residents there can now convert their front yards to fake grass and receive a modest rebate from the local water district. "There's a lot of people that really

want to do their part in conserving water," said Lee Marino, a senior planner in Garden Grove. "But there's always going to be that segment of society that, regardless, they're going to want natural materials. They don't like the idea of fake."

As Garden Grove is allowing it, however, other Southwest municipalities are finding reasons to say no to faux. Glendale, Ariz., had once given rebates to residents for installing artificial turf as a water-saving alternative. The savings turned out to be modest and conversions ended up causing environmental problems. The city stopped giving rebates after the Centers for Disease Control and Prevention released an advisory in June 2008 associating artificial turf with a potential exposure to lead dust, created as the fibers making up some phony grass blades age and wear.

"When the advisory came out, we thought it was best to err on the side of caution if it had something to do with public health," said Jo Miller, the city's water conservation program manager.

A concern that seems to be making more of an impact on city policy decisions than the CDC advisory is the tendency of artificial turf to get really hot. "During the day it can heat up and be as hot as the asphalt in parking lots," Miller said. So even though it's not alive, fake grass still needs water to keep cool and to clean up when the neighbor's dog leaves something behind.

Other cities in Arizona are following Glendale's move away from artificial turf — but incompletely. Rebates still exist for converting lawns in Scottsdale, but officials there are steering residents away from artificial turf and toward xeriscaping their yards with native plants that require little water. "A natural landscape with soil that is breathing and living and has actual plants in it that are transpiring is a lot more beneficial than a plastic landscape," said Christina Klien, water conservation coordinator for the city of Scottsdale.

As climate change exacerbates water shortages in arid areas, more cities will need to limit water use. Lawn-watering is an obvious target for regulation; lawns may themselves become targets for widespread prohibition. Las Vegas, for example, has banned the use of grass for road medians, streetscaping and "front lawns that nobody ever stepped foot on unless they were pushing a lawnmower," says Doug Bennett, conservation manager at the Southern Nevada Water Authority.

Despite emergent environmental concerns, the homeowner who wants but doesn't use a grass lawn may represent a prime market for sellers of artificial turf. For homeowners looking to keep up appearances or comply with the rules of their homeowners association, after all, what really matters is that yards look like yards.

But Bennett suspects that even those who think fake grass can pass, aesthetically speaking, for real will have adjusting to do if they make the switch. "You have to keep it in perspective," he says. "It looks like a lawn, but it's really a plastic rug."

[http://www.miller-mccune.com/science\\_environment/faux-better-or-worse-1389?utm\\_source=Newsletter72&utm\\_medium=email&utm\\_content=0901&utm\\_campaign=newsletters](http://www.miller-mccune.com/science_environment/faux-better-or-worse-1389?utm_source=Newsletter72&utm_medium=email&utm_content=0901&utm_campaign=newsletters)

### ***Aggression Not As Attractive As Men Believe***

- By: [Tom Jacobs](#) | August 31, 2009



New research finds that men mistakenly believe aggressive behavior is admired. Andres Rodriguez

#### **New research finds males mistakenly believe aggressive behavior is admired.**

To the long list of unfounded assumptions widely held by men, we can now add the alleged attractiveness of aggressive behavior.

According to a [paper](#) just published in the *Journal of Experimental Social Psychology*, men overestimate how appealing such behavior is to women. They also overestimate the combativeness of their fellow males and the extent to which their same-sex peers approve of aggressive acts.

The researchers, led by psychologist [Joseph Vandello](#) of the University of South Florida, describe a culture of misperceived machismo, where some men behave aggressively due to unfounded fears that passive behavior will be frowned on by their peers.

They conclude that "men who may be privately reluctant to escalate conflict to the point of aggression may set aside these misgivings in order to conform to erroneously perceived social norms."

Their findings emerged from a series of studies conducted at the University of South Florida, in which students were presented with scenarios in which someone like themselves was challenged in public. One takes place in a crowded restaurant; it involves a student who finds himself in a confrontation with a peer who accidentally spilled soda on his shirt. He asks for an apology, but the student who is at fault dismissively refuses.

"Participants were asked to estimate the probability that they would punch the offending party," the researchers report. "Next, they were asked to imagine 100 same-sex students on their campus and to estimate the number of students who would punch the offender."



Among men, 28 percent of the men said they'd be likely to take a swing at the jerk. But they estimated that 45 percent of their fellow male students would do the same. In other words, guys overestimated how aggressively other guys were likely to behave.

(Of the women, just under 30 percent said they'd slug another co-ed who had dissed them in such a way. That was quite close to their estimate that 36 percent of their fellow female students would do so.)

The men's disconnect between perception and reality was confirmed by a second study, in which their feelings about someone who walked away from a fight were "significantly less negative than the evaluations they predicted others would have."

"One implication of men's inflated belief that others will perceive them as weak or wimpy for not using aggression is that they might resort to violence even when they do not privately internalize pro-aggression norms," the researchers write. "In this way, male norms about violence might be perpetuated despite not being strongly endorsed by most men."

Adding to the problem is the male misunderstanding of what women want. "Though women greatly preferred a non-aggressive response to an aggressive one, men thought that women would prefer an aggressive response," the researchers write. "There was a dramatic gap between men's guesses about the views of women and women's actual views."

The researchers concede their test subjects may not be representative of the population as a whole, as their youth and cultural backgrounds may predispose them to favor aggression. Before generalizing too, umm, aggressively, it would be wise to see if similar results are obtained from samples of older men and men from other regions of the country.

But even if the results aren't universally applicable, the study has interesting ramifications for law enforcement personnel and policymakers dealing with the issue of violence among young men. The findings suggest "it is important to consider the social context in which aggression occurs, particularly in terms of audience or bystander composition," the researchers write. A seemingly senseless act of aggression may, in fact, be a misguided attempt to impress a young man's peers or potential mates.

The scholars also come to one unassailable conclusion: "Norms can be very powerful, even when they are illusory."

[http://www.miller-mccune.com/news/aggression-not-as-attractive-as-men-believe-1444?utm\\_source=Newsletter72&utm\\_medium=email&utm\\_content=0901&utm\\_campaign=newletters](http://www.miller-mccune.com/news/aggression-not-as-attractive-as-men-believe-1444?utm_source=Newsletter72&utm_medium=email&utm_content=0901&utm_campaign=newletters)

### **From Sewage to Artichokes**

Wastewater recycling and other water-efficiency programs are saving aquifers and helping a famed produce industry thrive.

- By: Julia Griffin | August 25, 2009 |



Wastewater recycling and other water-efficiency programs are saving Monterey County, Calif., aquifers and helping a famed produce industry thrive.

With a blue plaid button-up shirt tucked in his jeans and a pair of ballpoint pens protruding from his front pocket, Chris Drew doesn't look much like a farmer until he puts on a pair of dirt-caked, orange leather gloves and begins trouncing through rows of 3-foot-tall artichoke plants. "Do you like big ones or small ones?" Drew, a production manager for Sea Mist Farms, shouts through a light mist.

"Doesn't matter," I call back to him, wriggling my black patent-leather heels from a suction cup of thick mud. "But the bigger the stem, the better. That's the best part."

Forging a path through thistle jungle, Drew retrieves a knife from his belt and slices two artichoke heads from their stems. "Watch the spines," he says, carefully placing them in my hands.

The acres of fruit and vegetable fields Drew oversees don't look much different than the average commercial agriculture area. Plots of artichokes commingle with rows of immature lettuce. Nearby, sprinklers rhythmically pulsate above freshly tilled ground; in the distance, white plastic carefully protects strawberry plants from the underlying dirt. But the fields around Castroville, Calif. — in all, nearly 12,000 acres of commercial cropland separating the Salinas Valley from Monterey Bay — are different from most other agricultural areas in one important way: They are irrigated with water recycled from urban sewage.

For most people — especially those not living in arid areas of the southwestern United States — the phrase "toilet to tap" elicits unpleasant images. Even in water-strapped California, only about 500,000

acre-feet of recycled water — just 1 percent of the total — are used each year. But population growth and other factors, including climate change, are dictating that California and other dry states become more efficient in their use of water. One water-treatment facility has found a way to really get the most out of its water, perhaps charting the course for other thirsty areas of California.

"Not only were we the first, but we're the largest raw-food crop-water recycling project in the world [that] we know of," says Keith Israel, general manager of the Monterey Regional Water Pollution Control Agency. The agency's regional treatment facility, which blends into the flat agricultural terrain so completely that you might not know it existed unless you were told, intercepts 20 million gallons of sewage water from 12 communities dotting the Monterey Bay coastline every day, treating the wastewater and recycling it to 30 Castroville growers via a system of purple pipes. The recycled water supplies about two-thirds of the growers' total water needs, greatly reducing the use of well water and slowing the intrusion of ocean water into the area's freshwater aquifers.

An 11-year study — reviewed and approved by the U.S. Environmental Protection Agency, California Department of Public Health, the Centers for Disease Control and the U.S. Department of Agriculture — showed that water from the treatment facility poses no risk to farmworkers. The study also found no salmonella, E. coli or other viable pathogens of public health concern in the recycled water. As an added bonus, the recycled water contains more nitrogen, potassium and phosphorous — all beneficial nutrients commonly found in fertilizers — than well water.

"We're confident that we are the safest growers," Drew says. "And the people who thought of this were our saving grace."

The reasoning behind Monterey County's water-recycling program stretches back more than 30 years. In the 1970s, Castroville's commercial agriculture community was at a crossroads. Farmers who had been growing artichokes, lettuce and broccoli in the area since the 1940s were watching their groundwater aquifers steadily being compromised. Instead of sinking like those in areas of California's Central Valley, where water levels had declined as much as 30 feet, Monterey County's freshwater aquifers were sucking in salty ocean water like a sponge.

The aquifers in Monterey County are stacked like a gigantic three-layer cake; as farmers drew water from the top two, they became heavily contaminated by seawater intrusion. By the time the treatment plant was completed in 1997, seawater had infiltrated the upper 180-foot-deep aquifer almost 6 miles inland and the second 400-foot-deep aquifer nearly 3 miles inland. At the time, the only other viable source for water was the lowest of the three aquifers. At 900 feet, it would have been a costly pumping operation for water whose quality was not only uncertain, but also the last untapped source in the region.

Without the regional treatment plant and its "tertiary" treatment facilities — which provide the third and final step in the water recycling process, making water finally "gulpable" — it would only have been a matter of time until the Castroville fields went fallow.

"A lot of the areas out here are multigenerational farms," Israel says. "No one wanted to get to the point where the only use for this land is urban development. The agricultural land we have out here really adds to the ambience of the community." Not to mention community pride: Each May, the annual Artichoke Festival celebrates the fact that 70 percent of the artichokes grown in United States come from the Castroville area, and 90 percent of them are irrigated with recycled water.

Actually, only two-thirds of the water flowing through the 45 miles of purple pipelines extending from the regional treatment plant to the farms is recycled; water is still being pumped from the aquifers. But because less groundwater comes from the supplemental wells, seawater intrusion has slowed 30 to 40 percent. "We've been in operation now for about 11 years," Israel says. "That's about 40 billion gallons of water that hasn't been pumped out of the ground."

But plans are afoot to make the water system in Monterey County even more efficient.

In a given year, only about 60 percent of the water entering the regional treatment plant is recycled and distributed to the Castroville farms. While urban sewage enters the facility at a steady pace throughout the year, a farmer's demand for water is not so linear.

From October to February, when fewer crops are growing and winter storms pass through the region, the demand for recycled water is so low that the facility must release excess treated water to Monterey Bay through an outfall pipe that extends 2 miles offshore. During the summer, the opposite occurs. "In the summer time, the farmers use every drop of water we can produce," Israel says. But since the growers need more water than the 12 contributing coastal municipalities can produce in sewage, the groundwater pumping continues — albeit to a smaller degree.

Israel does expect the amount of sewage water coming to the recycling plant to increase over time as Salinas and the other Monterey communities grow and the civilian redevelopment of Fort Ord, a former U.S. Army post closed in 1994, resumes. "Once the economy turns around and the developers believe they can sell houses again, I believe there's going to be about 6,000 new homes built," he says. "That's going to mean more sewage, and we'll be able to supply more water to the growers." But the Monterey water pollution control agency knows this additional water won't be sufficient for the growers' summer needs. In fact, the growing municipal water use means more groundwater will be pumped.

So in an effort to become more sustainable, the Monterey County Water Resource Agency — a sister agency of the Monterey Regional Water Pollution Control Agency — decided to design and install a rubber dam on the Salinas River, which divides the Castroville farm region as it flows out to Monterey Bay. Approved by the Environmental Protection Agency, the California Department of Fish and Game, and the National Oceanic and Atmospheric Administration, the dam will be inflated from April through October; beginning next year, it will retain winter storm water released from the Nacimiento Dam upstream. Deflating the bladder in the winter will reduce negative environmental impacts, minimize sediment build up in its small retention reservoir and allow adult steelhead to migrate upstream from the ocean to spawn. (A fish ladder will allow steelhead to exit the reservoir when the dam is inflated.)

After treatment, the water stored behind the rubber dam will be mixed with recycled water and distributed to growers through the purple recycling pipes. Israel believes this additional water will supplement, if not fully replace, well water drawn during the dry, high-demand summer season and leave more water in the ground. "With the rubber dam, if you have several dry years in a row, there may be no water to release down the river," he says, "but at least then you'll have the backup wells and the groundwater they draw from."

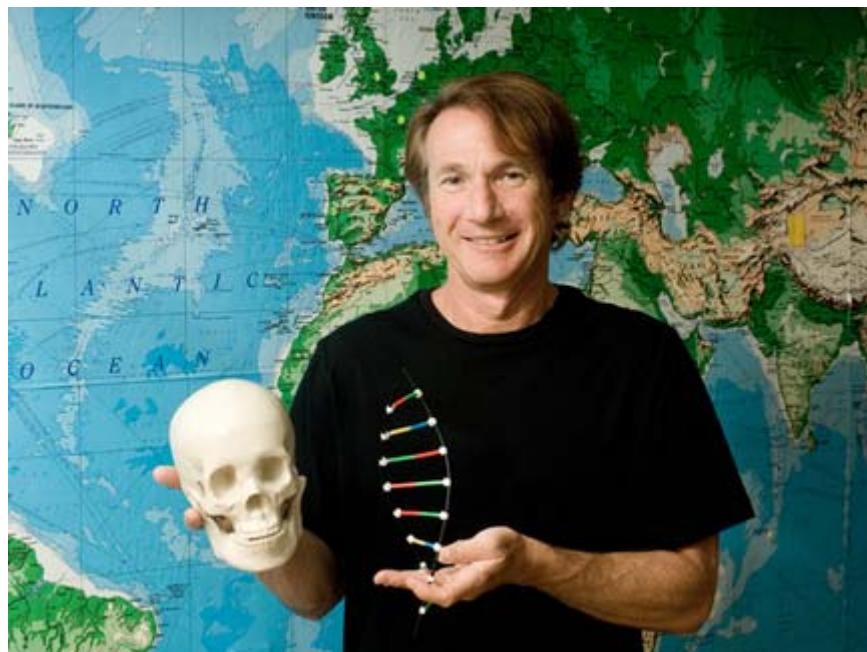
Although the dam will retain winter precipitation for summer use, the Monterey Regional Water Pollution Control Agency is already making plans, when funding becomes available, for another water-efficiency measure: a groundwater replenishment project that would inject secondarily treated wastewater back into the ground during the rainy season. The project would be similar to one instituted in Orange County, which has been injecting purified sewage water into its coastal aquifer since January 2008.

"A few years ago, people were saying, 'You guys aren't real smart. You don't have any external water — state, federal or otherwise — coming in, and you have seawater intrusion,'" Israel remembers, but he hopes the regional treatment plant has created a water-use template other cities and agricultural areas can build on, even if they don't produce 68 million pounds of artichokes a year. "From an energy perspective and a sustainability perspective, to be able to use all of our product and use it a second time makes a lot of sense."

[http://www.miller-mccune.com/science\\_environment/from-sewage-to-artichokes-1381?utm\\_source=Newsletter72&utm\\_medium=email&utm\\_content=0901&utm\\_campaign=newsletters](http://www.miller-mccune.com/science_environment/from-sewage-to-artichokes-1381?utm_source=Newsletter72&utm_medium=email&utm_content=0901&utm_campaign=newsletters)

## The Ancestor Hunter

By: Michael Haederle



Maybe it's the scooter propped in the corner of his office, or the fact that he's wearing a T-shirt and denim cargo shorts while sporting a gold hoop in his left ear, but Michael Hammer definitely looks more like a surfer than one of the world's leading gene detectives. The maps are a giveaway, though. His tiny cell of an office, which looks out onto a grove of lazily waving palm trees, is decorated with several maps of the planet. He has more maps — colorful wall-sized affairs — in his various labs scattered around the University of Arizona campus. Standing back from one of these maps, Hammer can look deep into human history. He sees the movement of ancient Asians into the New World and the rapid expansion of seagoing peoples across the Pacific 3,000 years ago. He can even discern the migrations of our early ancestors out of Africa 60 millennia or so back in time.

For Hammer, a population geneticist, it is a story told in our DNA, the nucleic acid that transmits the information encoded in genes down through generations. Curled up tightly into chromosomes, DNA is a long, twisting ladder-like chain of thousands of simple molecules called nucleotides, lined up in pairs. These base pairs occasionally drop out or repeat in distinctive ways as the DNA is passed from parent to child.

Scientists can figure out when these base pair variations — single nucleotide polymorphisms — diverged from one another, allowing them to build elaborate family trees stretching back tens of thousands of years. In a 2008 paper, for example, Hammer found chromosomal evidence that throughout human history, men have generally produced more offspring than women. (He calls it the Clint Eastwood effect after the legendary actor/director, who fathered seven children with five women.)

In plumbing this and other mysteries, Hammer and his collaborators rely on thousands of samples of DNA — mostly in the form of cheek swabs — they have collected from people all over the world. "It's genealogy at the level of families, genealogy at the level of distant cousins, genealogy at the level of populations that migrated in the last 3,000 years, all the way back to the genealogy of modern and archaic humans," Hammer explains.

In a series of recent studies, Hammer and his collaborators have found a unique sequence on the X chromosome suggesting that as anatomically modern humans arrived in Asia, they interbred with archaic hominids called Homo erectus. It's a controversial claim, given the prevailing view that modern humans emerging from Africa replaced Homo erectus without cross-mating. To Hammer, the interbreeding makes perfect biological sense, especially if one questions the assumption that Homo erectus and Homo sapiens were genetically isolated species.

More likely, he says, they existed on a genetic continuum. He notes that members of baboon species that diverged as long as 4 million years ago can still mate and produce viable offspring.

"If there's occasional interbreeding, and one form, the modern human, is outnumbering the archaic form, we might expect little pieces of our genome to trace back to the archaic form," Hammer says. "Those pieces of the genome would be fairly divergent from the rest of the genome."

If Hammer's parsing of the genetic code often aims to untangle humanity's deepest history, it also has practical application. He's used his skills to probe the ancestry of modern-day Japanese and to try to identify Mexican immigrants who died while attempting to cross southern Arizona's blistering Sonoran Desert on foot. And he has set up a nonprofit foundation to build a genetic database of Holocaust survivors that may help descendants know their family histories. Even when his studies focus on the real world of the 21st century, though, they never roam far from that largest of philosophical questions: Where did we come from?

Sitting in his office on a warm Tucson day, Hammer treats me to a dazzling two-hour cram course in modern genetics. The field has come a long way in a generation. When Hammer started 30 years ago — he's now 55 — scientists painstakingly crossbred animal or plant specimens to isolate specific genes, and they needed massive amounts of tissue to extract small amounts of genetic material. Today, automated gene sequencers can unravel the nucleotide sequence of a bacterium in a few hours. These technical advances make it possible to study an entire genome, as opposed to a handful of selected targets, but they also create a mind-boggling amount of data.

"We're in the business now of figuring out how we grind all that data," Hammer says. "We're using supercomputers, trying to figure out statistical methods that will allow us to take this huge amount of data and analyze it."

Hammer has a particular knack for looking above the details supplied by technology to ask deep questions about human origins — to be able to see the genetic forest for the trees. Through the years he has collaborated with paleontologists, linguists and anthropologists, eager to answer the big questions about human origins in a multifaceted way.

Hammer's journey began in Highland Park, Ill., where he was one of three children raised by a stay-at-home mother and a father who was in the steel business. He was interested in marine biology but graduated from Lake Forest College with a liberal arts degree. After a stint as a technician in a molecular biology lab at the University of Chicago, he was accepted into a graduate program in evolution run by the late Allan C. Wilson at the University of California, Berkeley.

Wilson, who pioneered the use of molecular biology to understand evolutionary mechanisms, made a big impact. "I thought, 'This is the guy I want to work with,'" Hammer recalls. "He was working on things like the evolution of gene expression. He was basically trying to explain what were the key genetic changes that tracked the major things we see in life."

Hammer, who earned his doctorate in 1984, started out researching how house mice evolved the ability to use lysozyme, an enzyme that the body normally uses to attack bacteria, to help them digest plants. But in his eyes, the biggest mystery back then — as now — revolved around how, when and where modern humans arose.

In the 1980s, paleontologists who studied skeletal remains were divided into two camps. Pretty much everyone agreed that a wave of early *Homo erectus* had spread out of Africa across the Eurasian landmass — Peking Man and Java Man being some of the better-known examples. The "multiregional" school of thought held that *Homo erectus* and Neanderthals (*Homo neanderthalensis*) evolved into modern humans continuously in many places across Eurasia. The other view — dubbed the "Out of Africa" model — contended that anatomically modern humans evolved from *H. erectus* somewhere in Africa and migrated out in a second wave, entirely supplanting the earlier human population.

Meanwhile, in Wilson's Berkeley lab, researchers Rebecca Cann and Mark Stoneking were studying human mitochondrial DNA. The DNA in our mitochondria — tiny energy powerhouses in our cells — mutates at a higher rate than the rest of our genome, providing a magnified view of evolutionary change. In 1987, the Berkeley researchers published a paper in *Nature* that decisively weighed in on the side of the "Out of Africa" hypothesis. Genetics was starting to answer questions hitherto reserved for other disciplines.

But mitochondrial DNA, which is usually passed only through the mother and is distinct from our nuclear DNA, tells only part of the story. Hammer, who was in Wilson's lab when Cann and Stoneking were carrying out their research, developed an interest in the Y chromosome, which is passed from father to son.

In post-doctoral work at Princeton and in the Harvard lab of Richard Lewontin, another giant in genetics and evolutionary biology, Hammer mastered newly developed methods of teasing apart DNA into smaller, more manageable elements.

One was the polymerase chain reaction, a method of quickly copying DNA segments that has become a standard tool in genetic analysis. Another was the use of "four-cutter" restriction enzymes (so named because they recognize places in a DNA chain that are four specific nucleotides long) to isolate and identify short fragments of DNA. These small sections of the chromosome sometimes rearrange the ordering of their base pairs, either through selective evolutionary pressures or a process of random shuffling known as genetic drift.

Geneticists have learned to track these base pair reorderings, known as polymorphisms, to see how the genome has changed through time.

Now Hammer brought these techniques to bear on the Y chromosome, which was slow in giving up its secrets. In fact, the earliest investigators thought that unlike all other chromosomes, the Y had no polymorphic diversity — which would have made it a peculiar exception. But Hammer proved them wrong. "It turns out that's not the case," Hammer says. "There were just very low levels of diversity on the Y, and we just needed to look at lots and lots of DNA in sequence to find it. I started finding some variation with these four-cutter filter methods. In the meantime, PCR had become a real technique, and so I started switching over to PCR and direct DNA sequencing, and found some of the first polymorphisms on the Y."

Just as had happened with mitochondrial DNA, Hammer started to build a family tree of Y polymorphisms (today more than 700 are known), leading back to a common male African ancestor something like 110,000 years ago.

By 1991, Hammer had moved to the University of Arizona, where he was charged with developing the university's core genomics laboratory. In 1994, Russian research geneticist Tatiana Karafet joined Hammer's lab. Karafet had spent a lot of time collecting demographic information and DNA samples from Siberian tribes. "It was obvious we had great resources for studying the source populations for Native Americans," Hammer says. They set about collecting Native-American DNA to match against the Siberian samples. That proved difficult because many Native Americans object to being research subjects, Hammer says.

In 1986, a trio of prominent researchers had proposed that there were three waves of migration from Asia into the New World via the Bering Land Bridge. They drew on dental and genetic data, as well as the fact that all the languages in North and South America seem to fall into three "superfamilies."

In 1997, though, Hammer and Karafet looked at the Y chromosomes in their more than 1,600 samples. Their data pointed to a single migration of ancestral Native Americans, probably originating in the Altai Mountains of central Asia. "Today we could do a lot more with the genomic data," he says. (A study of whole-genome DNA recently published in the journal *Molecular Biology and Evolution* reached the same conclusion as Hammer's team.)

All in all, the era of Y-chromosome research was a heady time. "We suddenly were turned loose," Hammer says. "We had a cottage industry. We could type these Y markers, and we could look at populations all over the world. I got very interested in the peopling of Japan. I got interested in Jewish groups and the Jewish Diaspora and the peopling of Europe. It's like there are a million stories in the naked city."

In the early 1990s, Hammer had discovered a 300 base-pair element on the Y chromosome that had a very unusual pattern of expression. It shows up in 50 percent of sub-Saharan Africans and at very low frequencies in Europe and most of Asia. But some 35 percent of Japanese carry it, as do isolated groups in Tibet and the Andaman Islands. How had such widely separated groups come to have the same genetic marker?

Collaborating with some Japanese researchers, Hammer sampled DNA from throughout the Japanese islands and discovered a trend: People in Okinawa and Hokkaido, the southernmost and northernmost areas respectively, had the highest concentration of the rare variation, but it was lowest in central Japan, at the point closest to Korea.

Hammer thought this supported a hypothesis that the Japanese are actually a hybrid of two ancient migrations. The first people, about 10,000 years ago, were known as the Jomon, a hunter-gatherer group that also made a distinctive style of pottery. "They were able to probably just walk over to Japan from the continent of Asia because sea levels were lower," Hammer says. "Then, as the glacial maximum passed and sea levels rose again, the archipelago was isolated from Asia for 8,000 years."

But about 2,000 years ago, a new wave of rice-cultivating immigrants arrived from Korea by boat — the Yayoi. "Probably the Yayoi descend from one of these groups that extended out from southern China with rice agriculture," Hammer says. "They brought their genes with them, and they were different genes, different Y chromosomes."

Hammer believes the rare Y-chromosome marker came to Japan with the Jomon. "The Jomon origin probably goes back to somewhere in central Asia, and that's why we find that marker on the Y in Tibet," he says.

"In most of our history, up through the past couple of hundred years, people really did sit where they were," Hammer says. "They really didn't move very far. So you get this nice gradient of variation that reflects these old, old migratory processes. I think it's one of the nicer examples of that."

Jews, whose Diaspora started with the Babylonian exile and continued through the Roman occupation, are something of an exception, having dispersed widely in western Eurasia and northern Africa. That prompted Hammer to wonder whether modern Jews retain close genetic links to their ancestors. "Are contemporary Jews descendants of Middle Eastern or biblical Jews?" Hammer asks. "Are they really converts? Was there so much intermarriage that the Middle Eastern genetic signal was diluted out?"

In a 2000 paper, Hammer and his colleagues reported that a comparison of Y-chromosome markers showed most Jewish groups were closely related to one another, despite having been scattered across

central Europe, North Africa, Spain and Yemen. They showed only slight genetic admixture with their neighboring non-Jewish populations, but they turned out to be closely related to contemporary Palestinians, Lebanese and Syrians.

Earlier, in 1997, Hammer co-authored the first paper showing that there was a genetic marker on the Y chromosome that seemed to correlate with a shared common paternal ancestor for the Kohanim — the Jewish priestly caste — a finding that gained widespread news coverage.

For all the information he has managed to wring from the Y (or male) chromosome, Hammer in recent years has joined his peers in using markers from the X chromosome and the 22 pairs of non-sex chromosomes in a cell's nucleus, which are known as autosomes.

These days, he's collaborating with Steve Lansing, a University of Arizona social anthropologist, on the Austronesian Societies Project, which uses genetics, linguistics, anthropology and mathematical modeling to trace the expansion of Austronesian-speaking people through the Indonesian archipelago.

"We're using genetics more like the fossil record," Hammer says. "You're studying recent linguistic change happening on a very recent time scale, and there's no fossil record for language. We've kind of turned it on its head and used genes to reconstruct the movements of people, then superimposing their languages on top of the population history."

Lansing, who has known Hammer since 1999, says that just as Hammer can use his tools to reconstruct large-scale migrations that took place thousands of years ago, the Indonesian research is working on the scale of individual villages within the past few hundred years.

Meanwhile, Lansing says, he and Hammer are joining with mathematicians at the Santa Fe Institute, where Lansing also has an appointment, to study the microevolution of the malaria parasite. They plan to replicate the bug from blood samples drawn from villagers, then study how its genome has evolved over time. That in turn could give medical researchers insights into new strategies for fighting the disease.

The big, established centers for population genetics may be at major research universities like Harvard and Stanford, Lansing says, but Hammer has made a name for himself nonetheless. "Michael set up this little shop in Arizona, and it seems to keep turning out all these interesting results," Lansing says. "He's a one-man band."

In recent years, Hammer has revisited the question of modern human origins addressed two decades ago by his Berkeley colleagues. He saw shortcomings with both the prevailing "Out of Africa" model and the multiregional theory that *Homo erectus* evolved into modern humans all over Eurasia. "I think both models are overly simplistic," he says. "The truth lies somewhere in the middle. I think we're more towards the African origin and replacement — clearly there was a huge advantage for much of our genome to fit that model, but not all of it. It's the exceptions that are going to be the most interesting in revealing what humans were like biologically and behaviorally, a hundred thousand years ago."

Previous research that had focused on mitochondrial DNA and the Y chromosome had found no evidence that *Homo erectus* or Neanderthals had contributed to the modern human genome, Hammer says. But in the past five years, Hammer and his collaborators have found that a 2-million-year-old variation of *RRM2P4* "pseudogene on the X chromosome is much more common in east Asia than anywhere else. (Pseudogenes are defunct relatives of known genes that no longer seem to have a cellular function but provide clues about when and how the genome changed. Like other genes, their names derive from their function and their location on the chromosome.) They interpret this as evidence of interbreeding in Asia that would, to some extent, undermine the "Out of Africa" theory.

One problem with the "Out of Africa" theory (also known as the Single Origin theory) is that it tends to assume anatomically modern humans evolved in Africa at a particular moment, within a small, isolated

population — a proverbial Garden of Eden. "That would be very unbiological, in a lot of ways of thinking about it," Hammer says. "Most species do not have pure, isolated origins. Why would humans be different?"

Hammer acknowledges that the single example of RRM2P4 doesn't prove his case. "You really need to find evidence from more than one part of the genome," he says. "What we're finding is there are other regions of the genome that show that pattern, but they don't necessarily show Asian populations versus African populations. We're seeing this pattern within Africa."

In other words, it's possible that as anatomically modern humans were mingling with archaic hominids across Eurasia, the same thing was happening within Africa involving as-yet-unidentified groups, perhaps the African version of *Homo erectus* or the Neanderthal. "We may use genetics here as a predictor of what the paleontologists might find," Hammer says.

The University of Arizona lists Hammer as a research scientist, relieving him of teaching duties, although he does lecture and work with graduate students in a number of different departments. He presides over a multifaceted operation, serving as director of the university's Genomic Analysis and Technology Core facility, which provides centralized training and DNA services, and the Human Origins Genotyping Laboratory, which performs high-volume DNA testing for both academic and private-sector clients.

After hours, Hammer shares child-care duties for his 13-year-old daughter and 9-year-old son with his former wife. His daughter was born with severe autism and epilepsy that has left her with minimal communication skills. Over veggie spring rolls at an off-campus Vietnamese eatery, he tells me that he, his children and their mother have contributed their DNA to a study an associate is conducting. "If I were to go to school again, I'd go into neurogenetics because I think that is the next frontier in terms of understanding human disease, biology and behavior," he says. "For personal reasons, I'd like to know what kinds of genetic changes can lead to the kinds of dysfunction that I see in my daughter."

We walk across campus to Bio 5, the university's state-of-the-art research complex, where Matt Kaplan supervises the Human Origins Genotyping Laboratory. Kaplan, one of Hammer's former graduate assistants who took part in some of the Jewish population research, shows me how robotic equipment processes newly arrived cheek swabs through several steps into testable samples of DNA. The lab tests between 1,000 and 4,500 samples a week, Kaplan says. Each person's DNA is extracted from a comb-like plastic swab that scrapes cells from the inside of the cheek.

Many of the swabs, sealed into small, fluid-filled tubes, come from Family Tree DNA, a Houston-based commercial testing venture for which Hammer also serves as chief scientist. Family Tree and Kaplan's lab are handling the public testing for The Genographic Project, a five-year research effort sponsored by IBM and National Geographic to create an inventory of DNA collected from around the world. Kaplan estimates the lab has tested more than 260,000 samples for the project since 2005.

Kaplan shows me a National Geographic map created depicting ancient migration routes around the world as deduced from Y chromosome and mitochondrial DNA. "You can actually swab your cheek and find out which one of those lines on the map is your paternal lineage," he says matter-of-factly. "It isn't magic. This is stuff we have been doing as academic researchers for years."

Hammer co-founded the DNA Shoah Project, which is using Kaplan's genotyping laboratory to create a database of genetic material from Holocaust survivors and their immediate descendants. The nonprofit organization hopes to make it possible for descendants to find displaced relatives and learn about their biological families.

The project is a partnership with Syd Mandelbaum, a businessman and the son of Holocaust survivors, who read a news story in 2005 about the discovery of World War II-era remains in Germany and realized there was no genetic database available to help identify and repatriate them. "The idea is not that we're

going to try to test the genetic material in the bones directly, but build a database — a 'build it and they will come' sort of thing," Hammer says. "What we would like to do is store the survivors' DNA. Unfortunately there's only a thousand (samples collected) now, and there's a couple hundred thousand to get. Getting the word out and getting funded to do this has been slowing us down." He estimates that the project will need about \$500,000 to get fully up to speed.

Hammer notes that in the next 15 years the last of the Holocaust survivors will be gone. "I almost feel like we have to do it because we can," he says. Although "Shoah" is the Hebrew word for the Holocaust, the project would be open to all victims of the Nazi genocide — Poles, Gypsies and Russians as well as Jews, Hammer says. "Anybody who's a survivor of the Holocaust can get their DNA taken for free and stored, and we take all the information about their family history."

Hammer has also consulted with the Pima County Medical Examiner's office, which is storing the bodies of more than 200 people who died in the desert while trying to cross illegally from Mexico into the U.S. "We'd like to be able to help families in Mexico get their bodies back," he says. "In the meantime, while they're not identified, they sit in the morgue for years, and then they're cremated. It costs the county money. It costs the families grief. ... If we could just make a database of the families and then type the bones, we could actually match them up."

In the meantime, Hammer hopes to add nuance to the "Out of Africa" model of human origins, looking at how genes might have flowed as diverging populations occasionally came back into contact and hybridized. "In plants, there's a huge amount of novelty that comes from hybridizing," he points out. "I don't see why that couldn't be something that was part of our history. Populations that were ecologically suited for one region in Africa or another could have shared their genes to give rise to a progenitor that had the advantages of both ancestors. The novelty is coming from not being in a special place and uniquely experiencing one environment, but from the multiple experiences of the groups."

Hunting for clues to support his hunch, Hammer will examine more odd and overlooked bits of DNA that may speak to unexpected patterns of human mating and migration. "Clearly the bulk of the genome is telling us something that is fairly well accepted. What we don't know will be discovered by looking at these other, exceptional regions.

"I believe that they're there at some rate," he says. "We'll be able to learn more about our ancestry.

"It may be more complicated than what the current model will accommodate."

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### **Drought, Not 'Old Chaparral,' Aiding Wildfires**

Decades of 'fuel management' have been ineffective in preventing wildfires, scientists say, and in all likelihood make the blazes more likely and more devastating.

- By: [John McKinney](#) | August 25, 2009 |



Decades of "fuel management" have been ineffective in preventing wildfires, scientists say, and in all likelihood make the blazes more likely and more devastating.[wikipedia.org](http://wikipedia.org)

The communities of scrub and shrub known as chaparral have been the scenes of the biggest — and most expensive-to-fight — wildfires in [California](#), many of which have occurred during the last five years. The increased frequency of these fires, as well as their size and intensity, have accelerated the study of chaparral especially as millions of people and billions of dollars of property now nestle alongside it.

Attitudes toward chaparral and fire have changed drastically since Europeans arrived. During the 19th century and half the 20th, chaparral — found along the Pacific Coast and western edge of the Sierra Nevada mountain range from Oregon's Rogue River Valley to Baja California's San Pedro Martir — was considered a wasted landscape and worthless. Ranchers set it on fire to get rid of it and planted grass for livestock. As more and more people moved to the great scrublands, chaparral was branded an ugly fire hazard and wildfires demonized as a hellish occurrence.

Until the 1960s, chaparral fires, like forest fires, were to be prevented and suppressed at all costs. Next, scientists and public lands managers were convinced that fire was "good" for chaparral and "needed" to burn often to maintain health and prevent more serious conflagrations.

"The latest research search suggests that chaparral has evolved and adapted to fire, but certainly doesn't need it," declares Richard Halsey, founder and director of the [California Chaparral Institute](#), a repository of knowledge on all matters chaparral.

In short, old chaparral is no more fire-prone than new chaparral. One-hundred-year-old chaparral flora (ceanothus, chamise, manzanita and more) is perfectly healthy, Halsey points out. In fact, statistical analyses by scientists found no significant change in the probability of chaparral burning as it ages.

"High intensity wildfire in the shrublands are a natural occurrence and historically there have always been large fires," states [Jon Keeley](#), a research ecologist with U.S. Geologic Survey and a chaparral expert who has recently published his [findings](#) in Ecological Applications and other [journals](#).

The problem for the chaparral — and the many humans who live nearby — is the frequency of such fires. There are about 100 times more wildfire ignitions in Southern California today than in 1900, says Keeley, who has tracked the region's fire history back to the 19th century.

"An ecosystem adapted to fire every 60 to 100 years is now burning every 10 years-or even more often," Keeley notes.

Too many fires in the chaparral can compromise or even kill off the plant community, scientists have recently discovered. The native chaparral is unable to regenerate and nonnative species take over, upsetting nature's balance. Invasive weeds and grasses cause even greater fire safety issues and headaches for firefighters than the original scrublands.

Land management policy in the chaparral zone has long been based on the belief that fuel management can limit the size and severity of wildfires. Believing chaparral needed to [burn](#) because of an "unhealthy" accumulation of old growth, land managers ordered controlled burns in order to thin the flora and make it more fire resistant. An expanding volume of research is refuting the wisdom of this practice.

Keeley and colleagues have shown that during a century of always dogged and often heroic fire-suppression efforts, the number of fires per decade has actually increased and no significant decline in area burned has resulted.

Researchers have discovered that California's long history of mega-fires (more than 150,000 acres burned) are not linked to old chaparral but to prolonged droughts. Such dry spells lead to an increase of dead fuels. Desiccated undergrowth lingers for many years so the potential for severe fire may continue years after a drought's end.

While fires are indeed a natural part of the chaparral ecosystem, naturally occurring fires are few and far between; lightning is the natural cause of wildfires and lightning storms are rare in Southern California. In most cases, it's humans who start chaparral fires — and the more humans who live amidst the chaparral, the more ignitions.

During the 19th century and early 20th, chaparral wildfires raged for weeks, even months, and got little ink from the region's newspapers. The public was blasé about such blazes because they occurred "way out there" on mountains and in remote canyons far removed from towns and cities. Nowadays, suburbia squats on scrubland slopes, and subdivisions are stuffed into chaparral-cloaked canyons.

Armed with the latest research, Halsey and his Chaparral Institute aim to change the thinking of policymakers. They tell them wildfire risk in Southern California is not a result of poor fire-suppression techniques or old stands of chaparral, but an inherent part of the landscape.

As Halsey sees it, three of the most significant threats to chaparral are: 1) too many people living in a highly flammable environment; 2) humans sparking excessive wildfires; 3) land-use managers clinging to now discredited beliefs about chaparral.

Halsey is convinced that with the latest chaparral research in hand, it will be possible to craft a workable combination of effective fire safety and responsible resource management policy. Unfortunately, he adds glumly, chaparral management shares common ground with so many other endeavors: Money drives policy.

For example, funding from the ironically named Healthy Forests Initiative, a federal program launched by the Bush administration, goes to grinding wide swaths of chaparral into smithereens in the name of fire prevention. What politician or policymaker has the courage to turn down funding for costly "fuel management" programs just because researchers have demonstrated that they're ineffective?

Concludes Halsey: "If we really want to save lives, safeguard property and protect the environment, we need to adapt to the environment instead of making the environment adapt to us."

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### **How Could They Have Stayed Behind?**

A group of psychologists argue that during Hurricane Katrina, those who stayed in New Orleans had a very different sense of their options than those who oversaw the evacuations or those watching from afar.

- By: [Lee Drutman](#) | August 28, 2009



In 2005, New Orleans residents wait to be transported from the Superdome after spending the first five days of Hurricane Katrina in the sports complex. Manila Ryce

In the weeks and months following Hurricane Katrina, many commentators and politicians expressed considerable frustration and puzzlement as to why so many people ignored the warnings and decided to stay in New Orleans. One — then-Sen. Rick Santorum, R-Pa. — even suggested that, "There may be a need to look at tougher penalties on those who decide to ride it out and understand that there are consequences to not leaving."

But how much of a decision was it really?

According to new study by a group of psychologists, to think of it as an active decision betrays a particular model of human agency, an individual-centered one held by mainstream American culture, in which people both have resources and generally enjoy a high degree of personal efficacy. But had observers like Santorum spent their entire life in the Ninth Ward of New Orleans, they surely would have understood that hunkering down to brace for the storm was not so much a conscious choice for most, but really the only option that made sense, given a lack of resources and the centrality of community and faith in their lives.

"The event was framed by media and government as being a product of choice," said Nicole Stephens, who is completing a doctorate in psychology at Stanford University and was the lead author on the study. "The media focused on how survivors chose to stay, and the assumption was that everyone's actions reflected what they wanted to do, but it didn't attend to powerful environmental constraints, like whether people have cars."

The study, titled "Why Did They 'Choose' to Stay?" was published in *Psychological Science* and co-authored with MarYam G. Hamedani, a former Stanford psychology Ph.D. student who's currently a private research consultant; Stanford psychology professor Hazel Rose Markus; Princeton psychology Ph.D. student Hilary B. Bergsieker; and Stanford psychology Ph.D. student Liyam Eloul.

The psychologists framed the study around a distinction between two models of human agency — the disjoint and the conjoint — in order to understand what happened in New Orleans and why.

The disjoint model is built on assumptions of independence. It assumes that individuals have opportunities, make choices to influence their environment and that their choices are a reflection of their goals and preferences. This is the model that dominates mainstream American discourse and culture, and the model of agency held by many of the people who did leave.

The conjoint model, on the other hand, is built on assumptions of interdependence. Here, human agency is primarily about adapting one's self to the world (rather than trying to change the environment), often through faith and spirituality, and decisions are more community-oriented. Though the conjoint model might seem more familiar to many middle-class observers as an East Asian philosophy, the authors argue that these attitudes are also prevalent in working-class Americans.

That's because many working-class folks lack the resources to engage in individualistic, independent behaviors. And this particular lived experience leads them to adapt by developing a sense of personal agency in which they make the most of their lives, given the challenges they face in exerting meaningful control over their environment. This is something that is often very difficult for outsiders to get.

"Despite the whole thing about putting yourself in someone else's shoes, you won't necessarily get it," Hamedani said. "Even to walk a mile in someone else's shoes. You have to walk through their world and how that informs who they are."

The difficulty of really understanding another point of view came through in a survey of both New Orleans relief workers and lay observers that the psychologists conducted. Though the researchers had been somewhat optimistic that the relief workers might have more understanding of those who stayed behind, they generally described them in quite negative terms, portraying the stayers in varying shades of passive, lazy and uninformed. In this respect, the relief workers were not particularly different than the lay observers, even despite their close contact with many survivors.

"We thought they'd be more charitable," Stephens said. "I think it's just a powerful testament to the fact that our mainstream culture is so focused on choice and individualism and what people can do to control their environment."

A second survey in the study contrasted the attitudes of leavers and stayers. As expected (and consistent with the different models of human agency), leavers were much more likely to emphasize choice, independence and to talk about being focused on the future and concerned about the risks of staying. Stayers were much more likely to emphasize community, faith, inner strength and tended to underestimate the risks. In short, while leavers saw the risks and wanted to get the heck out, stayers turned to the limited resources they had to do their best to weather the storm. For them, agency was handling what life gave them.

All of this has important consequences for how cities and agencies think about disaster evacuation and relief. At the most basic level, as the researchers emphasized in interviews, there is the simple fact that many of the people who stayed behind did so simply because they didn't have cars and/or didn't have any friends or family outside the city to take them in. But at a more fundamental level, there is the challenge of disseminating messages that will both reach and resonate with all residents of the city, not just those with an individualistic sense of agency.



"One of the things we heard from many of the survivors was that they didn't hear too many warnings or didn't think the warnings were that big of a deal," Stephens said. "If you distribute messages through sources that people trust, it makes those messages more effective."

For example, Stephens suggested that it might be more effective to disseminate messages through trusted institutions like churches or other community groups, rather than the mainstream media.

Markus emphasized the fact that since conjoint decision-making is community decision-making, it is important for messages to emphasize community concerns. "People tend to look into what others are doing because their fates are tied together," she said. "Most people are attached to their home communities and they don't want to leave them."

Stephens suggested that evacuation messages might be more effective if they mentioned things like, "how you need to help to preserve your community in the future. They would be more effective if they take into account the powerful relationships that people have with others."

But these different models of agency are important not just in the context of Katrina or disaster evacuation. Markus argues there is a real danger in assuming all people ought to come to the same decisions, and that this kind of misguided thinking is rampant in much of the scholarly research that ultimately informs policymaking.

"All of the social sciences are using one and the same model of the person," Markus said. "And that's a particular model that comes out of the middle-class American context in particular. It's the rational actor of economics, the reasonable person of the law.

"But as far as it goes," Markus added, "it's really right for about 5 percent of the world's population. When it comes down to it, when we say 'people,' we're talking only about North American, middle-class people with a reasonably high level of education and resources. ... This model is an historical and philosophical product, but it's not the way people naturally are. There are other ways to be an agent that deserve study."

[http://www.miller-mccune.com/culture\\_society/how-could-they-have-stayed-behind-1442?utm\\_source=Newsletter72&utm\\_medium=email&utm\\_content=0901&utm\\_campaign=newsletters](http://www.miller-mccune.com/culture_society/how-could-they-have-stayed-behind-1442?utm_source=Newsletter72&utm_medium=email&utm_content=0901&utm_campaign=newsletters)

## 'Bubble' children treatment hope

**Children seriously ill because their immune systems have genetic flaws could have their lives saved by a safer form of bone marrow transplant, doctors say.**



The London team says the treatment for so-called "bubble" children - who have to live in sterile conditions - almost eliminates the need for chemotherapy.

The Great Ormond Street doctors used antibodies to clear patient bone marrow and make room for donor stem cells.

They report in *The Lancet* the method cuts both rejection and side-effects.

### High doses

Chemotherapy has both short- and long-term consequences, ranging from hair loss to damage to organs such as the liver and lungs.

But it has been used as standard to kill the patient's own bone marrow and make room for stem cells.

This treatment has saved the lives of many children with serious genetic defects in their immune systems - primary immunodeficiencies or PID - that render even the most minor infections life-threatening.

Fifty such transplants are carried out each year.

But some children are deemed too sick to withstand the high doses of drugs needed to wipe out the bone marrow.

Gentler chemotherapy has been developed, but is still too much for certain groups of patients, such as babies.

### Sickest children

26

The new technique, developed by doctors from Great Ormond Street Hospital (GOSH) and the UCL Institute of Child Health, uses an antibody that targets a molecule specific to blood and bone cells - meaning other tissues are left undamaged.

**" This provides a viable alternative conditioning treatment for children unable to tolerate intensive transplant chemotherapy "**

Chris Hughan The Primary Immunodeficiency Association

The team, led by Dr Persis Amrolia, reported that 13 of the 16 patients treated in the study had survived and been cured of their underlying disease.

They recovered twice as quickly as those given standard treatment, although there were still some complications.

"Because this approach was experimental, we only used it on the sickest children, who we felt could not tolerate standard transplant chemotherapy.

"Given how sick these children were before transplant, the results are remarkable," said Dr Amrolia.

"What's really encouraging is that pretty much all the children who survived now have a really good quality of life.

"There's still a lot to do and the challenge now is to develop similar targeted approaches for children with other genetic diseases and leukaemia."

Chris Hughan, chief executive of The Primary Immunodeficiency Association, said: "We welcome this important study as it heralds a potential breakthrough in the treatment of paediatric PID patients who need a bone marrow transplant (BMT) but have significant chronic infection or organ damage at the time.

The new treatment "provides a viable alternative conditioning treatment for children unable to tolerate intensive transplant chemotherapy".

"We look forward to supporting this new BMT programme at GOSH and making our members aware of this exciting new treatment development."

Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8231818.stm>

Published: 2009/09/01 23:23:05 GMT

## Boy conceived using new test born

**The first baby conceived with the help of a new egg screening technique which could offer hope to women for whom IVF has repeatedly failed has been born.**

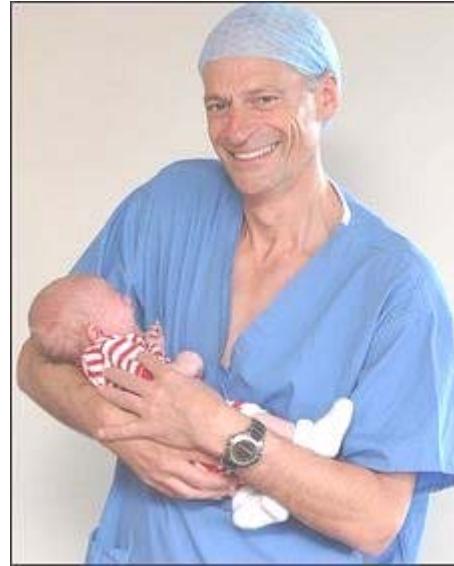
Oliver was born to a 41-year-old woman who had had 13 failed IVF treatments.

The new screening method, developed in Nottingham, allows a rapid analysis of the genetic material in fertilised eggs to check for chromosomal abnormalities.

The British Fertility Society said the technique was promising but that more research was needed.

Professor Simon Fishel, who led the team, said Oliver's arrival showed that the test could help couples who have repeatedly failed to become pregnant.

"All the team have been waiting for this very special baby to be born.



"Oliver's birth is an important landmark in shaping our understanding of why many women fail to become pregnant.

"Up to half of the eggs in younger women and up to 75% in women over 39 are chromosomally abnormal.

**"At the moment this can only be viewed as a potentially very lucky result"**  
Professor Peter Braude, King's College

"Array Comparative Genomic Hybridisation is used to screen eggs or embryos in an IVF cycle, evaluate all the chromosomes and select the most chromosomally normal embryos."

Before an egg is fertilised, it ejects half of its own set of chromosomes to leave space for the chromosomes coming from the father's sperm.

## Miscarriages

These "spare" chromosomes are kept in a structure on the edge of the cell known as the "polar body".

Array CGH involves extracting the polar body and looking to see if there are too few or too many chromosomes.

It is believed that two out of three women fail at each IVF attempt because of chromosomal abnormalities in the implanted egg.

The team at Care Fertility Clinic have found a way of speeding the analysis of the genetic material they extract.

Two years ago US scientists announced that 18 women had given birth after having their eggs screened using a similar technique.

But in those cases the resulting embryos had to be frozen and re-implanted later.

The Nottingham team can get the results back in 24 hours which means that the mother can undergo IVF in the same cycle of treatment.

Oliver's parents had 13 previous failed IVF cycles and three miscarriages.

Eight eggs were tested and only two found to be chromosomally normal. One of those produced Oliver.

### **Great hope**

British Fertility Society chairman Tony Rutherford said the technology offered much promise but the widespread use of it should await the outcome of further rigorous research.

He said there was no compelling evidence yet that pre-implantation genetic screening (PGS) tests, in which embryos are looked at for genetic abnormalities before they are implanted in the womb, improved the pregnancy rate or live birth rate.

He said: "All too often we see groundbreaking news about techniques that seem to offer great hope, but fail to live up to expectations when applied in widespread clinical practice."

Professor Peter Braude, head of the department of women's health at King's College London, said he was delighted that the mother had achieved her positive outcome after so many years of trying but he too sounded a note of caution.

"At the moment this can only be viewed as a potentially very lucky result," he said.

Stuart Lavery, a consultant gynaecologist and director of IVF at Hammersmith Hospital in London, said: "This technique is a very powerful tool that may allow us to detect which embryos of the many produced in an IVF cycle have the best chance of implantation and resulting in a birth.

"Clearly this is very early days, and our optimism needs to be tempered with caution until we have more evidence of the technique's safety and effectiveness.

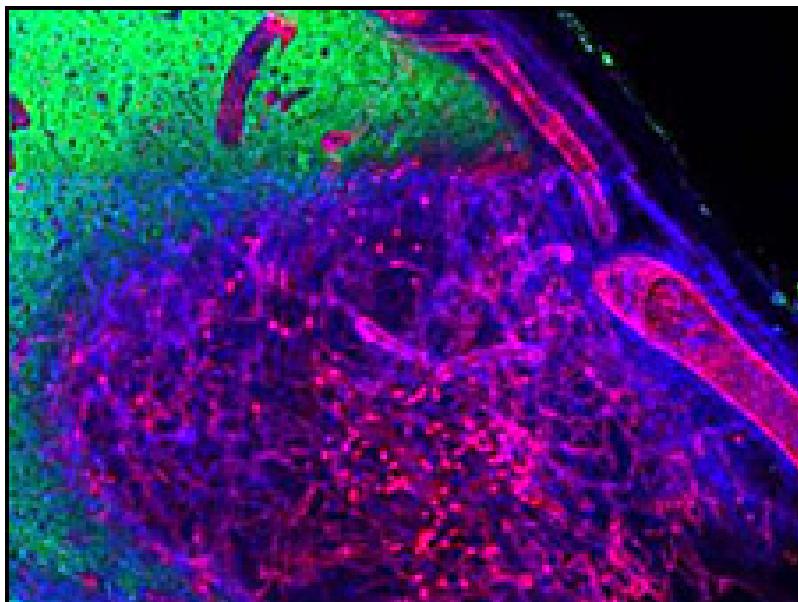
"My own unit at the Hammersmith has recently been given an HFEA licence for microarray CGH and we look forward to contributing to this promising new field."

Story from BBC NEWS:  
<http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8232146.stm>

Published: 2009/09/02 00:55:15 GMT

## Gel hope for brain injury repair

**An injectable hydrogel could aid recovery from brain injury by helping stimulate tissue growth at the site of the wound, researchers say.**



Research on rats suggests the gel, made from synthetic and natural sources, may spur growth of stem cells in the brain.

The gel has been developed by Dr Ning Zhang at Clemson University, South Carolina, who presented her work to a conference on military health research.

She predicted the gel may be ready for human testing in about three years.

**“ Our strategy can potentially be applied to head injuries caused by car accidents, falls and gunshot wounds ”**

Dr Ning Zhang Clemson University

Following a brain injury the tissues tend to swell up and this causes the loss of even more cells, compounding the damage caused by the original wound.

The standard treatments attempt to minimise this secondary damage at the site of the injury, for instance by lowering the temperature or relieving the build up of pressure.

However, their impact is often limited.

Scientists believe that transplanting donor brain cells into the wound to repair tissue damage is potentially a more productive approach.

### Donor cells

But while this method has had some success in treating some central nervous system diseases, it has produced very limited results when used to treat brain injuries.

The donor cells do not tend to thrive at the site of injury, or to stimulate repair.

This could be due to inflammation and scarring at the injury site, and the lack of supportive tissue and blood supply to provide the necessary nutrients.

Researchers say the advantage of the new gel, which is injected into the injury in liquid form, is that it can be loaded with different chemicals to stimulate various biological processes.

First, Dr Zhang used it to help re-establish a full blood supply at the site of a brain injury in rats, potentially providing a much more friendly environment for donor cells to thrive.

Then, in follow-up work, she loaded it with immature human stem cells and the chemicals they need to develop into fully fledged adult brain cells.

After eight weeks of treatment with this mixture rats with severe brain injuries showed signs of making a significant recovery.

Dr Zhang, whose work is funded by the US Department of Defense, said: "We have seen an increase in brain injuries due to combat, but our strategy can also potentially be applied to head injuries caused by car accidents, falls and gunshot wounds."

She said the gel could potentially be loaded with different factors to make it useful for patients at varying stages following injury.

Professor James Fawcett, of the Cambridge University Centre for Brain Repair, said a brain-compatible gel that could inhibit scar formation and prevent the release of toxic molecules following brain injury would be a significant advance.

Headway, the brain injury association, said the research looked very interesting and could potentially be a "significant step forward".

But in a statement, the charity said: "It is important to remember, however, that no human trials have taken place at this stage and a great deal more research is required before this method of regenerating brain tissue following traumatic injury can be heralded.

"We are some years away from the possible therapeutic use of this gel and it is important the expectations of people with brain injury are managed to avoid promises of miracle cures."

Story from BBC NEWS:  
<http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8233209.stm>

Published: 2009/09/03 00:31:24 GMT

## Climate targets 'will kill coral'

By Richard Black  
Environment correspondent, BBC News website

**Current climate targets are not enough to save the world's coral reefs - and policymakers urgently need to consider the economic benefits they bring.**



Those are two of the conclusions from a UN-backed project aiming to quantify the financial costs of damaging nature.

Studies suggest that reefs are worth more than \$100bn (£60bn) annually, but are already being damaged by rising temperatures and more acidic oceans.

The study puts the cost of forest loss each year at \$2-5 trillion.

Looking ahead to December's UN climate conference in Copenhagen, study leader Pavan Sukhdev said it was vital that policymakers realised that safeguarding the natural world was a cost-effective way of protecting societies against the impacts of rising greenhouse gas levels.

### Green roots

The current UN climate negotiations contain measures for protecting forests as carbon stores - an initiative called Redd (Reducing Emissions from Deforestation and forest Degradation).

**"There's evidence that current levels of CO<sub>2</sub> are already causing damage to reefs "**  
Alex Rogers, Institute of Zoology

Its roots lie in the calculation that forest loss accounts for about 20% of greenhouse gas emissions, and that combating it is probably the cheapest way of reducing emissions overall.

But protecting societies against climate impacts (climate adaptation) will also be a key component of any Copenhagen deal, because it is the single biggest priority for many developing nations.

The TEEB (The Economics of Ecosystems and Biodiversity) analysis emphasises that forests, coral reefs and many other ecosystems can be the cheapest "adaptation tools" as well.

"We feel this isn't really at the top of politicians' minds at the moment," he told BBC News.

"But when you decide how you invest money for climate adaptation, you should quickly come to the conclusion that ecology provides the best bangs for bucks - and that's even without taking into account the added benefits of saving biodiversity."

Mr Sukhdev, who is on secondment to the UN Environment Programme (Uep) from the global markets division of Deutsche Bank, cited studies showing that money spent on nature preservation provided rates of return of between three and 75 times the initial investment.

Preserving forests kept fresh water systems intact, he noted. Coral reefs and mangroves protected communities from storm damage; and healthy ecosystems were essential for food production.

### **Reef notes**

There are a number of somewhat notional targets on the table in the run-up to Copenhagen.

One, an EU initiative that now has much wider support, is to keep the global average temperature rise since the pre-industrial age within 2C - which according to some analyses means carbon dioxide concentrations in the atmosphere cannot rise above 450 parts per million (ppm).

The current level is about 387ppm, and it is rising at about 2ppm each year, although this year's global recession may bring a blip.

### **OCEAN ACIDIFICATION**

Up to 50% of the CO<sub>2</sub> released by burning fossil fuels over the past 200 years has been absorbed by the world's oceans

This has lowered the pH value of seawater - the measure of acidity and alkalinity - by 0.1

The vast majority of liquids lie between pH 0 (very acidic) and pH 14 (very alkaline); 7 is neutral  
Seawater is mildly alkaline with a "natural" pH of about 8.2

The IPCC forecasts that ocean pH will fall by "between 0.14 and 0.35 units over the 21st Century, adding to the present fall of 0.1 units since pre-industrial times"

Mr Sukhdev's team heard evidence from coral scientists that these targets would not be enough to prevent damage to coral reefs around the tropics.

"There's evidence that current levels of CO<sub>2</sub> are already causing damage to reefs," said Alex Rogers from London's Institute of Zoology.

"Stabilising at anything more than about 350ppm will lead to further destruction, and really we need to be aiming for zero emissions."

Elevated carbon dioxide levels in the atmosphere have a twin impact on coral. They warm the oceans; but also, a portion of the extra CO<sub>2</sub> becomes dissolved in seawater, which makes it slightly more acidic (or less alkali).

Ocean pH levels have already decreased by about 0.1 since pre-industrial times.

A 2007 study showed that rates of coral growth on the Great Barrier Reef had fallen by 14% since 1990.

TEEB's analysis suggests that between half a billion and one billion people depend on coral reefs for at least part of their food supply.



Set up in 2007 by the German government and the European Commission, TEEB is now supported by some other governments (including the UK) and by UneP.

Its final report is due out in the second half of 2010, just before a key meeting of the UN biodiversity convention.

For that analysis, Mr Sukhdev's team will also attempt to capture the economics of fisheries loss, and finalise a complex matrix giving legislators comprehensive information about the costs and benefits of protecting - or destroying - various aspects of the natural world.

[Richard.Black-INTERNET@bbc.co.uk](mailto:Richard.Black-INTERNET@bbc.co.uk)

Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8233632.stm>

Published: 2009/09/02 13:42:11 GMT

## Galaxy's 'cannibalism' revealed

**The vast Andromeda galaxy appears to have expanded by digesting stars from other galaxies, research has shown.**



SPL

When an international team of scientists mapped Andromeda, they discovered stars that they said were "remnants of dwarf galaxies".

The astronomers report their findings in the journal Nature.

This consumption of stars has been suggested previously, but the team's ultra-deep survey has provided detailed images to show that it took place.

This shows the "hierarchical model" of galaxy formation in action.

The model predicts that large galaxies should be surrounded by relics of smaller galaxies they have consumed.

The scientists charted the outskirts of Andromeda in detail for the first time.

They discovered stars that could not have formed within the galaxy itself.

Pauline Barmby, an astronomer from the University of Western Ontario, Canada, who was involved in the study, told BBC News the pattern of the stars' orbits revealed their origin.

"Andromeda is so close that we can map out all the stars," she said.

"And when you see a sort of lump of stars that far out, and with the same orbit, you know they can't have been there forever."

Andromeda, which is approximately 2.5 million light-years from Earth, is still expanding, say the scientists.



The researchers also saw a "stream of stars" of a nearby galaxy called Triangulum "stretching" towards Andromeda.

Dr Scott Chapman, reader in astrophysics at the Institute of Astronomy, University of Cambridge, UK, was also involved in the research.

He said: "Ultimately, these two galaxies may end up merging completely.

"Ironically, galaxy formation and galaxy destruction seem to go hand in hand."

Nickolay Gnedin, an astrophysicist from the University of Chicago, US, who was not involved in this study, described the work as showing "galactic archaeology in action".

Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8234898.stm>

Published: 2009/09/03 01:37:00 GMT

## First Genetic Link Between Reptile And Human Heart Evolution Found



*Embryo hearts show evolution of the heart from a three-chambered in frogs to a four-chambered in mammals. (Credit: Zina Deretsky, National Science Foundation after Benoit Brueau, the Gladstone Institute of Cardiovascular Disease)*

ScienceDaily (Sep. 3, 2009) — Scientists at the Gladstone Institute of Cardiovascular Disease (GICD) have traced the evolution of the four-chambered human heart to a common genetic factor linked to the development of hearts in turtles and other reptiles.

The research, published in the September 3 issue of the journal *Nature*, shows how a specific protein that turns on genes is involved in heart formation in turtles, lizards and humans.

"This is the first genetic link to the evolution of two, rather than one, pumping chamber in the heart, which is a key event in the evolution of becoming warm-blooded," said Gladstone investigator Benoit Bruneau, PhD, who led the study. "The gene involved, Tbx5, is also implicated in human congenital heart disease, so our results also bring insight into human disease."

From an evolutionary standpoint, the reptiles occupy a critical point in heart evolution.

While bird and mammalian hearts have four chambers, frogs and other amphibians have three. "How did hearts evolve from three to four chambers?" Bruneau said. "The different reptiles offer a sort of continuum from three to four chambers. By examining them, we learned a lot about how the human heart chambers normally form."

He explained that with four chambers—two atria and two ventricles—humans and all other mammals have completely separate blood flows to the lungs and to the rest of the body, which is essential for us to be warm-blooded.

When it comes to reptiles, such as turtles and lizards, there is debate about whether they have one or two ventricles, which are the pumping chambers. "The main question for us to understand the evolution of the heart was to identify the true nature of these early reptile ventricles and to figure out what controls the separation of the heart into left and right sides," said Dr. Bruneau.

To better understand reptile heart evolution, Dr. Bruneau's team used modern molecular genetics to examine Tbx5. Mutations in the human gene that encodes Tbx5 result in congenital heart disease and, in particular, defects in the ventricular septum, the muscular wall that separates the ventricle into two sections. Tbx5 is a transcription factor, a protein that turns other genes on or off. In humans and other mammals, Tbx5 levels are high in the left ventricle and low in the right. The boundary of high and low levels is right where the septum forms to divide the ventricle into two parts. "Based on these

observations," said Dr. Bruneau, "we thought Tbx5 was a good candidate as a key player in the evolution of septation."

The team looked at Tbx5 distribution in the turtle and the green anole lizard. During the early stages of heart formation in both reptiles, Tbx5 activity is found throughout the embryonic ventricular chamber. In the lizard, which forms only one ventricle, this pattern stays the same as the heart develops. However, in the turtle, which has a primitive septum that partially separates the ventricles into left and right sides, distribution of Tbx5 is later gradually restricted to the area of the left ventricle, resulting in a left-right gradient of Tbx5 activity. This meant that the gradient of Tbx5 forms later and less sharply in the turtle than in species with a clear septum, such as mammals, providing a tantalizing clue about how septation evolved.

They then wanted to determine whether Tbx5 was really a main regulator of septation or merely a bystander. Mice were genetically engineered to express Tbx5 at a moderate level throughout the developing heart, just like in turtle hearts. By mimicking the turtle pattern, mouse hearts now resembled turtle hearts. The offspring from these mice died young and had only a single ventricle. This striking result conclusively showed that a sharp line delineating an area of high level of Tbx5 is critical to induce formation of a septum between the two ventricles.

"This really nailed the importance of Tbx5 in patterning the heart to allow septation to occur," said Dr. Bruneau.

During evolution, new genetic regulatory elements evolved to tell the Tbx5 gene to form a sharp boundary of Tbx5 expression. This resulted in two ventricles. Researchers will now work to identify those genetic regulatory mechanisms during the evolution of reptiles. The work also has important implications for the understanding of congenital heart defects, which are the most common human birth defect, occurring in one out of every one hundred births worldwide. Humans born with only one pumping chamber, resembling frog hearts, suffer the highest mortality and require extensive surgery as newborns.

"Our study provides exciting new insights into the evolution of the heart, which had not been examined in over 100 years," Dr. Bruneau explained. "In a larger context, it provides good support for the concept that changes in the expression levels of various regulatory molecules are important in evolution. From these studies we also hope to understand further how defects in septation occur in humans with congenital heart disease."

Other contributors to the research were Gladstone's Kazuko Koshiba-Takeuchi, Alessandro D. Mori, Bogac L. Kanyak and Tatyana Sukonnik; Judith Cebara-Thomas of Millersville University, Romain O. Georges and Mona Nemer of the University of Montreal; Stephany Latham, Laurel Beck and Juli Wade of Michigan State University; R. Mark Henkelman, Hospital for Sick Children, Toronto; Eric N. Olson, University of Texas Southwestern, Scott F. Gilbert, Swarthmore College; Jun Takeuchi, Tokyo Institute of Technology; and Brian L. Black, University of California, San Francisco.

The study was supported by the March of Dimes, William H. Younger, Jr., the NIH, the National Science Foundation, the University of Toronto, the Fumi Yamamura Foundation, the Sumitomo and Nakajima Foundations, the Heart and Stroke Foundation of Canada and the Canadian Institutes for Health Research.

Benoit Bruneau's primary affiliation is with the Gladstone Institute of Cardiovascular Disease where he is the William H. Younger, Jr. Investigator, and where his laboratory is located and all of his research is conducted. He is also Associate Professor of Pediatrics at the University of California, San Francisco.

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*Adapted from materials provided by Gladstone Institutes.*

<http://www.sciencedaily.com/releases/2009/09/090902133629.htm>

## Moths Cloaked In Color: Reexamining Parallel Evolution In Diurnal Neotropical Moths



*Phaeochlaena hazara* belongs in the "tiger strip" mimicry complex and is widely distributed in the Amazon. (Credit: James Miller)

ScienceDaily (Sep. 3, 2009) — Travelers to the neotropics—the tropical lands of the Americas—might be forgiven for thinking that all of the colorful insects flitting over sunny puddles or among dense forest understory are butterflies. In fact, many are not. Some are moths that have reinvented themselves as butterflies, converging on the daytime niche typically dominated by their less hairy relatives. Now, a new revision of the taxonomic relationships among one such group of insects, the subfamily Dioptinae, sheds light on the diversity of tropical moth species and presents a unique story of parallel evolution.

"These diurnal moths are a microcosm of butterfly evolution," says James Miller, author of the new *Bulletin of the American Museum of Natural History* and a research associate in the Division of Invertebrate Zoology at the Museum. "There are about 500 spectacular dioptine species, all of which evolved from a common ancestor—a nondescript brown nocturnal moth—into a diversity of butterfly mimics." Miller qualifies this with a technicality, though, noting that no one is sure whether butterflies or diurnal moths evolved their colors first (and who is really mimicking whom).

The wing pattern diversity within the subfamily is enormous: some species mimic clear-winged butterflies and inhabit the darker parts of the forest understory where their co-mimics fly. The caterpillars of these species feed on palms. Still others have wings that are colored blue and yellow and feed on melastomes. About 100 species feed on Passiflora, the poisonous passion flowers famous for being consumed by the caterpillars of Heliconius butterflies. In fact, although most of the Dioptinae are diurnal, or fly during the day, a few species like those in Xenomigia have re-conquered the night. Although most dioptines are neotropical, ranging from lowland jungles to cloud forests at 4,000 meters in the Andes, *Phryganidia californica* occurs in the western United States.

The Dioptinae were first recognized as a distinct insect group in 1862 by Francis Walker of the British Museum of Natural History. At the same time, they were pivotal to the writings of Henry Walter Bates after he returned from a decade of exploration and collecting in the Amazon. Bates described moths that fly with and obtain protection from similarly-colored but poisonous butterflies that derive their toxicity from the plants their caterpillars feed on. This system—whereby a harmless species gains protection from its resemblance to a toxic species—is now known as Batesian mimicry.

Miller's new revision of the Dioptinae is the first systematic look at this group in almost a century. After studying over 16,700 specimens housed at 38 different institutions and private collections around the world, Miller discovered and described 64 new species and seven new genera, bringing the total to 456 species in 43 genera. Some of the new species were found during field work in parts of the tropical Americas poorly explored by lepidopterists: *Xenomigia pinasi* from Río Chalpi Grande, Ecuador; *Erbessa albilinea* and *Getta tica* from Braulio Carrillo, Costa Rica; *Phintia broweri* from Tambopata, Peru, and *Erbessa lamasi* from the remote Cosñipata Valley of southeastern Peru. Even so, there is much more work to be done on the Dioptinae. Miller estimates that there are about 100 to 150 species in collections that still need to be described and inserted into the taxonomy, and he thinks that additional fieldwork in under-sampled countries like Bolivia and Colombia will ultimately bring the total number of species to between 700 and 800.

Miller's first step in shedding light on the Dioptinae was to develop an evolutionary tree, or phylogeny. This tree is based on adult morphology of the moths: using 305 characters among 115 of the species (representing all 43 genera), Miller determined that the group was divided into two tribes, Josiini and Dioptini. The first contains the Passiflora-feeders, while the second includes species with a remarkable range of host plants. It is interesting that in an age dominated by DNA analysis, adult morphological traits provided the structure for a very solid phylogeny for this group of animals.

Other taxonomic changes were also found. The previous classification, published in 1930, had little structure; species whose wing patterns essentially looked the same were lumped together. Miller's careful analysis has dissected these taxonomic groups, finding that 47 of the previously named species could be included within another existing species. Consequently, the total number of species has not increased substantially since the previous systematic review. Miller also found that clear-winged moths evolved four times within the Dioptinae and belong in four different genera. Similarly, moths from the passion-flower feeding group that have orange or yellow stripes radiating from the wing base had previously been put into one genus but are now determined to represent two separate evolutionary events; they belong in two different genera, *Josia* and *Lyces*.

"This Bulletin takes a previously unknown but vastly interesting group of insects and provides a means to identify them," says Miller. "Now, there is a real classification for this group, a sort-of launching pad for future investigations into a broad range of evolutionary topics."

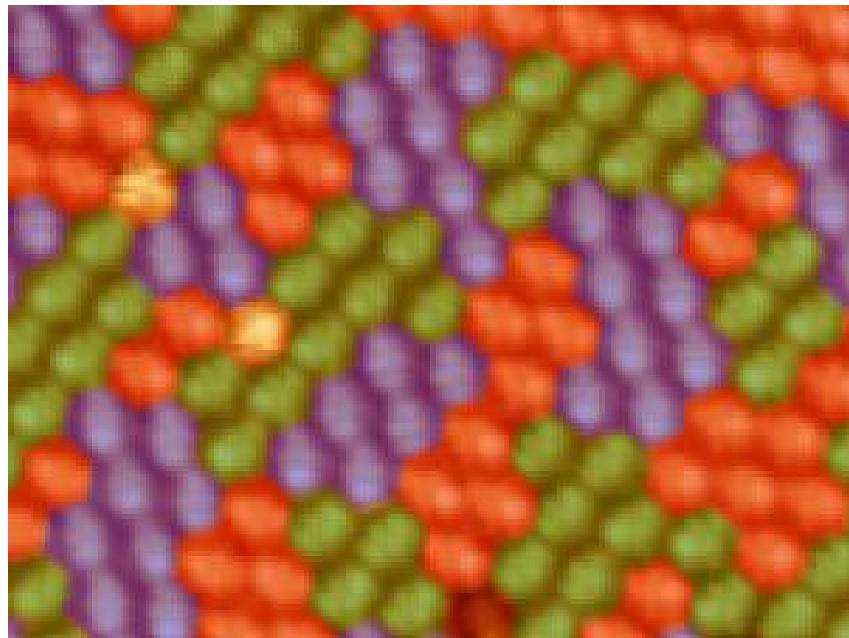
All taxonomic information collected from this research has been placed in the Discover Life database and is currently being entered into the Lepidoptera Tree of Life. This research was funded in part by the National Science Foundation, the American Museum of Natural History, and by Museum trustee Robert G. Goelet. The author also acknowledges the support of the Museum's Lee Herman, David Grimaldi, Toby Schuh, and Steve Thurston, among many others. The Museum is one of the world's foremost venues for publishing large scientific monographs like Miller's Bulletin.

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*Adapted from materials provided by [American Museum of Natural History](#), via [EurekAlert!](#), a service of AAAS.*

<http://www.sciencedaily.com/releases/2009/08/090831130753.htm>

## Nano Data Storage: Researchers Study Ordering Mechanism In Metallofullerenes



*Metallofullerenes – when deposited on a surface – form ordered islands of identically orientated molecules. This scanning tunnelling microscopy image has been reproduced in colour in order to improve visual analysis – a different colour has been used for each individual orientation of the molecules. (Credit: Image courtesy of Empa)*

ScienceDaily (Sep. 3, 2009) — Interest is growing in the use of metallofullerenes – carbon “cages” with embedded metallic compounds – as materials for miniature data storage devices. Researchers at Empa have discovered that metallofullerenes are capable of forming ordered supramolecular structures with different orientations. By specifically manipulating these orientations it might be possible to store and subsequently read out information.

Carbon exists in the form of diamond, graphite and nanotubes – and also as so-called fullerenes. The spherical structures of such fullerene "cages" - the most frequently-observed representative of which contains 60 carbon atoms and looks exactly like a football – may also serve as “nanocontainers” for metallic compounds. These so-called metallofullerenes have special electronic properties, which are of particular interest to the IT industry for use as possible "nano" data storage materials.

Together with colleagues at the University of Zurich, the Paul Scherrer Institute and the Leibniz Institute in Dresden, researchers in Empa’s “nanotech@surfaces” laboratory have been studying metallofullerenes and have been able to show that, when deposited on a surface, these form ordered islands with domains of identically orientated molecules. Different orientations have, however, been found for the endohedral metallic compounds. Provided an external stimulus could be found which would be able to bring about a change between different orientations – like a switch – the basic mechanism for data storage would have been achieved.

Empa researchers published their results in the journal *Physical Review B*.

### Footballs with content

Fullerenes were discovered in the 1980's as the third modification of carbon. Soon after, researchers began working on the idea of embedding clusters consisting of individual elements or compounds into the structures of these “nano-cages”. The synthesis of such molecules – so-called endohedral fullerenes – was

achieved just a few years later. Metallofullerenes have primarily attracted interest in the IT and pharmaceutical sectors. Among other applications, metallofullerenes can be used to provide a contrast medium for use in magnetic resonance tomography.

The molecules studied by Empa researchers are endohedral metallofullerenes, consisting of 80 carbon atoms forming the carbon cage with an embedded tri-metal nitride (1 nitrogen atom, 3 metal atoms) unit. The metal used is dysprosium (Atomic Number 66), an element of the lanthanides group. Endohedral complexes cannot be formed with all metallic elements in the periodic table – the lanthanides, however, can be successfully put inside the carbon cage. There are, in fact, very few alternative uses of the element dysprosium. One application is the use of the metal as an alloy with lead for the shielding of nuclear reactors.

The research was carried out by producing a single molecule-thin layer of the metallofullerene on a copper substrate. The ordering of the metallofullerene on the substrate was then investigated by means of a scanning tunnelling microscope and through photoelectron diffraction performed at the “Swiss Light Source” (SLS) – the Paul Scherrer Institute’s synchrotron facility. The experiments showed that the embedded metallic compound “feels” the substrate and takes compatible orientations.

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#### **Journal reference:**

1. Treier et al. **Looking inside an endohedral fullerene: Inter- and intramolecular ordering of Dy<sub>3</sub>N@C<sub>80</sub> (I<sub>h</sub>) on Cu(111).** *Physical Review B*, 2009; 80 (8): 081403 DOI: [10.1103/PhysRevB.80.081403](https://doi.org/10.1103/PhysRevB.80.081403)

*Adapted from materials provided by Empa, via AlphaGalileo.*

<http://www.sciencedaily.com/releases/2009/08/090831214020.htm>

## Rise In Weight-loss Drugs Prescribed To Combat Childhood Obesity

ScienceDaily (Sep. 3, 2009) — Thousands of children and adolescents are using anti-obesity drugs that in the UK are only licensed for use by adults. The number of young people receiving prescriptions for these drugs has increased 15-fold since 1999, but most stop using them before they could expect to see any benefit, according to a new study.

The study, published in the British Journal of Clinical Pharmacology, focuses on prescriptions in the UK, where the drugs are not licensed for use under the age of 18. Extrapolated across the whole population, the results indicate that around 1,300 young people are now being prescribed off-licence anti-obesity drugs each year.

More than three quarters of those included in the study received prescriptions for orlistat, also known as Xenical or Alli. Orlistat has been approved for children as young as 12 in the US, but only for adults in the UK. Most patients given orlistat stopped using it very quickly, on average after just three months, and therefore would have been unlikely to see any benefit.

"It's possible that the drugs are being given inappropriately, or that they have excessive side effects that make young people discontinue their use. On the other hand they could be expecting the drugs to deliver a miracle "quick fix" and stop using them when sudden, rapid weight loss does not occur," said Russell Viner, one of the authors of the study based at the General & Adolescent Paediatrics Unit at University College London.

As anti-obesity medications are expensive, not sticking to drug programmes wastes valuable resources. Study author Ian Wong says that children who are prescribed orlistat may need more support and should be made fully aware of the potential side effects, which include loose, oily stools if fat intake is not reduced.

"You have to tell them that, yes, it is healthier not to absorb the fat, but if they continue to eat as much as they used to then it will be really unpleasant. The key thing is that the drug itself is not the answer. Kids should only be using it as part of a comprehensive weight-loss programme," said Wong.

The researchers used data from the General Practice Research Database, which covers around 5% of the UK population. 452 children and adolescents were prescribed anti-obesity drugs between 1999 and 2006. Over eight years, the number of young people receiving prescriptions rose 15-fold from 0.006 per 1,000 to 0.091 per 1,000.

According to the researchers, it is highly unlikely that the drugs are doing any damage, as well-conducted short-term clinical trials did not report life-threatening side-effects in young people. But they say further research into the safety and efficacy of anti-obesity drugs in children and adolescents in clinical practice is warranted, particularly considering the dramatic increase in prescriptions and likely further increases due to childhood obesity globally.

### Journal reference:

1. Viner, R.M., Hsia, Y., Neubert., and Wong, I.C.K. **Rise in anti-obesity drug prescribing for children and adolescents in the UK: a population-based study.** *British Journal of Clinical Pharmacology*, 2009; DOI: [10.1111/j.1365-2125.2009.03528.x](https://doi.org/10.1111/j.1365-2125.2009.03528.x)

*Adapted from materials provided by Wiley-Blackwell, via EurekAlert!, a service of AAAS.*

<http://www.sciencedaily.com/releases/2009/09/090902195238.htm>

## Believing Is Seeing: Thoughts Color Perception -- Implications From Everyday Misunderstandings To Eyewitness Memory



Researchers showed experimental participants still photographs of faces computer-morphed to express ambiguous emotion and instructed them to think of these faces as either angry or happy. Once an ambiguous look was interpreted, it biased subsequent perception. (Credit: Courtesy of Piotr Winkielman, UC San Diego)

ScienceDaily (Sep. 3, 2009) — Folk wisdom usually has it that "seeing is believing," but new research suggests that "believing is seeing," too – at least when it comes to perceiving other people's emotions.

An international team of psychologists from the United States, New Zealand and France has found that the way we initially think about the emotions of others biases our subsequent perception (and memory) of their facial expressions. So once we interpret an ambiguous or neutral look as angry or happy, we later remember and actually see it as such.

The study, published in the September issue of the journal *Psychological Science*, "addresses the age-old question: 'Do we see reality as it is, or is what we see influenced by our preconceptions?'" said coauthor Piotr Winkielman, professor of psychology at the University of California, San Diego. "Our findings indicate that what we think has a noticeable effect on our perceptions."

"We imagine our emotional expressions as unambiguous ways of communicating how we're feeling," said coauthor Jamin Halberstadt, of the University of Otago in New Zealand, "but in real social interactions, facial expressions are blends of multiple emotions – they are open to interpretation. This means that two people can have different recollections about the same emotional episode, yet both be correct about what they 'saw.' So when my wife remembers my smirk as cynicism, she is right: her explanation of the expression at the time biased her perception of it. But it is also true that, had she explained my expression as empathy, I wouldn't be sleeping on the couch."

"It's a paradox," Halberstadt added. "The more we seek meaning in other emotions, the less accurate we are in remembering them."

The researchers point out that implications of the results go beyond everyday interpersonal misunderstandings – especially for those who have persistent or dysfunctional ways of understanding emotions, such as socially anxious or traumatized individuals. For example, the socially anxious have negative interpretations of others' reactions that may permanently color their perceptions of feelings and intentions, perpetuating their erroneous beliefs even in the face of evidence to the contrary. Other applications of the findings include eyewitness memory: A witness to a violent crime, for example, may attribute malice to a perpetrator – an impression which, according to the researchers, will influence memory for the perpetrator's face and emotional expression.

The researchers showed experimental participants still photographs of faces computer-morphed to express ambiguous emotion and instructed them to think of these faces as either angry or happy. Participants then

watched movies of the faces slowly changing expression, from angry to happy, and were asked to find the photograph they had originally seen. People's initial interpretations influenced their memories: Faces initially interpreted as angry were remembered as expressing more anger than faces initially interpreted as happy.

Even more interesting, the ambiguous faces were also perceived and reacted to differently. By measuring subtle electrical signals coming from the muscles that control facial expressions, the researchers discovered that the participants imitated – on their own faces – the previously interpreted emotion when viewing the ambiguous faces again. In other words, when viewing a facial expression they had once thought about as angry, people expressed more anger themselves than did people viewing the same face if they had initially interpreted it as happy.

Because it is largely automatic, the researchers write, such facial mimicry reflects how the ambiguous face is perceived, revealing that participants were literally seeing different expressions.

"The novel finding here," said Winkielman, of UC San Diego, "is that our body is the interface: The place where thoughts and perceptions meet. It supports a growing area of research on 'embodied cognition' and 'embodied emotion.' Our corporeal self is intimately intertwined with how – and what – we think and feel."

Also coauthors on the study are Paula Niedenthal and Nathalie Dalle, both at the Université Blaise Pascal, Clermont-Ferrand, France.

The research was supported by a National Science Foundation grant to Winkielman and Niedenthal and a University of Otago Research Grant to Halberstadt.

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*Adapted from materials provided by University of California - San Diego.*

<http://www.sciencedaily.com/releases/2009/09/090902161116.htm>

## 'S' Stands For Surprise: Anticoagulant Plays Unexpected Role In Maintaining Circulatory Integrity

*In the top image an inert red dye injected into the circulation of normal mice remains confined within blood vessels (green) of the brain. Whereas in the bottom image the same red dye injected into the circulation of mice with a 50 percent reduction in the level of Protein S leaks out of brain vessels (green), and leaches into the surrounding brain tissue.*  
*(Credit: Courtesy of Tal Burstyn-Cohen)*

ScienceDaily (Sep. 3, 2009) — Protein S, a well-known anticoagulant protein, keeps the blood flowing in more than one way, discovered researchers at the Salk Institute for Biological Studies. The protein contributes to the formation and function of healthy blood vessels.

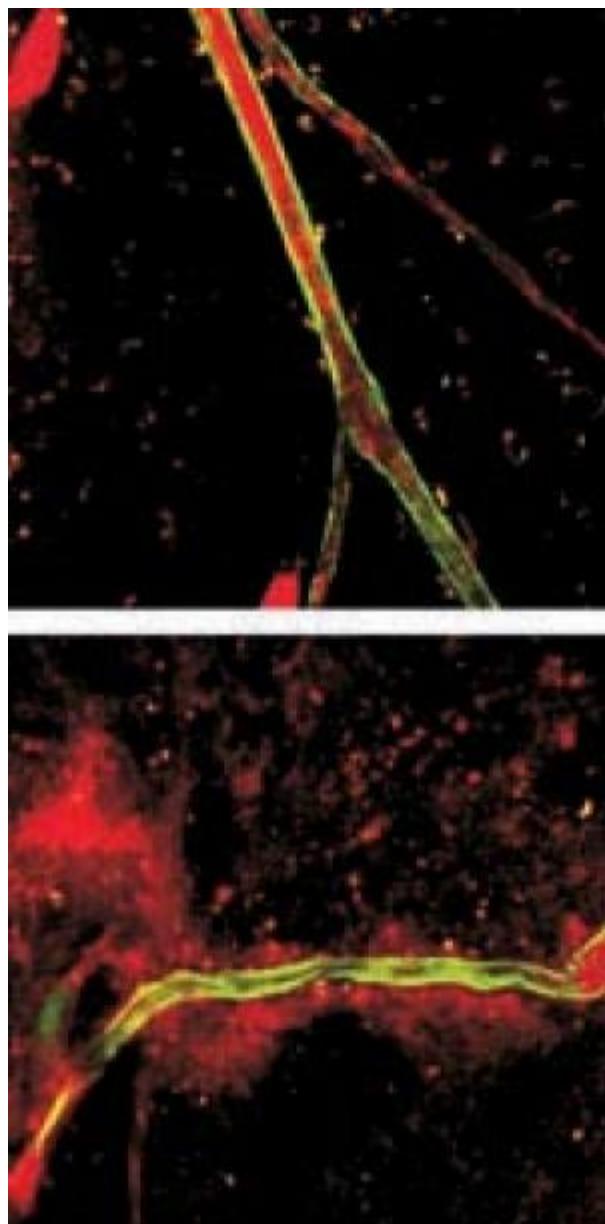
The researchers found that mice lacking protein S suffered massive blood clots, but also had defective blood vessels that allow blood cells to leak into the surrounding tissue.

"We had anticipated finding clotting problems, but the prominent role of protein S in the development and maintenance of blood vessels was completely unexpected," says first author Tal Burstyn-Cohen, Ph.D., a former post-doc in the Molecular Neurobiology Laboratory and now at the Department of Ophthalmology, Hadassah Medical Center, Jerusalem, Israel.

There are more than 200 known human mutations and polymorphisms in the gene coding for protein S, which was arbitrarily named after Seattle, the city of its discovery. The resulting deficiencies predispose carriers to deep venous thrombosis, strokes at an early age, recurrent miscarriages, and pre-eclampsia, and are associated with several autoimmune diseases, most prominently systemic lupus erythematosus.

"Protein S is a really interesting molecule," says Greg Lemke, Ph.D., a professor in the Salk's Molecular Neurobiology Laboratory, who led the study, which appears in the Sept. 1, 2009, issue of the *Journal of Clinical Investigation*. "During the course of evolution, it was co-opted from the coagulation cascade for the regulation of inflammation in the immune system."

The moment a blood vessel is breached, the coagulation cascade activates a series of enzymes in domino-like fashion, which allows the rapid formation of a plug at the site of injury. As part of a carefully calibrated system of checks and balances, Protein S aids with the inactivation of clotting factors Va and VIIIa, preventing excessive clotting.



In patients who are born with two abnormal copies of the protein S gene, a severe form of thrombosis called purpura fulminans can result. This life-threatening condition involves severe clotting throughout much of the body, ultimately causing death to the tissues.

But Protein S also binds to and activates a trio of receptors, Tyro3, Axl, and Mer, which are collectively known as TAMs. Apart from being involved in a host of cellular processes, the TAMs most famously act as a molecular "trip switch" that prevents the immune system from spiraling out of control and turning against one's own body.

Though protein S's dual role in coagulation and inflammation is one that scientists have known about for years, its exact function has remained a mystery. Lemke and Burstyn-Cohen, wanting to understand the molecular details, created knockout mice missing the ProS1 gene, which encodes protein S.

"It was the last gene encoding a critical component of the blood coagulation cascade to be inactivated in mice," says Burstyn-Cohen, "and the resulting phenotype is probably the most severe of them all." Mice without functional protein S die in utero with massive consumptive blood clots, which soak up all available clotting factors, causing severe hemorrhaging elsewhere.

In addition to blood clots, these mice also had problems with vascular integrity and the functioning of these blood vessels. "TAM receptors are important for maintaining the physiological integrity of the smooth muscles that line blood vessels," explains Burstyn-Cohen. "Without protein S the muscle layer is disordered, and the vessels become leaky."

Like other components of the clotting cascade, most of the circulating protein S is produced by hepatocytes in the liver, or so it was thought. When Burstyn-Cohen shut down the production of protein S in hepatocytes, however, levels of protein S only dropped by half. A closer look revealed that the endothelial cells lining blood vessels themselves provided most of the remaining protein.

"Blood clotting disorders are a good target for gene therapy since the absence of a single factor can sabotage the body's ability to stanch bleeding or stop the coagulation process," says Lemke. "Our findings suggest that in addition to hepatocytes, endothelial cells, which are easily accessible via the circulatory system, may be a particularly good target for gene therapy to correct genetic or acquired defects in ProS or other regulators of blood coagulation."

This work was supported by the National Institutes of Health, grants from the Lupus Research Institute, the Stein Endowment Fund, and the Hoffman Foundation.

Mary Jo Heeb, Ph.D., in the Department of Molecular and Experimental Medicine at The Scripps Research Institute, La Jolla, also contributed to this work.

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

<http://www.sciencedaily.com/releases/2009/09/090901172834.htm>

## Computational Process Zeroes In On Top Genetic Cancer Suspects



*Rachel Karchin, right, an assistant professor of biomedical engineering, and doctoral student Hannah Carter led a Johns Hopkins team that developed software to narrow the search for mutations linked to cancer. (Credit: Photo by Will Kirk)*

ScienceDaily (Sep. 2, 2009) — Johns Hopkins engineers have devised innovative computer software that can sift through hundreds of genetic mutations and highlight the DNA changes that are most likely to promote cancer. The goal is to provide critical help to researchers who are poring over numerous newly discovered gene mutations, many of which are harmless or have no connection to cancer. According to its inventors, the new software will enable these scientists to focus more of their attention on the mutations most likely to trigger tumors.

A description of the method and details of a test using it on brain cancer DNA were published in the August 15 issue of the journal *Cancer Research*.

The new process focuses on missense mutations, meaning protein sequences that each possess a single tiny variation from the normal pattern. A small percentage of these genetic errors can reduce the activity of proteins that usually suppress tumors or hyperactivate proteins that make it easier for tumors to grow, thereby allowing cancer to develop and spread. But finding these genetic offenders can be difficult.

“It’s very expensive and time-consuming to test a huge number of gene mutations, trying to find the few that have a solid link to cancer,” said Rachel Karchin, an assistant professor of biomedical engineering who supervised the development of the computational sorting approach. “Our new screening system should dramatically speed up efforts to identify genetic cancer risk factors and help find new targets for cancer-fighting medications.”

The new computational method is called CHASM, short for Cancer-specific High-throughput Annotation of Somatic Mutations.

Developing this system required a partnership of researchers from diverse disciplines. Karchin and doctoral student Hannah Carter drew on their skills as members of the university’s Institute for Computational Medicine, which uses powerful information management and computing technologies to address important health problems, and collaborated with leading Johns Hopkins cancer and biostatistics experts from the university’s School of Medicine, its Bloomberg School of Public Health and the Johns Hopkins Kimmel Cancer Center.

The team first narrowed the field of about 600 potential brain cancer culprits using a computational method that would sort these mutations into “drivers” and “passengers.” Driver mutations are those that initiate or promote the growth of tumors. Passenger mutations are those that are present when a tumor forms but appear to play no role in its formation or growth. In other words, the passenger mutations are only along for the ride.

To prepare for the sorting, the researchers used a machine-learning technique in which about 50 characteristics or properties associated with cancer-causing mutations were given numerical values and programmed into the system. Karchin and Carter then employed a math technique called a Random Forest classifier to help separate and rank the drivers and the passengers. In this step, 500 computational “decision trees” considered each mutation to decide whether it possessed the key characteristics associated with promoting cancer. Eventually, each “tree” cast a vote: Was the gene a driver or a passenger?

“It’s a little like the children’s game of ‘Guess Who,’ where you ask a series of yes or no questions to eliminate certain people until you narrow it down to a few remaining suspects,” said Carter, who earned her undergraduate and master’s degrees at the University of Louisville and served as lead author of the Cancer Research paper. “In this case, the decision trees asked questions to figure out which mutations were most likely to be implicated in cancer.”

The election results—such as how many driver votes a mutation received—were used to produce a ranking. The genetic errors that collected the most driver votes wound up at the top of the list. The ones with the most passenger votes were placed near the bottom. With a list like this in hand, the software developers said, cancer researchers can direct more of their time and energy to the mutations at the top of the rankings.

Karchin and Carter plan to post their system on the Web and will allow researchers worldwide to use it freely to prioritize their studies. Because different genetic characteristics are associated with different types of cancers, they said the method can easily be adapted to rank the mutations that may be linked to different forms of the disease, such as breast cancer or lung cancer.

In addition to Karchin and Carter, the Johns Hopkins co-authors of the Cancer Research paper were Sining Chen, Leyla Isik, Svitlana Tyekucheva, Victor E. Velculescu, Kenneth W. Kinzler and Bert Vogelstein.

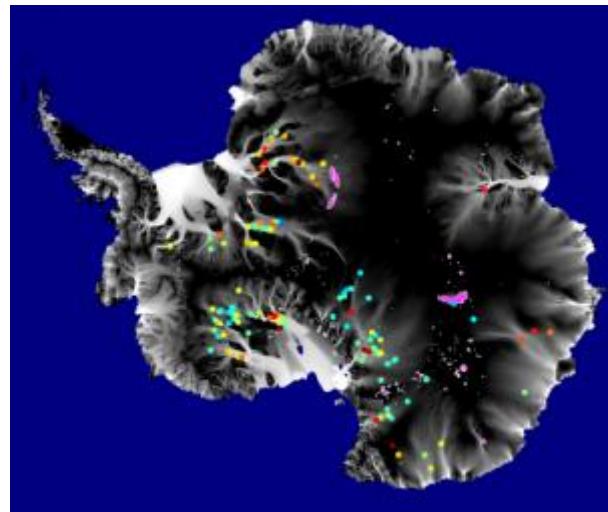
Funding for the research was provided by the National Cancer Institute, the Susan G. Komen Foundation, the Virginia and D. K. Ludwig Fund for Cancer Research and the National Institutes of Health.

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*Adapted from materials provided by Johns Hopkins University.*

<http://www.sciencedaily.com/releases/2009/09/090901172836.htm>

## Map Characterizes Active Lakes Below Antarctic Ice



*Dots represent the locations where scientists have identified 124 active lakes below the ice sheet in Antarctica. Warmer colors (orange and red) depict lakes with larger water volumes while cooler colors (green and blue) depict lakes with smaller volumes. Purple areas show the locations of previously known inactive lakes. (Credit: Ben Smith, University of Washington)*

ScienceDaily (Sep. 2, 2009) — Lakes in Antarctica, concealed under miles of ice, require scientists to come up with creative ways to identify and analyze these hidden features. Now, researchers using space-based lasers on a NASA satellite have created the most comprehensive inventory of lakes that actively drain or fill under Antarctica's ice. They have revealed a continental plumbing system that is more dynamic than scientists thought.

"Even though Antarctica's ice sheet looks static, the more we watch it, the more we see there is activity going on there all the time," said Benjamin Smith of the University of Washington in Seattle, who led the study.

Unlike most lakes, Antarctic lakes are under pressure from the ice above. That pressure can push melt water from place to place like water in a squeezed balloon. The water moves under the ice in a broad, thin layer, but also through a linked cavity system. This flow can resupply other lakes near and far.

Understanding this plumbing is important, as it can lubricate glacier flow and send the ice speeding toward the ocean, where it can melt and contribute to sea level change. But figuring out what's happening beneath miles of ice is a challenge. Researchers led by Smith analyzed 4.5 years of ice elevation data from NASA's Ice, Cloud and land Elevation satellite (ICESat) to create the most complete inventory to date of changes in the Antarctic plumbing system. The team has mapped the location of 124 active lakes, estimated how fast they drain or fill, and described the implications for lake and ice-sheet dynamics in the Journal of Glaciology.

### What Lies Beneath

For decades, researchers flew ice-penetrating radar on airplanes to "see" below the ice and infer the presence of lakes. In the 1990s, researchers began to combine airborne- and satellite-based data to observe lake locations on a continent-wide scale.

Scientists have since established the existence of about 280 "subglacial" lakes, most located below the East Antarctic ice sheet. But those measurements were a snapshot in time, and the question remained as to whether lakes are static or dynamic features. Were they simply sitting there collecting water?

In 2006 Helen Fricker, a geophysicist at the Scripps Institution of Oceanography, La Jolla, Calif., used satellite data to first observe subglacial lakes on the move. Working on a project to map the outline of Antarctica's land mass, Fricker needed to differentiate floating ice from grounded ice. This time it was laser technology that was up to the task. Fricker used ICESat's Geoscience Laser Altimeter System and measured how long it took a pulse of laser light to bounce off the ice and return to the satellite, from which she could infer ice elevation. Repeating the measurement over a course of time revealed elevation changes.

Fricker noticed, however, a sudden dramatic elevation change -- over land. It turned out this elevation change was caused by the filling and draining of some of Antarctica's biggest lakes.

"Sub-ice-sheet hydrology is a whole new field that opened up through the discovery of lakes filling and draining on relatively short timescales and involving large volumes of water," said Robert Bindschadler, a glaciologist at NASA's Goddard Space Flight Center in Greenbelt, Md., who has used ICESat data in other studies of Antarctica. "ICESat gets the credit for enabling that discovery."

### **Networking in the Antarctic**

But were active lakes under the ice a common occurrence or a fluke?

To find out, Ben Smith, Fricker and colleagues extended their elevation analysis to cover most of the Antarctic continent and 4.5 years of data from ICESat's Geoscience Laser Altimeter System (GLAS). By observing how ice sheet elevation changed between the two or three times the satellite flew over a section every year, researchers could determine which lakes were active. They also used the elevation changes and the properties of water and ice to estimate the volume change.

Only a few of the more than 200 previously identified lakes were confirmed active, implying that lakes in East Antarctica's high-density "Lakes District" are mostly inactive and do not contribute much to ice sheet changes. Most of the 124 newly observed active lakes turned up in coastal areas, at the head of large drainage systems, which have the largest potential to contribute to sea level change.

"The survey identified quite a few more subglacial lakes, but the locations are the intriguing part," Bindschadler said. "The survey shows that most active subglacial lakes are located where the ice is moving fast, which implies a relationship."

Connections between lakes are apparent when one lake drains and another simultaneously fills. Some lakes were found to be connected to nearby lakes, likely through a network of subglacial tunnels. Others appeared to be linked to lakes hundreds of miles away.

The team found that the rate at which lake water drains and fills varies widely. Some lakes drained or filled for periods of three to four years in steady, rather than episodic, changes. But water flow rates beneath the ice sheet can also be as fast as small rivers and can rapidly supply a lubricating film beneath fast-flowing glaciers.

"Most places we looked show something happening on short timescales," Smith said. "It turns out that those are fairly typical examples of things that go on under the ice sheet and are happening all the time all over Antarctica."

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*Adapted from materials provided by NASA/Goddard Space Flight Center.*

<http://www.sciencedaily.com/releases/2009/09/090901150949.htm>

## Bio-enabled, Surface-mediated Approach Produces Nanoparticle Composites



*Georgia Tech researcher Eugenia Kharlampieva studies the properties of composite materials containing silk and metallic nanoparticles. (Credit: Georgia Tech Photo: Gary Meek)*

ScienceDaily (Sep. 2, 2009) — Using thin films of silk as templates, researchers have incorporated inorganic nanoparticles that join with the silk to form strong and flexible composite structures that have unusual optical and mechanical properties. This bio-enabled, surface-mediated formation approach mimics the growth and assembly processes of natural materials, taking advantage of the ability of biomolecules to chemically reduce metal ions to produce nanoparticles without harsh processing conditions.

Less than 100 nanometers thick, silk-silver nanoparticle composite films formed in this process can be used for flexible mirrors and films that reflect light in specific wavelengths. The technique could also be used to create anti-microbial films, thin film sensors, self-cleaning coatings, catalytic materials and potentially even flexible photovoltaic cells.

"We are taking advantage of biological molecules that have the ability to bind metallic ions of silver or gold from solution," said Vladimir Tsukruk, a professor in the School of Materials Science and Engineering at the Georgia Institute of Technology. "These molecules can create mono-dispersed metallic nanoparticles of consistent sizes under ambient conditions – at room temperature and in a water-based environment without high vacuum or high temperatures."

Sponsored by the Air Force Office for Scientific Research and the Air Force Research Laboratory, the research is scheduled to be described August 19th at the Fall 2009 National Meeting of the American Chemical Society in Washington, D.C.

The nanoparticles produced range in size from four to six nanometers in diameter, surrounded by a biological shell of between one and two nanometers. The silk template permits good control of the nanoparticle placement, creating a composite with equally dispersed particles that remain separate. The optical properties of the resulting film depend on the nanoparticle material and size.

"This system provides very precise control over nanoparticle sizes," said Eugenia Kharlampieva, a postdoctoral researcher in Tsukruk's laboratory. "We produce well-defined materials without the problem

of precipitation, aggregation or formation of large crystals. Since the silk fibroin is mono-dispersed, we can create uniform domains within the template."

Fabrication of the nanocomposites begins by dissolving silk cocoons and making the resulting fibroin water soluble. The silk is then placed onto a silicon substrate using a spin-coating technique that produces multiple layers of thin film that is then patterned into a template using a nanolithography technique.

"Because silk is a protein, we can control the properties of the surface and design different kinds of surfaces," explained Kharlampieva. "This surface-mediated approach is flexible at producing different shapes. We can apply the method to coat any surface we want, including objects of complex shapes."

Next, the silk template is covered with a solution containing ions of gold, silver, or other metal. Over a period of time ranging from hours to days, the nanoparticles form within the template. The relatively long growth time, which operates at room temperature and neutral pH in a water-based environment, allows precise control of the particle size and spacing, Tsukruk noted.

"We operate at conditions that are suitable for biological activities," he said. "No reducing agents are required to produce the particles because the biomolecules serve as reducing agents. We don't add any chemicals that could be toxic to the protein."

Use of these mild processing conditions reduces the cost producing the composites and their potential environmental impact. When dried, the resulting silk-nanoparticle film has high tensile strength, high elasticity and toughness.

"Silk is almost as strong as Kevlar, but it can be deformed by 30 percent without breaking," said Tsukruk. "The silk film is very robust, with a complicated structure that you don't find in synthetic materials."

For the future, the researchers plan to use the bio-assisted, surface-mediated technique to produce nanoparticles from other metals. They also hope to combine different types of particles to create new optical and mechanical properties.

"If we combine gold-binding and silver-binding peptides, we can make composites that will include a mixture of gold and silver nanoparticles," said Kharlampieva. "Each particle will have its own properties, and combining them will create more interesting composite materials."

The researchers also hope to find additional applications for the films in such areas as photovoltaics, medical technology, and anti-microbial films that utilize the properties of silver nanoparticles.

Beyond Tsukruk and Kharlampieva, the research team has included Dmitry Zimnistky, Manesh Gupta and Kathryn Bergman of Georgia Tech; David Kaplan of the Department of Biomedical Engineering at Tufts University, and Rajesh Naik of the Materials and Manufacturing Directorate of the Air Force Research Laboratory at Wright-Patterson Air Force Base.

"Nanomaterials grown under environmentally friendly conditions can be as good as synthetic materials that are produced under harsh conditions," Tsukruk added. "This technique allows us to grow very useful materials under natural conditions."

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*Adapted from materials provided by [Georgia Institute of Technology](#), via [EurekAlert!](#), a service of AAAS.*

<http://www.sciencedaily.com/releases/2009/08/090819123935.htm>

## Diesel Exhaust Is Linked To Cancer Development Via New Blood Vessel Growth



*New research shows that diesel exhaust can induce the growth of new blood vessels that serve as a food supply for solid tumors. (Credit: iStockphoto)*

ScienceDaily (Sep. 2, 2009) — Scientists have demonstrated that the link between diesel fume exposure and cancer lies in the ability of diesel exhaust to induce the growth of new blood vessels that serve as a food supply for solid tumors.

The researchers found that in both healthy and diseased animals, more new blood vessels sprouted in mice exposed to diesel exhaust than did in mice exposed to clean, filtered air. This suggests that previous illness isn't required to make humans susceptible to the damaging effects of the diesel exhaust.

The tiny size of inhaled diesel particles, most less than 0.1 microns in diameter, potentially enables them to penetrate the human circulatory system, organs and tissues, meaning they can do this damage just about anywhere in the body. A micron is one millionth of a meter.

Diesel exhaust exposure levels in the study were designed to mimic the exposure people might experience while living in urban areas and commuting in heavy traffic. The levels were lower than or similar to those typically experienced by workers who use diesel-powered equipment, who tend to work in mines, on bridges and tunnels, along railroads, at loading docks, on farms and in vehicle maintenance garages, according to the U.S. Department of Labor.

"The message from our study is that exposure to diesel exhaust for just a short time period of two months could give even normal tissue the potential to develop a tumor," said Qinghua Sun, senior author of the study and an assistant professor of environmental health sciences at Ohio State University.

"We need to raise public awareness so people give more thought to how they drive and how they live so they can pursue ways to protect themselves and improve their health. And we still have a lot of work to do to improve diesel engines so they generate fewer particles and exhaust that can be released into the ambient air."

The research appears online and is scheduled for later print publication in the journal *Toxicology Letters*.

The researchers experimented with mice that resembled two conditions that could be present in a human body. In one, the scientists implanted a small platform seeded with normal endothelial cells, the cells that line blood vessels, under the skin of the mice. This was designed to mimic relatively normal conditions in human bodies for cell growth.

In the other, the researchers created an environment that would follow a significant loss of blood flow to a section of a vessel, called ischemia, in the hind limbs of the mice. This generated severe hypoxia, an area with low or no oxygen, a condition that is present in certain diseases.

Both types of mice were then exposed to either whole diesel exhaust containing particles at a concentration of about 1 milligram per cubic meter, or to filtered outdoor air, for six hours per day five days a week. The rest of the time they breathed filtered air in their cages. Effects of the exposure were measured after two weeks, five weeks and eight weeks of the exposures.

Though some blood vessel growth and chemical changes could be seen in the mice after two weeks of exposure, “generally, the longer the exposure, the more effects we could see,” said Sun, also an investigator in Ohio State’s Davis Heart and Lung Research Institute. “It’s difficult to translate outcomes from an animal study directly to the human experience, but the bottom line is, the shorter the exposure to diesel exhaust, the better.”

The exposure to diesel exhaust caused a six-fold increase in new blood vessel formation in the ischemic hind limbs after eight weeks and a four-fold increase in vessel sprouting in the normal hind limbs of the mice in the same amount of time, compared to mice breathing filtered air.

The researchers also saw significantly more blood vessel growth in the implanted cells and in rings of tissue taken from the aortas of mice exposed to the exhaust compared to the control mice exposed to clean air. In fact, the researchers found that three types of blood vessel development occurred in these areas after exposure to the diesel exhaust: angiogenesis, the development of new capillaries; arteriogenesis, the maturation or re-started growth of existing vessels; and vasculogenesis, the formation of new blood vessels.

All of these processes are associated with tumor growth, but unprogrammed angiogenesis in particular can wreak havoc in the human body, Sun said.

“Whenever you talk about a solid tumor, angiogenesis is one of the fundamental mechanisms behind its development. Angiogenesis provides the means for tumor cells to grow because they have to have a blood supply. Without a blood supply, solid tumors will not grow,” he said.

“We want our bodies to generate new blood vessels only when we need them. And then stop producing them when we need them to stop.”

Though the researchers have not defined every mechanism behind these processes, they sought to explain at least a few ways in which blood vessels are able to sprout or mature after exposure to diesel exhaust.

They observed that diesel exhaust exposure activated a chemical signal, vascular endothelial growth factor, which has long been associated with new blood vessel development. The exposure also increased levels of a protein, hypoxia-inducible factor 1, that is essential to blood vessel development when oxygen levels are low. At the same time, the presence of the exhaust lowered the activity of an enzyme that has a role in producing substances that can suppress tumor growth.

The scientists also tracked low-grade inflammation in tissues exposed to the exhaust, which is often associated with tumor development.



Though the tiny size of diesel exhaust particles may contribute to their ability to penetrate all areas of the body, Sun noted that their complex chemical composition, and the way in which those chemicals are released once particles enter the body, also influence how they react with human cells.

Gasoline exhaust particles are larger than diesel fume particles, but it's premature to suggest that they are any less dangerous to humans, Sun said.

"The bigger particles are known to be harmful primarily for upper respiratory tract illnesses. Larger particles also can't travel long distances – they tend to fall to the ground," he said. "Smaller particles hover in the air for a long time and can have long-term impact on humans when inhaled."

Sun and colleagues are now conducting a study testing whether the exhaust particles promote tumor development and metastasis.

This work is supported by Health Effects Institute awards and grants from the National Institutes of Health.

Co-authors on the study are Xiaohua Xu and Ling Zheng of Ohio State's Division of Environmental Health Sciences; Nishar Ahmed Kherada, Aixia Wang and Sanjay Rajagopalan of the Davis Heart and Lung Research Institute; Xinru Hong of the Department of Obstetrics and Gynecology at Fuzhou General Hospital in Fujian Province, China; Chunli Quan, Morton Lippmann and Lung Chi Chen of the Department of Environmental Medicine at the New York University School of Medicine; and Loren Wold of the Center for Cardiovascular and Pulmonary Research at Nationwide Children's Research Institute.

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*Adapted from materials provided by Ohio State University.*

<http://www.sciencedaily.com/releases/2009/09/090902110108.htm>

## Waist-hip Ratio Better Than BMI For Gauging Obesity In Elderly, Study Finds



New research shows that the ratio of waist size to hip size may be a better indicator when it comes to those over 70. (Credit: iStockphoto/Marc Dietrich)

ScienceDaily (Sep. 2, 2009) — Body mass index (BMI) readings may not be the best gauge of obesity in older adults, according to new research from UCLA endocrinologists and geriatricians. Instead, they say, the ratio of waist size to hip size may be a better indicator when it comes to those over 70.

In a new study published online in the peer-reviewed journal *Annals of Epidemiology*, researchers from the David Geffen School of Medicine at UCLA found that the waist-to-hip circumference ratio was a better yardstick for assessing obesity in high-functioning adults between the ages of 70 and 80, presumably because the physical changes that are part of the aging process alter the body proportions on which BMI is based.

"Basically, it isn't BMI that matters in older adults — it's waist size," said Dr. Preethi Srikanthan, UCLA assistant professor of endocrinology and the study's lead investigator. "Other studies have suggested that both waist size and BMI matter in young and middle-aged adults and that BMI may not be useful in older adults; this is one of the first studies to show that relative waist size does matter in older adults, even if BMI does not matter."

Using data from the MacArthur Successful Aging Study — a longitudinal study of high-functioning men and women between the ages of 70 and 79 — researchers examined all-cause mortality risk over 12 years by BMI, waist circumference and waist-hip ratio. They adjusted for gender, race, baseline age and smoking status. The average age of participants was 74.

Obesity is often associated with premature mortality because it leads to an increased risk of diabetes, heart attack, stroke and other major health problems, the study authors say.

The researchers found no association between all-cause mortality and BMI or waist circumference; the link was only with waist-hip ratio. In women, each 0.1 increase in the waist-hip ratio was associated with a 28 percent relative increase in mortality rate (the number of deaths per 100 older adults per year) in the group sampled. Thus, if the waist-hip ratio rose from 0.8 to 0.9 or from 0.9 to 1.0, it would mean a 28

percent relative increase in the death rate. Put another way, if hip size is 40 inches, an increase in waist size from 32 to 36 inches signaled a 28 percent relative death-rate increase.

The relationship was not graded in men. Instead there was a threshold effect: The rate of dying was 75 percent higher in men with a waist-hip ratio greater than 1.0 — that is, men whose waists were larger than their hips — relative to those with a ratio of 1.0 or lower. There was no such relationship with either waist size or BMI.

The study may have some limitations, the authors noted. For instance, participants' BMI may be underestimated because height and weight were self-reported and older adults tend to report those numbers from their younger, peak years. Also, waist-hip ratios, waist circumference and BMI numbers were based on single measurements, limiting the researchers' ability to gauge how changing body size in old age can affect mortality risk.

Teresa Seeman and Arun S. Karlamangla, both also of UCLA, were co-authors on the study.

The National Institute on Aging funded this research.

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

<http://www.sciencedaily.com/releases/2009/09/090901150951.htm>

## High School Put-downs Make It Hard For Students To Learn, Study Says

ScienceDaily (Sep. 2, 2009) — High-school put-downs are such a staple of teen culture that many educators don't take them seriously. However, a University of Illinois study suggests that classroom disruptions and psychologically hostile school environments can contribute to a climate in which good students have difficulty learning and students who are behind have trouble catching up.

"We need to get away from the idea that bullying is always physical. Bullying can also include verbal harassment, which can be just as damaging and detrimental to student learning," said Christy Lleras, a U of I assistant professor of human and community development. The study used data from the National Educational Longitudinal Study and included 10,060 African American, Latino, and white tenth graders in 659 U.S. high schools. It is one of the first to look at the national incidence of verbal harassment in public and private high schools, she said.

"In looking at whether students felt safe at school, students' fear for their physical safety was actually pretty low. But 70 percent of the students said they were bothered by disruptions in their classroom, and one in five students said that they were often put down by their peers in school," she said.

Lleras came to three interesting conclusions as she reviewed the data. One was that smaller, private, and more affluent schools do very little to protect students from verbal abuse. "I assumed that the sorts of school environments that protect students from physical harm would also protect students from emotional harm, and that was not the case. These 'safe' schools are not significantly reducing the likelihood that students will experience harassment by their peers," she said.

This was especially true for adolescent boys. The results showed that boys experience verbal harassment from peers more often than girls, particularly if they are in private schools, Lleras said. Lleras also found that African American high-school students who thought of themselves as very good students were more likely to experience verbal put-downs from their peers, but only when they were in high-minority schools.

Why would high-achieving African-American students in high-minority schools face more verbal harassment? Lleras doesn't believe it can be entirely attributed to the oppositional culture hypothesis—namely, that high-achieving minority students are more likely to be negatively sanctioned by their peers for their efforts than white students. She speculates that verbal put-downs in these schools may be a coping strategy that students use when they don't have the skills to do the work and have little hope of acquiring them in their academic environment.

"When high-achieving minority kids are put down by their peers, it can contribute to a climate in which lower-achieving kids fall farther and farther behind and must struggle to catch up. This hostile school climate isn't a cause of the racial achievement gap—we see evidence of the achievement gap well before middle school—but it contributes to it," she said.

"Sadly, verbal harassment is just one more thing these students have to deal with, and as long as we accept it because it's not physical bullying, we're doing a grave disservice to the kids who need non-disruptive and focused learning environments the most," she said.

The study was published in the *Journal of School Violence*.

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*Adapted from materials provided by University of Illinois at Urbana-Champaign, via EurekAlert!, a service of AAAS.*

<http://www.sciencedaily.com/releases/2009/09/090901105142.htm>



## Discovery Of Novel Genes Could Unlock Mystery Of What Makes Us Uniquely Human



A baby chimp (*Pan troglodytes*) and his handler looking at each other. (Credit: iStockphoto/Warwick Lister-Kaye)

ScienceDaily (Sep. 2, 2009) — Humans and chimpanzees are genetically very similar, yet it is not difficult to identify the many ways in which we are clearly distinct from chimps. In a study published online in *Genome Research*, scientists have made a crucial discovery of genes that have evolved in humans after branching off from other primates, opening new possibilities for understanding what makes us uniquely human.

The prevailing wisdom in the field of molecular evolution was that new genes could only evolve from duplicated or rearranged versions of preexisting genes. It seemed highly unlikely that evolutionary processes could produce a functional protein-coding gene from what was once inactive DNA.

However, recent evidence suggests that this phenomenon does in fact occur. Researchers have found genes that arose from non-coding DNA in flies, yeast, and primates. No such genes had been found to be unique to humans until now, and the discovery raises fascinating questions about how these genes might make us different from other primates.

In this work, David Knowles and Aoife McLysaght of the Smurfit Institute of Genetics at Trinity College Dublin undertook the painstaking task of finding protein-coding genes in the human genome that are absent from the chimp genome. Once they had performed a rigorous search and systematically ruled out false results, their list of candidate genes was trimmed down to just three. Then came the next challenge. "We needed to demonstrate that the DNA in human is really active as a gene," said McLysaght.

The authors gathered evidence from other studies that these three genes are actively transcribed and translated into proteins, but furthermore, they needed to show that the corresponding DNA sequences in other primates are inactive. They found that these DNA sequences in several species of apes and monkeys contained differences that would likely disable a protein-coding gene, suggesting that these genes were inactive in the ancestral primate.

The authors also note that because of the strict set of filters employed, only about 20% of human genes were amenable to analysis. Therefore they estimate there may be approximately 18 human-specific genes that have arisen from non-coding DNA during human evolution.

This discovery of novel protein-coding genes in humans is a significant finding, but raises a bigger question: What are the proteins encoded by these genes doing? "They are unlike any other human genes and have the potential to have a profound impact," McLysaght noted. While these genes have not been characterized yet and their functions remain unknown, McLysaght added that it is tempting to speculate that human-specific genes are important for human-specific traits.

Scientists from the Smurfit Institute of Genetics, Trinity College Dublin (Dublin, Ireland) contributed to this study.

This work was supported by a President of Ireland Young Researcher Award from Science Foundation Ireland.

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#### **Journal reference:**

1. Knowles DG, McLysaght A. **Recent de novo origin of human protein-coding genes.** *Genome Research*, 2009; DOI: [10.1101/gr.095026.109](https://doi.org/10.1101/gr.095026.109)

*Adapted from materials provided by [Cold Spring Harbor Laboratory](#), via [EurekAlert!](#), a service of AAAS.*

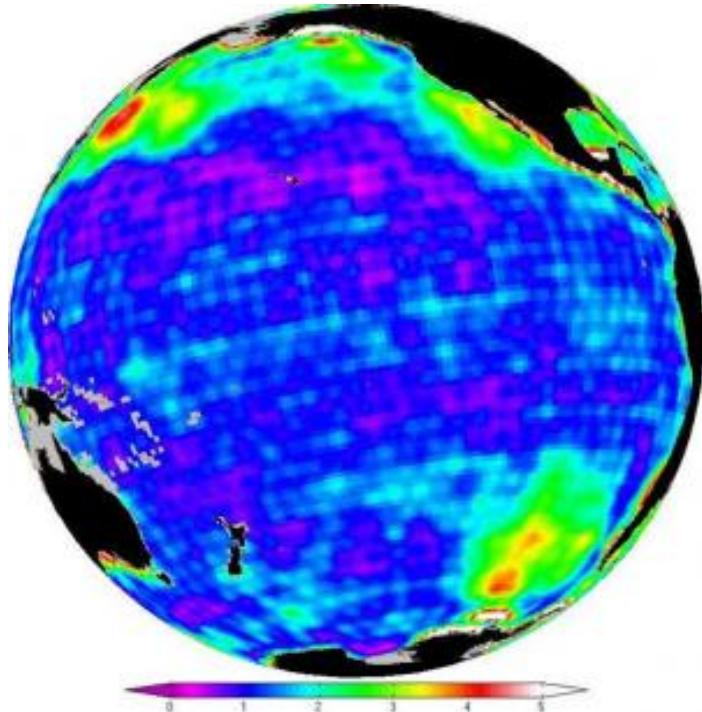
<http://www.sciencedaily.com/releases/2009/09/090901172832.htm>

## Old Moon Discovery Helps Unlock Earth Ocean Secrets

*This map shows changes in ocean bottom pressure measured by NASA's Gravity Recovery and Climate Experiment (Grace). Red shows where pressure varies by large amounts, blue where it changes very little. (Credit: Image courtesy of NASA)*

ScienceDaily (Sep. 2, 2009) — A discovery about the moon made in the 1960s is helping researchers unlock secrets about Earth's oceans today.

By applying a method of calculating gravity that was first developed for the moon to data from NASA's Gravity Recovery and Climate Experiment, known as Grace, JPL researchers have found a way to measure the pressure at the bottom of the ocean. Just as knowing atmospheric pressure allows meteorologists to predict winds and weather patterns, measurements of ocean bottom pressure provide oceanographers with fundamental information about currents and global ocean circulation. They also hold clues to questions about sea level and climate. "Oceanographers have been measuring ocean bottom pressure for a long time, but the measurements have been limited to a few spots in a huge ocean for short periods of time," says JPL oceanographer Victor Zlotnicki.



Launched in 2002, the twin Grace satellites map Earth's gravity field from orbit 500 kilometers (310 miles) above the surface. They respond to how mass is distributed in the Earth and on Earth's surface -the greater the mass in a given area, the stronger the pull of gravity from that area.

The pressure at the bottom of the ocean is determined by the amount of mass above it. "Ocean bottom pressure is the sum of the weight of the whole atmosphere and the whole ocean," says Zlotnicki. "When winds move water on the surface, ocean bottom pressure changes. When glaciers melt and add water to the ocean, the ocean's mass increases and bottom pressure increases, either at one place or globally."

"Measuring ocean bottom pressure was one of the things we said we wanted to do from the very beginning of the mission," says Grace project scientist Michael Watkins, "but it has been a challenge. The signal is very small and hard to detect."

Gravity changes over the ocean are minuscule compared to those over land. The ocean is a fluid. It yields to pressure and spreads the effect over a vast area. Nothing in the ocean gives as big a gravity signal as a flooding Amazon River or melting glaciers in Greenland or Alaska, changes that Grace can measure fairly easily, says Watkins. "Those hydrology signals are huge in comparison," he says.

However, as the mission progressed, Watkins explains, the science team has found better ways to process Grace data. And by turning to a technique developed for the lunar world, Grace researchers are getting the precise measurements of ocean bottom pressure they were hoping for.

## From the moon to the ocean bottom

In the days leading up to the Apollo missions, JPL scientists discovered that certain areas of the moon had higher concentrations of mass than others. The result of these "mass concentrations" was marked differences in the moon's gravity field. The researchers then devised a new way to calculate the gravity field called a "mascon" (for mass concentration) solution. Mascon solutions break the gravity field into small, individual regions. The more traditional ways of computing gravity, often called harmonic solutions, smooth everything together and calculate gravity for a whole large area or body.

Recently scientists have begun developing mascon solutions for Grace data for use in a variety of studies, and they are revealing fascinating new details about Earth's gravity field. These mascon solutions are also proving to be a key to Grace's ability to measure ocean bottom pressure.

"Some of the very best harmonic solutions show some bottom pressure signals, but the mascon solutions appear to do a better job and provide much higher resolution," says Watkins. "Using a mascon solution with Grace data is a way of weighing each little piece of the ocean," he says. The result is a new view of the gravity field - one that reveals sharp contrasts in gravity precise enough to calculate variations in ocean bottom pressure.

A large field experiment off the coast of Japan provided an unusual and welcomed opportunity to put Grace mascon estimates of ocean bottom pressure to the test. There are few places in the ocean where there are enough data on ocean bottom pressure to validate the satellite's observations.

Oceanographer Jae-Hun Park and his colleagues at the University of Rhode Island compared the Grace measurements with data collected by a large array of pressure-reading instruments stationed on the ocean bottom as part of the Kuroshio Extension System Study. This two-year observational program to study deep ocean currents and fronts ran from 2004 to 2006.

"Our site covered a very wide area of 600 by 600 kilometers (370 miles) with 43 available bottom pressure sensors," says Park. He and his colleagues found that while some of the individual sensors had very high correlations with Grace measurements, others were very low. "These low correlations were small-scale eddies that Grace cannot catch," explains Park. Grace's resolution is about 200 kilometers (125 miles).

However, when they compared the spatially averaged monthly mean ocean bottom pressure measured by the ocean sensors with the latest JPL Grace mascon solution for the center of the array, "we found a high correlation between the Grace measurements and our in-situ measurements," says Park. "This experiment gave us the opportunity to validate the Grace data." The results of the study appeared last year in *Geophysical Research Letters*.

Grace's new ability to detect small changes in ocean mass - reflected in ocean bottom pressure - will help scientists answer ongoing questions about sea level and climate change. It will help clarify, for example, just how much of sea level change is due to differences in ocean mass, the result of evaporation, precipitation, melting land ice, or river run-off and how much is due to temperature and salinity.

"Now, for the first time with these new mascon solutions," say Zlotnicki, "Grace will allow us to measure changes in ocean bottom pressure globally for long periods of time. This is a new tool for oceanography."

*Adapted from materials provided by [NASA](#).*

<http://www.sciencedaily.com/releases/2009/08/090831130145.htm>

## Why AI is a dangerous dream

- 01 September 2009 by **Nic Fleming**



Magazine issue 2723.

Noel Sharkey thinks artificial intelligence is an illusion (Image: Rex Features)

*Robotics expert **Noel Sharkey** used to be a believer in artificial intelligence. So why does he now think that AI is a dangerous myth that could lead to a dystopian future of unintelligent, unfeeling robot carers and soldiers? Nic Fleming finds out*

### What do you mean when you talk about artificial intelligence?

I like AI pioneer Marvin Minsky's definition of AI as the science of making machines do things that would require intelligence if done by humans. However, some very smart human things can be done in dumb ways by machines. Humans have a very limited memory, and so for us, chess is a difficult pattern-recognition problem that requires intelligence. A computer like Deep Blue wins by brute force, searching quickly through the outcomes of millions of moves. It is like arm-wrestling with a mechanical digger. I would rework Minsky's definition as the science of making machines do things that lead us to believe they are intelligent.

### Are machines capable of intelligence?

If we are talking intelligence in the animal sense, from the developments to date, I would have to say no. For me AI is a field of outstanding engineering achievements that helps us to model living systems but not replace them. It is the person who designs the algorithms and programs the machine who is intelligent, not the machine itself.

### Are we close to building a machine that can meaningfully be described as sentient?

I'm an empirical kind of guy, and there is just no evidence of an artificial toehold in sentience. It is often forgotten that the idea of mind or brain as computational is merely an assumption, not a truth. When I point this out to "believers" in the computational theory of mind, some of their arguments are almost religious. They say, "What else could there be? Do you think mind is supernatural?" But

accepting mind as a physical entity does not tell us what kind of physical entity it is. It could be a physical system that cannot be recreated by a computer.

The mind could be a type of physical system that cannot be recreated by computer  
**So why are predictions about robots taking over the world so common?**

There has always been fear of new technologies based upon people's difficulties in understanding rapid developments. I love science fiction and find it inspirational, but I treat it as fiction. Technological artefacts do not have a will or a desire, so why would they "want" to take over? Isaac Asimov said that when he started writing about robots, the idea that robots were going to take over the world was the only story in town. Nobody wants to hear otherwise. I used to find when newspaper reporters called me and I said I didn't believe AI or robots would take over the world, they would say thank you very much, hang up and never report my comments.

### **You describe AI as the science of illusion.**

It is my contention that AI, and particularly robotics, exploits natural human zoomorphism. We want robots to appear like humans or animals, and this is assisted by cultural myths about AI and a willing suspension of disbelief. The old automata makers, going back as far as Hero of Alexandria, who made the first programmable robot in AD 60, saw their work as part of natural magic - the use of trick and illusion to make us believe their machines were alive. Modern robotics preserves this tradition with machines that can recognise emotion and manipulate silicone faces to show empathy. There are AI language programs that search databases to find conversationally appropriate sentences. If AI workers would accept the trickster role and be honest about it, we might progress a lot quicker.

### **These views are in stark contrast to those of many of your peers in the robotics field.**

Yes. Roboticist Hans Moravec says that computer processing speed will eventually overtake that of the human brain and make them our superiors. The inventor Ray Kurzweil says humans will merge with machines and live forever by 2045. To me these are just fairy tales. I don't see any sign of it happening. These ideas are based on the assumption that intelligence is computational. It might be, and equally it might not be. My work is on immediate problems in AI, and there is no evidence that machines will ever overtake us or gain sentience.

### **And you believe that there are dangers if we fool ourselves into believing the AI myth...**

It is likely to accelerate our progress towards a dystopian world in which wars, policing and care of the vulnerable are carried out by technological artefacts that have no possibility of empathy, compassion or understanding.

### **How would you feel about a robot carer looking after you in old age?**

Eldercare robotics is being developed quite rapidly in Japan. Robots could be greatly beneficial in keeping us out of care homes in our old age, performing many dull duties for us and aiding in tasks that failing memories make difficult. But it is a trade-off. My big concern is that once the robots have been tried and tested, it may be tempting to leave us entirely in their care. Like all humans, the elderly need love and human contact, and this often only comes from visiting carers. A robot companion would not fulfil that need for me.

### **You also have concerns about military robots.**

The many thousands of robots in the air and on the ground are producing great military advantages, which is why at least 43 countries have development programmes of their own. No one can deny the



benefit of their use in bomb disposal and surveillance to protect soldiers' lives. My concerns are with the use of armed robots. Drone attacks are often reliant on unreliable intelligence in the same way as in Vietnam, where the US ended up targeting people who were owed gambling debts by its informants. This over-reaching of the technology is killing many innocent people. Recent US planning documents show there is a drive towards developing autonomous killing machines. There is no way for any AI system to discriminate between a combatant and an innocent. Claims that such a system is coming soon are unsupportable and irresponsible.

### **Is this why you are calling for ethical guidelines and laws to govern the use of robots?**

In the areas of robot ethics that I have written about - childcare, policing, military, eldercare and medical - I have spent a lot of time looking at current legislation around the world and found it wanting. I think there is a need for urgent discussions among the various professional bodies, the citizens and the policy makers to decide while there is still time. These developments could be upon us as fast as the internet was, and we are not prepared. My fear is that once the technological genie is out of the bottle it will be too late to put it back.

### **The organisers of the robot soccer competition RoboCup aim to develop an autonomous robot soccer team that can beat a human team by 2050. How do you rate their chances?**

Football requires a certain kind of intelligence. Someone like David Beckham can look at the movement of the players, predict where the ball is likely to go and put himself in the right place. Soccer robots can move quickly, punch the ball hard and get it accurately into the net, but they cannot look at the pattern of the game and guess where the ball is going to end up. I can't see robots matching humans at football strategy. But in the 1960s everyone was pretty sure that AI would never succeed at championship chess, so who knows? Like chess programs, soccer robots may win by brute force - although I don't think they will be very good at faking fouls.

### **Profile**

Born in Belfast, UK, Noel Sharkey left school at 15, working as an apprentice electrician, railway worker, guitarist and chef, before studying psychology and getting his PhD at the University of Exeter. He has held positions at Yale, Stanford and Berkeley, and is now professor of artificial intelligence and robotics at the University of Sheffield. He hosts *The Sound of Science* radio show ([www.soundofscience.wordpress.com](http://www.soundofscience.wordpress.com))

<http://www.newscientist.com/article/mg20327231.100-why-ai-is-a-dangerous-dream.html?full=true&print=true>

## Sleep May Be Nature's Time Management Tool

By BENEDICT CAREY



If there is a society of expert sleepers out there, a cult of smug snoozers satisfied that they're getting just the right number of restful hours a night, it must be a secretive one. Most people seem insecure about their sleep and willing to say so: they would like to get a little more; maybe they wish they could get by on less; they wonder if it's deep enough.

And they are pretty sure that being up at 2 a.m., pacing the TV room like a caged animal, cannot be good. Can it?

In fact, no one really knows. Scientists aren't sure why sleep exists at all, which has made it hard to explain the great diversity of sleeping habits and quirks in birds, fish and mammals of all kinds, including humans.

Why should lions get 15 hours a night and giraffes just 5 — when it is the giraffes who will be running for their lives come hunting time? How on earth do migrating birds, in flight for days on end, sleep? Why is it that some people are early birds as young adults and night owls when they're older?

The answer may boil down to time management, according to a new paper in the August issue of the journal Nature Reviews Neuroscience. In the paper, Jerome Siegel, a professor of psychiatry at the University of California, Los Angeles, argues that sleep evolved to optimize animals' use of time, keeping them safe and hidden when the hunting, fishing or scavenging was scarce and perhaps risky. In that view, differences in sleep quality, up to and including periods of insomnia, need not be seen as problems but as adaptations to the demands of the environment.

"We spend a third of our life sleeping, and it seems so maladaptive — 'the biggest mistake nature has made,' scientists often call it," said Dr. Siegel, who is also chief of neurobiology at the V.A. Greater Los Angeles Healthcare system. "But another way of looking at it is this: unnecessary wakefulness is a bigger mistake."

As a field of study, sleep research is anything but sleepy — experts disagree strongly on almost every theory offered, and this one is no exception. Among other objections, critics point out that sleeping animals are less alert to predators than they are while awake, and that sleep appears to serve other essential functions. Some studies suggest that the brain consolidates the day's memories during slumber; others suggest that it needs sleep to repair neural damage.

"My own theory, which is more consistent with the mainstream, is that neurons require sleep as part of the long-term process" of modification to support learning, wrote Dr. Clifford Saper, a neuroscientist at Harvard, in an e-mail message. But, he added, his theory and Dr. Siegel's may not be mutually exclusive.

For one thing, sleep is not nearly as vulnerable a state as it appears. Sleepers are highly sensitive to some sounds, like a baby's whine or an unusual thump or voice. And as Dr. Siegel put it, sleepers are less vulnerable to harm than they would be if they were out on the street late at night.

For another thing, the new paper argues, evidence from other animals strongly suggests that the need for sleep drops sharply during the most important waking hours. Migrating killer whales are alert and swimming for weeks on end, and seemingly just as alert as when well rested, studies find. Recent research suggests that the same goes for white-crowned sparrows : they get far less sleep than usual when migrating.

Consider the big brown bat, perhaps the longest-sleeping mammal of them all. It snoozes 20 hours a day, and spends the other 4 hunting mosquitoes and moths in the dusk and early evening. "Increased waking time would seem to be highly maladaptive for this animal, since it would expend energy and be exposed to predatory birds with better vision and better flight abilities," Dr. Siegel writes.

In humans, it is well known that sleep quality changes with age, from the long, deep plunges of early childhood to the much lighter, more frequently interrupted five or six hours that many elderly people call a night's sleep. Doctors have long debated whether elderly people are sleep-deprived as a result, or simply need less restful slumber. In Dr. Siegel's view, it's a matter of tradeoffs: older people no longer have a child's need to grow, which requires deep, long sleep and may have more need and more ability to do things for themselves instead.

In short, when there is hay to be made, animals tend to make it, whether the sun is shining or not. Depending on the animal, a long period of waking may or may not be followed by a long recovery sleep.

The theory also supports what people already suspect about early birds and night owls: they are most alert when they are naturally most productive. And they can feel strung out if their work schedule doesn't match.

None of which is to say that good sleep is unnecessary or that serious sleep problems do not exist. It is and they do. But the theory does suggest that a stretch of insomnia may not be evidence of a disorder. If sleep has evolved as the ultimate time manager, then being wired at 2 a.m. may mean there is valuable work to be done. Time to turn off the "South Park" reruns and start doing it.

[http://www.nytimes.com/2009/09/01/health/01mind.html?\\_r=1&ref=science](http://www.nytimes.com/2009/09/01/health/01mind.html?_r=1&ref=science)

My Brain on Chemo: Alive and Alert

By DAN BARRY



Within the chemotherapy alumni corps there exists a mutual respect not unlike the bond shared by veterans of war. Sometimes that respect is silently conveyed; not everyone wants to talk about it. And sometimes it is shared in the shorthand of the battle-hardened.

Where?

Esophagus.

Who?

Sloan-Kettering.

What kind?

Cisplatin, fluorouracil, Drano,

Borax ... .

Side effects?

The usual: nausea, vomiting, hair loss. And the toes are still numb.

Yeah.

At this point the two chemo alums may begin to sense a phantom metallic taste at the back of their throat, a taste sometimes prompted by the intravenous infusion of the corrosive chemicals intended to save their lives. A strong drink might be in order; maybe two.

With that first, taste-altering sip, the two might begin to discuss another side effect that has received attention lately, the one rudely called “chemo brain”: the cognitive foginess that some patients experience after completing their regimen. That foginess does not always completely lift, and oncologists are now taking seriously what they might once have dismissed as a complaint rooted in advanced age or cancer fatigue.

For me, reading about chemo brain has resurrected that faint taste of metal. I underwent chemotherapy in 1999 and again in 2004, thanks to a profoundly unwelcome recurrence. Depending on one’s perspective, I was both unfortunate and fortunate. Unfortunate in that I endured all the concomitant fears and indignities, twice. Fortunate in that I had the option of chemotherapy, twice. Not all cancers respond; not everyone is so lucky.

I experienced all the typical side effects. Nausea: for several days at a time, though vomiting sometimes broke the monotony. Hair loss: I was balding anyway, so chemo saved me from comb-over delusions. Neuropathy: even now, my toes feel as if they were wrapped in cotton.

And, I now think, chemo brain — but a form that seems to be the common definition’s opposite. My self-diagnosis is that I had a pre-existing case of foginess that lifted during and immediately after my chemotherapy regimen: I suddenly experienced acute clarity. Then, as the effects and memory of chemotherapy faded, my confusion returned. Twice.

In 1999, before the diagnosis of cancer and the prognosis of let’s hope for the best, I was enveloped in the haze of the everyday. Rather than rejoicing in a loving wife, a daughter not yet 2, a job I enjoyed — in being, simply, 41 — I created felonies out of matters not worth a summons. Traffic jams. Work conflicts. No Vienna Fingers in the cupboard. Felonies all.

Cancer, as is often said, tends to focus the mind. But my diagnosis hovered in the theoretical until the moment I began the first of six rounds of chemotherapy, each one requiring a five-day hospital stay. The nurse hung bags of clear, innocent-looking liquid from an IV pole, found a plump vein along my right arm — and the fog slowly lifted.

Sickened by the mere smell of food, I suddenly saw the wonder in the most common foods: an egg, a hard-boiled egg. Imprisoned and essentially chained to an IV pole, I would stare out my hospital room window at the people below, and feel a rush of the purest envy for their routine pursuits. Imagining the summer night air blowing cool through sweat-dampened shirts, I’d think how good a \$3 ice cream would taste right about now, or a \$5 beer, and how nice it would be to watch a baseball game of no consequence.

Men acting like boys, hitting, throwing, running on grass. I used to play baseball.

In the morning, after urinating away the remnants of poisons pumped into me, I would roll my IV-pole partner back to the window and study again the people below, moving, hustling, ambling, to jobs, to appointments, to a diner, maybe, for one of the fried-egg sandwiches served countless times every morning in Manhattan.

Gradually, from midsummer to late fall, the chemotherapy transformed me into a bald guy whose pallor was offset only by the hint of terror in his eyes. But the chemo also wiped away the muddle, revealing the world in all its mundane glory. I won’t tell you that I wept at the sight of a puppy. But I did linger over my sleeping daughter to watch her tiny chest rise and fall. I did savor the complexities of a simple olive. I did notice fireflies, those dancing night sparks I had long ago stopped seeing.

After the chemotherapy, radiation and a few weeks to allow things to settle down, as my doctor put it, I was declared “clean” in February 2000. Never again, I vowed, would I take these simple things for granted. I was blind, but now I see.

The fog, of course, returned as the effects and memory of chemo faded, no matter that my wife and I were now blessed with two daughters. How I hated traffic jams. And the Vienna Fingers! Who ate the last Vienna Finger?

Then, in the late spring of 2004, probably while I was railing about something eminently unimportant, my cancer impolitely returned. Once again I felt the frigid breath of mortality at my neck. I also felt like a fool. What is the use of surviving cancer if you don't learn from it? Are improved by it? Am I so thick that I need to receive the life-is-precious message twice?

I returned to Sloan-Kettering for more chemotherapy and more of the same side effects — including my own manifestation of chemo brain. Fog lifted, world revealed.

After the chemotherapy came major surgery, which provided the exclamation point to whatever chemo was trying to tell me. Once again I was declared clean. And this time, by God! This time!

I became a walking platitude, telling friends without a trace of irony to live every day as though it were their last. Because, man, I've been there. And if I weren't so repressed I'd give you a hug.

Slowly, insidiously, the fog of the everyday has returned to enshroud me. It came in wispy strips, a little more, then a little more, wrapping me like a mummy. Just the other day, in the car with my wife and my two daughters, I began railing about being stuck in a traffic jam.

Perspective, my wife said. Perspective.

I could not hear her. You see, I'm struggling with this pre-existing human condition.

*Dan Barry writes the "This Land" column in The New York Times.*

<http://www.nytimes.com/2009/09/01/health/01case.html?nl=health&emc=healthupdateema1>

## When Patient Handoffs Go Terribly Wrong

By PAULINE W. CHEN, M.D.

I have always felt uneasy about patient handoffs, transferring my responsibility as a doctor to another physician. We cannot be on duty all the time, but I worry that I am playing some real-life medical version of the children's game "Telephone" where the complexity of my patient's care will be watered down, misinterpreted and possibly mangled with each re-telling. I wonder, too, if it is only a matter of time before the kind of mistake that happened to Joey (not his real name) might happen to one of my patients.

Two-year-old Joey had been healthy since birth. But a few weeks before I met him, his mother noticed that the left side of his face had started to swell. By the time he appeared in clinic, it looked as if a ping pong ball had been permanently lodged in his cheek.

Despite the senior surgeon's years of experience, removing the mass from Joey's cheek proved to be a challenge. It had insinuated itself into every possible crevice; and the nerve that innervated the muscles of his mouth and cheek — the nerve of facial expression — was embedded deep within.

The senior surgeon spent hours daintily picking away at the mass, sorting through strands of fibrous connective tissue, many of them neuronal doppelgangers, in order not to injure the buried nerve. After being nibbled at with surgical instruments for hours, the toddler's flayed cheek looked more like a puppy's well-worn chew toy than any recognizable set of anatomical structures. When the surgeon had at last cleaned the strand he believed was the nerve, he looped a slender yellow rubber tie around it. Then, without warning, the surgeon put down his instruments and looked up at the clock. He barked at the nurse to call for one of his colleagues, then stepped away from the table and ripped off his surgical mask and gown. "You take over," he said when his colleague came into the room. "It's mostly out, but I need to leave." None of us knew if he had to attend to another urgent patient matter in the hospital or how long he might be gone.

The covering surgeon stepped up to the table, poked his finger around the remnants of the mass, then pulled on the rubber tie and the presumptive nerve. "What's this?" he asked, reaching for a pair of scissors.

Without waiting for a response, he snipped the strand in two.

That night, I hovered outside of Joey's room, waiting for him to wake up, laugh, cry or simply move his mouth. But it wasn't until two days later, after we had removed all the gauze covering his incision, that I saw what I had feared I would. Joey grinned, but his left cheek remained frozen. His once symmetrical smile had been transformed into a contorted grimace.

Years later I am still haunted by the memory of Joey and that handoff which went terribly wrong. I don't know what caused the first surgeon to suddenly leave. And because the operation was so difficult and the field of view so small, I'm not sure if the nerve might have been damaged or transected even before the second surgeon stepped in. But I do know that the surgeons never communicated clearly about what had been done when they traded places at the table. And I also know that transitions between physicians are now, more than ever, a routine and frequent part of health care.



Like many others among my professional peers, I find myself signing out and my patients being handed off more than I ever thought would happen. While older patients with multiple chronic conditions will see up to 16 doctors a year, some of the healthiest younger patients I see count not only a primary care physician among their doctors but also a handful of specialists. Hospitalized patients, no longer cared for by their primary care doctors but by teams of fully trained doctors, or hospitalists, in addition to groups of doctors-in-training, are passed between doctors an average of 15 times during a single five-day hospitalization. And young doctors, with increasing time pressures from work hours reforms, will sign over as many as 300 patients in a single month during their first year of training.

While these changes have led to improvements in certain aspects of quality of care and better rested physicians, it has also resulted in frank fragmentation. It's hardly surprising, then, that according to two recent studies, the vast majority of hospitalized patients are unable to name their doctor, and an equally large percentage of their discharge summaries have no mention of tests and studies that are pending.

Over the last decade, medical researchers and educators turned their attention increasingly to this issue. I spoke recently to Dr. Vineet M. Arora, an assistant professor of medicine at the University of Chicago, who studies patient handoffs and the ways in which they might be improved.

Handoffs are supposed to mitigate any issues that arise when doctors pass the responsibility for patient care to a colleague. "But that requires investing time and effort," Dr. Arora said, "and using handoffs as an opportunity to come together to see how patient care can be made safer."

Most of the time, however, handoffs are fraught with misunderstanding and miscommunication. Physicians who are signing out may inadvertently omit information, such as the rationale for a certain antibiotic or a key piece of the patient's surgical history. And doctors who are receiving the information may not assume the same level of responsibility for the care of that patient. "Handoffs are a two-way process," Dr. Arora observed. "It's a complex interplay." Missed opportunities to impart important patient information result in more uncertainty for the incoming doctor. That uncertainty leads to indecision which can ultimately result in significant delays during critical medical decisions.

More recently, Dr. Arora pointed out, researchers have begun looking for new ways to approach patient handoffs, studying other high-stakes shift-oriented industries like aviation, transportation and nuclear power, as well as other groups of clinicians.

"We can borrow from the models of other health care practitioners," Dr. Arora said. Nurses, for example, have long placed great importance on the process of handing off patients. "It's pretty difficult to find and interrupt a nurse during shift change because they have made it a high priority," Dr. Arora remarked. "There's a dedicated time, a dedicated room, a culture that has developed around it. In contrast, physicians have historically emphasized continuity much more than handoffs. As a result, doctors' signouts happen quickly, last-minute and on the fly."

By incorporating more efficient methods of communication, the hope is that patient care transitions will eventually become seamless and less subject to errors. But even more important than teaching and learning those methods, Dr. Arora says, will be transforming physician attitudes.

"It's critical that we invest the time and that our payment system eventually reflects how important that time is," Dr. Arora said. "But we also need to change our profession's thinking so that handoffs are a priority and not an afterthought. We need to be able to say that the ability to transition care well is an important metric by which you will be judged to be a good doctor."

"Good handoffs are about best practices, about being a good doctor. Investing time in them is the right thing to do."

<http://www.nytimes.com/2009/09/03/health/03chen.html?ref=health>

## For the Overweight, Bad Advice by the Spoonful

By GINA KOLATA



Robyn Beck/Agence France-Presse

Two-thirds of Americans are overweight or obese. For most, research shows, neither diets nor moderate exercise brings significant long-term weight loss.

**In Brief:**

*Weight control is not simply a matter of willpower. Genes help determine the body's "set point," which is defended by the brain.*

*Dieting alone is rarely successful, and relapse rates are high.*

*Moderate exercise, too, rarely results in substantive long-term weight loss, which requires intensive exercise.*

Americans have been getting fatter for years, and with the increase in waistlines has come a surplus of conventional wisdom. If we could just return to traditional diets, if we just walk for 20 minutes a day, exercise gurus and government officials maintain, America's excess pounds would slowly but surely melt away.

Scientists are less sanguine. Many of the so-called facts about obesity, they say, amount to speculation or oversimplification of the medical evidence. Diet and exercise do matter, they now know, but these environmental influences alone do not determine an individual's weight. Body composition also is dictated by DNA and monitored by the brain. Bypassing these physical systems is not just a matter of willpower.

More than 66 percent of Americans are overweight or obese, according to the federal Centers for Disease Control and Prevention, in Atlanta. Although the number of obese women in the United States appears to be holding steady at 33 percent, for most Americans the risk is growing. The nation's poor diet has long

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been the scapegoat. There have been proposals to put warning labels on sodas like those on cigarettes. There are calls to ban junk foods from schools. New York and other cities now require restaurants to disclose calorie information on their menus.

But the notion that Americans *ever* ate well is suspect. In 1966, when Americans were still comparatively thin, more than two billion hamburgers already had been sold in McDonald's restaurants, noted Dr. Barry Glassner, a sociology professor at the [University of Southern California](#). The recent rise in obesity may have more to do with our increasingly sedentary lifestyles than with the quality of our diets.

"The meals we romanticize in the past somehow leave out the reality of what people were eating," he said. "The average meal had whole milk and ended with pie.... The typical meal had plenty of fat and calories."

"Nostalgia is going to get us nowhere," he added.

Neither will wishful misconceptions about the efficacy of exercise. First, the federal government told Americans to exercise for half an hour a day. Then, dietary guidelines issued in 2005 changed the advice, recommending 60 to 90 minutes of moderate exercise a day. There was an uproar; many said the goal was unrealistic for Americans. But for many scientists, the more pertinent question was whether such an exercise program would really help people lose weight.

The leisurely after-dinner walk may be pleasant, and it may be better than another night parked in front of the television. But modest exercise of this sort may not do much to reduce weight, evidence suggests.

"People don't know that a 20-minute walk burns about 100 calories," said Dr. Madelyn Fernstrom, director of the weight-management center at the University of Pittsburgh Medical Center. "People always overestimate the calories consumed in exercise, and underestimate the calories in food they are eating."

Tweaking the balance is far more difficult than most people imagine, said Dr. Jeffrey Friedman, an obesity researcher at [Rockefeller University](#). The math ought to work this way: There are 3,500 calories in a pound. If you subtract 100 calories per day by walking for 20 minutes, you ought to lose a pound every 35 days. Right?

Wrong. First, it's difficult for an individual to hold calorie intake to a precise amount from day to day. Meals at home and in restaurants vary in size and composition; the nutrition labels on purchased foods — the best guide to calorie content — are at best rough estimates. Calorie counting is therefore an imprecise art.

Second, scientists recently have come to understand that the brain exerts astonishing control over body composition and how much individuals eat. "There are physiological mechanisms that keep us from losing weight," said Dr. Matthew W. Gilman, the director of the obesity prevention program at Harvard Medical School/Pilgrim Health Care.

Scientists now believe that each individual has a genetically determined weight range spanning perhaps 30 pounds. Those who force their weight below nature's preassigned levels become hungrier and eat more; several studies also show that their metabolisms slow in a variety of ways as the body tries to conserve energy and regain weight. People trying to exceed their weight range face the opposite situation: eating becomes unappealing, and their metabolisms shift into high gear.

The body's determination to maintain its composition is why a person can skip a meal, or even fast for short periods, without losing weight. It's also why burning an extra 100 calories a day will not alter the verdict on the bathroom scales. Struggling against the brain's innate calorie counters, even strong-willed dieters make up for calories lost on one day with a few extra bites on the next. And they never realize it. "The system operates with 99.6 percent precision," Dr. Friedman said.



The temptations of our environment — the sedentary living, the ready supply of rich food — may not be entirely to blame for rising obesity rates. In fact, new research suggests that the environment that most strongly influences body composition may be the very first one anybody experiences: the womb.

According to several animal studies, conditions during pregnancy, including the mother's diet, may determine how fat the offspring are as adults. Human studies have shown that women who eat little in pregnancy, surprisingly, more often have children who grow into fat adults. More than a dozen studies have found that children are more likely to be fat if their mothers smoke during pregnancy.

The research is just beginning, true, but already it has upended some hoary myths about dieting. The body establishes its optimal weight early on, perhaps even before birth, and defends it vigorously through adulthood. As a result, weight control is difficult for most of us. And obesity, the terrible new epidemic of the developed world, is almost impossible to cure.

<http://health.nytimes.com/ref/health/healthguide/esn-obesity-ess.html>

## Strange jellies of the icy depths

Matt Walker  
Editor, Earth News

**New details are emerging about the life-forms that survive in one of the world's most inaccessible places.**



Scientists have published descriptions of a range of jelly-like animals that inhabit the deep oceans of the Arctic.

The animals were originally filmed and photographed during a series of submersible dives in 2005.

One of the biggest surprises is that one of the most common animals in the Arctic deep sea is a type of jellyfish that is completely new to science.

The deep Arctic ocean is isolated from much of the water elsewhere on the globe.

One area, known as the Canadian Basin, is particularly cut off by deep-sea ridges. These huge barriers can isolate any species there from other deep-water animals.

**One thing was just how many different jellies there were, and the sizes of their populations**  
Dr Kevin Raskoff

So in 2005, an international team of scientists, funded primarily by the US National Oceanic and Atmospheric Administration's Office of Ocean Exploration and Research, conducted a series of deep-sea dives using a remote operated vehicle (ROV).

Details of what they found have now been published in the journal Deep Sea Research Part II.

"There were a lot of surprises," says biologist Dr Kevin Raskoff of Monterey Peninsula College in California, US, a leading member of the dive team.

"One thing was just how many different jellies there were, and the sizes of their populations."

"Some were somewhat well known from other oceans, but had not previously been found in the Arctic. That caused us to rethink our ideas about what the typical habitat would be for the species. We also discovered a number of new species that had not been found before."

During a series of dives to depths of 3000m, the ROV filmed over 50 different types of gelatinous or jelly-like animal.

The majority of animals recorded were Medusae, a particular type of jellyfish that tend to be bell or disc shaped.

Other jelly-like creatures seen included ctenophores, an unusual group that can look like jellyfish, but are not able to sting, siphonophores, which are actually colonies of smaller animals living together in a structure that looks like a single, larger animal, and larvaceans, plankton-like creatures unrelated to jellyfish.

Of all the Medusae observed, two species dominated at most locations visited by the ROV.

The first was a species called *Sminthea arctica*, which lived at depths ranging from 100m to 2,100m. This jellyfish has been recorded before by scientific expeditions.

However, the other common jelly was a species new to science.

"Probably the single most interesting discovery was a new species of a small blue jellyfish, from a group called the Narcomedusae," says Dr Raskoff.

"This group has several interesting features that set them apart from typical jellyfish, such as the fact that they hold their tentacles over their bell as they swim."

Most jellyfish let their tentacles drift in the water behind them, but the new species holds its tentacles out in front, perhaps enabling it to better catch prey.

The new species is so unusual that it has been classified within its own genus, and will be formally described later this year.

"It was also the third most common jellyfish found on the cruise, which is really surprising when you think about the fact that even the most common species in the area can be totally new and unexpected species," says Dr Raskoff.

Another striking find was a type of ctenophore called *Aulacocetna*, which is one of the most spectacular examples of its kind.

At over 15cm long, its tentacles can grip almost anything underwater, yet little is known about its lifestyle.

However, one of the specimens collected by the ROV ejected its stomach contents, which revealed it may have fed on a bright orange animal.



The researchers suspect it feeds on bright orange worms that also live in the Arctic deep, and it gets its colour from its prey.

The scientists are now keen to find out much more about how these strange and enigmatic creatures interact with their environment, and how they influence or underpin the ecology of the deep ocean in which they live.

They also hope to raise funds to explore other little-visited regions of the deep Arctic ocean, as well as exploring the Aleutian trench off the coast of Alaska.

"You don't have to go too far to find interesting areas to study, you just have to dive deep," says Dr Raskoff.

Story from BBC NEWS:

[http://news.bbc.co.uk/go/pr/fr/-/earth/hi/earth\\_news/newsid\\_8231000/8231367.stm](http://news.bbc.co.uk/go/pr/fr/-/earth/hi/earth_news/newsid_8231000/8231367.stm)

Published: 2009/09/01 11:35:52 GMT

## Engineering Earth 'is feasible'

By Pallab Ghosh  
Science correspondent, BBC News



**A UK Royal Society study has concluded that many engineering proposals to reduce the impact of climate change are "technically possible".**

Such approaches could be effective, the authors said in their report.

But they also stressed that the potential of geo-engineering should not divert governments away from their efforts to reduce carbon emissions.

Suggestions range from having giant mirrors in space to erecting giant CO<sub>2</sub> scrubbers that would "clean" the air.

Such engineering projects could either remove carbon dioxide or reflect the Sun's rays away from the planet.

**"Geo-engineering and its consequences are the price we may have to pay for failure to act on climate change"**

Professor John Shepherd, University of Southampton

Ambitious as these schemes seem, the report concluded that many of them potentially had merit, and research into them should be pursued.

The authors stated, however, that some of the technology was barely formed and there were "major uncertainties regarding its effectiveness, costs and environmental impacts".

One of the technologies considered "too risky" was pouring iron filings into the ocean to grow algae which, the authors said, could cause "substantial damage" to marine life and freshwater, estuary and coastal ecosystems.

### **Buying time**

The study stressed that engineering approaches would only have a limited impact, and that efforts should continue to be focused on reducing CO<sub>2</sub> emissions.

"(Governments) should make increased efforts toward mitigating and adapting to climate change and in particular agreeing to global emissions reductions of at least 50% on 1990 levels by 2050 and more thereafter," the authors wrote.

But, they continued, there should be "further research and development" into geo-engineering options "to investigate whether low-risk methods can be made available if it becomes necessary to reduce the rate of warming this century".

Of the two basic geo-engineering approaches, the report concluded that those involving the removal of carbon dioxide were preferable, as they effectively return the climate system closer to its pre-industrial state.

But the authors found that many of these options were currently too expensive to implement widely.

This included "carbon capture and storage" methods, which require CO<sub>2</sub> be captured directly from power plants and stored under the Earth's surface.

Current proposed methods also work very slowly, taking many decades to remove enough carbon dioxide to significantly reduce the rate of temperature rise.

Of the carbon removal techniques assessed, three were considered to have most potential:

**1. CO<sub>2</sub> capture from ambient air:** This would be the preferred method, as it effectively reverses the cause of climate change.

**2. Enhanced weathering:** This aims to enhance natural reactions of CO<sub>2</sub> from the air with rocks and minerals. It was identified as a prospective longer-term option.

**3. Land use and afforestation:** The report found that land-use management could and should play a small but significant role in reducing the growth of atmospheric CO<sub>2</sub> concentrations.

So-called solar radiation management methods do not take carbon dioxide out of the atmosphere, and, according to some climate models, may be ineffective in altering shifts in rainfall patterns and storms, the report said.

But the authors said that the door should not be shut to the approach, which could be a faster way to reduce the rate of increase in global temperatures.

Some suggestions include: a giant mirror on the Moon; a space parasol made of superfine aluminium mesh; and a swarm of 10 trillion small mirrors launched into space one million at a time every minute for the next 30 years.

The study also said that many of these approaches had huge logistical demands, and it could take several decades for them to be implemented.

But if temperatures rose to such a level where more rapid action needed to be taken, three techniques were considered to have most potential:

- 1. Stratospheric aerosols:** Previous volcanic eruptions have effectively provided case studies of the potential effectiveness of this method.
- 2. Space-based methods:** These were considered to be a potential technique for long-term use, but only if major problems of implementation and maintenance could be solved.
- 3. Cloud albedo approaches:** These include "cloud ships" which would send sea water into the clouds to make them more reflective.

The report also highlighted an inadequate international legal framework for cross border projects.

"The greatest challenges to the successful deployment of geo-engineering may be to social, ethical, legal and political issues associated with governance rather than scientific issues," it pointed out.

The authors urged an appropriate international body, such as the UN Commission for Sustainable Development, to establish a method for developing treaties to determine who would be responsible for research that might have global risks and benefits.

Professor John Shepherd, a researcher from the University of Southampton, chaired the Royal Society's geo-engineering study.

He said: "It is an unpalatable truth that unless we can succeed in greatly reducing CO<sub>2</sub> emissions, we are headed for a very uncomfortable and challenging climate future.

"Geo-engineering and its consequences are the price we may have to pay for failure to act on climate change."

Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8231387.stm>

Published: 2009/09/01 11:32:43 GMT

<http://www.nytimes.com/2009/09/04/science/earth/04arctic.html?ref=science>

## Global Warming Could Forestall Ice Age

By **ANDREW C. REVKIN**



The human-driven buildup of heat-trapping greenhouse gases in the atmosphere appears to have ended a slide, many millennia in the making, toward cooler summer temperatures in the Arctic, the authors of a [new study](#) report.

Scientists familiar with the work, to be published Friday in [the journal Science](#), said it provided fresh evidence that human activity is not only warming the globe, particularly the Arctic, but could also even fend off what had been presumed to be an inevitable descent into a new ice age over the next few dozen millennia.

The reversal of the slow cooling trend in the Arctic, recorded in samples of layered lakebed mud, glacial ice and tree rings from Alaska to Siberia, has been swift and pronounced, the team writes.

Earlier studies have also shown that the Arctic, more than the planet as a whole, has seen unusual warming in recent decades. But the new analysis provides decade-by-decade detail on temperature trends going back 2,000 years — five times further than previous work at that detailed a scale.

Several climate scientists said the new study was most significant for showing just how powerfully the Arctic climate appears to be responding to a greenhouse-gas buildup that is having more complex and subtle mix of effects elsewhere around the globe.

[Darrell S. Kaufman](#), the lead author and a climate specialist at Northern Arizona University, said the biggest surprise was the strength of the shift from cooling to warming, which started in 1900 and intensified after 1950.

“The slow cooling trend is trivial compared to the warming that’s been happening and that’s in the pipeline,” Dr. Kaufman said.

Several scientists who were not involved with the study concurred that the pace of the temperature reversal far exceeded the natural variability in Arctic temperatures, supporting the idea that the warm-up is human-caused and potentially disruptive.

According to the study, after a slow cooling of less than half a degree Fahrenheit per millennium, driven by a cyclical change in the orientation of the North Pole and the [Sun](#), the region warmed 2.2 degrees just since 1900, with the decade from 1998 to 2008 the warmest in 2,000 years.

In theory, summer temperatures in the Arctic region would be expected to cool for at least 4,000 more years, given the growing distance between the Sun and the North Pole during the summer in the Northern Hemisphere, the study says.

But Jonathan T. Overpeck, a study author and climate specialist at the University of Arizona, said the rising concentration of long-lived greenhouse gases guaranteed warming at a pace that could stress ecosystems and cause rapid melting of Greenland's great ice sheet.

"The fast rate of recent warming is the scary part," Dr. Overpeck said. "It means that major impacts on Arctic ecosystems and global sea level might not be that far off unless we act fast to slow global warming."

In the very long term, the ability to artificially warm the climate, particularly the Arctic, could be seen as a boon as the planet's shifting orientation to the Sun enters a phase that could initiate the next ice age. As a result of such periodic shifts, 17 ice ages are thought to have come and gone in two million years. The last ice age ended 11,000 years ago and the next one, according to recent research, could be 20,000 or 30,000 years off discounting any influence by humans. The last ice age buried much of the Northern Hemisphere under a mile or more of ice.

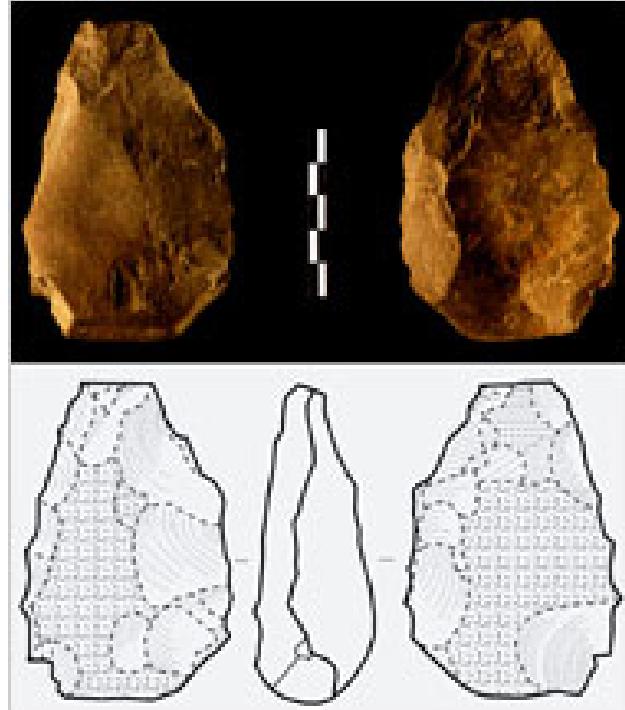
With humans' clear and growing ability to alter the climate, Dr. Overpeck said, "we could easily skip the next opportunity altogether."

<http://www.nytimes.com/2009/09/04/science/earth/04arctic.html?ref=science>



## Earlier Date for First Refined Stone Tools in Europe

By **HENRY FOUNTAIN**



Stone Age peoples weren't always so stone age. As time went on, they became more refined in their toolmaking, able to create larger double-faced implements like hand axes and cleavers.

These kinds of Acheulian artifacts, as they are known, have been found in Africa dating back about 1.5 million years. But in Europe, the oldest hand axes that had been found dated to only half a million years ago. Scientists have wondered why it took so long for early humans with such refined toolmaking to show up in Europe.

Now research from two sites in southeastern Spain provides an answer: it didn't take that long, after all. Using paleomagnetic dating, Gary R. Scott and Luis Gibert of the Berkeley Geochronology Center in California have determined that rather than being about 200,000 years old, the two sites, Solano del Zamborino and Estrecho del Quípar, are about 760,000 and 900,000 years old, respectively.

Paleomagnetic dating takes advantage of the fact that the Earth's magnetic field has reversed itself often on geological timescales. By analyzing the polarity of magnetic minerals in rock, scientists can determine when the rock formed. Fossil remains — in this case, of rodents and other small mammals from an ancient basin near one of the two sites — can help correlate the dates.

At each site, the researchers took samples at regular intervals above and below the level where hand axes were found. The last complete magnetic reversal was 780,000 years ago, and both sites dated back to about this time.

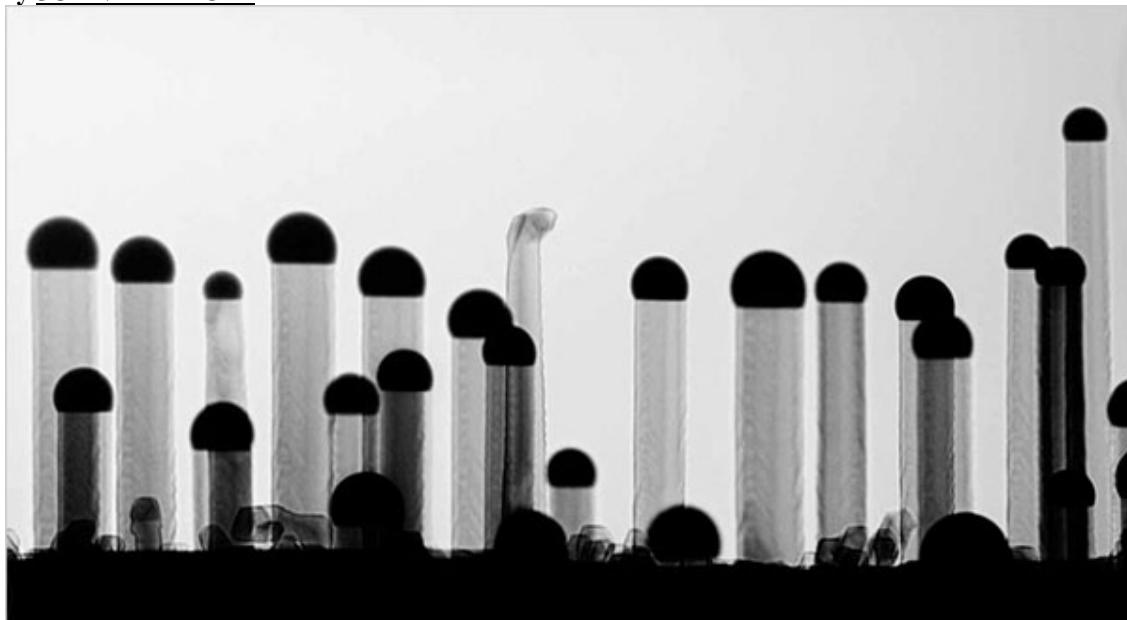
Dr. Gibert said the finding, which was published in Nature, adds to mounting evidence that early humans migrated to Europe from Africa earlier than previously thought.

"The question is, which route did they follow?" he said. Rather than coming through the Middle East and then westward, Dr. Gibert said he is convinced they came across at Gibraltar. "We think the Gibraltar straits were a permeable barrier," he said. "It's a provocative interpretation but I think there is enough information to support it."

<http://www.nytimes.com/2009/09/08/science/08obaxe.html?ref=science>

## After the Transistor, a Leap Into the Microcosm

By JOHN MARKOFF



YORKTOWN HEIGHTS, N.Y. — Gaze into the electron microscope display in Frances Ross's laboratory here and it is possible to persuade yourself that Dr. Ross, a 21st-century materials scientist, is actually a farmer in some Lilliputian silicon world.

Dr. Ross, an [IBM](#) researcher, is growing a crop of mushroom-shaped silicon nanowires that may one day become a basic building block for a new kind of electronics. Nanowires are just one example, although one of the most promising, of a transformation now taking place in the material sciences as researchers push to create the next generation of switching devices smaller, faster and more powerful than today's transistors.

The reason that many computer scientists are pursuing this goal is that the shrinking of the transistor has approached fundamental physical limits. Increasingly, transistor manufacturers grapple with subatomic effects, like the tendency for electrons to "leak" across material boundaries. The leaking electrons make it more difficult to know when a transistor is in an on or off state, the information that makes electronic computing possible. They have also led to excess heat, the bane of the fastest computer chips.

The transistor is not just another element of the electronic world. It is the invention that made the computer revolution possible. In essence it is an on-off switch controlled by the flow of electricity. For the purposes of computing, when the switch is on it represents a one. When it is off it represents a zero. These zeros and ones are the most basic language of computers.

For more than half a century, transistors have gotten smaller and cheaper, following something called Moore's Law, which states that circuit density doubles roughly every two years. This was predicted by the computer scientist Douglas Engelbart in 1959, and then described by Gordon Moore, the co-founder of [Intel](#), in a now-legendary 1965 article in Electronics, the source of Moore's Law.

Today's transistors are used by the billions to form microprocessors and memory chips. Often called planar transistors, they are built on the surface (or plane) of a silicon wafer by using a manufacturing process that precisely deposits and then etches away different insulating, conducting and semiconducting materials with such precision that the industry is now approaching the ability to place individual molecules.

A typical high-end Intel microprocessor is today based on roughly one billion transistors or more, each capable of switching on and off about 300 billion times a second and packed densely enough that two million transistors would fit comfortably in the period at the end of this sentence.

In fact, this year, the chip industry is preparing to begin the transition from a generation of microprocessor chips based on a minimum feature size of 45 nanometers (a human hair is roughly 80,000

nanometers in width) to one of 32 nanometers — the next step down into the microcosm. But the end of this particular staircase may be near.

“Fundamentally the planar transistor is running out of steam,” said John E. Kelly III, I.B.M.’s senior vice president and director of research.

“We’re at an inflection point, you better believe it, and most of the world is in denial about it,” said Mark Horowitz, a Stanford University electrical engineer who spoke last week at a chip design conference in Palo Alto, Calif. “The physics constraints are getting more and more serious.”

Many computer scientists have been warning for years that this time would come, that Moore’s Law would cease to be valid because of increasing technical difficulties and the expense of overcoming them. Last week at Stanford University, during a panel on the future of scaling (of which the shrinking of transistors is one example), several panelists said the end was near.

“We’re done scaling. We’ve been playing tricks since 90 nanometers,” said Brad McCredie, an I.B.M. fellow and one of the company’s leading chip designers, in a reference to the increasingly arcane techniques the industry has been using to make circuits smaller.

For example, for the past three technology generations Intel has used a material known as “strained silicon” in which a layer of silicon atoms are stretched beyond their normal atomic distance by depositing them on top of another material like silicon germanium. This results in lower energy consumption and faster switching speeds.

Other researchers and business executives believe the shrinking of the transistor can continue, at least for a while, that the current industry standard Mosfet (for Metal-Oxide-Semiconductor Field-Effect-Transistor) can be effectively harnessed for several more technology generations.

Technology executives at the Intel Corporation, the world’s largest chipmaker, say they believe that by coupling more advanced photolithographic techniques with new kinds of materials and by changing the design of the transistor, it will be possible to continue to scale down to sizes as small as five nanometers — effectively taking the industry forward until the end of the next decade.

“Silicon will probably continue longer than we expect,” said Michael C. Mayberry, an Intel vice president and the director of the company’s component research program.

Both Intel and I.B.M. are publicly committed to a new class of transistors known as FinFETs that may be used as early as the 22-nanometer technology generation beginning in 2011 or 2012. Named for a portion of the switch that resembles a fish fin, these transistors have the dual advantage of offering greater density because they are tipped vertically out of the plane of the silicon wafer, as well as better insulating properties, making it easier to control the switching from a 1 to a 0 state.

But sooner or later, new materials and new manufacturing processes will be necessary to keep making computer technology ever cheaper. In the long term, new switches might be based on magnetic, quantum or even nanomechanical switching principles. One possibility would be to use changes in the spin of an individual electron to represent a 1 or a 0.

“If you look out into the future, there is a branching tree and there are many possible paths we might take,” Dr. Mayberry said.

In Dr. Ross’s laboratory at I.B.M., researchers are concentrating on more near-term technology. They are exploring the idea of constructing FinFET switches in a radical new process that breaks away from photo etching. It is a kind of nanofarming. Dr. Ross sprinkles gold particles as small as 10 nanometers in diameter on a substrate and then suffuses them in a silicon gas at a temperature of about 1,100 degrees Fahrenheit. This causes the particles to become “supersaturated” with silicon from the gas, which will then precipitate into a solid, forming a wire that grows vertically.

I.B.M. is pressing aggressively to develop this technology, which could be available commercially by 2012, she said. At the same time she acknowledged that significant challenges remain in perfecting nanowire technology. The mushroom-shaped wires in her laboratory now look a little bit like bonsai trees. To offer the kind of switching performances chipmakers require, the researchers must learn to make them so that their surfaces are perfectly regular. Moreover, techniques must be developed to make them behave like semiconductors.

I.B.M. is also exploring higher-risk ideas like “DNA origami,” a process developed by Paul W. K. Rothemund, a computer scientist at the California Institute of Technology.

The technique involves creating arbitrary two- and three-dimensional shapes by controlling the folding of a long single strand of viral DNA with multiple smaller “staple” strands. It is possible to form everything from nanometer-scale triangles and squares to more elaborate shapes like smiley faces and a rough map of North America. That could one day lead to an application in which such DNA shapes could be used to

create a scaffolding just as wooden molds are now used to create concrete structures. The DNA shapes, for example, could be used to more precisely locate the gold nanoparticles that would then be used to grow nanowires. The DNA would be used only to align the circuits and would be destroyed by the high temperatures used by the chip-making processes.

At Intel there is great interest in building FinFET switches but also in finding ways to integrate promising III-V materials on top of silicon as well as exploring materials like graphene and carbon nanotubes, from which the company has now made prototype switches as small as 1.5 nanometers in diameter, according to Dr. Mayberry. The new materials have properties like increased electron mobility that might make transistors that are smaller and faster than those that can be made with silicon.

"At that very small dimension you have the problem of how do you make the connection into the tube in the first place," he said. "It's not just how well does this nanotube itself work, but how do you integrate it into a system."

Given all the challenges that each new chip-making technology faces, as well as the industry's sharp decline in investment, it is tempting to suggest that the smaller, faster, cheaper trend may indeed be on the brink of slowing if not halting.

Then again, as Dr. Mayberry suggests, the industry has a way of surprising its skeptics.

This article has been revised to reflect the following correction:

Correction: September 3, 2009

An article on Tuesday about efforts to develop ever smaller successors to the transistor missstated part of the name of the device that is the current industry standard. Known as Mosfet, the device is the metal-oxide semiconductor field-effect transistor—not metal-oxide "silicon."

<http://www.nytimes.com/2009/09/01/science/01trans.html?ref=science>

**ASBURY H. SALLENGER JR.****The Geologist's Tale: A Storm, a Survivor and a Vanishing Island**By **CORNELIA DEAN**

When Asbury H. Sallenger Jr. first heard of Emma Mille, “I had to check the references,” he said. The hurricane that almost killed the young woman, and the doctor who tended her injuries and won her heart, “just sounded Hollywood.”

But it was all true. And now Dr. Sallenger, a coastal geologist for the [United States Geological Survey](#), has turned the 153-year-old story into a book he hopes will not only engage readers with its tale of love, death and narrow escapes but also teach them about the hazards of living on the ever-changing coastal landscape, particularly in an era of [climate change](#) and rising seas.

The book is “[Island in a Storm](#).” The island is Isle Derniere (in French, “last island”), one of the barrier islands that run along the Louisiana coast. And the storm was a ferocious hurricane that roared out of the Gulf of Mexico on Aug. 10, 1856.

Even at the time, Isle Derniere was not a particularly robust island. Its dunes were “insignificant,” Dr. Sallenger writes. But it was backed by stretches of glorious marshes, and its sandy beach, frame cottages and Muggah House hotel made it a favorite of prosperous Louisianians seeking refuge from the summer heat.

The storm, now estimated to have hit the island as a Category 4 hurricane, washed all of that away. About 400 people are believed to have been on the island that day; only about half survived. The storm also flooded New Orleans and extensively damaged Houma Indian and Cajun settlements in the Louisiana marshes.

For Isle Derniere, Dr. Sallenger writes, the hurricane was “a tipping point from which it could not recover.” Today it has lost more than three-quarters of its land area and, like Louisiana’s other coastal barriers, it erodes significantly each time a storm strikes.

If these offshore barriers disappear, as many geologists including Dr. Sallenger predict they will, their loss will leave the state’s vanishing coastal marshes even more vulnerable to destruction.

Dr. Sallenger, 60, first set foot on the island in the 1980s, when he joined efforts to research the extreme erosion of coastal Louisiana, important not just to environmentalists but also to the oil and gas companies that were cutting canals and running pipes through coastal marshes. Since becoming head of the Geological Survey's storm impact assessment efforts, based in St. Petersburg, Fla., he has visited the area often.

But Dr. Sallenger said the practically featureless topography of Isle Derniere had never matched his idea of what a beach should look like. Dr. Sallenger was a self-described Navy brat who moved often in his childhood but spent summers in a house his father built in Southern Shores, a town on the Outer Banks of North Carolina where the dunes are high.

On the other hand, one of his most vivid childhood memories of the place is of a visit there immediately after the notorious Ash Wednesday storm of 1962, which remains one of the most destructive ever on the East Coast. "The waves came over the dunes and pushed the dunes into the houses and filled them to the roof with sand," he recalled. In a photograph from the visit, he said, "my feet are resting on the sand and I am sitting on the roof."

But the family house survived untouched, he said. "We built on a dune, well back from the beach." It is a lesson he wishes more people would absorb today.

In high school in McLean, Va., he said, a "fabulous" earth science teacher encouraged his interest in geology, which he pursued in undergraduate and doctoral degrees at the University of Virginia. "I did not think practical, where can I get the best job," he said. "I was thinking, 'what am I interested in?' Earth science was the topic that really stood out."

After joining the Geological Survey, he worked in the Bering Sea area before shifting his focus to coastal Louisiana, where, he said, the problem is "remarkably the same as we describe it today — extreme land loss." Dr. Sallenger and his colleagues concluded that the barrier islands might be the most "manageable place to start" their research.

But, he went on, "getting to Isle Derniere is a chore, then and now." Basically, he said, the trip involves driving deep into the Louisiana marshes and getting into a boat with someone "you hope knows the way. It is easy to get lost in the marsh channels."

Over the years he and his colleagues have produced scores of research papers, atlases of shoreline change and other reports. But he had a desire to write something beyond the typical research paper with a set format he describes as: "Hypothesis, how you did it, what you found, your conclusions and then you're out."

He began taking courses and enrolled in writing workshops. "It meshed with my desire to communicate science," he said. "I thought the test would be to engage just regular folks who just want to know about the world and how it works."

Also, he said, "I was looking for a story that would tell how land is moving, how the land is changing." He learned about the hurricane and Emma Mille on trips to Louisiana, when he would take breaks to comb newspaper archives and library collections. He discovered that the young woman had traveled to her family's cottage from their sugar plantation near the town of Plaquemine. When the storm struck, she was swept out to sea, clinging to a bit of wreckage. Miraculously, shifting winds carried her back to the island. Almost everyone else in her family was gone; she ended up with other bedraggled survivors in the beached hull of a wrecked steamer.

To his surprise, he said, he became "passionate" about his subject. And by 2007, what started as a hobby had turned into a book proposal and then a contract with PublicAffairs. "I wrote virtually every day, early in the morning before going to work, on the weekends," he said.

Although the book's narrative heart is the story of Emma, her family and their fates, Dr. Sallenger has worked in plenty of social history and included geological material ranging from early theorizing about

the formation of the Louisiana landscape to predictions of what lies ahead for this and other coastal areas in an era of climate change, especially if people continue “to develop extremely hazardous coastal locations.”

For example, he writes that if sea level rises three feet, which many scientists consider likely by the end of the century, the islands that line the coast from Rhode Island to Texas could meet the same fate as Isle Derniere.

He saw something like that himself in 2005, when Hurricane Katrina inundated the Chandeleur Islands, barrier islands east of Isle Derniere. According to Dr. Sallenger, the storm reduced the islands’ surface area by 80 to 90 percent and, like Isle Derniere, they are unlikely to recover.

As for Emma, although she lost most of her family, her story had a happy ending. In the hull of the steamer she met Alfred Duperier, a young doctor who had been staying at Muggah House and who, like Emma, had been swept to sea on a bit of wreckage and washed up back on the island. He was tending to the survivors, and as he stitched up a cut on Emma’s head, Dr. Sallenger writes, “a bond was formed.” Eventually, they married.

Dr. Sallenger, who with his wife, Dee, a retired language arts teacher, has two grown children, said he would like to write another book. But he is waiting to see how “Island in a Storm” is received, not just by the reading public but also by fellow scientists who, as a community, have a history of raising eyebrows at efforts outside of professional orthodoxy. (So far, he said, “the feedback I have been getting is very gratifying.”)

Meanwhile, though, he hopes that one day someone will think of turning Emma Mille’s story into movie. “But if they did I hope they would really work hard on weaving the science into the story,” he said. “If somebody could do that, that could make it really special.”

This article has been revised to reflect the following correction:

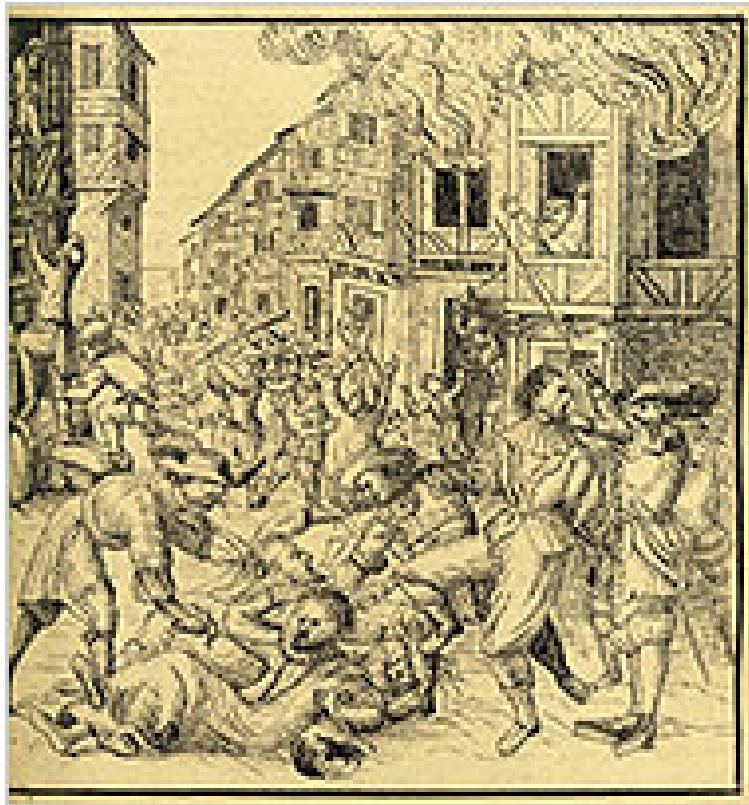
Correction: September 3, 2009

The Scientist at Work article on Tuesday, about the coastal geologist Asbury H. Sellenger Jr., author of “Island in a Storm,” a new book about a hurricane that struck Louisiana in 1856, rendered the name of the publisher incorrectly. It is PublicAffairs, not Public Affairs.

<http://www.nytimes.com/2009/09/01/science/01prof.html?ref=science>

## Finding a Scapegoat When Epidemics Strike

By DONALD G. McNEIL Jr.



Whose fault was the Black Death?

In medieval Europe, Jews were blamed so often, and so viciously, that it is surprising it was not called the Jewish Death. During the pandemic's peak in Europe, from 1348 to 1351, more than 200 Jewish communities were wiped out, their inhabitants accused of spreading contagion or poisoning wells.

The swine flu outbreak of 2009 has been nowhere near as virulent, and neither has the reaction. But, as in pandemics throughout history, someone got the blame — at first Mexico, with attacks on Mexicans in other countries and calls from American politicians to close the border.

In May, a Mexican soccer player who said he was called a “leper” by a Chilean opponent spat on his tormentor; Chilean news media accused him of germ warfare. In June, Argentines stoned Chilean buses, saying they were importing disease. When Argentina’s caseload soared, European countries warned their citizens against visiting it.

“When disease strikes and humans suffer,” said Dr. Liise-anne Pirofski, chief of infectious diseases at Albert Einstein College of Medicine and an expert on the history of epidemics, “the need to understand why is very powerful. And, unfortunately, identification of a scapegoat is sometimes inevitable.”

A recent exhibition, “The Erfurt Treasure,” at the Yeshiva University Museum in Manhattan, displayed a timely and depressing memento of this all too human habit. A chest with more than 600 pieces of gold jewelry, including a magnificent 14th-century wedding ring, was dug up during excavations in what was once a thriving Jewish quarter in Erfurt, Germany. It also held 3,141 silver coins, most with royal portraits; the last king depicted on them died in 1350.

That, said Gabriel M. Goldstein, the museum's associate director of exhibitions, strongly suggests the hoard was buried in 1349, the year the plague reached Erfurt.

"Why put such a huge investment portfolio in the ground and leave it for 700 years?" he asked. "There was a major uprising against Erfurt's Jews — records say 100 or 1,000 were killed. Seemingly, whoever hid it died and never came back."

Dr. Martin J. Blaser, a historian who is chairman of medicine at [New York University](#)'s medical school, offers an intriguing hypothesis for why Jews became scapegoats in the Black Death: they were largely spared, in comparison with other groups, because grain was removed from their houses for [Passover](#), discouraging the rats that spread the disease. The plague peaked in spring, around Passover.

But in every pandemic, the chain of causation is intricate. The historian William H. McNeill, author of "Plagues and Peoples," suggests that ultimate blame may rest with Möngke Khan, grandson of Genghis, who in 1252 sent his armies as far south as present-day Burma, putting them in contact with rodents whose [fleas](#) played host to Yersinia pestis, the plague bacillus. After Yersinia returned with them to the flea-bitten marmots of the Eurasian steppes, it began creeping through the rodent burrows lining Mongol caravan routes, which stretched as far west as the Black Sea. That's where plague-ridden rats boarded ships in the besieged Crimean port of Kaffa in 1346, taking it to Europe.

But that lets off the hook the Indian or Egyptian sailors who had presumably first moved the wild black rat out of India 1,000 years earlier. And then, whom in prehistory does one blame for first carrying Yersinia north from its original home in the Great Lakes region of Africa?

It is not uncommon for ethnic groups to have religious or cultural customs that protect against disease — but whether it was originally intended to do that or not is often lost in time.

Manchurian nomads, Dr. McNeill said, avoided plague because they believed marmots harbored the souls of their ancestors, so it was taboo to trap them, although shooting them was permitted. But in the early 20th century, trapping by immigrants from China contributed to plague outbreaks.

And Tamils from India working as plantation laborers in Malaysia may have had less [malaria](#) and dengue than their Malay and Chinese co-workers did because they never stored water near their houses, leaving mosquitoes no place to breed.

The most visible aspect of blame, of course, is what name a disease gets. The [World Health Organization](#) has struggled mightily to avoid the ethnic monikers given the Spanish, Hong Kong and Asian flus, instructing its representatives to shift from "swine flu" to "H1N1" to "A (H1N1) S-O.I.V." (the last four initials stand for "swine-origin [influenza](#) virus") to, recently, "Pandemic (H1N1) 2009."

Headline writers have rebelled, and ignored them.

Dr. Mirta Roses, director of the Pan American Health Organization, said that in the pandemic's early days, she fought suggestions that it be named the Mexican [flu](#) or the Veracruz flu or the La Gloria flu after the country, state and town where it was discovered.

"We try to avoid demonizing anyone and to keep the focus on the virus," she said. "It helps reduce the level of panic and aggression."

When Dr. Roses was a girl, growing up in a small town in Argentina, her neighbors blamed city dwellers for [polio](#). One summer, families took turns with the local police staffing roadblocks to turn back buses from the capital.

"No one wanted the people from Buenos Aires," she said, "because they were bringing polio." (There was some logic in it. Polio, an intestinal virus, peaks in summer, and is more common in cities with overflowing sewers than in rural areas with outhouses.)

"It wasn't until I grew up that I learned that that was no way to fight it," she said. "It was vaccinating 99 percent of the children that stopped polio."

By the old naming conventions, the 1918 Spanish flu probably ought to be known as the Kansas flu. According to "The Great Influenza: The Epic Story of the Deadliest Plague in History," John M. Barry's history of the epidemic, the first identifiable cases arose in Haskell County, in Kansas. They soon spread to Fort Riley, from there to other military bases, and then to Europe in troop ships. France, Germany and Britain had war censors controlling news reports; Spain did not. Spain got the blame.

Most human diseases originate in animals. While culling animals sometimes makes sense as a public health measure — for example, culling chickens to stop an outbreak H5N1 avian flu — animals are also sometimes "punished" pointlessly. In May, the Egyptian government slaughtered thousands of pigs belonging to the Coptic Christian minority, despite international protests that doing so was racist against Copts and medically pointless because the disease was already in people. When the swine flu arrived anyway — in a 12-year-old American girl, the first confirmed case — the government vowed to hunt down the last few pigs hidden by poor families and kill them on the spot.

In Afghanistan, Khanzir, the country's only pig, a curiosity in the Kabul Zoo, was quarantined to keep him away from the goats and deer he had formerly eaten with.

And during the spread of the avian flu around Asia, Thailand's government shot open-billed storks in its cities and chopped down the trees they nested in, even though the flu had not been found in a single stork.

Though the truth is that diseases are so complex that pointing blame is useless, simply deflecting blame may be more efficient.

During the Black Death, Pope Clement VI issued an edict, or bull, saying Jews were not at fault. He did not, of course, blaspheme by blaming God. Nor did he blame mankind's sins. That would have comforted the Flagellants, the self-whipping sect who were the bull's real target; they often led the mobs attacking both Jews and the corrupt church hierarchy, and were considered heretics. Nor did it blame Möngke Khan or Yersinia pestis. It would be 500 years until the "germ theory" of disease developed.

No, the pope picked a target particularly tough to take revenge upon: a misalignment of Mars, Jupiter and Saturn.

<http://www.nytimes.com/2009/09/01/health/01plague.html?ref=science>

## British plan to tackle asteroids

**A team of British scientists and engineers is developing plans for a spacecraft that could stop large asteroids from hitting the Earth.**



The 10-tonne "gravity tractor" would deflect any orbiting rocks years before any potential collision could happen.

The device, which would rely on the force of gravity, is being developed by Stevenage space company EADS Astrium.

However, the idea is still in its early stages and the company says a prototype is some way off from being built.

The US space agency's (Nasa) Near Earth Object programme reports on its website that it has recorded 1068 known "Potentially Hazardous Asteroids", however there are thousands more estimated to be present in space.

Dr Ralph Cordey, who is EADS Astrium's head of exploration and business, told BBC News that the concept of a gravity tug was actually first mooted by two Nasa astronauts, Edward Lu and Stanley Love, a few years ago.

He said: "Frankly, I thought it was crackers. I thought it would never work."

But he said after reconsidering the idea and focusing on specific engineering issues, including the size of the spacecraft, and long-term propulsion methods, it was considered by the team to be potentially feasible.



The tractor would intercept the asteroid from just 48m away and exert a small gravitational force on it, pulling the rock towards it. The pair would then embark on a slightly different orbit, away from the Earth.

It could possibly be powered using solar panels.

However, the device would have to be launched at least 15 years before any predicted collision and would need a team to monitor it from the ground during this time.

Dr Cordey said the company had worked with a number of space authorities on other methods of protecting the Earth from asteroids but this one would be able to target a wider range.

He said: "We have done quite a lot of design work on this with the European Space Agency and we believe this would work just as well on a big solid iron asteroid as well as other types."

But the high cost implications mean that before the device could be made, it would have to be commissioned by a government or a group of governments working together.

Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8230138.stm>

Published: 2009/08/31 10:09:38 GMT

## Depressed teens 'face adult risk'

**Teenagers who have minor depression are at a higher risk of mental health problems later in life, a study says.**



SPL

Psychiatrists at Columbia University and the New York State Psychiatric Institute spoke to 750 people.

Anxiety, severe depression and eating disorders were all far more common in 20 and 30-year-olds who had had minor depression as adolescents, they found.

The British Journal of Psychiatry report said further research was needed to unpick the reasons for the link.

UK charities said specialist services for young people were vital.

The study was based on interviews with 750 14 to 16-year-olds who were then assessed again as adults.

**"Ensuring teachers, social workers and the rest of the children's workforce have the appropriate skills and knowledge to identify when a child is showing signs of depression will enable young people to get help early before problems escalate to crisis point "**

Lucie Russell, Young Minds

It found that 8% of participants had minor depression as teenagers.

By the time they got to their 20s and 30s, the risk of them having major depression was four times higher than those who did not have signs of minor depression at the first interview.

There was a two-and-a-half times increased risk of agoraphobia, anxiety and obsessive compulsive disorder and a threefold risk of anorexia or bulimia.

## Early help

The researchers defined minor depression as milder than clinical depression but lasting at least two weeks and including symptoms such as feeling down, losing interest in activities, sleeping problems and poor concentration.

Study leader Dr Jeffrey Johnson said more research was needed to see if depression problems in teenagers were an early phase of major depressive disorder or if minor depression earlier in life contributed to the development of more serious problems later on.

Lucie Russell, director of campaigns at Young Minds, said the study highlighted the importance of giving teenagers the right support when problems first arise.

"Ensuring teachers, social workers and the rest of the children's workforce have the appropriate skills and knowledge to identify when a child is showing signs of depression will enable young people to get help early before problems escalate to crisis point."

But she added that access to specialist services was a problem with some parts of the country having year-long waiting lists.

Story from BBC NEWS:  
<http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8227485.stm>

Published: 2009/08/31 23:15:37 GMT

**Critical Care**  
**By ROBERT B. REICH**

**THE HEART OF POWER**

**Health and Politics in the Oval Office**

By David Blumenthal and James A. Morone

Illustrated. 484 pp. University of California Press. \$26.95



This timely and insightful book puts Barack Obama's current quest for universal health insurance in historical context and gives new meaning to the audacity of hope. Universal health care has bedeviled, eluded or defeated every president for the last 75 years. Franklin Roosevelt left it out of Social Security because he was afraid it would be too complicated and attract fierce resistance. Harry Truman fought like hell for it but ultimately lost. Dwight Eisenhower reshaped the public debate over it. John Kennedy was passionate about it. Lyndon Johnson scored the first and last major victory on the road toward achieving it. Richard Nixon devised the essential elements of all future designs for it. Jimmy Carter tried in vain to re-engineer it. The first George Bush toyed with it. Bill Clinton lost it and then never mentioned it again. George W. expanded it significantly, but only for retirees.

David Blumenthal, a professor at Harvard Medical School and an adviser to Barack Obama, and James A. Morone, a professor of political science at Brown University, skillfully show how the ideal of universal care has revolved around two poles. In the 1930s, liberals imagined a universal right to health care tied to compulsory insurance, like Social Security. Johnson based Medicare on this idea, and it survives today as the “single-payer model” of universal health care, or “Medicare for all.”

The alternative proposal, starting with Eisenhower, was to create a market for health care based on private insurers and employers; he locked in the tax break for employee health benefits. Nixon came up with notions of prepaid, competing H.M.O.'s and urged a requirement that employers cover their employees. Everything since has been a variation on one or both of these competing visions. The plan now emerging from the White House and the Democratic Congress combines an aspect of the first (the public health care option) with several of the second (competing plans and an employer requirement to “pay or play”).

Devising a plan is easy compared with the politics of getting it enacted. Mere mention of national health insurance has always prompted a vigorous response from the ever-vigilant American Medical Association; in the 1930s, the editor of its journal equated national health care with “socialism, communism, inciting to revolution.” Bill Clinton’s plan was buried under an avalanche of hostility that included the now legendary ad featuring the couple Harry and Louise voicing their fears that the Clinton plan would substitute government for individual choice — “they choose, we lose.”

So, Blumenthal and Morone say, a new president must move quickly, before opponents have time to stoke public fears. After his 1964 landslide, Johnson warned his staff to push Medicare immediately because “every day while I’m in office, I’m going to lose votes. I’m going to alienate somebody. We’ve got to get this legislation fast.” George W. Bush started planning what became the Medicare drug benefit months before he was elected.

Clinton, by contrast, suffered from delay. Right after his election, national health insurance looked so likely that even some Republicans began lining up behind various plans. A year later, it was dead. In the interim, battles over Clinton’s budget and Nafta drained his political capital, gave his opponents ample time to rouse public concerns about government-sponsored health care and soured key allies like organized labor and the AARP.

Congress can be just as much of an obstacle: the lesson that one will probably take away from “The Heart of Power” is that a president must set broad health reform goals and allow legislators to fill in the details, but be ready to knock heads together to forge a consensus. “I’m not trying to go into the details,” Johnson repeatedly said of his Medicare bill, yet he flattered, cajoled, intimidated and bluffed recalcitrant members until they agreed. “The only way to deal with Congress is continuously, incessantly and without interruption,” he quipped.

Carter, on the other hand, pored endlessly over his incipient health care plan, scribbling opinions in the margins about every detail, and dealt with Congress at arm’s length. And Clinton delivered a plan so vast and complex that even a Democratic Congress chose simply to ignore it. Republicans, meanwhile, decided that a defeat of Clinton’s health care bill would be seen as a repudiation of the new administration and might give them a shot at retaking the House and Senate.

Blumenthal and Morone’s most provocative finding is that presidents who have been most successful in moving the country toward universal health coverage have disregarded or overruled their economic advisers. Plans to expand coverage have consistently drawn cautions or condemnations from economic teams in every administration, from Harry Truman’s down to George W. Bush’s. An exasperated Lyndon Johnson groused to Ted Kennedy that “the fools had to go to projecting” Medicare costs “down the road five or six years.” Such long-term projections meant political headaches. “The first thing, Senator Dick Russell comes running in, says, ‘My God, you’ve got a one billion dollar [estimate] for next year on health. Therefore I’m against any of it now.’” Johnson rejected his advisers’ estimates and intentionally lowballed the cost. “I’ll spend the goddamn money.” An honest economic forecast would most likely have sunk Medicare.

It’s not so much that presidential economic advisers have been wrong — in fact, Medicare is well on its way to bankrupting the nation — but that they are typically in the business of thinking small and trying to minimize risk, while the herculean task of expanding health coverage entails great vision and large risk. Economic advice is important, but it’s only one source of wisdom.

Yet since Johnson, presidents have found it increasingly difficult to keep their economists at bay, mainly as a result of the growth of Washington’s economic policy infrastructure. Cost estimates and projections emanating from the White House’s Office of Management and Budget and the Congressional Budget Office, both created during the Nixon administration, have bound presidents within webs of technical arguments, arcane rules and budget limits. To date, Democratic presidents have felt more constrained by this apparatus than Republicans, perhaps because they have felt more of a need to prove their cost-cutting chops.

The book was written before President Obama began his push for universal health care, but he seems to have anticipated many of its lessons. He’s moved as quickly on the issue as this terrible economy has let him, and he has outlined his goals but left most details to Congress. Nor has he been too rattled by naysaying economists (although the cost estimates of the Congressional Budget Office set him back). The question remains whether, in the months ahead, he can knock Congressional heads together to clinch a meaningful deal, and overcome those who inevitably feed public fears about a “government takeover” of health care and of budget-busting future expenditures. “The Heart of Power” suggests that the odds are not in his favor.

But even if Obama fails, the authors offer one large consolation. There is an art to losing, too — in a way that can tee up the issue for future presidents. Truman lost but nonetheless redefined the terms of debate, setting the stage for Medicare (which is why Johnson honored Truman when he signed it into law). Compare him with Clinton, who walked away from the wreckage of his health care plan and rarely mentioned the subject again. According to the authors, this allowed opponents to gain control over the spin and history, so that the Democrats' signature cause slipped out of political sight for a decade. This fine book also contains a subplot with a supporting actor who, although he never became president, is repeatedly heard from offstage — goading, pushing, threatening and pulling presidents of both parties toward universal coverage. Ted Kennedy first introduced his ambitious national health insurance proposal 40 years ago, and he never stopped promoting the cause. A deal he reached with President Nixon was the closest this country has ever come to universal care. Even before Kennedy's death last month, his illness had tragically sidelined him just when his powerful voice was most needed. Yet when and if America ever achieves universal coverage, it will be due in no small measure to the tenacity and perseverance of this one remarkable man.

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[http://www.nytimes.com/2009/09/06/books/review/Reich-t.html?\\_r=1&nl=books&emc=booksupdateema1](http://www.nytimes.com/2009/09/06/books/review/Reich-t.html?_r=1&nl=books&emc=booksupdateema1)



**Another One for the Gipper**  
**By ROSS DOUTHAT**

**THE AGE OF REAGAN**

**The Conservative Counterrevolution, 1980-1989**

By Steven F. Hayward

753 pp. Crown Forum. \$35



We'll know it's safe to call [Barack Obama](#)'s presidency a success if 25 years from now the most interesting arguments about the Obama legacy are happening among his ideological opponents. That's the way it's been with [Ronald Reagan](#) lately: while Republicans take their fealty to Reaganism for granted, American liberals have been engaged in a low-grade civil war about how their greatest foe ought to be remembered.

On one side you have the stalwart Reagan haters, for whom the 40th president will always be an overrated dunce who rode racism and jingoism to power and left behind a legacy of greed, polarization and fiscal irresponsibility. On the other you have those journalists and academics — [Richard Reeves](#), John Patrick Diggins, [Sean Wilentz](#), for example — who have sought ways to recognize Reagan as a consequential president, and possibly even a great one, without ceding too much ideological ground to his conservatism. (The debate even found its way into the 2008 Democratic primaries, when Barack Obama's admission that Reagan did more to change “the trajectory of America” than any other recent president inspired howls of outrage from [Hillary Clinton](#) and [John Edwards](#).)

As fascinating as this feud can be, though, it's not the only Reagan-related argument worth having. Reagan would doubtless have appreciated the way his legacy has turned liberal against liberal, but he'd probably welcome a more spirited conversation within his own coalition. Especially lately, because in the post-Bush era of conservative retrenchment, there has often been more sloganeering than substance in the

way the Gipper's would-be heirs remember him. He's become a plaster saint rather than a living, breathing politician.

Steven F. Hayward's "Age of Reagan: The Conservative Counterrevolution, 1980-1989" may not shake up this Reagan-worshiping complacency — but it should. Like the first volume of "The Age of Reagan," which traced liberalism's post-1964 eclipse and the rise of movement conservatism, this is history that assumes the premises that today's liberals are wrangling over. Reagan's greatness is taken for granted, and so (broadly speaking) is the correctness of his worldview, on foreign and domestic policy alike. It's no accident that Hayward's title echoes Arthur Schlesinger Jr.'s "Age of Roosevelt" series. Like Schlesinger's work, "The Age of Reagan" is an essentially partisan history, written from the same ideological vantage point as the politician it celebrates.

There are obvious difficulties with this approach. This is not a book that's likely to win many converts from the ranks of Reagan skeptics, to put it mildly — and not only because Hayward isn't quite in Schlesinger's league as a writer. "The Age of Reagan" has a lot of ground to cover, but it would profit from lengthier pauses in its often headlong narrative, and more serious engagement with the enduring liberal critiques of Reagan's record.

This doesn't require giving credit where it isn't due. Hayward is appropriately dismissive toward the anti-anti-Communist left, whose cringing posture toward the Soviet Union throughout the 1970s and '80s still has the power to appall. (As he notes — harshly, but not unfairly — it was often difficult to tell the difference between the criticism by Reagan's left-wing opponents and editorials in *Pravda*.) And his damning portrayals of Democratic politicians like Tip O'Neill and Walter Mondale, men who seemed incapable of imagining an economic policy that didn't involve divvying up a shrinking pie among an expanding array of interest groups, feels entirely appropriate as well.

But not every argument from the 1980s is a dead letter today. In an age of counterinsurgency, the moral compromises that America's support for third world anti-Communism entailed deserve more scrutiny than "The Age of Reagan" gives them. So too, in an era of mounting deficits, do the long-term consequences of Reagan's fiscal policy — for the country, but especially for the conservative approach to governance. (Hayward does criticize Reagan for claiming, as his supply-side advisers rarely did, that tax cuts would increase revenue in the short run. But he doesn't acknowledge the extent to which Reagan's assumptions, rather than the sounder views of his advisers, have become orthodoxy for right-wing politicians ever since.)

But "The Age of Reagan" demonstrates the strengths of partisan historiography as well. Because he takes for granted that Reagan's presidency was successful, Hayward is free to explore, as few authors have, exactly how he did it. Reagan the wordsmith gets his due — the book is filled, appropriately, with extensive quotations from the Great Communicator's addresses, television chats and press conferences. So does Reagan the savvy diplomat, whose rapport with Mikhail Gorbachev played a significant role in easing the cold war to an end. But Hayward's most timely portrait is probably Reagan the wheeler-dealer, who came to office with the presidency's influence at a modern nadir and maneuvered sweeping domestic legislation through a Congress that was often controlled by the opposition party. ("The Age of Reagan," in other words, puts Rahm Emanuel's challenges in perspective.)

Hayward's ideological vantage point also leaves him well situated to analyze where and how Reagan's record should be deemed a disappointment by conservatives. This critique extends from specific fumbles, like the mishandling of the Robert Bork nomination, to the broader failure to significantly reduce the size and scope of government.

Many liberals have passed from underestimating the Reagan revolution to overestimating — out of shock at its staying power, perhaps — how revolutionary it really was. Hayward has a clearer view. "Reagan successfully curbed the excesses of liberalism," he concludes, but "he did not curb liberalism itself." The angst of his opponents notwithstanding, Reagan's budgets hardly touched the Great Society, let alone the New Deal. The conservative era he ushered in was, in fact, conservative: It halted liberals in their tracks, without significantly rolling back the state that Roosevelt and Johnson had built.

Hayward obviously sees this as a lost opportunity. But it's one of his book's great strengths that he also recognizes the centrality of compromise to Reagan's overall success. This was something, he emphasizes repeatedly, that many right-wingers got wrong at the time. Again and again, movement conservatives misread and misunderstood their greatest champion, whether they were bemoaning Reagan's willingness to include moderate Republicans in his councils or condemning him, in his second term, as a sellout to the Soviets.

Ideological to a fault, Reagan-era conservatives failed to see that "the most successful presidencies tend to be those that have factional disagreements," rather than those whose inner circles march in perfect lockstep. They often "missed the signals of Soviet vulnerability" that presaged Communism's peaceful fall. In both cases, Reagan knew better, and the country was better off because he did.

Since "The Age of Reagan" will probably find more readers among conservatives than liberals, this is the message they ought to take to heart — that being like Reagan can mean more than simply checking off a list of ideological boxes, or delivering a really impressive speech. It can mean marrying principle to practicality, tolerating fractiousness within one's own coalition and dealing with the political landscape as it actually exists, rather than as you would prefer it to be. (And in Hayward's account of the flailing Reagan-era Democratic Party, conservatives can find an object lesson in what happens if you don't.) There is also a message here for all partisans and all seasons — for contemporary liberals as well as Reagan nostalgists, and for anyone who's invested himself in the redemptive power of politics.

Reconsidering his hero inspires Hayward to meditate on leadership, on greatness and on the possibility of world-historical change. Channeling William F. Buckley, he ponders "the limitations of politics," the fact that "the most powerful man in the world is not powerful enough to do everything that needs to be done." From his lips, one hopes, to Barack Obama's ear.

*Ross Douthat is an Op-Ed columnist for The Times.*

<http://www.nytimes.com/2009/09/06/books/review/Douthat-t.html?ref=books>



**Two of a Kind**  
By CAROLINE ALEXANDER

**THE SISTERS OF SINAI**

**How Two Lady Adventurers Discovered the Hidden Gospels**

By Janet Soskice Illustrated. 316 pp. Alfred A. Knopf. \$27.95



Despite its popular characterization as a period of stultifying stuffiness or, as the O.E.D. puts it, of “prudishness and high moral tone,” the Victorian age abounded with adventurers intent on intellectual discovery. These included the explorer Richard Burton, who brought back to mother England not only geographical information from Africa and Arabia, but also translations of Oriental erotica; and Mary Kingsley, whose travels in equatorial Africa made her an enlightened amateur scholar of African fetish beliefs; not to mention Charles Darwin, whose travels in South America rewrote the history of the world. As Janet Soskice makes clear in “The Sisters of Sinai,” figuring among the ranks of such adventurous seekers were Agnes and Margaret Smith, identical Scottish twins, whose travels to St. Catherine’s Monastery in the Sinai desert resulted in the electrifying discovery of one of the oldest manuscripts of the Gospels ever found.

The Smith sisters were born in 1843, in Irvine, Scotland, and raised with stern enlightenment by their very wealthy widowed father, who, as Soskice reports, “educated his daughters more or less as if they had been boys.” In particular, he promised his daughters that he would take them to every country whose language they learned, a pact that, given the happy combination of the twins’ love of both languages and travel, resulted in their mastery of French, German, Spanish and Italian at a young age. Unshakably devout Presbyterians throughout their lives, the twins were deeply interested in biblical studies and languages, and between them eventually acquired Hebrew, ancient and modern Greek, Arabic and old Syriac. A desire to see the land of Abraham and Moses prompted their first adventure, a trip chaperoned by a lady companion, Grace Blyth, to Egypt and the Nile. Manifesting the unflappable hardiness that would serve them well on their many future travels, the twins not only survived the duplicitous mismanagement of their dragoman, or interpreter guide, but also enjoyed their near misadventure. Both sisters eventually made happy, if brief, marriages, Margaret to James Gibson, a Scottish minister of renowned eloquence and wide travel, and Agnes to Samuel Savage Lewis, a librarian and keeper of manuscripts at Corpus Christi College, Cambridge, and a scholar of enormous energy and erudition; Lewis’s circle of learned, progressive Cambridge associates was to transform both sisters’ lives. Each marriage lasted some three years, and each ended with the abrupt and much-lamented death of a husband.

It was in great part as an antidote to grief that the widowed sisters determined to fulfill a long-deferred wish to visit St. Catherine's Monastery in the Egyptian desert, near Mount Sinai. Margaret Gibson and Agnes Lewis arrived in Cairo in January 1892, equipped with the usual expeditionary paraphernalia and letters of introduction, but also, more unusually, with elaborate photographic equipment. As Soskice emphasizes — and as jealous biblical scholars would pretend to forget — the twins had not stumbled into Egypt, but had come on a carefully meditated and prepared mission: to find manuscripts of interest in the legendary library of St. Catherine's. As Soskice writes, “the latter half of the 19th century was a time of anxiety over *the Bible*,” an anxiety that, in an age of escalating scientific interest and discovery, pertained not only to the soundness of some of the Bible’s claims — manna from heaven, for example — but the soundness of the very text upon which believers pinned their faith. The search for earlier and better manuscripts had taken scholars into obscure corners of the globe. The library of St. Catherine’s, where the twins were destined, had already been searched, and even rifled, by earlier European visitors, including, most notoriously, the German scholar-adventurer Constantin von Tischendorf, who in 1859 found and “borrowed” the mid-fourth-century Codex Sinaiticus, one of the oldest and most complete manuscripts of the Bible ever found. More recently, and more significantly for the twins, J. Rendel Harris, a Quaker scholar based in Cambridge, had found in the same library an important document that gave unexpectedly early evidence of a well-developed system of Christian belief datable to the second century A.D. When Harris learned, through a chance encounter, of the twins’ plans to visit Sinai, he hastened over to meet them — and to share a secret: in a small, dark closet off a chamber beneath the archbishop’s rooms were chests of Syriac manuscripts that he had been unable to examine.

When, then, Agnes and Margaret arrived at St. Catherine’s, having traveled nine days by camel through the desert, they were specifically intent on examining the contents of this closet. At Harris’s suggestion, they had also come prepared to photograph manuscript finds they would not have the opportunity to transcribe on site — preparations that give evidence of both their seriousness of purpose and their expectations of success. And successful they were. Handling a dirty wad of vellum, sharp-eyed Agnes saw that its text, a racy collection of the lives of female saints, was written over another document. When close scrutiny revealed the words “of Matthew,” and “of Luke,” she realized she was holding a palimpsest containing the Gospels. Written in Syriac, a dialect of the Aramaic Jesus had spoken, the Sinai Palimpsest, or Lewis Codex, as it came to be called, would prove to date to the late fourth century; the translation it preserved was even older, dating from the late second century A.D. — “very near the fountainhead” of early Christianity.

Soskice follows the aftershocks of this extraordinary discovery as they reverberate both through the twins’ lives and through the world of biblical scholarship; among other things, the new codex’s Book of Mark lacked the final verses describing Christ’s Resurrection.

Herself a professor of philosophical theology at Cambridge, Soskice deftly positions the twins’ story in the wider and more profound context of ideas and discoveries of their age. With great clarity, she steadily and captivatingly unwinds the complicated threads of her narrative, explicating formidable scholarship while keeping the twins at the fore. The twins themselves, although well described, remain enigmatic — possibly a symptom of the reticence of their age — and Agnes especially so. In her youth, she had written two sentimental novels, and a whiff of unexpected romance can be detected in her own account of her discovery, “In the Shadow of Sinai,” published in 1898: “Darkness brought on a vision of loveliness. . . . A blazing fire beside us showed a group of hardy Bedawîn sitting within a ring of spectre-like camels.” Surely some yearning for romance per se, for adventure, as well as for righteous enlightenment, inspired her many travels to the holy lands.

Still, the redoubtable twins — sturdy, steady, passionately curious, generous as well as thrifty — will win the reader. Industrious to the end, they left a legacy of good works, including land for the establishment of Westminster College at Cambridge. For its evocation of the character, as well as the characters, of the era, “Sisters of Sinai” is a bracing and moving book, not only a story of adventure, but also a reminder of the ardor, hardship and energy invested in the pursuit of knowledge in that endlessly inquiring and industrious Victorian age.

*Caroline Alexander’s new book, “The War That Killed Achilles: The True Story of Homer’s ‘Iliad’ and the Trojan War,” will be published in October.*

<http://www.nytimes.com/2009/09/06/books/review/Alexander-t.html?ref=books>

## Kennedy's Rough Waters and Still Harbors

By **MICHIKO KAKUTANI**

### TRUE COMPASS

#### A Memoir

By Edward M. Kennedy

Illustrated. 532 pages. Twelve. \$35.



At the end of his deeply affecting memoir, the late Senator Edward M. Kennedy writes about his grandson "Little Teddy" — the son of his son "Medium Teddy" who delivered such a heartbreakingly eloquent eulogy at the senator's funeral on Saturday — and his difficulties mastering the family tradition of sailing. The senator told the 10-year-old "we might not be the best," but "we can work harder than anyone," and Little Teddy stayed with it, grew eager to learn and started winning races. That, the senator writes, "is the greatest lesson anyone can learn": that if you "stick with it," that if, as the title of his book suggests, you keep a "true compass" and do your best, you will eventually "get there."

And that, in a sense, is the theme of this heartfelt autobiography: that persistence, perseverance and patience in pursuit of a cause or atonement for one's failures can lead to achievement and the possibility of redemption. It's the story of how this youngest and most underestimated of siblings slowly, painfully, incrementally found genuine purpose of his own in shouldering the weighty burden of familial expectations and the duty of carrying on his slain brothers' work. He found a purpose, not as they did in the high-altitude pursuit of the presidency but in the dogged, daily grind of being a senator — of laboring over bills, of sitting through endless committee meetings, of wading through briefing books and making deals with members across the aisle. The resulting legislation — including the Civil Rights Act of 1964 and the State Children's Health Insurance Program of 1997 — would help the poor and the disenfranchised and those with disabilities, and win him recognition as one of the foremost legislators in American history.

Mr. Kennedy is not a particularly introspective writer — he acknowledges in these pages that he coped with the assassinations of his brothers Jack and Bobby by pushing his grief down, by trying to keep moving forward so as to stay ahead of the darkness and not to be engulfed by despair. But he writes in these pages with searching candor about the losses, joys and lapses of his life; the love and closeness of his family; the solace he found in sailing and the sea; his complex relationships with political allies and rivals. Mr. Kennedy's conversational gifts as a storyteller and his sense of humor — so often remarked on by colleagues and friends — shine through here, as does his old-school sense of public service and his hard-won knowledge, in his son Teddy Jr.'s words, that "even our most profound losses are survivable." In these pages (Ron Powers is credited as a collaborator) Mr. Kennedy draws some telling portraits of other politicians. Of Jimmy Carter, he writes, "He baffled many potential allies in his own party," but "I believed then and now that he deserved a special place in his animus toward me." He writes that his objections to Ronald Reagan's policies are "far too vast to enumerate" but that he admired the optimism Reagan brought to the country after the Carter era. More revealingly, Mr. Kennedy says that he is convinced that had his brother Jack lived, he would have sought a way out of Vietnam ("He had spoken with McNamara," referring to Defense Secretary Robert S. McNamara, "about a plan for withdrawal within two or three years," he writes) and that he, Teddy, is "satisfied that the Warren Commission got it right."

But it is Mr. Kennedy's personal rather than political reminiscences that are most memorable in "True Compass." He was a talented amateur painter, and there is a vivid, almost pictorial evocation of his privileged but pressured and sometimes lonely childhood and youth. He sometimes felt, he says, that his life was "a constant state of catching up" to his glamorous, larger-than-life brothers, whom he hero-worshipped as a boy: Joe Jr., who died young in war; Jack, who Teddy believed would always win even when the odds were against him, who "could do anything he wanted"; and Bobby, who was not "cold, calculating" as some of his critics charged, but who "lived and made decisions in the moment," completely absorbed in whatever he was doing.

Teddy is always the one who through sheer will and fortitude — whether passing a piece of legislation, finishing a perilous mountain climb or gritting his teeth through the pain of kidney stones to deliver a speech — keeps on keeping on, telling himself "I can handle this," "I can handle this." In trying to decide whether to run for the Senate in 1962, Mr. Kennedy writes, he remembered his father's words to him as a boy: "You can have a serious life or a nonserious life, Teddy. I'll still love you whichever choice you make. But if you decide to have a nonserious life, I won't have much time for you. You make up your own mind. There are too many children here who are doing things that are interesting for me to do much with you."

Later in this volume, Mr. Kennedy addresses his own failings and regrets. He writes about how his actions in 1969 at Chappaquiddick were "inexcusable," how Mary Jo Kopechne's death "haunts me every day of my life" and how "atonement is a process that never ends." When his father died four months later, he says, he "wondered whether I had shortened" his life "from the shock I had visited on him with my news of the tragic accident on Chappaquiddick Island. The pain of that burden was almost unbearable." In another chapter, Mr. Kennedy observes that "with all of the background noise about Palm Beach" — surrounding the rape trial of his nephew William K. Smith (who was found not guilty) — "and my bachelor lifestyle, I would have been the wrong person to lead the questioning" of Clarence Thomas during the Anita Hill portion of his confirmation hearings and that "many people were disappointed that I was unable to succeed in making a persuasive case against Thomas's confirmation."

After his brother Robert's assassination, Mr. Kennedy recalls how his anguish led him to drive his car at high speeds, to sometimes drive his "capacity for liquor to the limit" and how years earlier, Bobby's grief over their brother Jack's assassination "veered close to being a tragedy within the tragedy," with their mother, Rose, and Bobby's wife, Ethel, fearing for "his psychic survival." His brother Bobby's "blossoming idealism" — about Vietnam, about taking on the fight against poverty and urban violence — was in fact, he suggests, "provoked by Jack's death."

The murders of Jack and Bobby not only devastated Teddy and left him with an abiding sorrow and loneliness, but they also, on a subconscious level at least, made him fearful for his own life. He writes that

he flinched at 21-gun salutes at Arlington to honor the fallen in Iraq, once dived for the pavement when a car backfired in the street. In 1982, he says, his children's hope that he would not run for the presidency and their unspoken fears for his safety were crucial in his decision not to enter the race.

The tribulations of the Kennedy family have frequently been likened to something out of Shakespeare or a Greek tragedy, but Teddy Kennedy manages the difficult task in these pages of conveying the profoundly ordinary, human dimensions of his and his family's losses, the day-to-day reality of losing two siblings (Joe Jr. and Kathleen) when he was still a youth; of becoming a paterfamilias at the age of 37 for his nephews and nieces after Jack's and Bobby's deaths; of shepherding two of his children through the ordeal of cancer; of coming to a point in his life after all this sorrow and struggle of having "stopped looking forward to things," of retreating from the risk of "new personal commitments."

In the end, however, Mr. Kennedy was able to write a happy ending to his own life. He fell in love with and in 1992 married Victoria Reggie, whose "acute understanding and love of me" gave him a new sense of stability and tranquillity. He found renewed meaning in his work in the Senate. And he found, in Barack Obama, whom he helped elect, a new incarnation of the idealism and sense of public service he and his brothers had embraced as young men so many years ago.

In his last months, Mr. Kennedy says, he found that "simple pleasures fill me with happiness," that gazing out at the sea and his beloved boat Mya left him with a sense of peace. Sailing, he writes, always helped "displace the emptiness inside me with the awareness of direction": "an awareness that there is a beginning to the voyage and an end to the voyage, and that this beginning and ending is part of the natural order of things."

<http://www.nytimes.com/2009/09/04/books/04book.html?ref=books>



## A Tribute to the Man, Beyond Just the Mouse

By CAROL KINO



At first glance the Walt Disney Family Museum, which opens on Oct. 1, would seem a serious, even scholarly endeavor. Financed by the Walt Disney Family Foundation and run by Richard Benefield, the former deputy director of the Harvard University Art Museums, it is dedicated not to Disney the entertainment behemoth but to Disney the man, from his birth in Kansas City, Mo., to his role as a powerful studio boss in 1960s Hollywood. But the museum is likely to defy expectations of sober restraint. Although housed in an unprepossessing barracks in the Presidio, a landmarked 19th century Army base, inside it proves to be something of a high-tech wonderland, designed by David Rockwell, the man behind the 2009 Oscars broadcast and the Imagination Playground in New York.

Every gallery is packed with video monitors, touch screens and sound systems intended to bring static drawings, storyboards and ephemera to life. Many of the exhibits focus on technological advances made by Disney himself that resulted in the first successful synchronized sound cartoon ("Steamboat Willie," 1928), the first convincing suggestion of depth in animation ("The Old Mill," 1937) and the first modern-day theme park (Disneyland, 1955).

There is also abundant documentation of his private life, with snapshots and home videos everywhere. After the death of Disney's widow, Lillian, in 1997, Mr. Benefield said, it dawned on her grandchildren that vast quantities of her husband's personal memorabilia were packed away. "It just seemed like a shame," Mr. Benefield said. The family had the archives moved to a Presidio warehouse, cataloged and made available to scholars. "They started out with a small idea," he said, "and then it grew and it grew."

<http://www.nytimes.com/2009/09/06/arts/design/06kino.html?ref=design>

## With Sharp Satire, Enfant Terrible Challenges Czech Identity

By **DAN BILEFSKY**

PRAGUE



**DAVID CERNÝ** sends a rude text message to two bronze sculptures of naked, urinating men, which proceed to swivel their hips and move their protruding penises to trace his four-letter words into a pond shaped like a map of the Czech Republic.

To Mr. Černý, bad boy of the eastern European art world, the playfully subversive computer-controlled duo — installed a few years ago in a sleepy courtyard here — are an apt commentary on the self-deprecating Czechs, who he contends have gritted their teeth through centuries of invasion and occupation, barely resisting and seldom winning at anything.

“The Czech attitude is not to be proud of being Czech,” said Mr. Černý, a wiry, floppy-haired 41-year-old who resembles Mick Jagger. “It is a positive thing for me, but it also has a dark side, which is that we never won any war. In America, people are taught to be proud and as visible as possible. Here in this country, we are taught to be silent and invisible.”

No one could accuse Mr. Černý, who once considered getting silicon breast implants and walking around Prague naked “to see how people would react,” of seeking silence or obscurity.

In this post-Communist age, in which former Marxists have reinvented themselves as captains of industry and dissidents have long since become presidents, Mr. Černý is pursuing an artistic and political rebellion that is, perhaps by necessity, bolder and louder than his predecessors’.

He has painted a Soviet tank pink, depicted Prague’s heroic 10th-century King Wenceslas riding a dead, upside down horse and lampooned the incendiary, right-wing Czech president, Vaclav Klaus, by displaying a caricature of him inside a giant fiberglass anus.

“David Černý is one of the region’s leading cultural and political satirists and one of a handful of Eastern European artists who have achieved global stature,” says Jan Vitvar, culture editor of Respekt, the Czech political weekly. “Some Czechs would prefer him to be grayer, more contemplative and behave less like a rock star, but no one can ignore him.”

Indeed, the Czech Republic, which recently gave up the six-month presidency of the European Union, is still reeling from the scandal caused by Mr. Černý’s satire of European stereotypes in an eight-ton mosaic of the bloc’s 27 nations called “Entropa” last January.

The piece, which was installed at the European Council building in Brussels, was supposed to proudly display unique traits of each country in the union. Instead, it depicted Bulgaria as a Turkish toilet, Catholic Poland as a group of priests raising a gay flag and Germany as a network of motorways eerily resembling a swastika.

Officials in Prague, who had commissioned the work to mark the Czech presidency, had asked Mr. Černý to oversee a work by artists from each of the union’s member states. Instead, the sculpture turned out to

have been entirely constructed by Mr. Cerny and two friends in an elaborate hoax. Mr. Cerny even fabricated fake biographies and Web sites for the nonexistent artists, along with pseudo-intellectual absurdist texts. The fictional Bulgarian artist Elena Jelebova notes that she sought to create a “punk gesture, intentionally primitive and vulgar, fecally pubertal.”

Several countries demanded an apology, which the Czech government — and Mr. Cerny — grudgingly provided, prompting some critics to ask whether the prankster had caved in to the forces of political correctness.

MR. CERNY attributed his apology to emotional exhaustion. And he insisted that he had no regrets about creating a work that many critics have lauded as ingenious political art, exposing the cultural insecurities of an old continent. Indeed, the international debate spurred by “Entropa” may prove the most enduring legacy of the Czech presidency, which was deemed a disaster after the Czech government collapsed midway through.

“When the hoax was exposed, I went into a deep depression,” Mr. Cerny said. “It was hard to have that weight on my head. I regret how it all unfolded, but I wouldn’t hesitate to do it again. It was fun.”

The ruse elevated Mr. Cerny to the status of folk hero in his native country and spread his already growing reputation worldwide, including to the United States, where he has exhibited in New York, Philadelphia and Chicago.

But some critics, like Milan Knizak, the director of Prague’s National Gallery, counter that “Entropa” is little more than a cynical provocation by an artistic shock jock who has made a career out of thumbing his nose at the establishment.

“There is nothing special about David Cerny’s art, other than that he is more visible than other artists and talented at marketing,” Mr. Knizak said. “But artists like Cerny who are in headlines today will be forgotten tomorrow. His work is destined for the amusement park and won’t stand the test of time.” Mr. Knizak, whom Mr. Cerny once depicted inside the same towering sculpture of a rectum where he placed his other nemesis, Mr. Klaus, may not be the most objective critic.

In a 2003 work titled “Brown-nosers,” museumgoers were asked to climb a ladder and peer into a hole in the huge white rear end, where a video showed impersonators wearing rubber masks of Mr. Klaus and Mr. Knizak, feeding each other slop to the tune of “We Are the Champions.” Mr. Cerny is so contemptuous of Mr. Knizak, whom he accuses of fawning on the establishment, that he once refused to enter the National Gallery to accept an award. “It was hate at first sight,” he said.

Mr. Cerny first drew attention in May 1991, when, at 22, he was arrested after painting a giant Soviet tank pink, transforming a memorial to the liberation of Czechoslovakia by the Red Army in 1945 into the sculptural equivalent of a large pink toy.

Recalling his hooliganism, for which he spent a few days in prison, Mr. Cerny said the tank had been a symbol for him and his generation of the Soviet-led occupation of Czechoslovakia in 1968 and a monument to decades of Russian oppression. “I was sick and tired of passing by this tank, two years after Communism had fallen,” he said. “I was standing with a friend one day at a tram stop nearby staring at it and we both decided we should defile it.”

THE son of a painter and a restorer of 15th-century art, Mr. Cerny traces his impulse to revolt to a childhood under Communism, when freedom of expression was suppressed.

When he was 4 years old, a statue of Lenin was erected in a square near his house. One day, he and his father were driving by, and his father muttered, “They would be better off building streetlights.” When he repeated this at kindergarten, he said, the teacher called his parents to warn about their young subversive. “After that, my parents were afraid to say things in front of me, and I had problems with refusing to be quiet,” Mr. Cerny said.

Today, he commands six-figure private commissions and owns his own four-seater plane, somewhat undermining his status as a cultural dissident.

And yet, 20 years after the fall of the Iron Curtain, he laments, his parents still warn him to be careful. “The Czechs can’t get out of their ‘be careful’ mentality,” he said. “It is in our brains and in our bodies because of decades of watching out, of worrying that your neighbors are spying on you.”

<http://www.nytimes.com/2009/09/05/world/europe/05cerny.html?ref=design>

## Hybrid Art, a Mash-Up of Reality and Fantasy

By HOLLAND COTTER



If you can look past the mushrooming 21st-century industrial blocks, you'll find that Suzhou in southeast China is still, at least a little, what it anciently was: a city of humped bridges, walled gardens and winding dark-water canals. It was the cultural capital of the Ming dynasty (1368-1644) in the 15th and 16th centuries, which is when most of the gardens were built by scholar-officials, some of whom were artists.

One of the smallest and most intricate of the surviving gardens — it's like a walk-in clockwork of pavilions, freakish rocks and mini-trees — inspired the design of the Astor Court at the center of the Chinese painting galleries at the [Metropolitan Museum of Art](#). And these days Suzhou is everywhere inside those galleries, in the exhibition "Arts of the Ming Dynasty: China's Age of Brilliance." Like most dynasties, the Ming — the name means bright or brilliant — was built on the ruins of an earlier ruling line, in this case the Mongol Yuan dynasty. And again like most conquerors, the Ming sifted those ruins, extracting what was of cultural value or interest and adding new elements, including influences from a deeper Chinese past.

This mix of salvage and innovation produced, among other things, a hybrid art. The Ming inherited two different, parallel traditions of painting: courtly professional and scholar-amateur. They developed their own versions, which eventually bled into each other. The first, sometimes referred to as the Zhe school because of roots in Zhejiang province around the city of Hangzhou, involved a decorative, highly detailed and polished naturalism. It took as its model the academic art of the Southern Song dynasty (1127-1279) and was favored as very "Chinese" by the Ming rulers in Nanjing and Beijing.

The second tradition, which was concentrated in Suzhou and known as the Wu school, continued and elaborated on the self-expressive, improvisatory art practiced by Yuan scholars, and its artists followed the lead of their predecessors in keeping their distance from the centers of imperial power.

But in the Ming period the division between the modes was far from absolute. The court never established an academy, so professional art had no regulation look. And scholar-artists, far from being reclusive, often worked for the government. You can see all kinds of impulses — formal perfectionism, autobiographical storytelling, political commentary, soul-searching — playing out simultaneously in the Met show, which has been organized by Maxwell K. Hearn, a curator in the department of Asian art, entirely from the museum's collection.

The large hand scroll "Elegant Gathering in the Apricot Garden" falls somewhere in the realm of Zhe realism. It documents a specific occasion, a reception given by a scholar-official for eight of his high-ranking friends in Beijing on April 6, 1437. The picture's details are as precise as its date: the portraitlike faces, the minutely observed array of status objects — paintings, ceramics, brush holders, even a pet crane — arranged for maximum visibility here and there.

But this is realism of suffocating artificiality. The scholar-officials are substantial in form and dressed in colored robes, but they seem to exist in a depthless, monochromatic world. Are they sitting in a garden or on the front of an ink-painted mural of a garden? Or are they on a stage set with cut-out flats of rocks and

trees for props? The painting is intensely naturalistic but detached from nature, realistic but unconnected to life.

By contrast, the scholar-artists of Suzhou conjure fantastic, half-abstract dreamscapes that feel oddly, inhabitably real. A hanging scroll titled “Anchorage on a Rainy Night,” painted by Shen Zhou, the founder of the Wu school, is almost as much an occasional piece as the Beijing party picture is. We know from an inscription that Shen painted it in 1477, less than two months after the death of his father. He seems to have intended it as a thank-you gift for a friend, Zhou Weide, who kept him company at the time as he drifted around, grief-stricken, in a boat.

The landscape features are both plain and strange: a tiny harbor at the bottom right, a few trees and a rounded mountain. The trees are composed of ink stippling — dot, dot, dot — and thin spines of line. They look shivery and molecular, as if seen through water. And the mountain doesn’t look like a mountain, but like a big, solid, hunkered-down beast with a wrinkled pelt. Everything about it is soft, invites touch, radiates comfort, like a pillow. You could curl up beside it, the way a child curls up with a pet dog, and sleep.

As it happens, the show has a painting of someone sleeping, an album-page image of a scholar dozing on his bamboo studio couch. With its Zhe-style photographic detail, the picture could have been taken from life, except for one feature: the room’s walls are covered with patterns of rippling lines that suggest projections of a mellowed-out sleeper’s brain waves.

The point is that as Ming painting develops, naturalism and fantasy, what is and what could be or should be, flow together. In 1543 the Suzhou artist Wen Zhengming painted a picture, “Living Aloft: Master Liu’s Retreat,” depicting a rooftop pavilion within a walled garden with a wide-open gate. He made the picture for an old friend, Liu Lin, who at 69 was finally able to leave his government job but, whether for lack of time or funds, had neglected to provide himself with a retirement getaway. Now that he was ready to power down, he had no place quiet to go.

So Wen built one for him in the painting. It’s a sweet place, set amid treetops at the base of a hill near a stream — great feng shui — and simply but elegantly furnished. We can see that Liu has already moved in: there he sits, with stacks of books on a shelf behind him. And he has a visitor: Wen himself, who has dropped by for a chat and some tea. In real life Liu never did manage to build a real retreat; he settled for a comfortable chair somewhere, and that was that. But he had one in art, where the seasons never change, the talk is always good and tea is always at hand. Fantasy was realer than real.

By the late Ming the reality-fantasy mash-up was getting pretty wild. Politically and socially things were in rough shape, with absentee emperors, armies of venal officials and the sound of angry underdogs growling in the air. Ordinary people were growing scared and superstitious. Religious revivalism was on the rise. Imperial support for art had long since stopped, leaving former court painters to scrounge commissions from a rich bourgeoisie. With government jobs hard to find, scholar-artists were vying for the same clientele. Almost everyone was reduced to doing whatever would sell.

One thing that sold was a new kind of religious Pop Art. In a hanging scroll by Chen Hongshou, dated 1620, a Buddhist goddess radiates the picaresque glamour seen in illustrations of theater stars of the time. A hand scroll by Zheng Zhong, “Searching the Mountains for Demons,” brings lurid realism and comic-book fantasy together in illustrations of supernatural tales dating back to the Song.

Then the Ming imploded and another dynasty, the Qin, began to sift its ruins for salvage. Fortunately, one of the things that appealed to them was the idea of the scholars’ garden, which is one reason so many have survived in Suzhou. They are curious, contradictory creations: exquisitely calculated artificial containers for the organic energies of nature. The Astor Court at the Met only hints at this dynamic. Even in modern Suzhou it can be hard to see, but it is there.

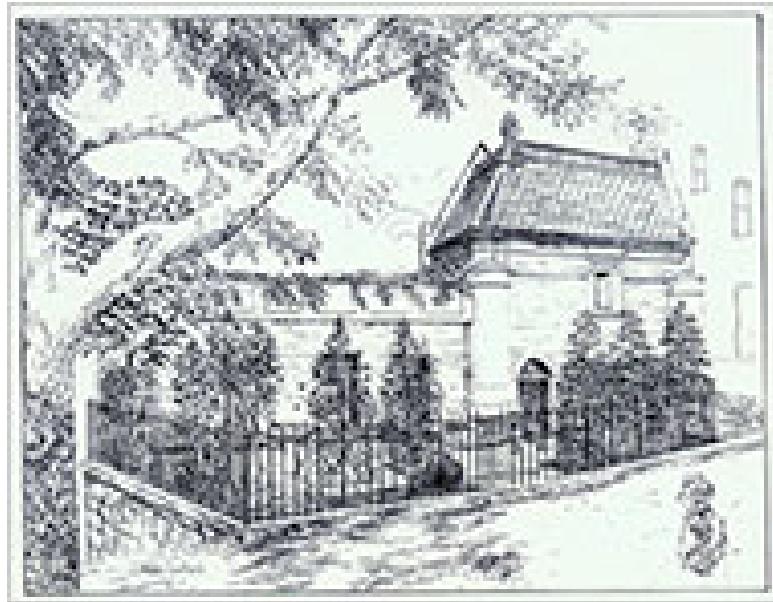
One of the city’s most popular gardens, the Garden of the Humble Administrator, has been altered so often over the centuries that it is basically a fantasy version of what it probably once was. Yet at least one Ming feature remains unchanged: a wisteria said to have been planted by Wen Zhengming still grows here, its trunk as dark and fantastically twisted as history, its branches flowering every spring.

*“Arts of the Ming Dynasty: China’s Age of Brilliance” continues through Sept. 13 at the Metropolitan Museum of Art; (212) 535-7710, metmuseum.org.*

<http://www.nytimes.com/2009/09/04/arts/design/04ming.html?ref=design>

**'THE MOUSE HOUSE'**  
**Tight Quarters (Only 500 Square Feet), but Oh, the Views**

By KAREN ROSENBERG



GREENWICH, Conn. — Apartment dwellers who worry that they don't have enough room to display art should take a trip to "The Mouse House: Art From the Collection of Olga Hirshhorn," at the Bruce Museum here. Ms. Hirshhorn managed to pack some 200 works of art into a tiny one-bedroom apartment in Washington.

Of course, it isn't her primary residence. Ms. Hirshhorn and her husband, Joseph, whose collection is now housed on the National Mall as the Hirshhorn Museum and Sculpture Garden, had art-filled homes in other cities. But after Mr. Hirshhorn died in 1981, she wanted a cozy pied-à-terre as a base for frequent visits to friends in the capital.

The Mouse House began life as a garage built for one of the earliest electric cars. It was part of Argyle House, a Beaux-Arts mansion on Embassy Row. (A stone sculpture of a cat on the mansion's roof was the inspiration for the smaller house's nickname.)

Converted by the architect Richard Ridley into a 500-square-foot triplex full of nooks and crannies, the Mouse House, as Ms. Hirshhorn calls it, proved to be an ideal backdrop for the small sculptures, drawings and decorative objects acquired by the Hirshhorns over the years.

Many hold personal as well as aesthetic value. Among the contents are drawings inscribed to Ms. Hirshhorn by de Kooning and Picasso, and minuscule Calders and Giacomettis obtained while socializing with the artists in Paris and on the Riviera.

To judge from the accompanying photographs, the Bruce Museum's show preserves the character of the Mouse House without recreating every detail. Some of it has the feel of a stage set, with *trompe l'oeil* brick, a faux staircase and white wood-paneled display cases that replicate built-in cabinetry.

Ms. Hirshhorn, now 88, worked closely with the Bruce curators on the installation. (Her collection of ceremonial gold ornaments from West Africa is on view in a separate exhibition that runs through Nov. 8.) The show is something of a homecoming: Ms. Hirshhorn, born to a family of immigrants from Ukraine, was raised in Greenwich and has fond memories of the museum and its neighboring park.

The arrangements reflect her habit of combining objects from different cultures: earthenware figures from Japanese temple roofs mingle with Early American wood carvings and French bronzes. Clever juxtapositions abound, particularly when animals are involved. A racehorse by Jean-Léon Gérôme stands next to a goat by Jack Zajac of California; a regal Egyptian cat rubs up against a ragged, alley-stalking one by Calder.

Also amusing is a bronze nude by Jean Alexandre Joseph Falguière, who shields her face as if disgusted by the subject of Théodule Augustin Ribot's small oil painting "Smoker." The Mouse House's preciousness encourages such readings; it's easy to imagine the artworks coming to life, as in a Hans Christian Andersen fairy tale.

Fortunately, the diminutive scale is broken by a few large, showstopping pieces. Most reflect a preference for red: a blazing target painting by Kenneth Noland, a Korean ancestor scroll depicting a crimson-robed man. The palette extends to some of the smaller objects, which helps to unify the overall look.

Just as impressive are the personalized works on paper scattered throughout the show, many of which attest to the Hirshhorns' relaxed and informal relationships with artists. De Kooning addressed several drawings of women to Ms. Hirshhorn, writing, "love, Bill." Picasso signed a pen-and-ink portrait "Pour Olga, Ton Ami, Pablo."

Navigating the show can be maddening. The objects are numbered and listed in a brochure, so as not to clutter the displays with labels. It would be fine if the printed numbers had anything to do with the order of the works as they appear. At the same time, this system (or lack of one) forces you to think about the art from the perspective of someone living with it. The Mouse House isn't a museum. There are no placards, only stories.

As if to emphasize this point, the show includes an unusual detail: a reproduction of Ms. Hirshhorn's dishwasher, which she uses as a filing cabinet to free up more space for art. The version here, for the sake of verisimilitude, has been stuffed with books and papers. Its silverware basket overflows with pens and rubber bands. Some New Yorkers will recognize it as their own. Ms. Hirshhorn's self-imposed limitations may irk people who live in small spaces as a matter of necessity, not choice. But you have to admire the way she puts art first. Viewers may leave the museum determined to carve out some room in their own homes — even if it means storing winter boots in the oven.

*"The Mouse House: Art From the Collection of Olga Hirshhorn"* continues through Oct. 18 at the Bruce Museum, One Museum Drive, Greenwich, Conn.; (203) 869-0376, brucemuseum.org.

<http://www.nytimes.com/2009/09/04/arts/design/04mouse.html?ref=design>

## Contradiction Remains Vital to Pakistan and Its Art

By **RANDY KENNEDY**



As a crew of riggers finished hoisting a big taxidermied water buffalo onto its surreal perch the other day at the [Asia Society Museum](#) on the Upper East Side of Manhattan, there was a certain logistical satisfaction for those who looked on. “Watch the tail, guys, the tail!” one rigger yelled as the beast was pivoted into place atop a tall Ionic column, where it seemed to have climbed in its confusion.

But the sense of symbolic accomplishment in the feat was much greater. The water buffalo is a ubiquitous presence in many areas of Pakistan, where its tail is often painted red with henna. And the ascension of one onto a pedestal — to create a comically eerie sculpture by the artist Huma Mulji — was an apt metaphor for the larger exhibition being installed around it that morning in several of the museum’s galleries. “Hanging Fire,” which opens next Thursday, is the first major survey of contemporary art from Pakistan to be presented by an American museum. And for many artists and curators who have long worked in relative obscurity in Pakistan’s contemporary art world — one that has been thriving since the 1980s despite and perhaps in some ways because of the country’s instability — it is a highly anticipated event. “I think it’s difficult for people outside Pakistan to understand what this kind of recognition on an international stage means within the country,” said Melissa Chiu, the museum’s director. “It’s a big moment.”

The exhibition features the work of 15 artists, almost all of whom live and work in Pakistan. Most have passed at one time or another through the National College of Arts in Lahore, an influential force in the country’s artistic life, where the show’s curator, the painter and writer Salima Hashmi, taught for many years. (In the exhibition’s catalog the novelist Mohsin Hamid lovingly describes the school as a microcosm of creative Pakistan; many of his friends went there, and he remembers it as a place where “people who prayed five times a day and people who escaped from their hostels late at night to disappear on sexual adventures in the city could coexist.”)

Pakistan’s reputation in the contemporary art world has often suffered from a simplistic conception that it is a society inhospitable to free expression. And certainly during several periods in the country’s 62-year history, its visual arts, theater and film have been hemmed in by restrictions imposed under [sharia](#), or Islamic law, and under military rule.

But even amid the country’s poverty and recent turmoil — an increase in bombings and kidnappings, the deep inroads made by the [Taliban](#) insurgency even as Pakistan has become enmeshed in the United States’ strategy in Afghanistan — a network of commercial galleries, art schools and studios has flourished. And work is being made that deals head on with difficult issues like religion, political oppression and the status of Muslim women.

Hamra Abbas, a 33-year-old artist who was educated in Lahore but spent several years working in Berlin, said in a recent interview at the Asia Society that when she moved back to Pakistan from Germany, her work grew more sophisticated, in part because she was able to find the kind of resources artists everywhere need: affordable space, a tight-knit artistic group, a network of friends and colleagues to collaborate with and help her.

Ms. Abbas's piece in the exhibition is a huge purplish-red winged fiberglass rocking horse based on the popular imagery that has grown up over centuries of the Buraq, Muhammad's steed. While the horse is "a culturally loaded icon," as Ms. Hashmi, the curator, notes, it is also seen everywhere in Pakistan, like a brand logo or cartoon character, and seems to be particularly popular as a way to beautify the sides and backs of trucks. Ms. Abbas, who has given the traditionally human female face of the steed some of her own features, imagines it as a kind of life-size toy, one she has climbed up on and ridden herself, though doing so too publicly in Pakistan could court dangerous misinterpretations.

"You have to be careful," she said. "The smallest things can end up being big things — you never know. And the big things no one seems to notice."

Though her work has dealt openly with sexual imagery and has been displayed cautiously within Pakistan — like much other contemporary work there — in private showings at galleries, she said that her reasons for sometimes pulling back from making work that might be too confrontational are mostly personal.

"There are things I have thought of doing and did not do, in part because I didn't want to offend my parents," she said.

A thread running through much of the work in the exhibition, one that speaks to the experience of life within the country and to the country's perception by the West, is the difference between reality comprehended close up and from a great distance.

Rashid Rana builds large hazy images from mosaics of thousands of tiny photographs. One work appears from a dozen feet away to be a lush medallion-patterned Persian rug, but as the viewer approaches, its dark-reddish hues slowly resolve themselves into individual pictures of bloodied animal carcasses and workers that Mr. Rana took in Pakistani slaughterhouses.

Ali Raza, an artist who has spent many years working the United States but who returned to live and work part-time in Pakistan in 2006, makes large collages using scraps of lushly illustrated advertisements and pages from art books and other publications that have been partly burned so that their incongruous imagery and texts peep out from the mostly blackened paper. As they do in Mr. Rana's work, the tiny elements coalesce into large figurative images, in one case a doubled portrait of a man screaming, based on a newspaper picture of a violent street protest.

Ms. Mulji's strangely stranded water buffalo (the one here, in an unanticipated conceptual twist, is American, stuffed by a taxidermist in Rhinebeck, N.Y., because of toxicity concerns about the original in Pakistan) grew out of the artist's exploration of the strangeness of rampant development in a mostly rural, underdeveloped nation. She describes Pakistan as a place existing "300 years in the past and 30 years in the future."

In many ways the exhibition, which continues through Jan. 3, illuminates the contradictions of Pakistani contemporary art itself and of its being recognized, especially now at such a crucial juncture in the country's history, in such a prominent international fashion. Quddus Mirza, a Pakistani artist and critic in Lahore, contends in an essay in the show's catalog that many artists working in the country have often become "exiles at home," whose work is "slowly drifting away from the local art scene."

Yet "the more it is uprooted from its native soil, the more accolades it receives in the mainstream art world," he adds, a paradoxical kind of success. Ms. Hashmi, whose personal tribulations have often mirrored that of her country's precarious art world — she was placed under house arrest during the imposition of martial law in 2007; she was not far away from a recent deadly bomb blast — does not necessarily disagree, but adds that the benefits of such success can outweigh the costs.

"The contemporary artist symbolizes a strong hope for Pakistan," she argues. "Those who gain a foothold in the international art discourse serve as a conduit, inviting a chance to dialogue with those inside — a conversation that may startle, beguile, enlighten and hopefully enrich."

This article has been revised to reflect the following correction:

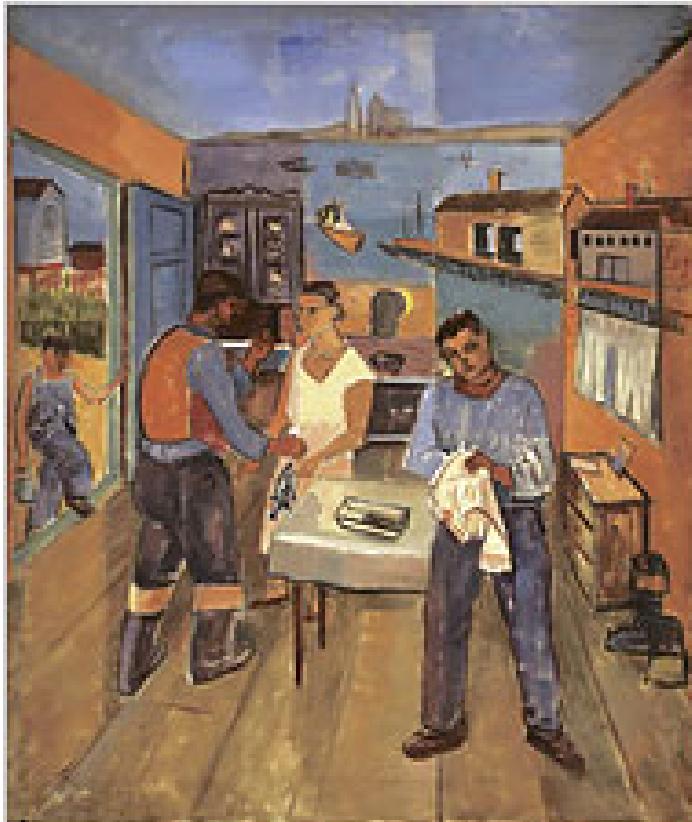
Correction: September 4, 2009

An article on Thursday about the first major survey of contemporary art from Pakistan at an American museum, at the Asia Society in Manhattan, misstated the number of years since Pakistan's creation. It is 62 years, not 52.

<http://www.nytimes.com/2009/09/03/arts/design/03fire.html?ref=design>

**JACK TWORKOV**  
**A Modern Artist Who Wielded Both Pen and Brush**

By KAREN ROSENBERG



The painter Jack Tworkov (1900-82) made his name at the height of Abstract Expressionism, but he was never really comfortable with the angst-filled, tortured aspects of that movement. A noted intellectual and a sharp-eyed critic, he held his art to high, self-imposed standards of clarity and coherence. And, as a small Tworkov survey at the UBS Art Gallery confirms, he did more soul-searching on paper than on canvas.

Tworkov was born in Biala, Poland, and grew up in a Lower East Side tenement. He went to Stuyvesant High School and then Columbia University, planning to devote himself to writing. Gradually, he drifted into art and found himself shuttling between an artists' colony in Provincetown, Mass., and the Art Students League in New York.

He never really put down his pen, filling journal after journal with notes and musings. He published criticism, including a 1950 article on Chaim Soutine that was later hailed as one of the earliest efforts to wrestle with the new style of painting.

“Jack Tworkov: Against Extremes — Five Decades of Painting,” organized by Jason Andrew, the curator and archivist of the Tworkov estate, is the artist’s first New York retrospective. Among the 26 paintings on view (supplemented by journals, jottings and works on paper) are loans from the Hirshhorn Museum and Sculpture Garden in Washington, the Albright-Knox Art Gallery in Buffalo and the Provincetown Art Association and Museum.

The show is accompanied by a related exhibition of letters, photographs and other Tworkov ephemera at the New York Research Center of the Archives of American Art, also in the UBS building. Both shows coincide with the publication of “The Extreme of the Middle: Writings of Jack Tworkov,” edited by Mira Schor and published by Yale (where Tworkov was chairman of the art department from 1963 to 1969).

In all of this Tworkov comes across as a restless but hamstrung figure. His career didn’t start, or end, with Abstract Expressionism and the New York School. In the beginning he was a Social Realist; much later

he embraced a geometric form of Minimalism. He switched movements effortlessly but rarely broke new ground.

Among his immigrant peers, Tworkov may have been the most connected to the Old World. He referred to himself as “a ghetto-Jew” and didn’t deracinate, like Mark Rothko (born Marcus Rothkowitz), or make up stories about his background, like Arshile Gorky. As the art historian David Anfam notes in his brochure essay, Tworkov’s article on Soutine had an element of self-diagnosis. (Soutine was a fellow “wanderer,” an artist “living in a foreign land.”)

Tworkov also gravitated to Cézanne and Matisse, as his early works reveal, managing to infuse even Social Realist canvases like “Fisherman’s Family” (1931) with Francophile modernity and grace. Later, after the war, he shared a studio and a sensibility with Willem de Kooning (both artists had worked together on the Works Progress Administration Federal Art Project in the late 1930s). “Untitled (Seated Figure)” (1950) could be a male version of one of de Kooning’s women, in an earthier palette.

Literature was still on Tworkov’s mind. In the early 1950s he made a series of increasingly abstract paintings based on Homer’s “Odyssey” (via Joyce’s “Ulysses”). He loved classical myths but disdained self-mythologizing. “The artists I like are ones who have stopped playing the aesthete — people who do not live other artists’ biographies,” he wrote to Franz Kline in 1950.

He peaked in the second half of that decade, turning out commanding paintings with centralized clusters of vertical and horizontal strokes. The best of those on view, “Pink Mississippi” and “Watergame,” pit roseate pinks against steely blues.

Tworkov wrote of these works: “The central image of these paintings is an action brought near by a telescope but out of earshot, silent and meaningless. In a thicket the actors might be lovers, or a murderer and his victim — the anxiety is that of silence of an action without sound, without meaning.” This noirish description has corollaries in the work of Philip Guston and Francis Bacon.

By the early 1960s his cuneiformlike brushstrokes had been replaced with larger, streamlined motifs he called Veils, Screens, Grids and Barriers. He achieved some commercial success, including shows at Castelli and a touring Whitney solo in 1964.

The paintings of this period, including “Thursday” (1960), are muscular and self-important, heralding the corporate co-option of Abstract Expressionism. And the linen-upholstered, dark-wood-paneled galleries along the UBS lobby don’t do the paintings any favors. (It’s easy to imagine them in the office of the “Mad Men” ad agency owner Bert Cooper, hanging next to the Rothko.)

To his credit, Tworkov didn’t care much about meeting anyone else’s expectations. In a 1962 letter to his sister, he described a new series of red, white and blue works as “an ironic comment on my growing patriotism,” and observed, referring to Leo Castelli, “They are quite different from the group of paintings called Barrier series, so different that I have Leo quite worried.”

The example on view, “RWB #3” (1961), is a clumsy, unfinished-looking painting. But its cockeyed boosterism reflects the tentative optimism of the year in which it was made, and is reminiscent of Jasper Johns’s maps and flags.

Around 1963, a change sets in. Tworkov’s late paintings — and there are many in this show — are as subdued as his midcentury works are swaggering. These geometric compositions, mapped out in preparatory drawings and delivered in measured doses of blue, gray and brown, are an antidote to two decades of gesture and expression.

There are exceptions. In “Crossfield 1” (1968) and “Partitions” (1971), Tworkov reintroduces pink to salubrious effect. Elsewhere, however, he pursues a cool neutrality, along the lines of Johns or Agnes Martin. His journals of the time are filled with self-abnegating dictums in the manner of John Cage: “The best way to work is to empty out your head, to aim at nothing, to become the medium of a process that is almost outside of oneself.”

Tworkov persisted with the geometric style until his death even as Neo-Expressionism took hold in the early 1980s. In a 1981 letter to the artist Andrew Forge, Tworkov described his approach as “less hypocritical at the moment than the apparent ecstatic self-expression that a more romantic art calls for.” Characteristically, he reined himself in when everyone else was letting go.

*“Jack Tworkov: Against Extremes — Five Decades of Painting” continues through Oct. 27 at the UBS Art Gallery, 1285 Avenue of the Americas, at 51st Street, Manhattan; (212) 713-2885.*

<http://www.nytimes.com/2009/09/01/arts/design/01tworkov.html?ref=design>

## Safety call over stem cell trips

**A clampdown on unproven and potentially unsafe stem cell research is being called for by an expert group.**



Bionet, a group of expert Chinese and European doctors, lawyers and bioethicists, says countries throughout the world must develop more effective regulation for this emerging science.

They say desperate patients are being subjected to a huge amount of hype when they travel abroad for treatments.

The only way to counter that is through proper clinical trials, they say. Professor Nicholas Rose, from the London School of Economics, who led the group, said Bionet's team had talked to physicians in China and Europe because China had now overtaken India as the place where pharmaceutical companies were carrying out most of their trials.

They had provided a wealth of anecdotal evidence about their concerns that stem cell research was being moved too rapidly into clinical practice without proper study.

He said: "The key is informed consent. Doctors should be able to tell the patient about the short-term and long-term prognosis and the things we don't know about the risks."

### Recommendations

Bionet is recommending that the safety and efficiency of stem cell treatments is investigated through state-of-the-art clinical trials before they are offered to patients.

It also says doctors should be honest about the conditions under which germ cells, embryos or embryonic tissue has been collected.

It also recommends that they should only be imported and used for research if they were collected under conditions which are either similar or equivalent to those in the receiving country.

Nobody should be coerced by unfavourable circumstances or by being dependent on someone to donate cells or tissue for research, banking or treatment purposes, Bionet says.

And there should be quality standards for stem cells used in clinical practice.

These should include the bacterial and viral contamination applied during the production of the stem cells.

China introduced new regulations in May calling for clinical trials before stem cell treatments were offered to patients.

Professor Qui Renzong, vice-president of the ethics committee at the Chinese Ministry of Health, said: "In China there are about 150 institutions now providing stem cell therapy for diabetes through to spinal injuries."

Foreign patients were paying an average of \$25,000 (£15,434) he said but since the regulations were only recently introduced there was no way of knowing how many foreigners had made trips to China for treatments.

### Patient's visits

One patient who did go to China is 39-year-old Brian MacNeill, from Argyll, on the west coast of Scotland. He suffers from hereditary ataxia, a muscle-wasting neurodegenerative disease.

Mr MacNeill said: "All I can say about the treatment I had with stem cells in China was that I felt a great benefit after the first lot of four injections, with lots of therapy as well, and good benefit from my second visit about one year later.

"The second visit was needed as I felt some of my symptoms come back after 10 months and now the second visit has lasted around 14 months.

"I now am feeling symptoms come back but cannot afford to go for more stem cells. If I could I would.

"It's better to feel good now when you have an illness than be somebody very unhappy and ill anyway without even trying."

A Department of Health spokesperson said: "Any new therapy or treatment requires carefully controlled and evaluated clinical research before it can be considered safe and effective.

"In the UK, there is strict regulation to ensure that vulnerable patients are not exploited or put at risk.

"When stem cell 'treatments' are based overseas, regulatory oversight and jurisdiction is particularly problematic.

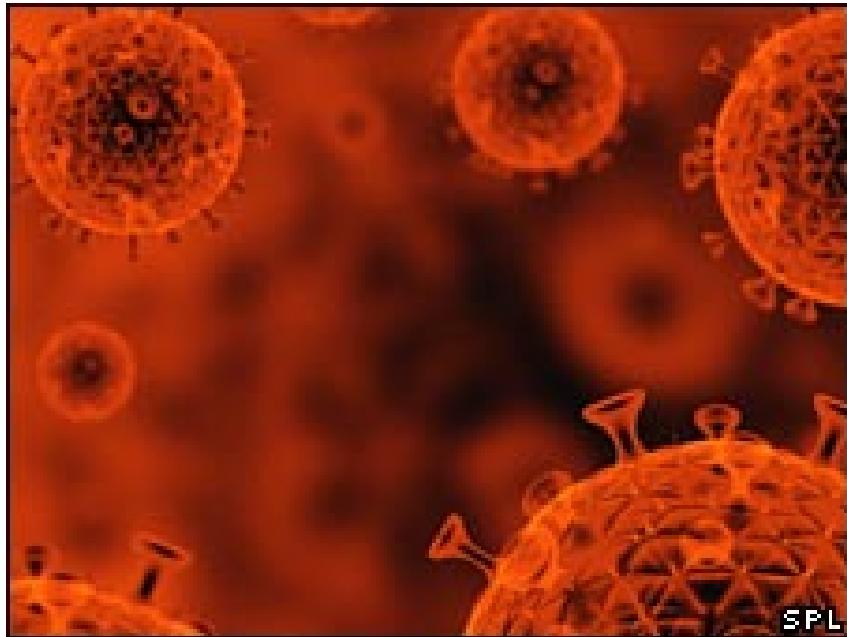
"We take this very seriously and strongly encourage anyone considering participating in overseas stem cell 'research trials' or buying internet treatments to talk to their doctor and follow health guidelines."

Story from BBC NEWS:  
<http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8234206.stm>

Published: 2009/09/03 23:18:09 GMT

## Antibodies 'may aid HIV jab hunt'

**Two powerful new antibodies to HIV have been found which could aid development of a vaccine, researchers say.**



Researchers, led by the International Aids Vaccine Initiative (IAVI), say the discovery reveals a potential new Achilles heel in the virus's defences.

The antibodies are the first of their type to be identified in more than a decade, and the first to be isolated from donors in developing countries.

Details of the breakthrough feature in the journal Science.

The researchers hope it could lead to more similar antibodies being found, which in turn could aid the hunt for an effective HIV vaccine.

**"Identifying antibodies that act against a broad range of HIV types will be critical for the development of an effective vaccine"**

Keith Alcorn NAM

Wayne Koff, of the IAVI, said: "The findings themselves are an exciting advance toward the goal of an effective Aids vaccine because now we've got a new, potentially better target on HIV to focus our efforts for vaccine design."

"And having identified this one, we're set up to find more, which should further accelerate global efforts in Aids vaccine development."

The new antibodies - broadly neutralising antibodies - are produced by a minority of people with HIV.

They are distinct from other antibodies to HIV because they neutralise a high percentage of the many types of HIV in circulation worldwide.

It is widely believed that to prevent HIV infection a vaccine would need to teach the body to produce these powerful antibodies before exposure to the virus.

Animal experiments suggest that conceptually such a vaccine would work.

Before this finding only four antibodies to HIV had been discovered that were widely agreed to be broadly neutralising.

However, all four worked by binding to a place on HIV that has proven difficult for vaccine-makers to exploit.

### **Accessible target**

The latest duo are potentially much more useful because they bind to the virus at sites which scientists believe are more accessible.

In theory that should make it easier to produce a vaccine which could stimulate the body to start producing these key antibodies.

And because the antibodies are very powerful they would not have to be produced in very large quantities to confer protection.

The two new antibodies target one of the proteins that form a spike used by HIV to infect cells.

These proteins are highly-variable and thus difficult for the immune system to attack.

But the new antibodies target an area of one protein that does not change.

Keith Alcorn, of the HIV information service NAM, said: "Identifying antibodies that act against a broad range of HIV types will be critical for the development of an effective vaccine."

"We need to remember that this is an early stage of research.

"HIV vaccine research will be a long-term effort and we certainly shouldn't expect these findings to lead to a vaccine in a few years.

"A lot more work on antibodies and vaccine design is going to be needed to come up with vaccines that can be put into clinical trials."

The IAVI team joined forces with the Scripps Research Institute, and the biotechnology companies Theraclone Sciences and Monogram Biosciences on the project.

Story from BBC NEWS:  
<http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8233784.stm>

Published: 2009/09/03 23:28:45 GMT

## Large thighs 'may protect heart'

**Men and women with thighs over 60cm (23.6in) in circumference have a lower risk of heart disease and early death, a study of 3,000 people suggests.**



SPL

The relationship remains even when body fat, smoking and blood cholesterol are taken into account, a Danish team says.

Those with narrow thighs may not have enough muscle mass to deal with insulin properly, raising the risk of diabetes and, in turn, heart disease, they say.

Experts cautioned that the research needed corroborating.

Some said it was too early to change current advice on eating and exercise for heart health, but the researchers said thigh size could be used as a marker for at-risk patients.

The study, published in the British Medical Journal, followed men and women in Denmark for more than 10 years.

They were measured for height, weight and thigh, hip and waist circumference and their overall percentage of body fat was calculated.

**"It's a very simple, very crude measure but it seems to have an individual effect. And it may be a way for doctors to assess risk."**

Professor Berit Heitmann, Copenhagen University Hospital

The thigh measurement was taken just below the gluteal fold, which is the crease caused by your buttocks.

Researchers also looked at the activity levels of the participants, whether they smoked, their blood pressure and cholesterol levels.

They then monitored incidence of heart disease over 10 years and death rates over 12-and-a-half years.

### 'Crude measure'

During this time, 257 men and 155 women died, 263 men and 140 women developed cardiovascular disease and 103 men and 34 women suffered from heart disease.

The team at the Copenhagen University Hospital found that those with the smallest thighs - below 55cm - had twice the risk of early death or serious health problems.

Professor Berit Heitmann, who led the research, said: "The increased risk was independent of abdominal and general obesity and lifestyle and cardiovascular risk factors such as blood pressure.

"Additionally we found that the risk was more highly related to thigh circumference than to waist circumference.

### HOW TO INCREASE YOUR THIGHS

Go to a gym and train three times a week

Exercise all the muscles in your thighs

Use a weight you can only just lift 10 times in a row

Over 3 months you will increase thighs by 6% to 10% Source: Loughborough University

"It's a very simple, very crude measure but it seems to have an individual effect. And it may be a way for doctors to assess risk.

"The nice thing is that if you have a small thigh you can do something about it through exercise."

Previous studies have suggested that a waist circumference of over 35in (88.9cm) for a woman and 40in (101.6cm) for a man indicated a high risk of developing diabetes and heart disease.

Professor Heitmann's team says the risk of narrow thighs could be associated with too little muscle mass. They say this can lead to the body not responding to insulin properly, increasing the risk of type 2 diabetes and, in the long-run, heart disease.

Too little fat can also lead to adverse changes in the way the body breaks down food.

### 'Great news'

British Heart Foundation senior cardiac nurse Judy O'Sullivan said: "There is insufficient evidence to confirm that a low thigh circumference affects a person's risk of developing cardiovascular disease. "However, low muscle mass is associated with low levels of physical activity which is an established risk factor for developing heart disease."

Tam Fry, of the National Obesity Forum, agreed that the research needed further corroboration, saying: "This is a very interesting and slightly counter-intuitive piece of work but it has to be respected because of the numbers looked at and the duration of the research.

"This must be great news for people with larger thighs. What I find fascinating is that researchers are now going back to the drawing board and looking for every possible way of mitigating obesity."

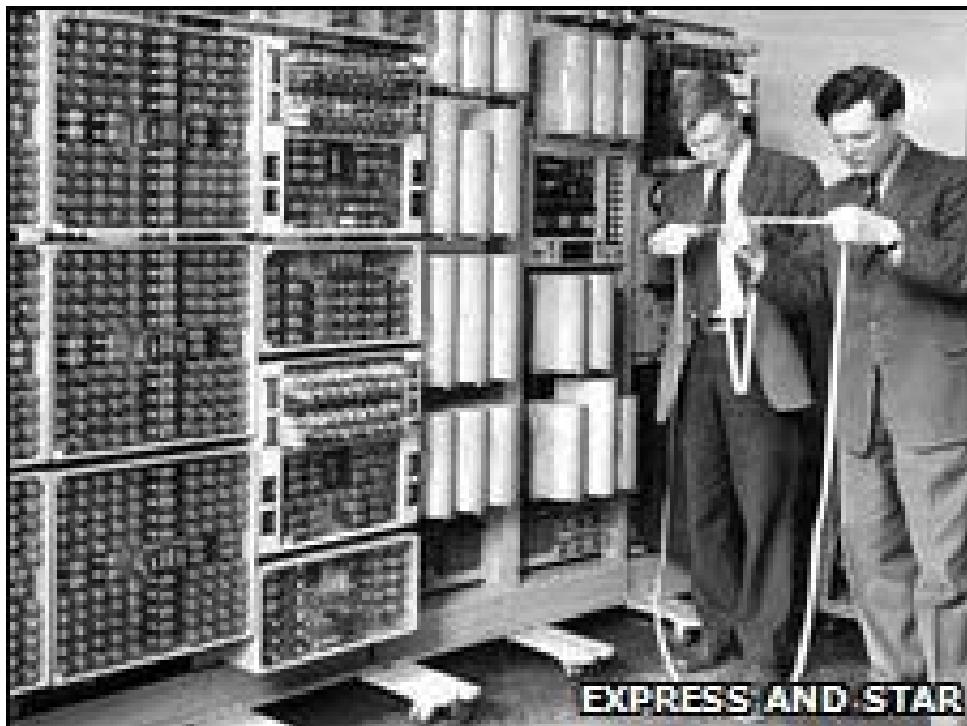
Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/-/2/hi/health/8236384.stm>

Published: 2009/09/04 00:07:37 GMT

## Reboot for UK's 'oldest' computer

**Britain's oldest original computer, the Harwell, is being sent to the National Museum of Computing at Bletchley where it is to be restored to working order.**



The computer, which was designed in 1949, first ran in 1951 and was designed to perform mathematical calculations; it lasted until 1973.

When first built the 2.4m x 5m computer was state-of-the-art, although it was superseded by transistor-based systems.

The restoration project is expected to take a year.

The system was built and used by staff at the Atomic Energy Research Establishment in Harwell, Oxfordshire.

Speaking to BBC News, Dick Barnes, who helped build the original Harwell computer, said the research was - officially at least - for civilian nuclear power projects.

"Officially it was to help with general background atomic theory and to assist in the development of civilian power," he said.

"Of course, it [the Atomic Energy Research Establishment] had connections to the nuclear weapons programme," he added.

Although not the first computer built in the UK, the Harwell had one of the longest service lives.

Built by a team of three people, the device was capable of doing the work of six to ten people and ran for seven years until the establishment obtained their first commercial computer.

"We didn't think we were doing anything pioneering at the time," said Mr Barnes.

"We knew the Manchester Baby and Cambridge's EDSAC were already up and running. Both these projects had large teams and we felt like a poor relation."

"Looking back, hardly any of us were computer literate and it's astonishing that we managed stored computing at all," he said.

The Harwell machine is recognisably modern in that unlike some of its predecessors such as Colossus it used a single memory to store data and programs.

Kevin Murrell, director of The National Museum of Computing at Bletchley Park, said it had some of the characteristics of contemporary machines.

"The machine was a relay-based computer using 900 Dekatron gas-filled tubes that could each hold a single digit in memory - similar to RAM in a modern computer - and paper tape for both input and program storage."

### Time line

Retired from service at Harwell, the system was offered as a prize for colleges, with Wolverhampton and Staffordshire Technical College (later Wolverhampton University) taking ownership and renaming it as the WITCH (Wolverhampton Instrument for Teaching Computing from Harwell). It was used in computer education until 1973.

It then went on display at Birmingham Science Museum, before being put in storage at Birmingham City Council Museums' Collection Centre.

Now it is being sent to the National Museum of Computing in Bletchley, where a team are set to restore it to working order.

Mr Barnes said the prospect of seeing the Harwell computer up and running after more than 36 years was "very exciting".

"I still don't know how they managed to find so many spare parts, but I think they have a very good chance of getting it going again," he said.

There are several significant predecessors to the Harwell computer: The Ace (parts of which are on display in London's Science Museum), the Electronic Delay Storage Automatic Calculator (EDSAC) which was broken up, and Manchester's Small-Scale Experimental Machine (SSEM) nicknamed Baby, which has been rebuilt but not using original parts.

Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/fr/-/2/hi/technology/8234428.stm>

Published: 2009/09/03 08:13:56 GMT

## Arctic 'warmest in 2,000 years'

By Richard Black  
Environment correspondent, BBC News website

**Arctic temperatures are now higher than at any time in the last 2,000 years, research reveals.**



Changes to the Earth's orbit drove centuries of cooling, but temperatures rose fast in the last 100 years as human greenhouse gas emissions rose.

Scientists took evidence from ice cores, tree rings and lake sediments.

Writing in the journal *Science*, they say this confirms that the Arctic is very sensitive both to changes in solar heating and to greenhouse warming.

The 23 sites sampled were good enough to provide a decade-by-decade picture of temperatures across the region.

**"How much energy we're getting from the Sun is no longer the most important thing governing the temperature of the Arctic"**

Nicholas McKay, University of Arizona, Tucson

The result is a "hockey stick"-like curve in which the last decade - 1998-2008 - stands out as the warmest in the entire series.

"The most pervasive signal in the reconstruction, the most prominent trend, is the overall cooling that took place for the first 1,900 years [of the record]," said study leader Darrell Kaufman from Northern Arizona University in Flagstaff, US.

"The 20th Century stands out in strong contrast to the cooling that should have continued. The last half-century was the warmest of the 2,000-year temperature record, and the last 10 years have been especially dramatic," he told BBC News.

On average, the region cooled at a rate of 0.2C per millennium until about 1900. Since then, it has warmed by about 1.2C.

Much debate on climate change has centred on the Mediaeval Warm Period, or Mediaeval Climate Anomaly - a period about 1,000 years ago when, historical records suggest, Vikings colonised Greenland and may have grown grapes in Newfoundland.

The new analysis shows that temperatures were indeed warmer in this region 1,000 years ago than they were 100 years ago - but not as warm as they are now, or 1,000 years previously.

"It shows that the Mediaeval Warm Period is real, and is... an exception from the general trend of cooling," commented Eystein Jansen from Bergen University in Norway, who was not involved in the research.

"It also shows there's lots of variability on the 100-year timescale, and that's probably more so in the Arctic than elsewhere."

Professor Jansen was a co-ordinating lead author on the palaeoclimate (ancient climate) chapter of the last Intergovernmental Panel on Climate Change (IPCC) assessment.

### **Arctic wobbles**

The root cause of the slow cooling was the orbital "wobble" that slowly varies, over thousands of years, the month in which the Earth approaches closest to the Sun.

This wobble slowly decreased the total amount of solar energy arriving in the Arctic region in summertime, and the temperature responded - until greenhouse warming took over.

"The 20th Century is the first century for which how much energy we're getting from the Sun is no longer the most important thing governing the temperature of the Arctic," said another of the study team, Nicholas McKay from the University of Arizona.

The recent warming of the Arctic has manifested itself most clearly in the drastic shrinkage in summer sea-ice extent, with the smallest area in the satellite era documented in 2007.

As the Science study emerged, UN Secretary-General Ban Ki-moon was telling the World Climate Conference in Geneva that many of the "more distant scenarios" forecast by climate scientists were "happening now".

Earlier this week, Mr Ban visited the Arctic in an attempt to gain first-hand experience of how the region is changing.

"Scientists have been accused for years of scaremongering. But the real scaremongers are those who say we cannot afford climate action," he said in his Geneva speech, calling for world leaders to make bigger pledges of action in the run-up to December's UN climate summit in Copenhagen.

[Richard.Black-INTERNET@bbc.co.uk](#)

Story from BBC NEWS:  
<http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8236797.stm>

Published: 2009/09/03 20:29:52 GMT



## Babies And Dogs Make The Same Classic Mistake

by Nell Greenfieldboyce

September 3, 2009



Both young infants and dogs sometimes ignore what they see with their own eyes and instead trust a human "teacher." Dogs may have evolved this trait to help them live with people.

Getty Images

Both young infants and dogs sometimes ignore what they see with their own eyes and instead trust a human "teacher." Dogs may have evolved this trait to help them live with people.

text size **AAA**

September 3, 2009

A new study shows that dogs and young human babies both make the same classic error in a famous psychology experiment — while wolves raised by people do not. The experiment was originally devised decades ago by the well-known child psychologist Jean Piaget. He found that if babies 10 months old or younger repeatedly see a toy placed in location A, they will look for the toy there even after watching the toy being placed in location B.

This is called the "A-Not-B Error." By 1 year of age, children have grown out of it. But it's such a weird observation that psychologists have been talking about it for decades. Some think it has to do with how babies perceive the permanence of objects. But others think it has something to do with how infants learn from people.

### More Animal Minds

Crows can recognize human faces and remember them for years.

**The Crow Paradox** July 27, 2009

Adam Miklosi of Eotvos Lorand University in Budapest, Hungary, is interested in how dogs have evolved to live with people, so he decided to see how dogs and their wild relatives, human-raised wolves, would do on this test.

In their experiment, wolves were generally not misled by what they had seen humans do before, according to a report in *Science*. They'd make a beeline for the right hiding place. But dogs would act like a 10-month-old baby, going to screen A even though they'd just seen someone put the toy behind screen B.

**The Human Influence**

Miklosi thinks this means that dogs interpret the situation as a learning situation and choose to trust what the human is communicating rather than what they see with their own eyes.

"The dogs are sort of looking at the human as a sort of a teacher that has the privilege of some sort of information and they don't want to override it with their own understanding of the case," says Miklosi.

When the experiment was rigged up so that it involved no people, and the toys were instead dragged from place to place by a moving string, the dogs were less likely to make the mistake. They suddenly acted more like their wolf relatives.

"If there's no teacher there, then the dogs are switching back, and then they are solving the problem on their own," Miklosi says. Human babies also were more likely to find the toy in the correct location if it was moved by a string instead of a person. "For me," says Miklosi, "this was the biggest surprise."

He believes all this shows that the presence of a person — social interaction — has a profound effect on how both dogs and babies interpret the situation.

**For Dogs, It All Depends On the Person**

There was one difference between dogs and young babies, though. When they redid the classic experiment but had more than one person do the hiding, it didn't matter to the babies. They kept reaching for screen A, suggesting they were able to generalize about people. But adding a new person changed everything for the dogs. "For the dog, if you're changing the person, the knowledge is gone," says Miklosi. The dogs ignored what had previously happened and, like the wolves, went straight to the toy.

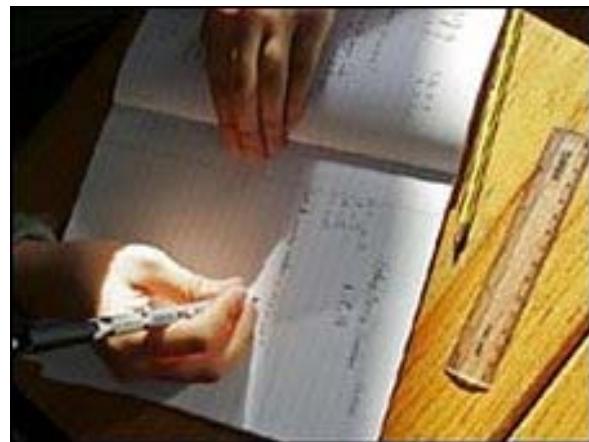
"It's a very original approach. It's a very thought-provoking experiment," says Clive Wynne, who studies dog cognition at the University of Florida. "I think like a lot of good studies, it doesn't lead so instantly to conclusions. It leads to new questions." For example, he says, "there's a puzzle in this paper in that you've got adult dogs behaving like 10-month-old children, when 10-month-old children are only going to act like this for two more months. They're going to grow out of it very quickly." Still, he thinks we need more studies like this one, to learn about both human cognition and the inner lives of our canine companions.

"It is important that we understand how dogs think about us," Wynne says, "because we have 70 million of these animals in our homes in the United States — more dogs than we have children."

<http://www.npr.org/templates/story/story.php?storyId=112524209>

### **Maths 'no better than in 1970s'**

**Pupils are no better at maths now than they were 30 years ago - despite a rise in exam grades, a study suggests.**



Researchers asked 3,000 11 to 14-year-olds in England to sit maths exams taken by pupils in 1976, and compared their scores with the earlier results.

Analysis suggested there was little difference between the two generations.

But among pupils from the previous generation taking O-level maths, less than a quarter gained a C or above, compared to 55% in GCSEs last year.

### **'Teaching to the test'**

Dr Jeremy Hodgen, of King's College, London, who led the research team, suggested the disparity between unchanged ability and the increase in grades was partly down to schools' obsession with Sats results and league table positions.

He said: "There's a great deal of teaching to the test, so that in trying to increase scores, schools develop an understandable focus on the test, so there's a narrowing of the curriculum."

He also said mainstream schools today had a higher proportion of lower-achieving pupils, whereas in the 1970s many of these pupils would have been in special schools.

The researchers found some differences in the abilities of the two groups of pupils in different areas of mathematics.

Today's secondary school pupils were much more familiar with decimals than they were 30 years ago. On the other hand, fractions appeared to be much harder for today's pupils, the study suggested.

**"The term grade inflation is a term which is referenced and it is used constantly"**  
Carol Vorderman

Thirty years ago, pupils would sometimes convert decimals into fractions to solve a problem, but those taking the tests now did the reverse, researchers found.

Schools Minister Diana Johnson said another independent report showed pupils in England making real progress in maths and that GCSE standards were rigorously monitored.

"We do not think that research based on tests in a small number of specific topics taken in 11 schools by 11 to 14-year-olds is a good way to judge standards in the maths GCSE - an exam which tests the full breadth of the curriculum and that is taken by older pupils from all schools in the country," she said.

"Improved mathematics attainment is down to pupils' hard work and excellent teaching. This is further reflected by the fact that more and more young people are going on to study mathematics and further mathematics at AS-level and A-level."

The research was presented at the British Educational Research Association conference in Manchester on Saturday.

Former Countdown television presenter Carol Vorderman, who is leading a Conservative task force into the subject, told BBC News that there was "no question" maths exams are easier than when she was at school.

"I've spent a lot of the last month going round a lot of university maths departments and speaking to the professors and to the students... and the term grade inflation is a term which is referenced and it is used constantly," she said.

Story from BBC NEWS:

[http://news.bbc.co.uk/go/pr/fr/-/2/hi/uk\\_news/education/8238759.stm](http://news.bbc.co.uk/go/pr/fr/-/2/hi/uk_news/education/8238759.stm)

Published: 2009/09/05 19:06:40 GMT





## Mass brain training study begins

**The public will be invited to take part in a mass brain training study later as part of a project between the BBC and medical research bodies.**

A host of celebrities will kick off the experiment on the BBC science series Bang Goes the Theory at 1930BST.

People are being asked to take part in regular memory and reasoning tests to see if they can boost brain function.

Dementia experts believe such computer tests could help ward off and slow the development of the disease.

But, to date, evidence has been mixed on the effectiveness of so-called brain training.

**" It's vital we understand the truth behind the old saying use it or lose it "**

Professor Clive Ballard, of the Alzheimer's Society

Dementia is caused by the mass loss of cells in the brain, and some believe one way to guard against it is to build up as many connections between cells as possible by being mentally active throughout life.

The theory has prompted several firms to market brain training programmes, but a recent investigation by consumer group Which? found only "weak" evidence they worked.

However, King's College London research has shown that keeping the mind active though things such as work or computer use, especially later in life, could help.

The BBC now wants to put brain training to the test by asking the British public to take part in the nine-month study, Brain Test Britain.

Participants will carry out 10-minute online brain training exercises three times a week for at least six weeks. Before and after the study they will be tested to see if they have improved brain function.

The trial will be launched on the BBC One show by radio presenter Evan Davis and celebrities including Richard McCourt, of Dick and Dom, and TV astrologer Russell Grant.

### Tests

Mr McCourt said: "I always wondered if any of these brain training gadgets and games really work.

"I'm looking forward to being trained and finding out a lot more about how our brains function.

"The more we know about the brain, the nearer we'll come to finding a cure for dementia - and that's the reason why I want to be involved."

A one-off show will be aired next year revealing the results, which will then be used by bodies such as the Medical Research Council and the Alzheimer's Society.

Around 700,000 people in the UK currently have dementia and experts have estimated that by 2051, the number could stand at 1.7m.



The Alzheimer's Society said even if brain function does improve through using the tests, there would still need to be a long-term study into whether this improved brain function could help protect people against the disease.

But Professor Clive Ballard, director of research at the charity, said the mass study could help solve "one of the biggest mysteries of the brain".

"It's vital we understand the truth behind the old saying use it or lose it.

"Every week thousands of people spend time exercising their brain using some form of computer-based brain training, but the jury's still out on whether exercising your brain can boost your brain power."

Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8238802.stm>

Published: 2009/09/06 23:15:34 GMT

## Cigarette branding 'misleading'

**Subtle branding on cigarette packets is misleading smokers into believing some products are less harmful than others, research suggests.**



GETTY IMAGES

Products branded "smooth", "silver" or "gold" are generally believed to be healthier and easier to give up, a survey of 1,300 people found.

But when shown plain packs the false beliefs disappeared, University of Nottingham researchers discovered.

EU rules ban any claims that some cigarettes are safer than others.

Participants in the study were shown pairs of cigarette packs and asked to compare what they were like, or what they assumed they would be like, in terms of taste, tar levels, health risk, attractiveness, how easy they would be to give up and how attractive they would be to someone choosing to smoke for the first time.

**"Plain packaging would prevent tobacco manufacturers from providing consumers with information about products that are legally available in retail outlets"**

Christopher Ogden, Tobacco Manufacturers' Association

The results from 800 adult smokers and 500 teenagers, all in the UK, also showed that lighter-coloured packaging led people to believe the cigarettes had a lower tar content or were generally less harmful.

More than half of adults and teenagers reported that among the eight brands they were shown those labelled "smooth" were less harmful than the regular variety.

Marlboro packs with a gold label were rated as having a lower health risk by 53% of adults and easier to quit by 31%, when compared with the Marlboro packs with a red logo.

When shown packs where the branding had been removed, false beliefs about the risk of harm or addiction dropped significantly.

## Restrictions

Since 2002 it has been illegal under EU legislation for manufacturers to use trademarks, text or any sign to suggest that one tobacco product is less harmful than another.

Banned phrases include "low tar", "light" and "mild".

In the UK, the Liberal Democrats are currently trying to reintroduce an amendment to the Health Bill to further restrict branding and designs on packs.

Writing in the European Journal of Public Health, the researchers said the regulations were failing to remove "potentially misleading" information from cigarettes.

Professor David Hammond, from the Department of Health Studies and Gerontology at the University of Waterloo in Ontario, Canada, said: "The truth is that all cigarettes are equally hazardous, regardless of what colour the pack is or what words appear on it."

"These tactics are giving consumers a false sense of reassurance that simply does not exist."

Christopher Ogden, chief executive of the Tobacco Manufacturers' Association, said it did not believe proposals for plain packaging were based on sound public policy or compelling evidence.

"Plain packaging would prevent tobacco manufacturers from providing consumers with information about products that are legally available in retail outlets."

"Adult smokers use packaging to identify, obtain information about and choose tobacco products, easily and without confusion."

He added the evidence in support of mandatory plain packaging was "speculative".

Deborah Arnott, chief executive of Action on Smoking and Health, said the research showed all tobacco products should be sold in plain packaging.

"That would remove false beliefs about different brands and communicate the message that all cigarettes are dangerous."

"This matter has been discussed by Parliament and there is now a perfect opportunity to include a requirement for plain packaging of tobacco products in the Health Bill."

Story from BBC NEWS:  
<http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8239028.stm>

Published: 2009/09/05 23:14:47 GMT

## Call to use more government data

By Maggie Shiels  
Technology reporter, BBC News, Silicon Valley

**A leading light of Web 2.0 has challenged the technology industry to innovate using a treasure trove of data the US government is making public.**



Internet guru Tim O'Reilly said Government 2.0 as a platform would only truly work if businesses and developers created killer apps using the data.

One of President Obama's campaign promises was to make the US government more open and transparent.

"It's a great opportunity to redefine how government works," said Mr O'Reilly

"It is a different way of understanding the issue. We have a unique opening here to show that this stuff matters and that we can make real progress on this thinking on the big problems that face this country."

"It's up to the tech community to respond with our ideas, our voices, our creativity and our code," Mr O'Reilly told BBC News.

### 'Best ideas'

The Obama administration has set up a number of websites to give citizens access to information such as crime figures, how tax dollars are being spent, energy consumption, train timetables and even what the occupants of 1600 Pennsylvania Avenue are up to.

But the administration's move to lift the lid on all this raw data is about more than just providing information; it is about enabling innovation, according to the government's chief information officer Vivek Kundra.

"We've got to recognise that we can't treat the American people as subjects but as co-creators of ideas. We need to tap into the vast amounts of knowledge... in communities across the country.

"The federal government doesn't have a monopoly on the best ideas," Mr Kundra said at a recent conference.

It is a view wholly backed by Mr O'Reilly, who will this week lead a two-day conference in Washington DC on the subject. It will be attended by Mr Kundra and other government heads as well as those from business and technology.

"We have gotten into this model of thinking the government is like a vending machine. We pay taxes and get roads and schools, police and armies and whatever else. When it doesn't work, we think participation means complaining and shaking the vending machine to get more out of it.

"The new model is about participation. It's about the government saying we will provide you with these services that you can build upon. When the government built the interstate, they enabled Walmart and a multi-billion dollar industry," said Mr O'Reilly.

### **Trusted partners**

The best way for businesses and developers to think about Government 2.0 as a platform is to look at Apple and the iPhone, according to Mr O'Reilly.

"With government procurement it's about working with the same group of people and saying we are going to work with trusted partners and them saying here is our handful of offerings.

"The iPhone comes out and Apple turns it into a platform and two years later there is something like 70,000 applications and 3,000 written every week. They have created a framework and infrastructure and that is the right way we should be thinking about government," said Mr O'Reilly.

He said past examples of how the government had excelled as a platform were the internet and GPS, the global positioning system, which were both government-funded projects.

"At some point the government and the air force made a policy decision from providing an application to a platform that resulted in multi-billion dollar industries," said Mr O'Reilly.

### **'Citizen technologists'**

One of the most cited examples of how government-as-a-platform works best can be seen at a site called Apps for Democracy.

It was set up nearly a year ago after the District of Columbia asked iStrategyLabs to show how all the information it unleashed could work for the citizens, visitors, businesses and government agencies of Washington DC.

The data catalogue contains everything from real-time crime feeds to school test scores and from poverty indicators to recycling locations.

As a result the company started a contest called Apps for Democracy which aimed to "engage citizen technologists to build the perfect technology solution to meet their needs".

To date Apps for Democracy boasts 47 iPhone, Facebook and web applications with an estimated value to the city of more than \$2.6m.



Last weekend a \$10,000 prize was awarded for an iPhone and Facebook app combination that allows users to submit and view service requests to the city via its 311 service, for everything from cleaning to rubbish and repairs to tree services.

"With the help of these home-grown innovators, we're engaging the community in government and building a digital democracy model for governments everywhere," said the district's interim chief technology officer Chris Willey.

Mr O'Reilly warned that "going back to politics as usual" was not an option and that in the midst of the government's willingness to open up its data, there were some pitfalls to look out for.

"In terms of unlocking information, it's not a question of fast enough, it's a matter of strategically enough.

"The government is so large and there is so much data there that the real question is how much of it is really useful. This is why it is important for the government to think strategically about what does 'government as a platform' mean?" said Mr O'Reilly.

Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/fr/-/2/hi/technology/8241029.stm>

Published: 2009/09/07 09:28:11 GMT



## Seas 'threaten 20m in Bangladesh'

By David Shukman  
BBC News, Bangladesh

**Up to 20 million people in low-lying Bangladesh are at risk from rising sea levels in the coming decades, according to new research.**



MARK GEORGIOU

Scientists predict that salty water could reach far inland, making it hard to cultivate staple foods like rice.

The research comes as the government appeals for \$5bn (£3bn) over five years to combat climate change.

In May, Cyclone Aila left thousands homeless, killed many and caused widespread flooding and damage.

The predictions come from the Centre for Environmental and Geographic Information Services (Cegis) in Bangladesh.

It suggests a surprisingly small area of land will be permanently lost to the waters, but notes that vast tracts in the south-west could be inundated every monsoon season.

### Food threats

Ahmadul Hassan, a senior scientist at Cegis, told the BBC that the intrusion of salt water would disrupt rice production in one of Bangladesh's poorest regions.

"These are very poor people, and vulnerable. For four months they'll have nowhere to work," he said.

"So people will migrate to the cities for jobs, because of the uncomfortable situation with sea level rise.

"We are talking about 20 million people," he adds.

According to the researchers, data from 11 Bangladeshi monitoring stations shows an average sea-level rise of 5mm per year over the last 30 years, with climate models forecasting further rises.

Of Bangladesh's total rice production, nearly half is so-called "monsoon" rice and much of that is grown in the areas most vulnerable to flooding.

In an interview with BBC News, Bangladesh's Minister of Disaster Management, Dr Muhammed Abdur Razzaque, said he wanted sea defences similar to those in Holland.

"We have to have new designs for embankments and we have to raise their height," he said.

"We are expecting \$5bn over the next five years in support from the international community.

"This must be a grant, not a loan with interest," he stipulated.

**"I think it is not possible to live in this country any longer, we have to move"**  
Asma Khatun Gabura Island resident

Bangladesh is among a number of developing countries campaigning for finance to help adapt to the effects of climate change.

There are hopes that the richest nations will agree to massive funding at the UN climate conference in Copenhagen in December.

Staff from the charity Oxfam point to the damage caused by Cyclone Aila last May to highlight why Bangladesh needs help preparing for future sea-level rise.

Abdul Khaleque is managing Oxfam's emergency response in Satkhira region, where more than 20,000 people lost their homes on Gabura Island.

He said: "This place is very near to the sea and we know climate change is causing sea levels to rise.

"If the situation gets worse then these people cannot go back to their villages, so permanent arrangements to improve these embankments need to be made."

### Defences breached

Four months after the cyclone, the sea defences are still breached and the island floods with every high tide. The chairman of the Gabura Island "union" or council, Shofiqul Ajam Lenin, is calling for the embankments to be far higher.

"If the current design is not changed then not only my union, but the other unions as well will not exist."

The flooding has ruined the island's freshwater supplies and hygiene in the camp is poor.

Among those living in tents on a narrow strip of high ground is Asma Khatun, a 25-year-old widow, who is now eager to leave.

"I think it is not possible to live in this country any longer. We have to move to other countries.

"We can't live here just by drinking this water. It is not possible to live here."

Story from BBC NEWS:

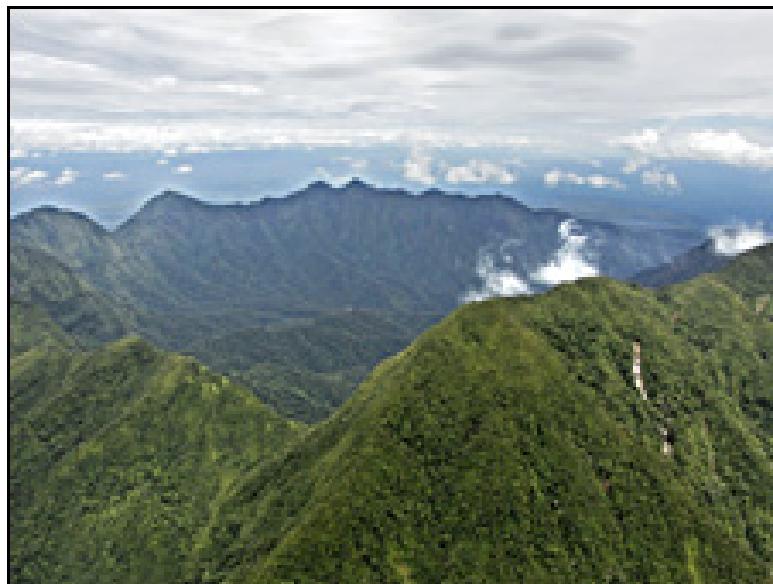
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Published: 2009/09/07 04:59:30 GMT

## Giant rat found in 'lost volcano'

By Matt Walker  
Editor, Earth News

**A new species of giant rat has been discovered deep in the jungle of Papua New Guinea.**



The rat, which has no fear of humans, measures 82cm long, placing it among the largest species of rat known anywhere in the world.

The creature, which has not yet been formally described, was discovered by an expedition team filming the BBC programme Lost Land of the Volcano.

It is one of a number of exotic animals found by the expedition team.

Like the other exotic species, the rat is believed to live within the Mount Bosavi crater, and nowhere else.

"This is one of the world's largest rats. It is a true rat, the same kind you find in the city sewers," says Dr Kristofer Helgen, a mammalogist based at the Smithsonian National Museum of Natural History who accompanied the BBC expedition team.

Initially, the giant rat was first captured on film by an infrared camera trap, which BBC wildlife cameraman Gordon Buchanan set up in the forest on the slopes of the volcano.

The expedition team from the BBC Natural History Unit recorded the rat rummaging around on the forest floor, and were awed by its size.

Immediately, they suspected it could be a species never before recorded by science, but they needed to see a live animal to be sure.

Then trackers accompanying the team managed to trap a live specimen.

"I had a cat and it was about the same size as this rat," says Buchanan.

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The trapped rat measured 82cm in length from its nose to its tail, and weighed approximately 1.5kg.

It had a silver-brown coat of thick long fur, which the scientists who examined it believe may help it survive the wet and cold conditions that can occur within the high volcano crater. The location where the rat was discovered lies at an elevation of over 1,000m.

Initial investigations suggest the rat belongs to the genus *Mallomys*, which contains a handful of other out-sized species.

It has provisionally been called the Bosavi woolly rat, while its scientific name has yet to be agreed.

Other rodents, the group of animals that includes rats, grow to a bigger size.

For example, the largest rodent of all is the capybara, which lives in or near freshwater in South America.

It can grow up to 130cm long and weigh up to 65kg.

The Philippines is also home to a few species of cloud rat which can reach over 2kg in weight.

But of the true rats, which includes urban brown and black rats that belong to the genus *Rattus*, few can match the new species.

In 2007, an expedition to New Guinea led by Conservation International discovered another closely related giant woolly rat, which can weigh up to 1.4kg. It also belongs within the genus *Mallomys*.

However, that species lives in the Foja Mountains, part of the Mamberamo Basin.

Mount Bosavi, where the new rat was found, is an extinct volcano that lies deep in the remote Southern Highlands of Papua New Guinea.

The expedition team entered the crater to explore pristine forest, where few humans have set foot.

Even members of the Kasua tribe, who acted as trackers for the expedition, live outside the crater, which is 4km wide and has walls up to 1km high, trapping the creatures that live within.

The island which includes Papua New Guinea and New Guinea is famous for the number and diversity of the rats and mice that live there.

Over 57 species of true "Murid" rats and mice can be found on the island. The larger rats are often caught by hunters and eaten.

*Broadcast of The Lost Land of the Volcano series will begin on BBC One on Tuesday 8 September at 2100 BST. The discovery of the Bosavi woolly rat is broadcast as part of the series on BBC One on Tuesday 22 September.*

Story from BBC NEWS:

[http://news.bbc.co.uk/go/pr/fr/-/earth/hi/earth\\_news/newsid\\_8210000/8210394.stm](http://news.bbc.co.uk/go/pr/fr/-/earth/hi/earth_news/newsid_8210000/8210394.stm)

Published: 2009/09/06 22:56:50 GMT



**That Late-night Snack: Worse Than You Think**

*Eating at irregular times -- the equivalent of the middle of the night for humans, when the body wants to sleep -- influences weight gain, a new study has found. (Credit: iStockphoto/Curt Pickens)*

ScienceDaily (Sep. 7, 2009) — Eat less, exercise more. Now there is new evidence to support adding another "must" to the weight-loss mantra: eat at the right time of day.

A Northwestern University study has found that eating at irregular times -- the equivalent of the middle of the night for humans, when the body wants to sleep -- influences weight gain. The regulation of energy by the body's circadian rhythms may play a significant role. The study is the first causal evidence linking meal timing and increased weight gain.

"How or why a person gains weight is very complicated, but it clearly is not just calories in and calories out," said Fred Turek, professor of neurobiology and physiology in the Weinberg College of Arts and Sciences and director of the Center for Sleep and Circadian Biology. "We think some factors are under circadian control. Better timing of meals, which would require a change in behavior, could be a critical element in slowing the ever-increasing incidence of obesity."

The findings could have implications for developing strategies to combat obesity in humans, as the United States and the world battle what has been called an "obesity epidemic." More than 300 million adults worldwide are obese, including more than a third of American adults.

Details of the obesity study, which was led by Turek, will be published online Sept. 3 by the journal *Obesity*.

"One of our research interests is shift workers, who tend to be overweight," said lead author Deanna M. Arble, a doctoral student in Turek's lab. "Their schedules force them to eat at times that conflict with their natural body rhythms. This was one piece of evidence that got us thinking -- eating at the wrong time of day might be contributing to weight gain. So we started our investigation with this experiment."

Simply modifying the time of feeding alone can greatly affect body weight, the researchers found. Mice that were fed a high-fat diet during normal sleeping hours gained significantly more weight (a 48 percent weight increase over their baseline) than mice eating the same type and amount of food during naturally wakeful hours (a 20 percent increase over their baseline). There was no statistical difference between the two groups regarding caloric intake or the amount of activity.

Over a period of six weeks, both groups of mice were allowed to eat as much high-fat diet as they wanted during their daily 12-hour feeding phase. (Much like many humans, mice have a preference for high-fat food.) Since mice are nocturnal, the 12-hour feeding phase was during the day for those fed during normal sleeping hours and during the night for those fed during naturally wakeful hours. Food was not provided during the other 12 hours of their day.

Our circadian clock, or biological timing system, governs our daily cycles of feeding, activity and sleep, with respect to external dark and light cycles. Recent studies have found the body's internal clock also regulates energy use, suggesting the timing of meals may matter in the balance between caloric intake and expenditure.

The researchers next plan to investigate the molecular mechanisms behind their observation that eating at the "wrong" time can lead to weight gain.

In addition to Turek and Arble, other authors of the paper are Joseph Bass, Aaron D. Laposky and Martha H. Vitaterna, all from Northwestern.

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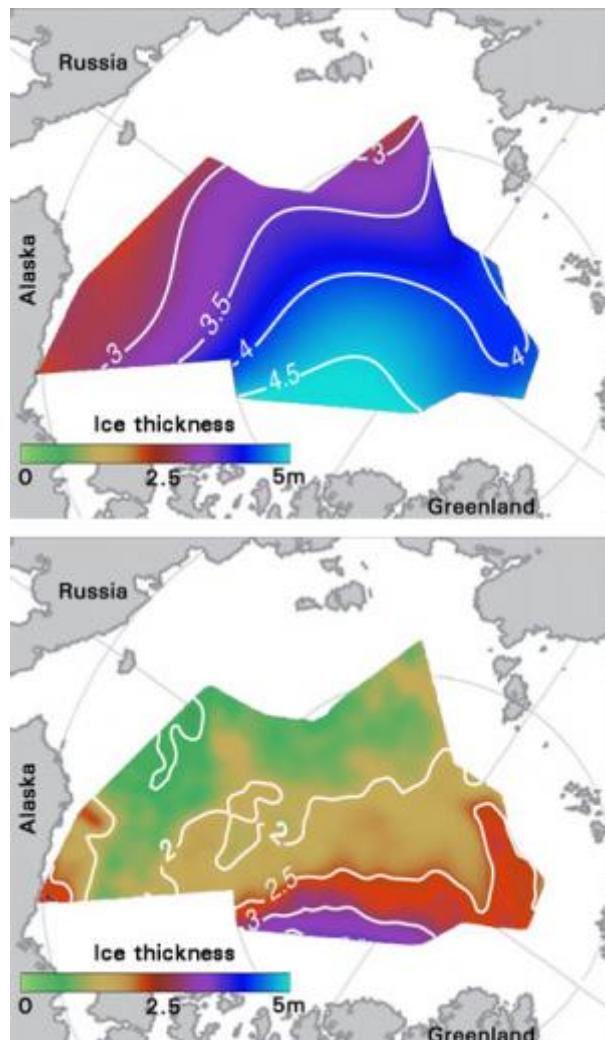
#### **Journal reference:**

1. Deanna M. Arble, Joseph Bass, Aaron D. Laposky, Martha H. Vitaterna and Fred W. Turek.  
**Circadian Timing of Food Intake Contributes to Weight Gain.** *Obesity*, 2009; DOI:  
[10.1038/oby.2009.264](https://doi.org/10.1038/oby.2009.264)

*Adapted from materials provided by [Northwestern University](#).*

<http://www.sciencedaily.com/releases/2009/09/090903110800.htm>

## Satellites And Submarines Give The Skinny On Sea Ice Thickness



*Patterns of average winter ice thickness from February to March show thicker ice in 1988 (above), compared to thinner ice averaged from 2003-2008 (below). Thickness information in Antarctica is limited to an irregular polygon shape that outlines the area where declassified submarine data are available. (Credit: Ronald Kwok/NASA)*

ScienceDaily (Sep. 7, 2009) — This summer, a group of scientists and students — as well as a Canadian senator, a writer, and a filmmaker — set out from Resolute Bay, Canada, on the icebreaker Louis S. St-Laurent. They were headed through the Northwest Passage, but instead of opening shipping lanes in the ice, they had gathered to open up new lines of thinking on Arctic science.

Among the participants in the shipboard workshop (hosted by Fisheries and Oceans Canada) was Ron Kwok of NASA's Jet Propulsion Laboratory in Pasadena, Calif. Kwok has long provided checkups on the health of Arctic sea ice — the frozen sea water floating within the Arctic Ocean basin. He also knows that some important clues about ice changes can't be seen from a ship.

### Extending the Record

While satellites provide accurate and expansive coverage of ice in the Arctic Ocean, the records are relatively new. Satellites have only monitored sea ice extent since 1973. NASA's Ice, Cloud, and land

Elevation Satellite (ICESat) has been on the task since 2003, allowing researchers to estimate ice thickness as well.

To extend the record, Kwok and Drew Rothrock of the University of Washington, Seattle, recently combined the high spatial coverage from satellites with a longer record from Cold War submarines to piece together a history of ice thickness that spans close to 50 years.

Analysis of the new record shows that since a peak in 1980, sea ice thickness has declined 53 percent. "It's an astonishing number," Kwok said. The study, published online August 6 in *Geophysical Research Letters*, shows that the current thinning of Arctic sea ice has actually been going on for quite some time.

"A fantastic change is happening on Earth — it's truly one of the biggest changes in environmental conditions on Earth since the end of the ice age," said Tom Wagner, cryosphere program manager at NASA Headquarters. "It's not an easy thing to observe, let alone predict, what might happen next."

Sea ice influences the Arctic's local weather, climate, and ecosystems. It also affects global climate. As sea ice melts, there is less white surface area to reflect sunlight into space. Sunlight is instead absorbed by the ocean and land, raising the overall temperature and fueling further melting. Ice loss puts a damper on the Arctic air conditioner, disrupting global atmospheric and ocean circulation.

To better identify what these changes mean for the future, scientists need a long-term look at past ice behavior. Each year, Arctic ice undergoes changes brought about by the seasons, melting in the summer warmth and refreezing in the cold, dark winter. A single extreme melt or freeze season may be the result of any number of seasonal factors, from storminess to the Arctic Oscillation (variations in atmospheric circulation over the polar regions that occur on time scales from weeks to decades).

But climate is not the same as weather. Climate fluctuates subtly over decades and centuries, while weather changes from day to day and by greater extremes.

"We need to understand the long-term trends, rather than the short-term trends that could be easily biased by short-term changes," Kwok said. "Long-term trends are more reliable indicators of how sea ice is changing with the global and regional climate."

That's why a long-term series of data was necessary. "Even decadal changes can be cyclical, but this decline for more than three decades does not appear to be cyclical," Rothrock said.

### All the Ice Counts

Arctic sea ice records have become increasingly comprehensive since the latter half of the 20th century, with records of sea ice anomalies viewed from satellites, ships, and ice charts collected by various countries. Most of that record, kept in the United States by the National Snow and Ice Data Center at the University of Colorado, Boulder, describes the areal extent of sea ice.

But a complete picture of sea ice requires an additional, vertical measurement: thickness. Melting affects more than just ice area; it can also impact ice above and below the waterline. By combining thickness and extent measurements, scientists can better understand how the Arctic ice cover is changing.

Kwok and other researchers used ICESat's Geoscience Laser Altimeter System to estimate the height of sea ice above the ocean surface. Knowing the height, scientists can estimate how much ice is below the surface.

Buoyancy causes a fraction (about 10 percent) of sea ice to stick out above the sea surface. By knowing the density of the ice and applying "Archimedes' Principle" — an object immersed in a fluid is buoyed by

a force equal to the weight of the fluid displaced by the object — and accounting for the accumulation of snowfall, the total thickness of the ice can be calculated.

In 2008, Kwok and colleagues used ICESat to produce an ice thickness map over the entire Arctic basin. Then in July 2009, Kwok and colleagues reported that multiyear 'permanent' ice in the Arctic Ocean has thinned by more than 40 percent since 2004. For the first time, thin seasonal ice has overtaken thick older ice as the dominant type.

### **Submarines and Satellites**

To put the recent decline in context, Kwok and Rothrock examined the recent five-year record from ICESat in the context of the longer history of ice thickness observed by U.S. Navy submarines.

During the Cold War, the submarines collected upward-looking sonar profiles, for navigation and defense, and converted the information into an estimate of ice thickness. Scientists also gathered profiles during a five-year collaboration between the Navy and academic researchers called the Scientific Ice Expeditions, or "SCICEX," of which Rothrock was a participant. In total, declassified submarine data span nearly five decades—from 1958 to 2000—and cover a study area of more than 1 million square miles, or close to 40 percent of the Arctic Ocean.

Kwok and Rothrock compared the submarine data with the newer ICESat data from the same study area and spanning 2003 to 2007. The combined record shows that ice thickness in winter of 1980 averaged 3.64 meters. By the end of 2007, the average was 1.89 meters.

"The dramatic decrease in multiyear ice coverage is quite remarkable and explains to a large degree the decrease in total ice area and volume," Kwok said.

Rothrock, who has worked extensively with the submarine data, agrees. "This paper shows one of the most compelling signals of global warming with one of the greatest and fastest regional environmental impacts."

### **Ice Through Human Eyes**

While it is critical to keep monitoring the Arctic with satellites and aircraft, Kwok believes there is also a benefit in physically standing in a place and seeing the changes through human eyes—particularly for non-scientists, who do not keep a close watch on sea ice.

The August 2009 workshop in the Northwest Passage brought together an eclectic group of politicians, artists, and scientists to see the ice firsthand. The challenge was to see the problem of a changing Arctic environment from a variety of scientific, political, cultural and human perspectives and to discuss the future of collaborative study in the Arctic. The science of sea ice has implications for people's livelihoods, for long-established ecosystems, and for opening a new part of the world to exploration and exploitation.

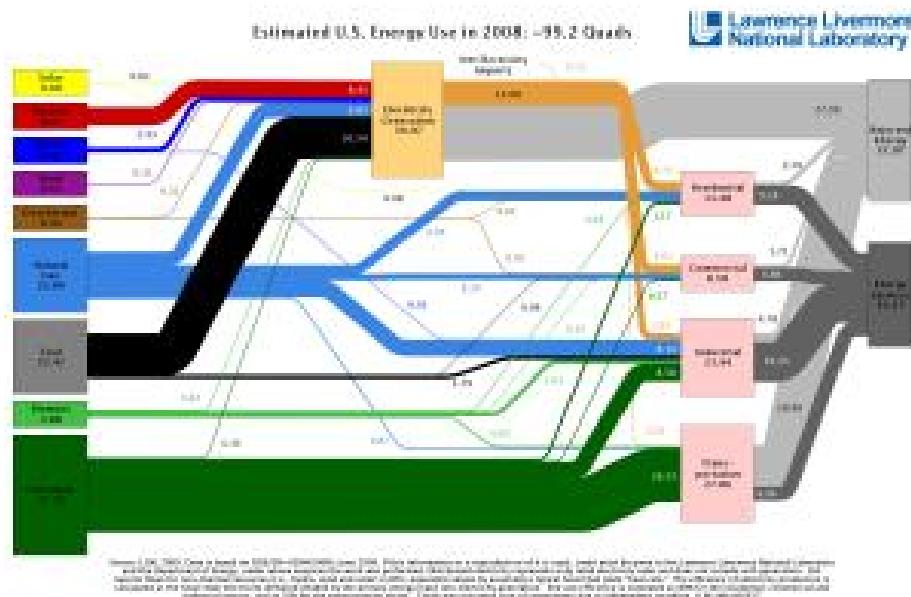
The workshop participants now take their experiences and observations back to warmer climates, where there is sometimes less urgency about ice retreat.

"Sea ice is about more than just hard science; it's a geopolitical and human issue," Kwok noted. "There is a big personal impact when you get away from your desk and see it in person."

*Adapted from materials provided by [NASA/Goddard Space Flight Center](#).*

<http://www.sciencedaily.com/releases/2009/09/090901143321.htm>

## US Energy Use Drops In 2008



*Distributed electricity represents only electricity sales and does not include self-generation. EIA reports flows from non-thermal resources (i.e., hydro, wind and solar) in BTU-equivalent values by assuming a typical fossil fuel plant "heat rate." The efficiency of electricity production is calculated as the total retail electricity delivered by the primary energy input into electricity generation. End use efficiency is estimated at 80% for the residential, commercial and industrial sectors, and as 25% for the transportation sector. Totals may not equal sum due to independent rounding. (Credit: Image courtesy of DOE/Lawrence Livermore National Laboratory)*

ScienceDaily (Sep. 7, 2009) — Americans used more solar, nuclear, biomass and wind energy in 2008 than they did in 2007, according to the most recent energy flow charts released by the Lawrence Livermore National Laboratory. The nation used less coal and petroleum during the same time frame and only slightly increased its natural gas consumption. Geothermal energy use remained the same.

The estimated U.S. energy use in 2008 equaled 99.2 quadrillion BTUs ("quads"), down from 101.5 quadrillion BTUs in 2007. (A BTU or British Thermal Unit is a unit of measurement for energy, and is equivalent to about 1.055 kilojoules).

Energy use in the industrial and transportation sectors declined by 1.17 and 0.9 quads respectively, while commercial and residential use slightly climbed. The drop in transportation and industrial use - which are both heavily dependent on petroleum - can be attributed to a spike in oil prices in summer 2008.

Last year saw a significant increase in biomass with the recent push for the development of more biofuels including ethanol.

"This is a good snapshot of what's going on in the country. Some of the year-to year changes in supply and consumption can be traced to factors such as the economy and energy policy," said A.J. Simon, an LLNL energy systems analyst who develops the energy flow charts using data provided by the Department of Energy's Energy Information Administration.

Simon said the increase in wind energy can be attributed to large investments in wind turbine technologies over the last few years as well as better use of the existing turbines.

Nuclear energy also saw a slight increase from 8.41 quads in 2007 up to 8.45 quads in 2008. While no new nuclear power plants came online in 2008, the existing plants had less down time. Over the last 20 years, the downtime for maintenance and refueling at nuclear power plants had been decreasing.

"There's an incentive to operate as much as possible," Simon said. "It's a smart thing to do. You can't earn revenue by selling electricity when you're down."

Many years of experience have allowed nuclear operators to optimize plant reliability on short maintenance cycles.

The chart also shows the amount of energy rejected by the United States. Of the 99.2 quads consumed, only 42.15 ended up as energy services. Energy services are "things that make our lives better," Simon said. "That's the energy that makes your car move and that comes out of your light bulb."

The ratio of energy services to the total amount of energy used is a measure of the country's energy efficiency. The remainder, explained Simon, "is simply rejected. For example, some rejected energy shows up as waste heat from power plants."

"I'm really excited about the renewed push for energy efficiency in this country," he said. "Because once that energy is rejected, it's no longer useful. But more efficient power plants, automobiles and even light bulbs really do reject less energy while providing the same energy services."

Lawrence Livermore National Laboratory has helped to visualize the Energy Information Administration's U.S. energy data since the early 1970s.

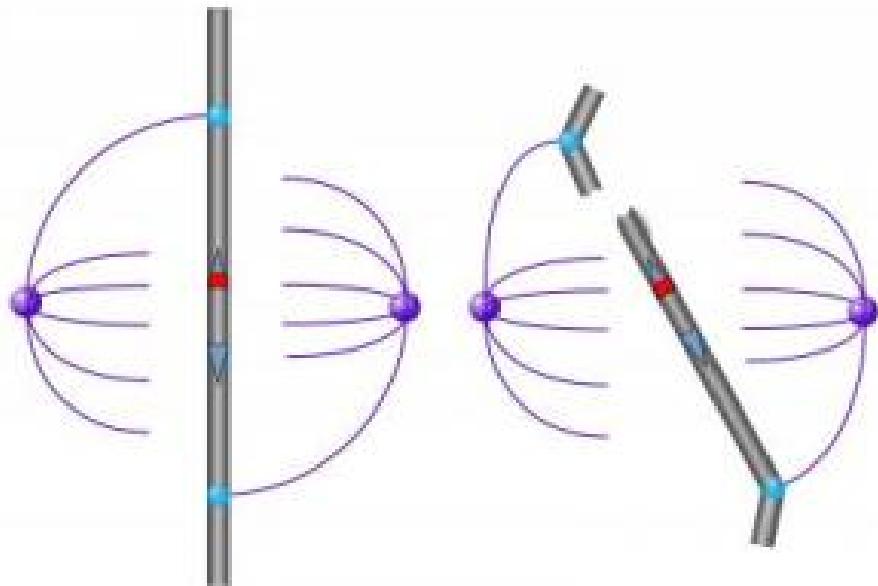
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*Adapted from materials provided by DOE/Lawrence Livermore National Laboratory.*

<http://www.sciencedaily.com/releases/2009/07/090720134556.htm>



## 'Achilles' Heel' In Y Chromosome Linked To Sex Disorders



*A tug of war between nascent daughter cells can snap isodicentric in two, leading to its loss during development of the fetus. (Credit: Tom DiCesare/Whitehead)*

ScienceDaily (Sep. 7, 2009) — The unique mechanism behind the evolutionary survival of the human Y chromosome may also be responsible for a range of sex disorders, from failed sperm production to sex reversal to Turner Syndrome.

Roughly six years ago, David Page's lab at Whitehead Institute for Biomedical Research reported the discovery of eight large areas of mirror-imaged genetic sequences, or palindromes, along the Y chromosome. Because the Y chromosome essentially has no partner with which to swap genes, a process that between ordinary chromosome pairs leads to genetic diversity and the exchange of good genes for damaged ones, it relies on its own palindromes to swap genes with itself. The Y, as it turns out, folds itself in the middle of palindromic regions, thereby pairing identical sequences to allow for potentially beneficial genetic exchange.

At the time, the finding provided explanation for why, despite much-heralded reports to the contrary, the Y chromosome is not doomed to extinction. Now, the Page lab has discovered that the Y's process of self-preservation can randomly go awry, with considerable clinical consequence.

"This is the sequel to the Y chromosome palindrome story," says Page, Whitehead Institute Director and a Howard Hughes Medical Institute investigator.

The latest chapter of the story, whose conclusion is published in the September 4 issue of *Cell*, began with the intriguing hypothesis that perhaps the Y's process of self-recombination can inadvertently turn the entire chromosome into a palindrome—literally, a mirror-image of itself. The result would be a so-called isodicentric Y chromosome (idicY), an abnormal structure with, as the name implies, two centromeres.

"We began to think seriously about the centromeres and the activity around them. Two centromeres render the chromosome susceptible to damage," says Julian Lange, first author of the *Cell* paper and a

former graduate student in the Page lab. Because of the Y chromosome's well known roles in sex determination and male fertility, Lange began to speculate about the potential clinical impact of the transmission of an idicY during fertilization.

"Because the Y chromosome is not essential to an individual's survival, these isodicentric Ys can persist," says Lange, who, after completing this research at Whitehead, became a postdoctoral fellow at Memorial Sloan-Kettering Cancer Center. "They can be found in the population."

And Lange found them, in the DNA samples of 51 patients screened from a field of nearly 2400 individuals who had come under study over the course of many years because of failed sperm production, structurally abnormal Y chromosomes, or sex reversal. Through sophisticated genetic analysis, it became clear that idicYs were responsible for spermatogenic failure in many of the male patients.

However, 18 of the 51 patients were anatomically female—despite having two copies of the male-determining SRY gene on their idicY chromosomes. Lange and Page began to hypothesize that the feminization they had identified was related to the instability of the idicYs themselves. Suspecting that the level of instability of an idicY increases with the size of the chromosome, they looked for a connection and found something somewhat paradoxical: the larger the Y chromosome, the greater the likelihood of sex reversal.

"We had predicted this correlation, which relates to the overall distance between the centromeres," says Page. "But when we confirmed it with the patient data, we were blown away."

Page believes that this new model for the formation of idicY chromosomes, coupled with the size-instability correlation, suggests a causal link to Turner syndrome, a chromosomal abnormality in girls or women, characterized by the lack of one sex chromosome. Turner syndrome affects an estimated 1 in 2500 females. Page won't yet speculate as to what percentage of Turner syndrome could be caused by this palindrome-to-palindrome recombination, but he does think it's significant.

David Page's primary affiliation is with Whitehead Institute for Biomedical Research, where his laboratory is located and all his research is conducted. He is also a Howard Hughes Medical Institute investigator and a professor of biology at Massachusetts Institute of Technology.

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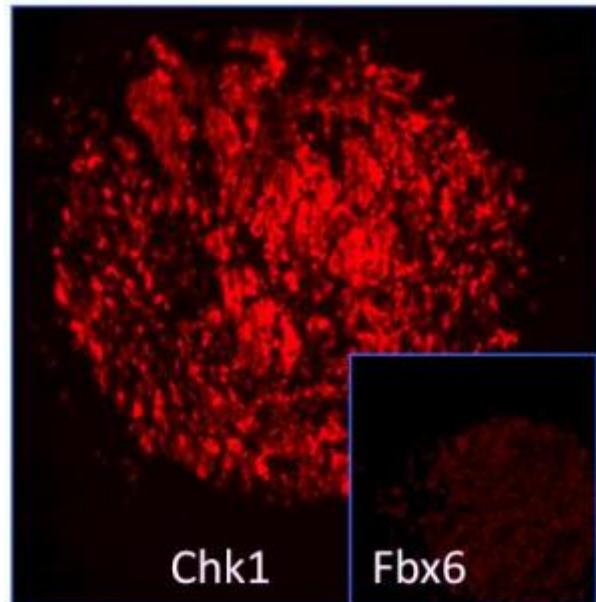
#### **Journal reference:**

1. Julian Lange, Helen Skaletsky, Saskia K.M. van Daalen, Stephanie L. Embry, Cindy M. Korver, Laura G. Brown, Robert D. Oates, Sherman Silber, Sjoerd Repping, David C. Page. **Isodicentric Y Chromosomes and Sex Disorders as Byproducts of Homologous Recombination that Maintains Palindromes.** *Cell*, 2009; DOI: [10.1016/j.cell.2009.07.042](https://doi.org/10.1016/j.cell.2009.07.042)

*Adapted from materials provided by [Whitehead Institute for Biomedical Research](#). Original article written by Matt Fearer.*

<http://www.sciencedaily.com/releases/2009/09/090903163715.htm>

## Chemotherapy Resistance: Checkpoint Protein Provides Armor Against Cancer Drugs



*These tumors with low levels of Fbx6 are unable to degrade the checkpoint protein Chk1 making them resistant to certain cancer drugs. (Credit: Courtesy of Dr. Youwei Zhang, Case Western Reserve University.)*

ScienceDaily (Sep. 7, 2009) — Cell cycle checkpoints act like molecular tripwires for damaged cells, forcing them to pause and take stock. Leave the tripwire in place for too long, though, and cancer cells will press on regardless, making them resistant to the lethal effects of certain types of chemotherapy, according to researchers at the Salk Institute for Biological Studies.

Their findings, published in the Aug. 28 issue of *Molecular Cell*, help explain how the checkpoint exit is delayed in some cancer cells, helping them to recover and resume dividing after treatment with DNA-damaging cancer drugs.

"A lot of progress has been made in understanding the molecular details of checkpoint activation," says senior author Tony Hunter, Ph.D., a professor in the Molecular and Cell Biology Laboratory, "but checkpoint termination, which is essential for the resumption of cell cycle progression, is less well understood."

The Salk researchers say that a better understanding of this crucial process may allow them to develop biological markers that predict clinical resistance to chemotherapy and to design cancer drugs with fewer side effects by exploiting the molecular mechanism underlying the checkpoint exit.

"If we could screen tumors for markers of chemo-resistance, we could then adjust the treatment accordingly," hopes first author You-Wei Zhang, Ph.D., formerly a postdoctoral researcher in Hunter's lab and now an assistant professor at Case Western Reserve University in Cleveland, Ohio.

In response to DNA damage and blocked replication—the process that copies DNA—eukaryotes activate the DNA damage checkpoint pathway, which stops the cell cycle, buying time to repair damage and recover from stalled or collapsed replication forks. If not repaired, these errors can either kill a cell when it attempts to divide or lead to genomic instability and eventually cancer.

A key role in this process is played by the checkpoint protein Chk1, which responds to stressful conditions induced by hypoxia, DNA damage-inducing cancer drugs, and irradiation. These same

conditions set the protein up for eventual degradation. But how the cellular protein degradation machinery knows that it is time to dispose of activated Chk1 was unclear.

In his experiments, Zhang discovered that activation of Chk1 exposes a so-called degron, a specific string of amino acids that attracts the attention of a protein known as Fbx6, short for F box protein 6. Fbx6 in turn brings in an enzyme complex that flags Chk1 proteins for degradation, allowing the cell to get rid of the activated checkpoint protein. Once Chk1 is eliminated, cells will resume the cell cycle progression, or, in the prolonged presence of replication stress, undergo programmed cell death. Yet some cancer cells keep dividing even in the presence of irreparable damage.

"Camptothecins are FDA-approved cancer drugs that induce replication stress and stop cancer cells dividing, but their clinical antitumor activity is very limited by the relatively rapid emergence of drug resistance, and the mechanisms are poorly understood," says Hunter. "We wondered whether defects in the Chk1 destruction machinery might allow cells to ignore the effects of camptothecin and similar drugs used for chemotherapy."

When Zhang checked cultured cancer cell lines and breast cancer tissue, he found that low levels of Fbx6 predicted high levels of Chk1 and vice versa. But most importantly, he was able to demonstrate that two of the three most camptothecin-resistant cancer cell lines in the cancer cell line panel available through the National Cancer Institute displayed significant defects in camptothecin-induced Chk1 degradation, which seemed to be caused by very low levels of Fbx6 expression.

"Chk1 and Fbx6 clearly play an important role for the regulation of the response to chemotherapy," he says. "One day, they could become an important prognostic marker that predicts patients' responsiveness to drugs such as irinotecan, platinum compounds, and gemcitabine, while Chk1 inhibitors might increase tumor cells' sensitivity to these drugs." Such a combination therapy could overcome clinical resistance or allow doctors to reduce the amount of administered drug, thereby reducing the often debilitating side effects.

Researchers who contributed to the work include John Brognard, Ph.D., Zhongsheng You, Ph.D., and Aaron Aslanian, Ph.D., in the Molecular and Cellular Biology Laboratory; Chris Coughlin, Ph.D., and Robert T. Abraham, Ph.D., at Wyeth Oncology Discovery in Pearl River, NY; Marisa Dolled-Filhart, Ph.D., at HistoRx Inc., New Haven, CT; and Gerard Manning, Ph.D., director of the Razavi-Newman Center for Bioinformatics at the Salk Institute.

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*Adapted from materials provided by [Salk Institute](#), via [EurekAlert!](#), a service of AAAS.*

<http://www.sciencedaily.com/releases/2009/08/090827123208.htm>

## Made-to-measure Solutions For Enhancing Prostheses Of Amputated Legs



*Prostheses for amputated leg. (Credit: Image courtesy of Basque Research)*

ScienceDaily (Sep. 7, 2009) — TECNALIA Corporación Tecnológica and the Valencia Institute for Biomechanics (IBV) have designed made-to-measure solutions to improve adaptation to replacements for amputated legs – the prime objective of the new health biomaterials project, FABIO, financed by the Ministry of Industry, Trade and Tourism.

The FABIO project aims for the total integration of the chain of design and manufacture of implants and necessary elements for enhancing the quality of life of patients. To this end, the project takes into account the process from the acquisition of data of the patient to the moment of surgery and the limb implant.

FABIO aims to achieve a process that is viable for manufacturers of these products, both for the quality of the results as well as for their functionality and financial and time costs. Thus, these advances could arrive on the market in three or four years.

In this project, the TECNALIA Health Unit focuses on the study of diverse biomaterials for the direct obtaining of health products through rapid manufacture technologies. What is involved is enhancing current materials at structural, mechanical, physical, functional and biocompatible levels in such a way that the materials developed within the project have properties equivalent to the natural materials of the human body. The materials obtained are characterised in the laboratory, during manufacture and in service.

The project, began in 2007, has already achieved the manufacture and evaluation of a new product. Concretely, what is involved is the possibility of designing a prosthesis socket for a patient with an amputated leg.

An amputation is an acquired condition the outcome of which is the loss of a limb and the cause usually being an injury, a disease or as a consequence of a surgical operation. More concretely, for amputations of the lower limb (85% of all amputations undertaken), the main cause is a peripheral vascular disease, the second cause being a break in the bone (10-12 % of all lower limb amputations).

In western developed countries the rate of amputations of lower limbs is 17.1 amputations per 100,000 inhabitants – in Spain alone 5,000 such amputations are carried out each year.

Currently, the number of persons with amputations of lower limbs is steadily increasing, due to the ageing of the population and the increase of peripheral vascular disease.

Amputations moreover mean a loss in mobility, a great psychological trauma for the patient who, besides, may fear that the amputation reduces acceptance by others. Apart from this, the loss of part of the body changes the self-image of the patient and his or her self-esteem.

Partners in the project have stated that they have managed to achieve “a personalised computer design for the socket that joins the prosthesis to the leg of the patient”. This design is undertaken by a laser scanning of the geometry of the patient’s stump. The result of the scanner enables the manufacturing of the socket with biocompatible resin and which adjusts perfectly to the stump.

This personalised socket has satisfactorily overcome the adjustment and operational trials and which will shortly serve for the evaluation of its mechanical resistance according to current norms.

In this sense, the first development undertaken by the FABIO Project could enhance the process of rehabilitation and patient care, amongst other aspects because costs and times are reduced, given that it is not necessary to make a plaster mould nor the final adjustments of fitting of the patient’s limb, thus reducing the number of required visits to the orthopaedic surgeon.

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*Adapted from materials provided by Basque Research.*

<http://www.sciencedaily.com/releases/2009/07/090717104612.htm>



## Milky Way's Not-so-distant Cousin Likely Harbors Supermassive Black Hole



*Seen edge-on, observations of NGC 4945 suggest that this hive of stars is a spiral galaxy much like our own Milky Way, with swirling, luminous arms and a bar-shaped centre. Sites of active star formation, known as H II regions, are seen prominently in the image, appearing bright pink. These resemblances aside, NGC 4945 has a brighter centre that likely harbours a supermassive black hole, which is devouring reams of matter and blasting energy out into space. NGC 4945 is about 13 million light-years away in the constellation of Centaurus (the Centaur) and is beautifully revealed in this image taken with data in five bands (B, V, R, H-alpha and S II) with the 2.2-metre MPG/ESO telescope at La Silla. The field of view is 30 x 30 arcminutes. North is up, East is to the left. (Credit: ESO)*

ScienceDaily (Sep. 6, 2009) — ESO has released a striking new image of a nearby galaxy that many astronomers think closely resembles our own Milky Way. Though the galaxy is seen edge-on, observations of NGC 4945 suggest that this hive of stars is a spiral galaxy much like our own, with swirling, luminous arms and a bar-shaped central region.

These resemblances aside, NGC 4945 has a brighter centre that likely harbours a supermassive black hole, which is devouring reams of matter and blasting energy out into space.

As NGC 4945 is only about 13 million light-years away in the constellation of Centaurus (the Centaur), a modest telescope is sufficient for skygazers to spot this remarkable galaxy. NGC 4945's designation comes from its entry number in the New General Catalogue compiled by the Danish-Irish astronomer John Louis Emil Dreyer in the 1880s. James Dunlop, a Scottish astronomer, is credited with originally discovering NGC 4945 in 1826 from Australia.

Today's new portrait of NGC 4945 comes courtesy of the Wide Field Imager (WFI) instrument at the 2.2-metre MPG/ESO telescope at the La Silla Observatory in Chile. NGC 4945 appears cigar-shaped from our perspective on Earth, but the galaxy is actually a disc many times wider than it is thick, with bands of stars and glowing gas spiralling around its centre. With the use of special optical filters to isolate the colour of light emitted by heated gases such as hydrogen, the image displays sharp contrasts in NGC 4945 that indicate areas of star formation.

Other observations have revealed that NGC 4945 has an active galactic nucleus, meaning its central bulge emits far more energy than calmer galaxies like the Milky Way. Scientists classify NGC 4945 as a Seyfert galaxy after the American astronomer Carl K. Seyfert, who wrote a study in 1943 describing the odd light signatures emanating from some galactic cores.

Since then, astronomers have come to suspect that supermassive black holes cause the turmoil in the centre of Seyfert galaxies. Black holes gravitationally draw gas and dust into them, accelerating and heating this attracted matter until it emits high-energy radiation, including X-rays and ultraviolet light. Most large, spiral galaxies, including the Milky Way, host a black hole in their centres, though many of these dark monsters no longer actively "feed" at this stage in galactic development.

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*Adapted from materials provided by ESO.*

<http://www.sciencedaily.com/releases/2009/09/090902112111.htm>

## Insomnia Is Bad For The Heart; Increases Blood Pressure



*New research shows that people who suffer from insomnia have heightened nighttime blood pressure, which can lead to cardiac problems. (Credit: iStockphoto/Justin Horrocks)*

ScienceDaily (Sep. 6, 2009) — Can't sleep at night? A new study published in the journal *Sleep* has found that people who suffer from insomnia have heightened nighttime blood pressure, which can lead to cardiac problems. The investigation, which measured the 24-hour blood pressure of insomniacs compared to sound sleepers, was conducted by researchers from the Université de Montréal, its affiliated Hôpital du Sacré-Cœur de Montréal Sleep Disorders Centre and the Université Laval.

"Over many years, chronic insomnia can have negative effects on the hearts of otherwise healthy individuals," says lead author Paola A. Lanfranchi, a professor in the Université de Montréal Faculty of Medicine and researcher at the Hôpital du Sacré-Cœur de Montréal Sleep Disorders Centre. "Whereas blood pressure decreases in regular sleepers and gives their heart a rest, insomnia provokes higher nighttime blood pressure that can cause long-term cardiovascular risks and damage the heart."

The findings are important given that insomnia, which is a chronic difficulty falling or staying asleep, affects up to 48 percent of the population at some point in their lives. As part of the study, the scientific team recruited 13 otherwise healthy chronic insomniacs and 13 good sleepers. Subjects spent 40 hours in the sleep laboratory: two nights for adaptation and one for monitoring followed by the intervening day.

"Blood pressure cycles are mainly linked to the sleep-wake cycle," says co-author Jacques Montplaisir, a professor in the Université de Montréal Department of Psychiatry and director of Hôpital du Sacré-Cœur de Montréal Disorders Center. "Since blood pressure is heightened among insomniacs, those with overt cardiac disease are particularly at risk for progression of the disease."

The article "Nighttime Blood Pressure in Normotensive Subjects With Chronic Insomnia: Implications for Cardiovascular Risk," published in *Sleep* was authored by Paola A. Lanfranchi, Marie-Hélène Pennestri, Lorraine Fradette, Marie Dumont and Jacques Montplaisir of the Université de Montréal and its affiliated Hôpital du Sacré-Cœur de Montréal, as well as Charles M. Morin of the Université Laval.

This study was funded by the Canadian Institutes of Health Research, the Heart and Stroke Foundation of Québec and the Fonds de Recherche en Santé du Québec.

*Adapted from materials provided by University of Montreal.*

<http://www.sciencedaily.com/releases/2009/09/090904165238.htm>

## Design Research Points The Way So You Won't Get Lost At The Hospital



*A symbol to designate an in-patient area, created by UC's Jameson Tyler.*

ScienceDaily (Sep. 6, 2009) — Help is on the way for anyone who has ever gotten lost at a hospital or other health-care setting.

That help is in the form of health-care signage symbols being developed by design students at the University of Cincinnati and three other U.S. universities.

These symbols will be tested this fall at four hospitals across the nation and by means of surveys taken among the populations in three Midwestern cities, according to Yolanda Partida, director of Hablamos Juntos (We Speak Together), based at UCSF Fresno Center for Medical Education & Research. Hablamos Juntos and the Society for Environmental Graphic Design are overseeing the project that is funded by the Robert Wood Johnson Foundation.

### Project Background

The project challenge for students is straightforward but substantial:

Develop symbols that could serve to guide any population – speaking any language and representing any reading or education level – to specific points in a hospital or other health-care setting. So, for instance, develop a symbol that would communicate and guide users to specific service areas: hospital admission, dental care, genetics counseling, mental health services, ophthalmology, nutrition counseling, pathology, radiology and more.

Students in the University of Cincinnati's internationally ranked School of Design began working on signage proposals in January 2009, led by Oscar Fernández, UC associate professor of design. In the current summer quarter, 16 students are now finishing up their health-care symbols, getting ready for testing of those symbols this fall.

In addition, students from California Polytechnic State University, Iowa State University and Kent State University have also been developing symbols to be part of the fall 2009 test group.

According to Partida, each school was asked to create 15-20 symbols that would be added to a collection of 28 symbols, created by professionals, already in use nationally.

### **Testing Begins In September**

A first round of testing on the student-created symbols will begin in September 2009. That's when students' final symbol designs will be reviewed in a series of recognition and comprehension tests.

The symbols judged to be the best performers in terms of comprehension and recognition will then be integrated into surveys administered in pockets of language groups (both English and non-English speakers) in Cincinnati, Ohio; Kent, Ohio; and Ames, Iowa.

Finally, the symbols that "make the grade" in terms of this community user survey/testing will be made available to actual health-care settings, pilot sites already working to implement health symbols as signage. These are:

- Grady Memorial Hospital, Atlanta, Ga. (the largest hospital in Georgia)
- International Community Health Services, Seattle, Wash.
- The Children's Mercy Hospital, Kansas City, Mo.
- Women and Infants Hospital of Rhode Island, Providence, R.I.

"These four facilities are currently designing wayfinding systems which will incorporate signage using symbols from our original set of 28 as well as those symbols, designed by the students, which successfully pass through the first test phases," said Partida.

UC graphic design senior Jesse Reed, 22, of Youngstown, Ohio, said that the testing of the students' work could be both "the most rewarding part of the project or the biggest letdown. That's when it'll be seen if the users understand what we're trying to communicate. I know that I think my designs are effective but users' reactions will certainly be the real test."

This communication challenge has also added a lot of fun to the project, he added, stating, "We want to have the least amount of parts or elements possible to communicate a very specific message. We're always asking ourselves: Where can we start subtracting. Where can we continue taking it apart and simplifying?"

From beginning to end, the project is about the end users, agreed UC digital design student Paige Farwick, 22, of the Cincinnati suburb of Eastgate. She explained, "We began our project by going out and asking non-designers to do a quick, rough sketch of the specific terms we were looking at. For instance, I asked family members to sketch the first thing they thought of when I said the term 'in-patient.' They all sketched a rough outline of a hospital building. It's probably not what I would have first thought of as a designer, but it gave me great insight into how a public audience thinks of that term."

As designers, the UC students are taking their assignment further than the prescribed outlines of the project – which focuses on symbols for the physical health-care setting. However, they have also opted to look at how the symbols might translate to other platforms, like the Web, printed materials such as brochures or even a nurse's call button.

It's something that Partida, in the role of project administrator/sponsor, admitted she wouldn't have thought to do.

Said UC's Fernández, "In order for these symbols to be effective in the physical environment, it's important that users become familiar with them and see them used across platforms – in the physical



realm, online and in other settings. So, we made a point to look at the symbols in the totality of environments (physical and electronic) where they will likely be used.”

### Next Steps

It's expected that refinements will be necessary to the student-created symbols after testing is completed in December 2009.

The ultimate goal is to have final symbols adopted both nationally and internationally.

“One of the reasons we’re working with designers, design students and healthcare settings is to encourage universal adoption of these symbols in the long term,” stated Partida. To encourage adoption, the project’s administrators are working with the Institute for Diversity in Health Management as well as the Association of Asian Pacific Community Health Organizations.

A new challenge that Partida would like to take on, also with the help of UC’s School of Design, is the creation of symbols that could be used for prescription labels.

She said, “We submitted a proposal to the National Institutes of Health. We already know that the symbols currently in use on prescription labels are not effective. We would want to apply user-oriented design principles in a similar manner to our current project.”

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*Adapted from materials provided by [University of Cincinnati](#).*

<http://www.sciencedaily.com/releases/2009/08/090806112355.htm>



## Monkey Brains Signal The Desire To Explore



*New research shows that humans aren't the only animals who wonder if the grass is greener elsewhere. Using brain scans in monkeys, researchers are now able to predict when monkeys will switch from exploiting a known resource to exploring their options. (Credit: iStockphoto/Roman Kobzarev)*

ScienceDaily (Sep. 6, 2009) — Sticking with what you know often comes at the price of learning about more favorable alternatives.

Managing this trade-off is easy for many, but not for those with conditions such as Alzheimer's disease or obsessive-compulsive disorder who are trapped in simple routines.

Using brain scans in monkeys, Duke University Medical Center researchers are now able to predict when monkeys will switch from exploiting a known resource to exploring their options.

"Humans aren't the only animals who wonder if the grass is greener elsewhere, but it's hard to abandon what we know in hopes of finding something better," said John Pearson, Ph.D., research associate in the Duke Department of Neurobiology and lead author of a study published in this week's *Current Biology*.

"Studies like this one help reveal how the brain weighs costs and benefits in making that kind of decision," Pearson said. "We suspect that such a fundamental question engages many areas of the brain, but this is one of the first studies to show how individual neurons can carry signals for these kinds of strategic decisions."

The researchers looked at how nerve cells fired in a part of the brain known as the posterior cingulate cortex as the monkeys were offered a selection of rewards. Generally, these neurons fired more strongly when monkeys decided to explore new alternatives.

The monkeys started with four rewards to choose from, each a 200 microliter cup of juice. After that, the four targets began to slowly change in value, becoming larger or smaller. The monkeys were free to explore the other targets or stay with the initial target, whose value they knew for certain. Monkeys had to select an option to learn its current value and integrate this information with their knowledge of the chances of getting more juice at a different target.

By studying the individual neurons, the researchers could predict which strategy the monkey would employ.

"These data are interesting from a human health perspective, because the posterior cingulate cortex is the most metabolically active part of the brain when we are daydreaming or thinking to ourselves, and it is also one of the first parts of the brain to show damage in Alzheimer's disease," said Michael Platt, Ph.D., professor of neurobiology and evolutionary anthropology at Duke and senior author of the study.

"People with Alzheimer's become set in their ways and don't explore as much, which may be because this part of the brain is damaged," Platt said. "Likewise, in people with obsessive-compulsive disorder, they can become fixed on certain activities or patterns of activity and can't disengage from them, which may also relate to changes in this part of the brain that renders them mentally unable to switch gears between exploring and exploiting."

More research is needed to learn about how this part of the brain functions, which might be crucial to the flexible adaptation of strategy in response to changing environments, Pearson said.

Other authors include Benjamin Y. Hayden and Sridhar Raghavachari of the Duke Department of Neurobiology. This work was supported by a National Institute on Drug Abuse postdoctoral fellowship, a National Institutes of Health grant, and the Duke Institute for Brain Studies.

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#### Journal reference:

1. John M. Pearson, Benjamin Y. Hayden, Sridhar Raghavachari, and Michael L. Platt. **Neurons in Posterior Cingulate Cortex Signal Exploratory Decisions in a Dynamic Multioption Choice Task.** *Current Biology*, 2009; DOI: [10.1016/j.cub.2009.07.048](https://doi.org/10.1016/j.cub.2009.07.048)

Adapted from materials provided by [Duke University Medical Center](#), via [EurekAlert!](#), a service of AAAS.

<http://www.sciencedaily.com/releases/2009/09/090904165447.htm>

## Indoor Plants Found To Release Volatile Organic Compounds



*Ficus benjamina*, a popular houseplant, was found to emit VOCs.

ScienceDaily (Sep. 6, 2009) — Potted plants add a certain aesthetic value to homes and offices, bringing a touch of nature to indoor spaces. It has also been shown that many common house plants have the ability to remove volatile organic compounds—gases or vapors emitted by solids and liquids that may have adverse short- and long-term health effects on humans and animals—from indoor air.

But take heed when considering adding some green to your environment; in addition to giving off healthy oxygen and sucking out harmful VOCs, a new study shows that some indoor plants actually release volatile organic compounds into the environment.

A research team headed by Stanley J. Kays of the University of Georgia's Department of Horticulture conducted a study to identify and measure the amounts of volatile organic compounds (VOCs) emitted by four popular indoor potted plant species. The study, published in the American Society for Horticultural Science journal *HortScience*, also noted the source of VOCs and differences in emission rates between day and night.

The four plants used in the study were Peace Lily (*Spathiphyllum wallisii Regel*), Snake Plant (*Sansevieria trifasciata Prain*), Weeping Fig (*Ficus benjamina L.*), and Areca Palm (*Chrysalidocarpus lutescens Wendl.*). Samples of each plant were placed in glass containers with inlet ports connected to charcoal filters to supply purified air and outlet ports connected to traps where volatile emissions were measured. The results were compared to empty containers to verify the absence of contaminants. A total of 23 volatile compounds were found in Peace Lily, 16 in Areca Palm, 13 in Weeping Fig, and 12 in Snake Plant. Some of the VOCs are ingredients in pesticides applied to several species during the production phase.

Other VOCs released did not come from the plant itself, but rather the micro-organisms living in the soil. "Although micro-organisms in the media have been shown to be important in the removal of volatile air pollutants, they also release volatiles into the atmosphere", Kays stated. Furthermore, 11 of the VOCs came from the plastic pots containing the plants. Several of these VOCs are known to negatively affect animals.

Interestingly, VOC emission rates were higher during the day than at night in all of the species, and all classes of emissions were higher in the day than at night. The presence of light along with many other factors effect synthesis, which determines the rate of release.

The study concluded that "while ornamental plants are known to remove certain VOCs, they also emit a variety of VOCs, some of which are known to be biologically active. The longevity of these compounds has not been adequately studied, and the impact of these compounds on humans is unknown."

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#### **Journal reference:**

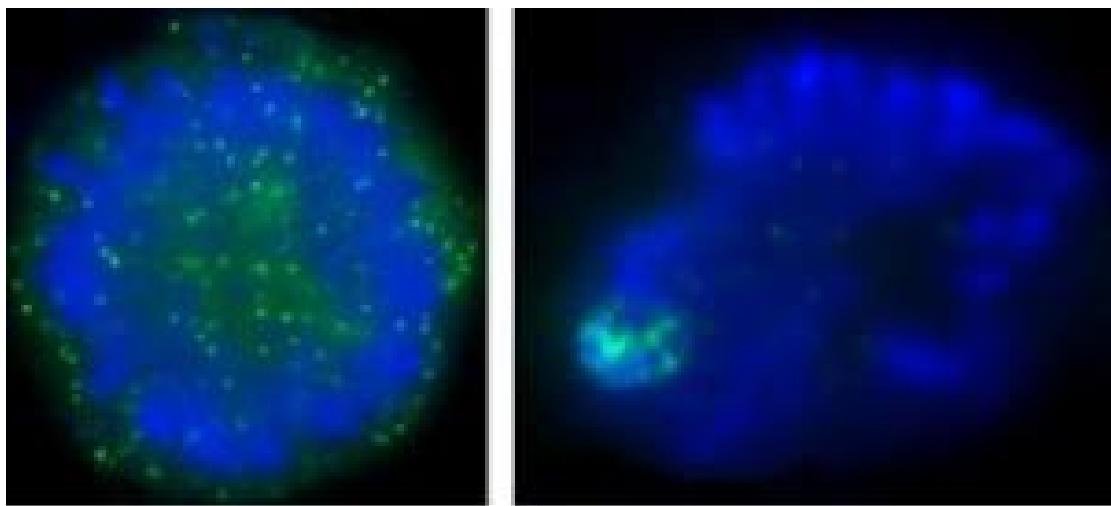
1. Dong Sik Yang, Ki-Cheol Son and Stanley J. Kays. **Volatile Organic Compounds Emanating from Indoor Ornamental Plants.** *HortScience*, 44: 396-400 (2009) [[link](#)]

*Adapted from materials provided by [American Society for Horticultural Science](#), via [EurekAlert!](#), a service of AAAS.*

<http://www.sciencedaily.com/releases/2009/09/090903163949.htm>



## Mitotic Release Of Chromatin-binding RNA Gives Insight Into X Chromosome Silencing



*Although XIST initiates the silencing of the chromosome, the RNA (green) is temporarily released during mitosis (left). By manipulating XIST binding *in vivo*, Hall et al. discover that Aurora B kinase regulates the RNA's association with chromatin: XIST is retained on the X chromosome in mitotic cells lacking Aurora B (right). (Credit: Hall, L.L., et al. 2009. J. Cell Biol. doi:10.1083/jcb.200811143)*

ScienceDaily (Sep. 6, 2009) — Early in development, mammalian female cells counteract their double dose of X chromosomes by coating one of them with a large RNA named XIST. The RNA binds to the same X chromosome from which it is transcribed and initiates a series of events leading to the chromosome's permanent silencing. In the August 24, 2009 issue of the *Journal of Cell Biology*, Hall et al. exploit the fact that XIST temporarily dissociates from the X chromosome during mitosis and find that Aurora B kinase helps regulate the RNA's chromatin binding.

Although more than 10 years have passed since XIST was shown to paint the inactivated X (Xi) chromosome, little is known of how the 14-kb, noncoding transcript binds its target. "We know it doesn't just bind the DNA, but no specific binding proteins have been identified," says lead author Lisa Hall. Biochemical approaches to finding protein partners may have been hampered by XIST's large size and tight association with the X chromosome, making it hard to extract the RNA complex and study it *in vitro*. So Hall, together with colleagues in Jeanne Lawrence's laboratory at the University of Massachusetts Medical School, took an *in vivo* approach—mimicking the events that cause XIST to drop off the Xi in early prophase.

Hall and colleagues found that treating cells with an inhibitor of protein phosphatase 1 (PP1) caused XIST to be released from the Xi in interphase cells. PP1 usually keeps the kinase Aurora B in check until the start of mitosis, so the team wondered whether XIST's premature release was driven by increased Aurora B activity. XIST was no longer released in interphase cells if PP1 and Aurora B were both inhibited. Moreover, inhibiting Aurora B with either drugs or a specific siRNA caused XIST to be retained on the Xi even in mitotic cells.

Lawrence says that the team was excited to identify Aurora B as a regulator of XIST. Their previous studies had suggested that a broader chromatin organizer might control XIST binding, particularly during cancer when the regulation of XIST and the Xi often goes awry. Aurora B fits the bill perfectly as it localizes to the chromosome arms at prophase, phosphorylates several chromatin proteins including histone H3, and is frequently activated in cancer cells.

It remains unclear exactly how Aurora B promotes XIST's loss from the Xi. "There are probably multiple places that XIST anchors to chromatin," says Lawrence. "In order to release it, you have to modify

multiple points." Further studies on the mitotic loss of XIST should help identify these different anchor points and determine how they are modified to promote or block RNA binding.

XIST may, in fact, represent a broader class of noncoding RNAs that associate with and regulate heterochromatin. "We hope that manipulating binding *in vivo* provides a new way to study RNA-chromatin interactions that other labs will build on," says Lawrence. "It will be interesting to determine if these other RNAs mirror the behavior of XIST and are controlled by the same mechanism."

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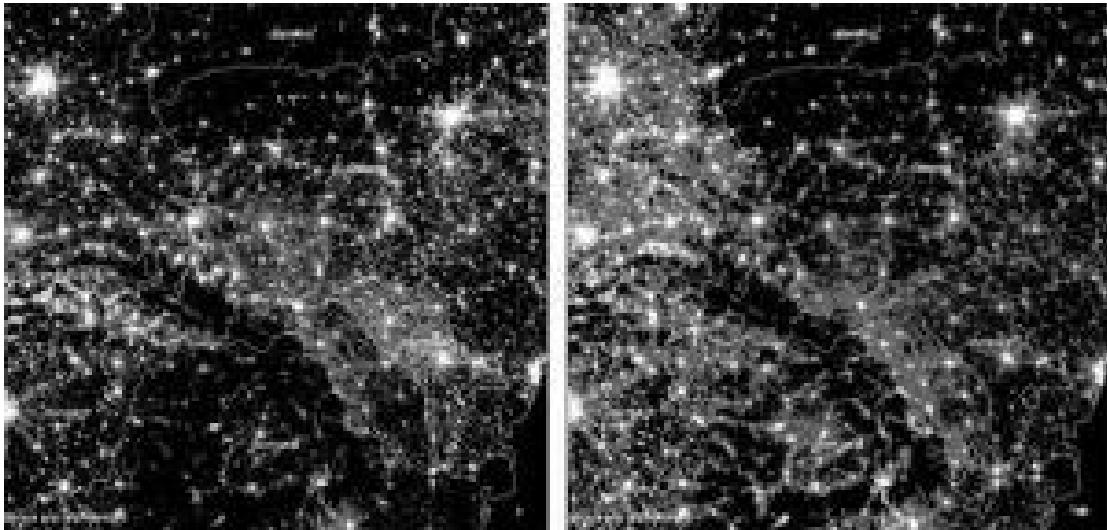
**Journal reference:**

1. Lisa L. Hall, Meg Byron, Gayle Pageau, and Jeanne B. Lawrence. **AURKB-mediated effects on chromatin regulate binding versus release of XIST RNA to the inactive chromosome.** *Journal of Cell Biology*, 2009; DOI: [10.1083/jcb.200811143](https://doi.org/10.1083/jcb.200811143)

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

<http://www.sciencedaily.com/releases/2009/08/090824115754.htm>

## Economists Measure GDP Growth From Outer Space



*Increased nighttime lighting indicates economic growth in Poland and Eastern Europe between 1992 (left, above) and 2002. Poland is in the top left quarter of each image. (Credit: NOAA and USAF Weather Agency)*

ScienceDaily (Sep. 6, 2009) — Outer space offers a new perspective for measuring economic growth, according to new research by three Brown University economists. In a National Bureau of Economic Research working paper, J. Vernon Henderson, Adam Storeygard, and David N. Weil suggest a new framework for estimating a country or region's gross domestic product (GDP) by using satellite images of the area's nighttime lights.

Reliable data on economic growth is hard to come by in many parts of the world — particularly in sub-Saharan Africa and other developing countries — and the data is often not calculated at all for cities. The authors cite the Penn World Tables, one of the standard compilations of data on income, which rank countries with grades A through D by the quality of their GDP and price data. While almost all industrialized countries receive a grade of A, nearly all sub-Saharan African countries get a grade of C or D, which is interpreted as roughly 30 or 40 percent margin of error. Several countries do not appear in the table, including Iraq, Myanmar, Somalia, and Liberia.

To improve these estimates, Henderson, Storeygard, and Weil suggest combining measured income data with the changes observed in a country's "night lights" as seen from outer space. Using U.S. Air Force weather satellite picture composites, they look at changes in a region's light density over a 10-year period. "Consumption of nearly all goods in the evening requires lights," they write. "As income rises, so does light usage per person, in both consumption activities and many investment activities."

When the researchers applied the new methodology to countries with low-quality national income data, the new estimates were significantly different. For example, in the Democratic Republic of Congo, lights suggest a 2.4-percent annual growth rate in GDP, while official estimates suggest a negative 2.6-percent growth over the same time period. The Congo appears to be growing faster than official estimates suggest. At the other end, Myanmar has an official growth rate of 8.6 percent a year, but the lights data imply only a 3.4-percent annual growth rate.

Henderson, Storeygard, and Weil say they don't envision the lights density data as a replacement for official numbers, but when added to existing data from agencies like the World Bank, the lights density can provide a better indicator of how these economies really are performing.



“Our hope is that people start using this, either when they don’t have actual data on economic growth ... or when the numbers are pretty bad,” said Henderson, professor of economics. “This is just a way to get better estimates.”

The second portion of the paper establishes the first known causal relationship between local agriculture productivity and an increase in city incomes. The authors examined 541 cities in 18 African countries over a period of nine years, using rainfall as a way to measure “productivity shocks” to the rural areas. The authors conclude that an increase in agricultural output does in fact have substantial effects on local urban economic activity.

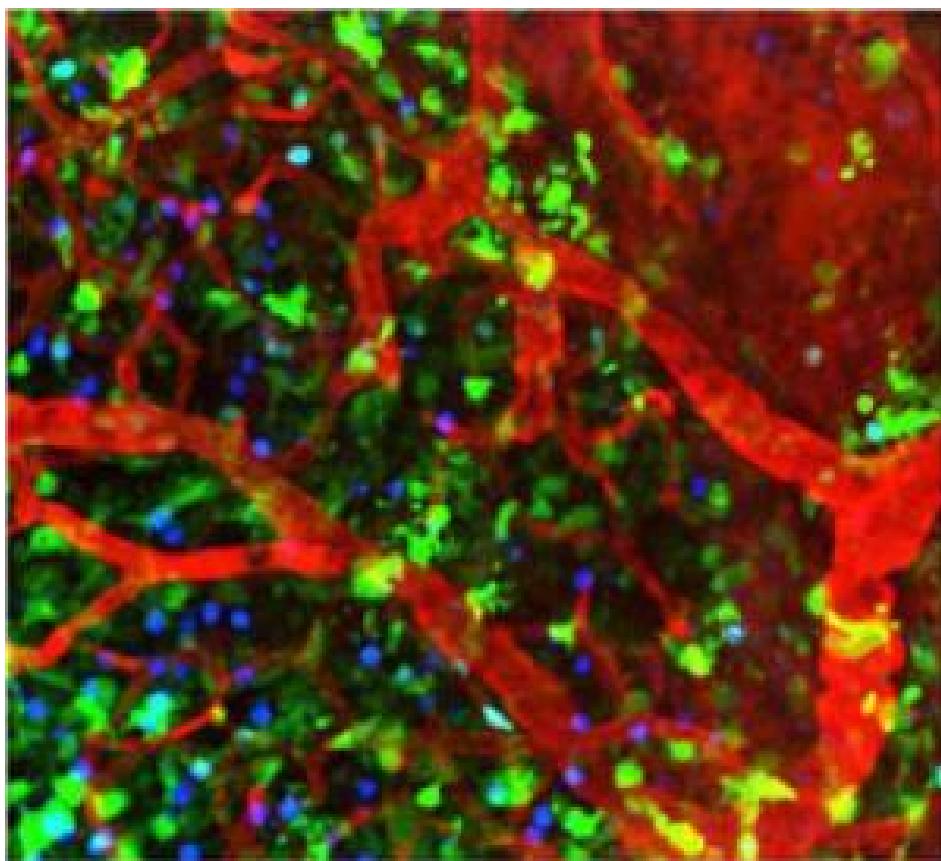
Storeygard, a fourth-year graduate student, added that the research was a true collaboration. Weil has written widely on various aspects of economic growth, while Henderson is interested in how to measure growth at a regional or subnational level. Storeygard has experience using geographic and satellite data. “It’s the kind of paper that used all three of our areas,” said Storeygard. “I don’t think any two of us would have been able to do this in quite the same way.”

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*Adapted from materials provided by Brown University.*

<http://www.sciencedaily.com/releases/2009/09/090904165302.htm>

## Large-scale Study Probes How Cells Fight Pathogens



Dendritic cells (in green) and other immune cells (in blue) congregate around a blood vessel (in red).  
(Credit: Image courtesy of Dr. Shakhar Guy)

ScienceDaily (Sep. 6, 2009) — Scientists have deciphered a key molecular circuit that enables the body to distinguish viruses from bacteria and other microbes, providing a deep view of how immune cells in mammals fend off different pathogens.

The new research, which appears in the September 3 advance online edition of the journal *Science*, signifies one of the first large-scale reconstructions of a mammalian circuit and offers a practical approach for unraveling the circuits that underpin other important biological systems.

"Our findings address a fundamental question in human biology: how do immune cells recognize various pathogens and use that information to mount distinct responses," said senior author Nir Hacohen, of the Massachusetts General Hospital (MGH) Center for Immunology and Inflammatory Diseases, an assistant professor at Harvard Medical School and a senior associate member at the Broad Institute. "We now have a detailed view of the circuitry that controls this critical process, providing a deeper understanding of immune biology that could inspire novel ways to treat disease and design better vaccines."

"One of the remarkable things about this study is the approach," said senior author Aviv Regev, a core member of the Broad Institute, an assistant professor at MIT and an early career scientist at the Howard Hughes Medical Institute. "Our methods are not only general and applicable to almost any biological system, they are also practical for most laboratory settings. This is an important step that has broad implications for the scientific community."

Cells receive and process information much like computers. Information flows in, is read and processed through a complex set of circuits, and an appropriate response is delivered. But instead of tiny transistors, the internal circuitry of mammalian cells is made up of vast networks of genes and their corresponding proteins. A frontier of modern genomic research is to identify these molecular parts and their interconnections, which reflect the normal — and sometimes faulty — "wiring" that underlies human biology and disease. Until recently, research in this area focused on yeast and bacteria because it was nearly impossible to undertake in mammals.

With a deep-seated interest in specialized immune cells known as dendritic cells, a research team led by scientists at the Broad Institute of MIT and Harvard and Massachusetts General Hospital set out to reveal the full scope of their internal circuitry. Dendritic cells are among the first to detect pathogens and can differentiate one type of pathogen from another, allowing them to orchestrate a pathogen-specific immune response. These cells accomplish such tasks through two crucial functions: first, they present small pieces of an infecting pathogen to other immune cells so those cells can learn to recognize it; and second, they instruct other cells to respond in ways that will eliminate the culprit pathogen.

To begin, lead author Ido Amit, a postdoctoral fellow at the Broad Institute and Massachusetts General Hospital, worked with his colleagues to assemble a detailed picture of the circuit's output. The researchers did this by measuring the activities of thousands of genes after mixing parts of different pathogens, including RNA from viruses and pieces of the bacteria *Escherichia coli*, with primary mouse dendritic cells. ("Primary" cells are taken directly from the body, rather than propagated for long periods in the laboratory.)

Next, they scoured these data to identify genes whose activities change with varying conditions. These genes form the circuit's potential regulatory framework, responsible for controlling the flow of information.

To figure out how these potential regulators work and how they are wired together, the researchers systematically eliminated each of them, and recorded the changes in the circuit's output. This was made possible by the use of RNA interference (RNAi), which can reduce or "knock down" the activity of specific genes and can be applied to practically every gene in the mouse genome.

"Our use of RNAi was essential," said Hacohen. "We couldn't have done this work without the efforts of our collaborators in the Broad's RNAi Platform and the tools developed by The RNAi Consortium." The researchers also used a single-molecule technology that enabled them to generate sensitive readouts of gene activity.

Regev, Hacohen, Amit and their colleagues revealed a dendritic cell circuit with two major arms: an inflammatory arm, which is highly active during bacterial infections and can initiate a system-wide immune response; and an anti-viral arm, which is induced upon viral infections and coordinates a more focused response tailored to viruses. Together, these arms encompass about 100 regulators — roughly four times as many as were previously known to be involved — and include several proteins that were not suspected to direct immune responses. "These unexpected findings really underscore the power of an unbiased approach," said Regev.

Another remarkable finding is the way these regulators operate. The researchers identified a surprising number of connections between regulators and other circuit components, more than 2,300 connections in total. In addition, some regulators seem to control a relatively broad swath of the circuit, including 25 genes or more, while others influence just a handful of genes. "A good analogy is the tuning dials on an old radio," said Amit. "The big knobs provide coarse adjustments, while the little ones tend to be fine tuners."

One intriguing "coarse tuner" is a protein called Timeless. In fruit flies, it controls circadian rhythms, the internal clock that keeps biological processes operating on a 24-hour cycle. In mammalian dendritic cells,

however, Amit and his colleagues discovered that Timeless is a chief regulator of anti-viral responses, controlling over 200 genes required to fight viruses.

Another interesting regulator is CBX4, a "fine tuner" that controls the levels of a key protein involved in viral infections. This protein, called IFNB1 (for Interferon beta 1) requires precise control: if a virus is present, it must be highly active, yet if bacteria are the offending agents, its activity should be minimized.

Although the researchers' findings are largely mechanistic in nature and do not yet have any direct bearing on human disease, there are some important medical implications. For instance, a complete understanding of the regulatory network that controls immune responses can help lay the groundwork for more precise interventions, including drugs and vaccines. Moreover, 12 of the regulators identified in the Science study reside in regions of the genome that have been linked to autoimmune and other related diseases in humans, and could enhance researchers' understanding of the genetic susceptibilities to infections and other immune disorders

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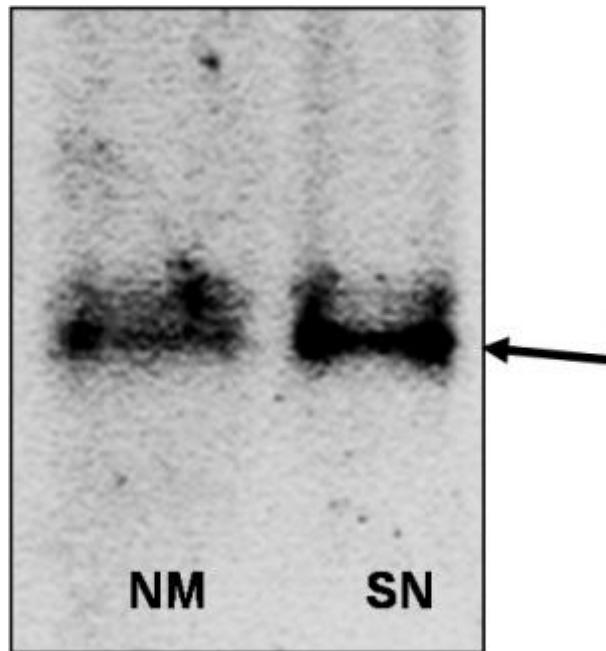
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*Adapted from materials provided by [Broad Institute of MIT and Harvard](#).*

<http://www.sciencedaily.com/releases/2009/09/090903163717.htm>



## Parkinson's Disease: Iron Accumulation To The Point Of Demise



*Proof of L-ferritin (marked with arrow) using immune transmission electron microscopy. (Credit: Image courtesy of Ruhr-Universitaet-Bochum)*

ScienceDaily (Sep. 6, 2009) — Neurons that produce the neurotransmitter dopamine are the cerebral cells that most commonly die-off in Parkinson's disease. The cells in the so-called substantia nigra, which contain the dark pigment neuromelanin, are affected. It is also known that the iron content of these cells increases during the course of Parkinson's disease.

A team of researchers from the University of Bochum working under the auspices of Prof. Katrin Marcus and in close collaboration with colleagues in Munich and Würzburg studied this process in greater depth. They have managed to make a first-time decisive observation, namely to provide evidence of ferritin in the neuromelanin granules in the affected brain cells. Ferritin is an iron depot protein that had only been proven in the supporting cells of the brain to date, but not in neurons. The scientists have published their results in *Molecular & Cellular Proteomics*.

### Dark cerebral matter fades in Parkinson's disease

Investigation of the human brain discloses a distinct dark discoloration of the substantia nigra and locus caeruleus within parts of the brainstem. This is due to the bluish to brown-black pigment neuromelanin, which is only present in the human brain and that of a few other mammals (primates, cows, horses, some breeds of sheep). Research into neuromelanin is particularly interesting because the substantia nigra of patients with PD fades in colour during the course of the disease. The pigment is most common in dopaminergic neurons, which mostly die-off in PD patients. Dopamine is an important neurotransmitter. Motor control is impaired if dopaminergic cells decay. This in turn results in the symptoms typical of Parkinson's disease such as resting tremor, increasing postural instability and poor coordination of general movements.

### Protective effect due to the “interception” of iron

After the researchers from Bochum and Würzburg had been able to clarify the composition and production of the neuromelanin granules four years ago, they began investigating the inner life of neuromelanin granules in greater detail. The significance of the currently obtained data is that the

selective necrosis of the dopaminergic neurons in the substantia nigra is accompanied by an accumulation of ferrous ions ( $\text{Fe}^{3+}$ ).

The homeostasis of the iron content is evidently damaged and this intensifies as the disease progresses. Elevated quantities of free  $\text{Fe}^{3+}$  result - *inter alia* - in an increased formation of cell-damaging free radicals which ultimately leads to necrosis of the cells. Neuromelanin is capable of bonding ferrous ions (and other heavy metals). For many decades, it had been uncertain whether the cells are protected by the pigment "intercepting" ferrous ions, or whether the accumulation of the iron was actually responsible for damaging the cells. Data gained during the past few years indicates that neuromelanin primarily plays a protective role for the neurons.

### **Additional iron accumulation mechanism**

During the current study, the scientists thus investigated whether there could be a further mechanism for the accumulation of iron in the substantia nigra over and above the direct binding of the  $\text{Fe}^{3+}$  to neuromelanin. For the first time, they were now able to supply evidence of ferritin in the neuromelanin granules using a combination of diverse techniques (one-dimensional SDS gel electrophoresis, targeted mass spectrometry, western blot analysis, as well as immune transmission electron microscopy). To date, this important iron depot protein had only been proven in glia but not in neurons.

### **New hypothesis on the development of Parkinson's disease**

Prof. Katrin Marcus concludes that - in the opinion of her research team - ferritin in the neuromelanin granules is a further significant element in the homeostasis of the iron content in the substantia nigra. This first direct proof of ferritin in neuromelanin granules in dopaminergic neurons is an important step towards an improvement in the comprehension of the iron metabolism in the human substantia nigra. It moreover supplies arguments for new hypotheses concerning the mechanisms of the iron-regulated degeneration of the substantia nigra in Parkinson's disease.

The scientists are currently investigating further unclarified issues, such as how the composition of the neuromelanin granules changes with increasing age and during the course of the disease. Moreover, they are trying to elucidate the exact function of the neuromelanin in the cell, and why only the neuromelanin-containing cells in the substantia nigra die-off.

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*Adapted from materials provided by Ruhr-Universitaet-Bochum, via AlphaGalileo.*

<http://www.sciencedaily.com/releases/2009/08/090819125038.htm>

## Do High-fat Diets Make Us Stupid And Lazy? Physical And Memory Abilities Of Rats Affected After 9 Days



*A new study shows that rats, when switched to a high-fat diet from their standard low-fat feed, show a surprisingly quick reduction in their physical performance. (Credit: iStockphoto/Leigh Schindler)*

ScienceDaily (Sep. 5, 2009) — Rats fed a high-fat diet show a stark reduction in their physical endurance and a decline in their cognitive ability after just nine days, a study by Oxford University researchers has shown.

The research, funded by the British Heart Foundation and published in the *FASEB Journal*, may have implications not only for those eating lots of high-fat foods, but also athletes looking for the optimal diet for training and patients with metabolic disorders.

"We found that rats, when switched to a high-fat diet from their standard low-fat feed, showed a surprisingly quick reduction in their physical performance," says Dr Andrew Murray, who led the work at Oxford University and has now moved to the University of Cambridge. "After just nine days, they were only able to run 50 per cent as far on a treadmill as those that remained on the low-fat feed."

High-fat diets, such as those that are prevalent in Western countries, are known to be harmful in the long term and can lead to problems such as obesity, diabetes and heart failure. They are also known to be associated with a decline in cognitive ability over long time spans. But little attention has been paid to the effect of high-fat diets in the short term. Physical endurance – how long we can keep exercising – depends on how much oxygen can be supplied to our muscles and how efficiently our muscles release energy by burning up the fuel we get from the food we eat. In particular, using fat as a fuel is less efficient than using glucose from carbohydrates, but the metabolic changes induced by different diets are complex and it has been controversial whether high-fat feeding for a short time would increase or decrease physical performance.

The Oxford team set out to investigate whether rats fed a high-fat diet for just a few days showed any change in their physical and cognitive abilities.

All 42 rats were initially fed a standard feed with a low fat content of 7.5 per cent. Their physical endurance was measured by how long they could run on a treadmill and their short-term or 'working' memory was measured in a maze task. Half of the rats were then switched to a high-fat diet where 55 per cent of the calories came from fat. After four days of getting used to the new diet, the endurance and cognitive performance of the rats on the low- and high-fat diets was compared for another five days.

"With the standard feed, 7.5 per cent of the calories come from fat. That's a pretty low-fat diet, much like humans eating nothing but muesli," says Dr Murray. "The high-fat diet, in which 55 per cent of the calories came from fat, sounds high but it's actually not extraordinarily high by human standards. A junk food diet would come close to that."

"Some high-fat, low-carb diets for weight loss can even have fat contents as high as 60 per cent. However, it's not clear how many direct conclusions can be drawn from our work for these diets, as the high-fat diet we used was not particularly low in carbs," he adds.

On the fifth day of the high-fat diet (the first day back on the treadmill), the rats were already running 30 per cent less far than those remaining on the low-fat diet. By the ninth day, the last of the experiment, they were running 50 per cent less far.

The rats on the high-fat diet were also making mistakes sooner in the maze task, suggesting that their cognitive abilities were also being affected by their diet. The number of correct decisions before making a mistake dropped from over six to an average of 5 to 5.5.

The researchers also investigated what metabolic changes the high-fat diet was inducing in the rats. They found increased levels of a specific protein called the 'uncoupling protein' in the muscle and heart cells of rats on the high-fat diet. This protein 'uncouples' the process of burning food stuffs for energy in the cells, reducing the efficiency of the heart and muscles. This could at least partly explain the reduction in treadmill running seen in the rats.

The rats that were fed a high fat diet and had to run on the treadmill also had a significantly bigger heart after nine days, suggesting the heart had to increase in size to pump more blood around the body and get more oxygen to the muscles. While this research has been done in rats, the Oxford team and Andrew Murray's new group in Cambridge are now carrying out similar studies in humans, looking at the effect of a short term high-fat diet on exercise and cognitive ability.

The results will be important not only in informing athletes of the best diets to help their training routine, but also in developing ideal diets for patients with metabolic disorders such as diabetes, insulin resistance or obesity. People with such conditions can have high levels of fat in the blood and show poor exercise tolerance, some cognitive decline, and can even develop dementia over time.

"These are startling results," says Professor Kieran Clarke, head of the research team at Oxford University. "It shows that high-fat feeding even over short periods of time can markedly affect gene expression, metabolism and physical performance. By optimising diets appropriately we should be able to increase athletes' endurance and help patients with metabolic abnormalities improve their ability to exercise and do more."

"In little more than a week, a change in diet appears to have made the rats' hearts much less efficient," says Professor Jeremy Pearson, Associate Medical Director of the British Heart Foundation, who funded the research. "We look forward to the results of the equivalent studies in human volunteers, which should tell us more about the short-term effects of high-fat foods on our hearts. We already know that to protect our heart health in the long-term, we should cut down on foods high in saturated fat."

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*Adapted from materials provided by [University of Cambridge](#).*

<http://www.sciencedaily.com/releases/2009/08/090811143548.htm>

## Designing Cars For Expectant Mothers

ScienceDaily (Sep. 5, 2009) — UK researchers have developed a new computer model - Expecting - that can be used as a design tool for automotive designers to help ensure that vehicle designs can accommodate the safety needs of pregnant occupants.

Serpil Acar of the Department of Computer Science, at Loughborough University, Alix Weekes (now at Thatcham MIRRC), and David van Lopik (now at Atkins Aviation and Defence Systems), have worked within a comprehensive research program at Loughborough University to improve pregnant occupant safety. The overall aim is to produce a pregnant occupant model capable of simulating the dynamic response to impact and predict the risk of injury in automobile crashes.

There are almost three quarters of a million pregnancies in the UK each year and it is fairly certain that a large number of those expectant mothers will at some point during their pregnancy drive, or be a passenger in a vehicle. Thousands are involved in accidents each year and while a relatively small proportion will die, many more will suffer injuries.

The researchers explain that the safety of pregnant women is often compromised because of the changes in their body size and shape that occur during pregnancy. These changes are not limited to the abdominal region, but affect the chest and thigh areas, all of which can affect sitting and driving posture and seat belt use.

Inappropriate seat belt is a significant problem for pregnant women. It is often difficult and sometimes impossible for a pregnant user to get her seat belt into a comfortable position. As such many women take unsafe actions, either hold the belt away from their bodies while the vehicle is moving or do not use a seat belt at all.

Another problem is pressure on the abdomen from the steering wheel in the event of a crash. Researchers have found that more than one in ten pregnant women find the gap between their abdomen and the steering wheel is less than 2.5 cm and for some there is no gap at all. This proximity to the steering wheel may put the placenta at increased risk of abruption from direct impact with the steering wheel.

Acar and Weekes have taken 48 different measurements from 100 pregnant women in different postures and at different terms in their pregnancy to help Acar and van Lopik to create their computer model. The measurements show that even the designers that take into account the measurements of larger men, may still exclude majority of women at the late stages of pregnancy.

'Expecting', has been further developed to be the world's first computational model of a 38-week pregnant car occupant, complete with a detailed representation of a foetus within uterus and it is now used in further research, together with MADYMO, in the simulation of crash scenarios.

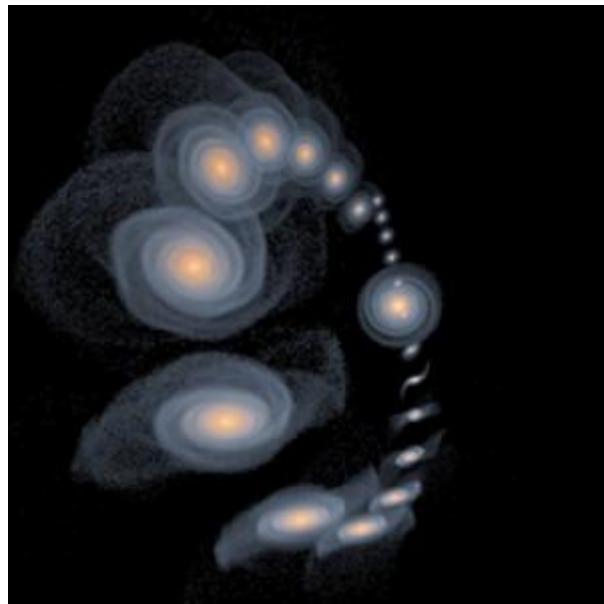
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*Adapted from materials provided by [Inderscience](#), via [AlphaGalileo](#).*

<http://www.sciencedaily.com/releases/2009/09/090903165013.htm>

## Next-door Cosmic Encounter: Neighboring Galaxies Collided 2-3 Billion Years Ago



*The possible orbit of the Triangulum galaxy around Andromeda. (Credit: Image courtesy of Queen's University)*

ScienceDaily (Sep. 5, 2009) — An international team of astronomers, including Queen's University physicist Larry Widrow, have uncovered evidence of a nearby cosmic encounter. Their study indicates that the Andromeda and Triangulum galaxies, the two galaxies closest to our own, collided about two to three billion years ago.

"The encounter forever changed the structure of the galaxies," says Dr. Widrow, a professor of Physics, Engineering Physics and Astronomy at Queen's. "The collision between the galaxies appears to have caused millions of stars to be ripped from the Triangulum disk to form a faint stream visible in the PAndAS data."

Dr. Widrow, along with John Dubinsky of the University of Toronto, recreated this galactic encounter using a high performance computer and theoretical modeling. Their simulations illustrate how the strong gravitational field of Andromeda could have pulled stars away from the Triangulum disk creating a stream just as the team saw.

The Pan-Andromeda Archeological Survey (PAndAS), led by Alan McConnachie of the Herzberg Institute of Astrophysics in Victoria BC, is using the Canada-France-Hawaii telescope to map the Andromeda and Triangulum galaxies. This map, the largest of its kind, will allow astronomers to test the hypothesis that galaxies grow by "cannibalizing" other galaxies.

The findings from the first year of the survey are published this week in the journal *Nature*.

Galaxies are large collections of stars, often distributed in a disk-like pattern with spiral arms. Nearly 40 years ago, astronomers learned that galaxies are embedded in extended halos of dark matter.

"Our observations now show that stars also inhabit these outer halos," says Dr. Widrow. "We believe that these stars are relics of small galaxies that were destroyed by the powerful tidal fields of a larger galaxy. Our observations also suggest that the Triangulum Galaxy is being ripped apart by Andromeda."

Andromeda, and our own galaxy the Milky Way, are the two largest members of a small cluster of galaxies known as the Local Group. Triangulum, the third largest member of the Local Group, is about one-tenth the size of Andromeda.

"Within a few billion years Triangulum will be completely destroyed by Andromeda and its stars will be dispersed throughout the Andromeda halo," says Dr. Widrow. "And a few billion years after that, Andromeda and the Milky Way will collide and merge together to form a giant elliptical galaxy."

Dr. Widrow is funded by a Discovery Grant with the Natural Sciences and Engineering Research Council of Canada (NSERC).

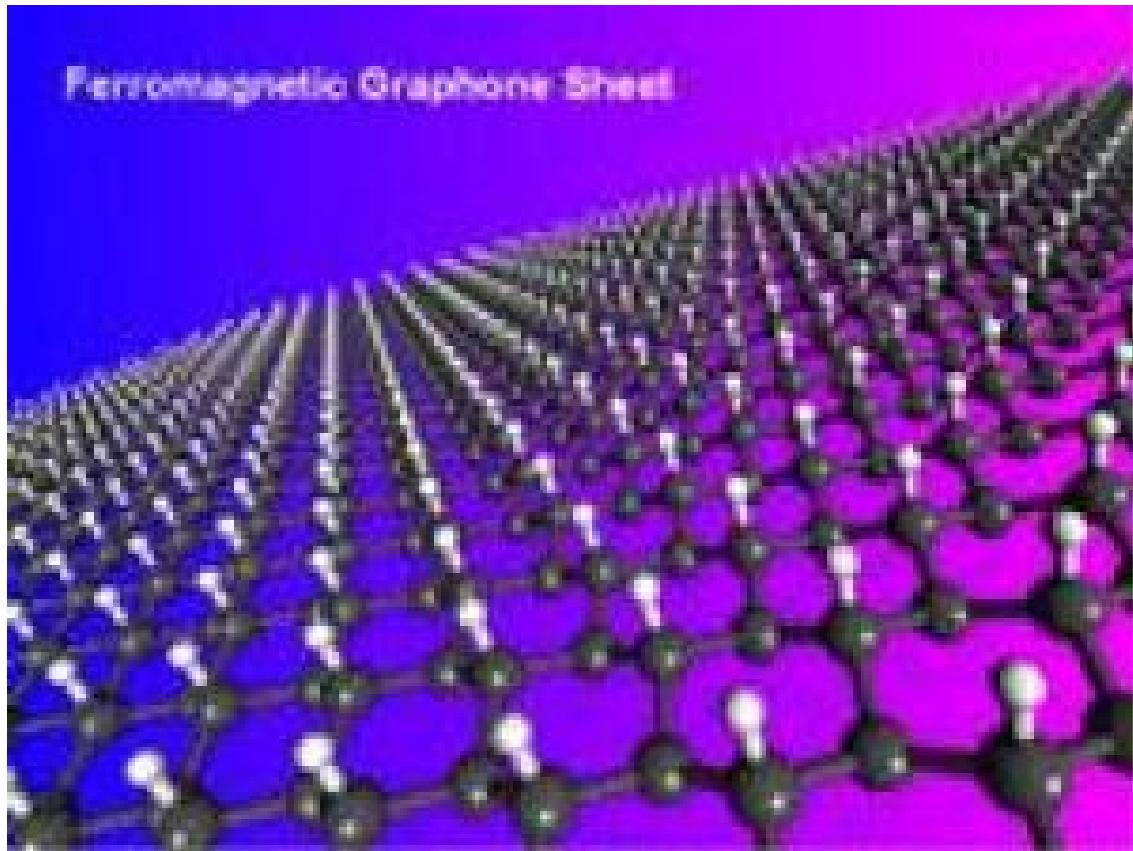
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Adapted from materials provided by *Queen's University*.

<http://www.sciencedaily.com/releases/2009/09/090904165246.htm>

## New Graphene-based, Nano-material Has Magnetic Properties



Ferromagnetic graphene sheet. (Credit: Puru Jena/VCU)

ScienceDaily (Sep. 5, 2009) — An international team of researchers has designed a new graphite-based, magnetic nano-material that acts as a semiconductor and could help material scientists create the next generation of electronic devices like microchips.

The team of researchers from Virginia Commonwealth University; Peking University in Beijing, China; the Chinese Academy of Science in Shanghai, China; and Tohoku University in Sedai, Japan; used theoretical computer modeling to design the new material they called graphone, which is derived from an existing material known as graphene.

Graphene, created by scientists five years ago, is 200 times stronger than steel, its electrons are highly mobile and it has unique optical and transport properties. Some experts believe that graphene may be more versatile than carbon nanotubes, and the ability to make graphene magnetic adds to its potential for novel applications in spintronics. Spintronics is a process using electron spin to synthesize new devices for memory and data processing.

Although graphene's properties can be significantly modified by introducing defects and by saturating with hydrogen, it has been very difficult for scientists to manipulate the structure to make it magnetic.

"The new material we are predicting – graphone – makes graphene magnetic simply by controlling the amount of hydrogen coverage – basically, how much hydrogen is put on graphene. It avoids previous difficulties associated with the synthesis of magnetic graphene," said Puru Jena, Ph.D., distinguished professor in the VCU Department of Physics.

"There are many possibilities for engineering new functional materials simply by changing their composition and structure. Our findings may guide researchers in the future to discover this material in the laboratory and to explore its potential technological applications," said Jena.

"One of the important impacts of this research is that semi-hydrogenation provides us a very unique way to tailor magnetism. The resulting ferromagnetic graphene sheet will have unprecedented possibilities for the applications of graphene-based materials," said Qiang Sun, Ph.D., research associate professor with the VCU team.

The study appeared online Aug. 31 in the journal *Nano Letters*, a publication of the American Chemical Society. The work was supported by a grant from the National Natural Science Foundation of China, The National Science Foundation and by the U.S. Department of Energy. Read the article abstract [here](#).

The first author of this paper is Jian Zhou, a Ph.D. student at Peking University. The other authors include Qian Wang, Ph.D., a research associate professor at VCU; Xiaoshuan Chen, Ph.D., a professor at the Shanghai Institute of Technical Physics; and Yoshiyuki Kawazoe, Ph.D., a professor at Tohoku University.

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*Adapted from materials provided by [Virginia Commonwealth University](#).*

<http://www.sciencedaily.com/releases/2009/09/090902122841.htm>

## Early Warning Signals Of Change: 'Tipping Points' Identified Where Sudden Shifts To New Conditions Occur



*Early warning indicators have been found in Wisconsin's side-by-side Peter and Paul Lakes. (Credit: Steve Carpenter, University of Wisconsin)*

ScienceDaily (Sep. 5, 2009) — What do abrupt changes in ocean circulation and Earth's climate, shifts in wildlife populations and ecosystems, the global finance market and its system-wide crashes, and asthma attacks and epileptic seizures have in common?

According to a paper published this week in the journal *Nature*, all share generic early-warning signals that indicate a critical threshold of change dead ahead.

In the paper, Martin Scheffer of Wageningen University in The Netherlands and co-authors, including William Brock and Stephen Carpenter of the University of Wisconsin at Madison and George Sugihara of the Scripps Institution of Oceanography in La Jolla, Calif., found that similar symptoms occur in many systems as they approach a critical state of transition.

"It's increasingly clear that many complex systems have critical thresholds -- 'tipping points' -- at which these systems shift abruptly from one state to another," write the scientists in their paper.

Especially relevant, they discovered, is that "catastrophic bifurcations," a diverging of the ways, propel a system toward a new state once a certain threshold is exceeded.

Like Robert Frost's well-known poem about two paths diverging in a wood, a system follows a trail for so long, then often comes to a switchpoint at which it will strike out in a completely new direction.

That system may be as tiny as the alveoli in human lungs or as large as global climate.

"These are compelling insights into the transitions in human and natural systems," says Henry Gholz, program director in the National Science Foundation (NSF)'s Division of Environmental Biology, which supported the research along with NSF's Division of Ocean Sciences.

"The information comes at a critical time -- a time when Earth's and, our fragility, have been highlighted by global financial collapses, debates over health care reform, and concern about rapid change in climate and ecological systems."

It all comes down to what scientists call "squealing," or "variance amplification near critical points," when a system moves back and forth between two states.

"A system may shift permanently to an altered state if an underlying slow change in conditions persists, moving it to a new situation," says Carpenter.

Eutrophication in lakes, shifts in climate, and epileptic seizures all are preceded by squealing.

Squealing, for example, announced the impending abrupt end of Earth's Younger Dryas cold period some 12,000 years ago, the scientists believe. The later part of this episode alternated between a cold mode and a warm mode. The Younger Dryas eventually ended in a sharp shift to the relatively warm and stable conditions of the Holocene epoch.

The increasing climate variability of recent times, state the paper's authors, may be interpreted as a signal that the near-term future could bring a transition from glacial and interglacial oscillations to a new state -- one with permanent Northern Hemisphere glaciation in Earth's mid-latitudes.

In ecology, stable states separated by critical thresholds of change occur in ecosystems from rangelands to oceans, says Carpenter.

The way in which plants stop growing during a drought is an example. At a certain point, fields become deserts, and no amount of rain will bring vegetation back to life. Before this transition, plant life peters out, disappearing in patches until nothing but dry-as-bones land is left.

Early-warning signals are also found in exploited fish stocks. Harvesting leads to increased fluctuations in fish populations. Fish are eventually driven toward a transition to a cyclic or chaotic state.

Humans aren't exempt from abrupt transitions. Epileptic seizures and asthma attacks are cases in point. Our lungs can show a pattern of bronchoconstriction that may be the prelude to dangerous respiratory failure, and which resembles the pattern of collapsing land vegetation during a drought.

Epileptic seizures happen when neighboring neural cells all start firing in synchrony. Minutes before a seizure, a certain variance occurs in the electrical signals recorded in an EEG.

Shifts in financial markets also have early warnings. Stock market events are heralded by increased trading volatility. Correlation among returns to stocks in a falling market and patterns in options prices may serve as early-warning indicators.

"In systems in which we can observe transitions repeatedly," write the scientists, "such as lakes, ranges or fields, and such as human physiology, we may discover where the thresholds are."

"If we have reason to suspect the possibility of a critical transition, early-warning signals may be a significant step forward in judging whether the probability of an event is increasing."

Other co-authors of the paper are Jordi Bascompte and Egbert van Nes of the Consejo Superior de Investigaciones Científicas, Sevilla, Spain; Victor Brovkin of the Max Planck Institute for Meteorology in Hamburg, Germany; Vasilis Dakos of the Potsdam Institute for Climate Research in Potsdam, Germany; and Max Rietkerk of Utrecht University in The Netherlands.

The research also was funded by the Institute Para Limes and the South American Institute for Resilience and Sustainability Studies, as well as the Netherlands Organization of Scientific Research and the European Science Foundation, among others.

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*Adapted from materials provided by [National Science Foundation](#).*

<http://www.sciencedaily.com/releases/2009/09/090902133625.htm>

## New Treatment In Sight For Ovarian Cancer

ScienceDaily (Sep. 5, 2009) — In the future, women with metastatic ovarian cancer could be treated with a radioactive substance that can seek and destroy tumour cells. An initial study in patients conducted jointly by the Sahlgrenska Academy at the University of Gothenburg and Sahlgrenska University Hospital has found that the treatment has no unwanted side-effects.

"Our research team has long hoped to be able to target radiotherapy in this way," says oncologist Håkan Andersson from Sahlgrenska University Hospital, who is leading the research alongside professor Ragnar Hultborn from the Sahlgrenska Academy and radiation physicist Lars Jacobsson.

"There is a good chance of this treatment working, as the study indicates that a sufficient amount of the active substance reaches the tumour cells in the abdominal cavity without any measurable side-effects."

The aim of this initial patient study, just published in the *Journal of Nuclear Medicine*, was to study the substance's distribution in the body and any side-effects in nine women with ovarian cancer.

The new treatment has been developed jointly over a number of years by researchers at the Sahlgrenska Academy and Sahlgrenska University Hospital. The treatment entails injecting the patient with a radioactive isotope bound to carrier molecules. This complex has the ability to bind to structures on the surface of tumour cells where the isotope emits alpha particles with such a short range that only the very nearest tumour cells' DNA is destroyed. The injection is administered straight into the abdominal cavity.

"We have previously seen that mice with ovarian cancer given this treatment are generally cured without serious side-effects, so we hope that this will become an established and effective treatment for women with metastatic ovarian cancer," says Ragnar Hultborn, professor of oncology at the University of Gothenburg's Sahlgrenska Academy. "But it will still be several years of development."

The research is being funded partly by the Swedish Research Council and the Swedish Cancer Society.

"In our next study, 80 women with ovarian cancer will receive this treatment as a supplement to their ordinary treatment so that we can scientifically test whether the effect is as good in real patients as the animal studies indicate," Håkan Andersson says.

### **Journal reference:**

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

<http://www.sciencedaily.com/releases/2009/08/090831130653.htm>

## Researcher Uses 100,000 Degree Heat To Study Plasma, What Happens To Matter Around Black Holes



*Roberto Mancini, professor and chair of the University of Nevada, Reno Physics Department stands next to the experiment chamber of the University's Nevada Terawatt Facility 2-terawatt Zebra accelerator, one of the two most powerful University based pulse-power generators nationwide, where researchers come to conduct high energy density plasma experiments. (Credit: Photo by Mike Wolterbeek. University of Nevada, Reno)*

ScienceDaily (Sep. 5, 2009) — Using one of the greatest artificial sources of radiation energy, University of Nevada, Reno researcher and faculty member Roberto Mancini is studying ultra-high temperature and non-equilibrium plasmas to mimic what happens to matter in accretion disks around black holes.

Physics department professor and chair Mancini has received a \$690,000 grant from the U.S. Department of Energy to continue his research in high energy density plasma; plasmas are considered to be the fourth state of matter. He will serve as principal investigator for a project titled "Experiments and Modeling of Photo-ionized Plasmas at Z."

"Receiving awards such as this exemplifies the academic caliber and national importance of the work in our Physics Department," Jeff Thompson, dean of the College of Science said. "We're proud of the team of researchers here working on cutting-edge science."

Mancini has been studying the atomic and radiation properties of high-energy density plasmas for more than 15 years, and this new grant will allow him to further explore what happens to matter when it is subjected to extreme conditions of temperature and radiation – similar to what happens to many astrophysical objects in the universe.

The research will enable astrophysicists to better understand what happens around black holes and in active galactic nuclei. Scientists will also better understand the application of high-energy density plasmas to energy production, such as controlled nuclear fusion (produced in the laboratory), and production of X-ray sources for a variety of applications.

"Using theories and tools created here at the University to design and analyze experiments, we then go to the only national facility that has the capacity to deliver the high-intensity flux of X-rays required to perform and measure these experiments," Mancini said. "We custom build instrumentation in our machine shop that meets the high standard set by the national facility so that it will fit onto the target chamber of the pulsed-power Z-machine, enabling us to conduct this unique experiment."

The pulsed-power machine at the Sandia National Laboratories in New Mexico (similar in concept but larger than the University's Nevada Terawatt Facility Zebra accelerator) is the most powerful source of X-rays on earth, Mancini said.

"We subject a very small cell – a 1-inch by ½-inch cube – filled with a gas, such as neon, to this tremendous, short burst of X-ray energy," he said. "It's about 10 nanoseconds of the most intense power on earth – creating conditions of hundreds of thousands of degrees and millions of atmospheres in pressure – in the form of X-rays."

The researchers can then compare their extensive computer modeling and calculations with the measurements so they can study and explain the extreme state of matter (plasma) created during those 10 nanoseconds, which mimics the majority of matter found throughout the universe.

"We are using a unique imaging X-ray spectrometer to measure the intensity distribution of radiation as a function of wavelength, which tells us what happens with the plasma," Mancini said. From detailed analysis of the data, Mancini can extract the plasma's density, ionization and temperature.

He said the plasma reaches extreme conditions, very unlike the low-energy plasma found in a neon light or a plasma television screen, with light 1,000 times more energetic than visible light, temperature as high as 100,000 degrees Fahrenheit, and ionization mainly driven by the action of the X-ray flux going through the plasma.

The University of Nevada, Reno Physics Department has a team of about 20 scientists, faculty and research associates working on a variety of projects in the field of High Energy Density Plasma Physics Research. Mancini emphasized that having strong research programs is critical for the quality of education and training that the University can provide to students.

The U.S. Department of Energy awarded grants to 28 researchers from 18 states as part of a new program in High Energy Density Laboratory Plasmas (HEDLP), a joint program with grants funded by the National Nuclear Security Administration and the Department of Energy Office of Science.

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*Adapted from materials provided by [University of Nevada, Reno](#). Original article written by Mike Wolterbeek.*

<http://www.sciencedaily.com/releases/2009/09/090902161120.htm>

## People With Type 2 Diabetes Not Meeting Important Nutritional Recommendations

ScienceDaily (Sep. 5, 2009) — People with type 2 diabetes are not consuming sufficiently healthy diets and could benefit from ongoing nutritional education and counseling, according to a new study by researchers at Wake Forest University School of Medicine and colleagues.

The study appears in the August issue of the *Journal of the American Dietetic Association*.

"The most important thing about controlling diabetes, especially type 2 diabetes, is being able to manage energy in and energy out, and the best way to do that is through the diet," said Mara Z. Vitolins, Dr.P.H., M.P.H., R.D., lead author on the study and an associate professor in the department of epidemiology and prevention, part of the School of Medicine's Division of Public Health Sciences.

The study was done to see what people with type 2 diabetes were eating to make them overweight, Vitolins said. The results were surprising, she added, because researchers found that a majority of the group was not meeting food intake recommendations outlined in national dietary guidelines.

"I thought we were going to find people who, because they have a chronic disease, were more educated about and more motivated than the average American to eat healthy, but that's not the case," she said.

For the study, researchers used a detailed survey to assess the regular food consumption of 2,757 people with type 2 diabetes as they entered into a national study evaluating the effects of a lifestyle intervention, involving weight loss and physical activity, on cardiovascular disease. The goal was to find out what the participants were eating on a regular basis that led them to being overweight before any intervention.

The study showed that 93 percent of participants exceeded the recommended percentage of daily calories from fat, 85 percent exceeded the saturated fat recommendation and 92 percent consumed too much sodium in their regular diets. Additionally, less than half of the participants met the minimum recommended daily servings of fruits, vegetables, dairy products and grains based on the year 2000 version of the Food Guide Pyramid recommendations. Intake of diets rich in fruits and vegetables have been shown to prevent heart disease, the leading cause of death in people with type 2 diabetes.

"The way that the 2000 food guide pyramid was set up is really clever," Vitolins said. "It was meant to be a visual reminder that if you take out one of the blocks, or food groups – if you're missing any of the bricks – the pyramid collapses. It just crumbles. It's important that people with type 2 diabetes follow the recommendations. They can't afford to let their pyramids fall."

Only a limited number of participants met nutrient intake recommendations for total fat, saturated fat, sodium and fiber. Overall, the participants consumed a diet that provided approximately 44 percent of calories from carbohydrates, 40 percent from fat and 17 percent from protein.

Optimizing control of blood sugar, lipids, blood pressure and weight in people with type 2 diabetes is essential to reduce the risk for long-term complications and chronic disease, including cardiovascular disease. Consuming a low-saturated fat, high-fiber diet that includes high quality, nutrient-dense foods can aid in achieving and maintaining that type of metabolic control. Evidence-based nutrition principles and recommendations, as well as national guidelines, have been established to help inform and educate the public on healthy eating practices. Still, the study showed that these participants fell short of consuming foods that would help them meet those guidelines.

"It would seem likely that participants who had managed diabetes over a greater length of time would be more likely to understand the importance of consuming a healthful diet, but this was not supported by the data," the researchers wrote.

"The findings clearly illustrate a need to provide ongoing nutrition education for people with diabetes regardless of the amount of time they've had the disease," Vitolins said. "We can't continue to assume that people know how to follow an eating pattern that is healthy if they have type 2 diabetes. These people have, within their cupboards and refrigerators, the potential to really manage their diabetes well. Day to day, the foods they are eating should be considered a vital part of their treatment."

Additionally, Vitolins added, research efforts are needed to better understand the types of barriers that overweight people with type 2 diabetes face in their attempts to consume a healthy diet.

Co-authors on the study were Andrea M. Anderson, M.S., of the School of Medicine; Gary D. Miller, Ph.D., R.D., of Wake Forest University; Linda Delahanty, M.S., R.D., of Massachusetts General Hospital Diabetes Center; Hollie Raynor, Ph.D., of the University of Tennessee-Knoxville; Connie Mobley, Ph.D., R.D., of the University of Nevada-Las Vegas School of Dental Medicine; Rebecca Reeves, Ph.D., R.D., of Baylor College of Medicine; Monica Yamamoto, Ph.D., R.D., of the Public Health University of Pittsburgh Graduate School; Catherine Champagne, Ph.D., R.D., of Pennington Biomedical Research Center; Rena R. Wing, Ph.D., of Brown University; Elizabeth Mayer-Davis, Ph.D., R.D., of the University of North Carolina-Chapel Hill; and the Look AHEAD Research Group.

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*Adapted from materials provided by Wake Forest University Baptist Medical Center, via EurekAlert!, a service of AAAS.*

<http://www.sciencedaily.com/releases/2009/09/090903111501.htm>

## How Can Clinicians Help Patients Make Decisions Consistent With Their Values?

ScienceDaily (Sep. 5, 2009) — In a pair of trials carried out over the Internet, Cheryl Carling and colleagues from the Norwegian Knowledge Centre for the Health Services (Oslo, Norway) attempted to understand how information should best be presented to individuals in order to help them make healthcare choices that are most consistent with their values. The findings are published this week in the open-access journal *PLoS Medicine*, and a linked editorial discusses the relevance of the results for decision making in healthcare.

Previous research shows clearly that, when presenting treatment options to patients, the type of statistic chosen to illustrate the risks and benefits of treatment may affect the patient's choice. For example, even when the actual data are equivalent, a patient is more likely to choose invasive therapy if the outcomes of treatment are presented in terms of likely survival as compared to the likely risk of dying. However, Carling and colleagues also wanted to understand these effects and how they related to an individual's values—which they define as the "relative importance of the desirable and undesirable effects of an intervention."

Both trials were carried out via the Internet, and were advertised on Norwegian television. On logging on to the study websites, information about the study was presented to participants and some details collected from them regarding baseline information and their values in relation to treatment. Participants were then randomized to different displays regarding the risks and benefits of different treatment options. One study randomized 2,978 participants who then viewed six alternative presentations of the likely reduction in risk of coronary heart disease after taking statins. The other trial randomized 1,760 people to four different displays (or no information) regarding the likely effects of antibiotics on sore throat.

Both trials show that as participants' values change, their decision as to whether to opt for (or seek) treatment also change. For example, in the statins trial, participants who are more concerned about the prevention of coronary heart disease are more likely to choose to take statins. In addition, some ways of presenting information about risk were found to be more "persuasive" in motivating participants to opt for treatment, irrespective of their values. Overall, Carling and colleagues found that, in the statins trial, presenting risk as natural frequencies (whole numbers of people affected, per 100 population) were the best understood, gave participants most confidence in their decision, and were the most appropriate tool to use for presenting these type of data. In the "sore throat" trial, bar charts showing likely duration of symptoms were found to be similarly the most appropriate tool in helping participants make decisions consistent with their values.

The limitations of the studies include the fact that participants were more likely to be young and well-educated relative to the general population, and that the studies involved participants imagining their response in relation to two hypothetical scenarios, rather than actual decision making by patients. A previous pilot trial establishing the feasibility of carrying out this type of study over the Internet was published in *PLoS One*.

In this month's related editorial the *PLoS Medicine* editors question the nature and effects of shared decision making on patient care and subsequent treatment. The editors discuss the criteria for when shared decisions between patient and healthcare provider should be made, how different forms of data presentation can deepen a patient's understanding of possible treatment options, and how certain presentations can also prove unfairly persuasive. Linking to the two research articles by Cheryl Carling and colleagues, the editorial analyses the best ways for healthcare providers to be as informative as possible, whilst maintaining objectivity and a respect for patients' values prior to treatment.

Both studies were funded by the Norwegian Research Council.



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*Adapted from materials provided by [Public Library of Science](#), via [EurekAlert!](#), a service of AAAS.*

<http://www.sciencedaily.com/releases/2009/08/090824204106.htm>

## Preparing for a Stressful Flu Season

By TARA PARKER-POPE



A few weekends ago, a mother I know called to ask about swine flu after her daughter complained of breathing trouble and other worrisome symptoms. Fortunately, my friend quickly reached her pediatrician, who reassured her about the child's condition.

But the conversation made me realize just how stressful this flu season is going to be for parents. Every sniffle and every cough is going to be scrutinized, awakening fears of the ominously named swine flu virus. How do you know when to relax? How do you know when to call the doctor?

Here are some answers to questions that will arise during what experts predict will be a very busy flu season:

### **How worried should we be?**

When this new strain of H1N1 influenza emerged last spring, experts feared that it might follow the pattern of the 1918 flu, the world's deadliest epidemic. That strain also showed up as a relatively mild spring virus but re-emerged in a more virulent form in the fall.

The new strain of H1N1 is not following that pattern. While it has accounted for about 90 percent of the flu virus circulating in the Southern Hemisphere, the strain is behaving a lot like seasonal flu, said Dr. Neil O. Fishman, an infectious-disease specialist at the University of Pennsylvania.

"There is a sigh of relief that the virus hasn't mutated," Dr. Fishman told me. "Fortunately, the swine flu that we're seeing still is a moderate disease that is behaving very much like ordinary seasonal influenza."

That said, Dr. Fishman noted that the virus was unpredictable and could still mutate. So people need to be vigilant about washing their hands, and if they develop symptoms they need to stay home.

And "ordinary" flu is not to be taken lightly. Each year in the United States, about 200,000 people are hospitalized with severe flu symptoms, and 36,000 die.

## **Are children at higher risk for swine flu?**

A main difference between swine flu and seasonal flu is that people over 60 appear to have some immunity to swine flu, while younger people seem not to. And because children and young adults are more likely to gather in groups — at school and colleges — they are more vulnerable to catching all types of flu. So while the disease does not appear to be more severe than seasonal flu, a disproportionate number of young people will probably get it.

As with seasonal flu, some people will get very sick and some of them will die. Federal health officials report that at least 36 children in the United States have died of swine flu; most had nervous system disorders like cerebral palsy or developmental delays. Some, however, had been healthy; they died of bacterial infections that set in after the flu. Doctors speculate that children with nerve and muscle disorders can't cough hard enough to clear the airways, putting them at higher risk for complications.

Each year seasonal flu kills 50 to 100 children, and it's too soon to know whether swine flu will turn out to be more deadly. Up to 40 percent of children contract regular seasonal flu, said Dr. Nathan Litman, director of pediatric infectious diseases at the Children's Hospital at Montefiore in New York City, who added, "We almost expect that as soon as school is open we'll start seeing increased numbers."

## **When will the swine flu vaccine be available? Will there be enough to go around?**

The federal government has ordered 195 million doses of vaccine. The Centers for Disease Control and Prevention recommends it for health care workers, children and young adults ages 6 months to 24 years, pregnant women and people caring for an infant younger than 6 months.

While there will be enough vaccine to cover the recommended groups, the timing will vary. The vaccine is undergoing clinical trials, and the first 40 million doses or so should be available by Oct. 15. Thirty million more will be delivered by the end of October, and new batches each week after that.

The vaccine may require a second dose three weeks after the first, and it may take another two weeks for the body to build up full immunity, the C.D.C. says. That means those who receive flu shots in mid-October won't be fully protected until late November.

## **How do I get a swine flu shot?**

The government will distribute the vaccine through state health departments, which will send it to local health departments and doctors' offices. Check with your family doctor to find out when it will be available.

## **What about the severe complications that followed the last swine flu shots, given in 1976?**

In 1976, a swine flu vaccine was associated with Guillain-Barré syndrome (pronounced ghee-YAN bah-RAY), in which the body damages its own nerve cells, causing weakness and sometimes paralysis. The reasons are unclear; some studies found no link. Another study suggested that one person in every one million vaccinated for seasonal flu might be at risk for Guillain-Barré.

In 1976, however, techniques for rapidly making vaccine were much less sophisticated than they are now. And Dr. Fishman noted that existing flu vaccines contain components of the H1N1 virus, so "I do not consider this a new vaccine — the vaccine is being made the same way that every influenza vaccine is made."

## **What are the symptoms of swine flu? When does it become an emergency?**

In children, the warning signs include fast or troubled breathing, bluish or gray skin, and persistent or severe vomiting. If a child isn't drinking enough fluids, is unusually hard to wake up, is not interacting or is so irritable that he or she doesn't want to be held, you should call your doctor.

Adults with severe symptoms may also complain about pain or pressure in the chest or abdomen, sudden dizziness and confusion.

Children with underlying neurological problems should be quickly seen by a doctor if they run a fever. In otherwise healthy children, the main warning sign is that the child seems to feel better, then appears to relapse with a high fever. This signals a bacterial infection that must be treated with antibiotics. Even though such infections are seldom severe, the child should be seen by a pediatrician as quickly as possible.

#### **Should I bother getting a seasonal flu shot?**

Yes. Seasonal flu is as much of a concern as it has always been. Given that swine flu shots won't be available until late in the season, a regular shot will protect you and your family from the body aches, cough and misery of seasonal flu, and allow you to cross one worry from your list.

[http://www.nytimes.com/2009/09/08/health/08well.html?\\_r=1&nl=health&emc=healthupdateema1](http://www.nytimes.com/2009/09/08/health/08well.html?_r=1&nl=health&emc=healthupdateema1)



## First Stem Cell Drug Fails 2 Late-Stage Clinical Trials

By ANDREW POLLACK

What might become the first drug derived from human stem cells failed in two late-stage clinical trials, dealing a setback to the drug's developer and to the stem cell field.

The developer, Osiris Therapeutics, said Tuesday that its drug, Prochymal, was no more effective, overall, than a placebo in treating a life-threatening complication of bone marrow transplantation, though certain patients seemed to be helped.

Shares of Osiris, which is based in Columbia, Md., fell 34 percent, to \$8.03.

Prochymal is a preparation of mesenchymal stem cells, which are obtained from the bone marrow of healthy young adults. Because the cells are derived from adults, they sidestep the ethical issues stemming from the destruction of human embryos needed to make embryonic stem cells. Unlike most other types of adult stem cells, mesenchymal cells grow well in culture, so thousands of doses can be produced from a single donation.

Stem cells, particularly in the form of bone marrow transplants, are already used in medicine. Osiris is hoping that Prochymal will become the first stem cell product approved by the Food and Drug Administration and sold as a mass-produced pharmaceutical product.

But the failure in the two trials could make it hard to reach that goal. Both trials tested Prochymal as a treatment for graft-versus-host disease, which occurs when immune cells in donated marrow attack the recipient's organs as foreign tissue. In one trial, in which Prochymal was used along with steroids, 45 percent of patients responded to Prochymal and steroids compared with 46 percent who had a response to steroid and a placebo.

In a second trial, in which Prochymal was tested in patients who were not benefiting from steroids, 35 percent of those getting the drug had a resolution of graft-versus-host disease for at least 28 days, compared with 30 percent getting the placebo. The difference was not statistically significant.

Osiris said, however, that in the second trial, the drug did provide a statistically meaningful benefit in patients having graft-versus-host disease that specifically affected their livers or their gastrointestinal tracts. C. Randal Mills, the company's chief executive, said he hoped the drug could be approved for those patients, given the seriousness of the disease. "Prochymal is having a clear effect in the liver, and that is the most underserved patient population," he said in an interview.

But the F.D.A. is usually reluctant to approve a drug based on its working in only a subset of patients.

In March, Osiris stopped enrollment in a trial testing Prochymal as a treatment for Crohn's disease, saying it was unlikely the drug would be better than a placebo, because of a high positive response to the placebo. Genzyme has the right to sell Prochymal outside the United States and Canada.

Dr. Darwin J. Prockop, an expert on mesenchymal stem cells who was not involved in the trials, said there were still a lot of unknowns about how the cells work. "Understanding it well enough to translate to the clinic — that's the hurdle we're at," said Dr. Prockop, who is director of the Institute for Regenerative Medicine at Texas A&M Health Science Center.

<http://www.nytimes.com/2009/09/09/health/research/09drug.html?ref=research>



## Children: Seeing a Family Benefit in Obesity Surgery

By RONI CARYN RABIN

Children born to women who had bariatric surgery for obesity may face a lower risk of severe obesity themselves, a study suggests.

The study, of 111 children born to 49 mothers who had a type of weight-loss surgery called biliopancreatic diversion, found that babies born after the operation had lower birth weights than those born before, and their risk of becoming severely obese as children was one-third the risk of those born before. Only 11 percent of the children born after surgery were severely obese, compared with 35 percent of the others.

Children born after the operation also had better cholesterol levels and improved insulin sensitivity, indicating they might be less likely to develop heart disease and diabetes later in life, the researchers found.

Two notes of caution about the paper, to be published in *The Journal of Clinical Endocrinology & Metabolism*: The findings are based on observation of the children (the study was not randomized and controlled), and bariatric surgery can lead to complications like anemia, malnutrition, loss of bone density and, rarely, death.

An author of the paper, Dr. John Kral, a professor of surgery and medicine at SUNY Downstate Medical Center in Brooklyn, said the benefits to the children might be due to metabolic and hormonal changes in the wombs of women who have had the operation.

<http://www.nytimes.com/2009/09/08/health/research/08child.html?ref=research>

## Splits Form Over How to Address Bone Loss

By KATE MURPHY

As people age, their bones lose density and they grow ever more vulnerable to osteoporosis, with its attendant risk of a disabling fracture. But how do you know just how vulnerable you are?

The question has been complicated by a relatively new diagnosis: osteopenia, or bone density that is below what is considered normal but not low enough to be considered osteoporosis.

Millions of people worldwide, most of them women, have been told they have osteopenia and should take drugs to inhibit bone loss. But the drugs carry risks, so many public-health experts say the diagnosis often does more harm than good.

Now the World Health Organization has developed an online tool meant to help doctors and patients determine when treatment for deteriorating bones is appropriate. A preliminary version of the tool, called FRAX, was released last year and can be found at [www.shef.ac.uk/FRAX/index.htm](http://www.shef.ac.uk/FRAX/index.htm). A revised version is to be released later this year.

But FRAX is proving almost as controversial as the diagnosis of osteopenia. While some experts applaud it for taking factors besides bone density into account, others say that the formula on which the tool is based is faulty and that the advised threshold for medication is too low.

“FRAX is coming from the same people who came up with osteopenia in the first place,” said Dr. Nelson Watts, director of Bone Health and Osteoporosis Center at the University of Cincinnati, who said the diagnosis unnecessarily frightened women and should be abolished. Indeed, it was a W.H.O. panel financed by the pharmaceutical industry that in 1994 defined normal bone mass as that of an average 30-year-old woman. Because bone naturally deteriorates with age, anyone much older than 30 is likely to qualify for a diagnosis of osteopenia; using similar logic, a middle-aged woman might be said to have a skin disorder because she had more wrinkles than her 30-year-old daughter.

Rebecca Doll, 36, received a diagnosis of osteopenia after a bone density test this year. “The nurse didn’t tell me how bad it was,” said Ms. Doll, a computer consultant who lives in Thousand Oaks, Calif. “She just wanted to know where to call in the prescription.”

The W.H.O. panel said its definitions of osteopenia and osteoporosis were not intended to provide reference points for diagnoses, much less for prescribing drugs. But Dr. Watts and other experts warn that this is what is happening, as more drugs become available to treat thinning bones and drug companies pay for the installation of bone-density measuring devices in doctors’ offices — not to mention in drugstores, shopping malls and health clubs.

Since 2003, annual sales of osteoporosis drugs have about doubled to \$8.3 billion, according to Kalorama Information, a provider of market research on medicine.

Dr. Watts said that while FRAX was a useful tool because it took factors like family history into account, it had significant flaws.

For example, he said, it does not consider factors like vitamin D deficiency, physical activity and use of epilepsy drugs and antidepressants that can erode bone. And while it accounts for tobacco and alcohol use, which can increase the risk of osteoporosis, it does not ask how long or how much a patient has been smoking or drinking.

Other experts object that the mathematical formula used to calculate FRAX scores has not been released to the public.

"I have asked for it repeatedly," said Dr. Nananda Col, director of the Center for Outcomes Research and Evaluation at Maine Medical Center in Portland. "There's no way to validate the equation if you can't tell the independent contribution or weight of each risk factor."

Dr. John A. Kanis, an emeritus professor of medicine at the University of Sheffield in England and the director of the W.H.O. center that developed FRAX, said the formula, or algorithm, had been kept secret so "the tool is not tampered with and remains authentic."

Dr. Kanis added that he was in "advanced negotiations" to license the formula to two leading manufacturers of bone-scanning equipment, GE Lunar and Hologic. That would allow them to incorporate it into their software, so patients would receive a calculation for risk of fracture, along with a T score, the standard measure of bone density.

The main controversy, however, involves whether and when to start taking bone-loss drugs, whose side effects can include gastrointestinal and other problems. Merck's popular drug Fosamax is the subject of hundreds of lawsuits by patients who assert that it caused osteonecrosis of the jaw, a rare disease that breaks down the jawbone. (The company says there is no proof of cause and effect.)

The FRAX guidelines in the United States call for medication when the calculated risk for hip fracture in the next 10 years is 3 percent or the combined risk of a broken hip, vertebra, shoulder or wrist is 20 percent.

The recommendations "don't mean you have to take drugs or you are crazy if you don't," said Dr. Bess Dawson-Hughes, senior scientist and director of the Bone Metabolism Laboratory at Tufts, who helped devise the United States guidelines. (Recommendations differ by country, she said, because of varying health care costs.) Indeed, Ms. Doll's FRAX calculation indicates that she does not need medication, even though her mother has osteoporosis.

But Dr. Pablo Alonso-Coello, an epidemiologist at the Iberian-American Cochrane Center in Barcelona, Spain, said the guidelines implied that "a hip fracture is greater in magnitude and patient importance than a cardiovascular event, because risk thresholds for treating the latter are usually stated as 20 to 30 percent at 10 years."

Dr. Alonso-Coello was the lead author of an analysis of osteoporosis drugs published last year in The British Medical Journal, concluding that they were largely ineffective and unnecessary in women with osteopenia.

To determine when drugs are appropriate, FRAX's developers said they undertook an extensive cost-benefit analysis comparing the expense of hospitalization and rehabilitation for a major fracture with the cost of drugs, which can range from \$105 to about \$1,800 a year. Dr. Ethel S. Siris, director of the Toni Stabile Osteoporosis Center at Columbia University, said she hoped FRAX would end the fixation on "that horrible term" osteopenia and focus treatment decisions on individual risk of fracture.

"Clearly, doctors have been at fault," Dr. Siris said. "But women need to educate themselves about the risks" before consenting to treatment.

Dr. Steven Cummings, professor of medicine and epidemiology at the University of California, San Francisco, said it was also important to understand when medication was likely to help. "The drugs work if you have osteoporosis," Dr. Cummings said. "But some studies suggest there is little benefit, if any benefit at all, if you take these drugs when you have osteopenia."

<http://www.nytimes.com/2009/09/08/health/08bone.html?ref=research>