



Infoteca's E-Journal



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Re-crafting the United States as Disunited Duchies

- Authors of two recent books, "Whitopia" and "The Big Sort," see Americans as disuniting based on politics, race and culture.



America is disuniting on the basis of race, politics and culture, say the authors of two recent books. Many are fleeing to what one calls "whitopia."

In Coeur d'Alene, Idaho, where 95 percent of the population is white, Rich Benjamin saw more Confederate flags than black people. Not that Benjamin was looking for suggestions of racism, but in his forthcoming book, *Searching for Whitopia: An Improbable Journey to the Heart of White America* (Hyperion, Oct. 6), he was trying to discover why some of the fastest-growing areas in America are also the most Caucasian.

"There's a long-term harm when Americans accept balkanization as a way of life," says Benjamin, who is an African American. "Segregation can appear to allay social tensions, but it worsens them in the long run. Optimal democracies require more than voting; they require social integration and involvement."

Benjamin defines Whitopias as towns that are much whiter than the nation as a whole, which means they are more than 75 percent Caucasian. He looked at areas with a population growth of more than 6 percent since 2000, in which the growth was 90 percent white. Then he set out to Forsyth County, Ga., (98,000 people, 684 of them black), St. George, Utah, Coeur d'Alene and other vanilla outposts to find out why folks were moving there.

"There are forces that push people out [of cities and inner suburbs], like diversity and crumbling infrastructure and high home prices," Benjamin says. "And there are pull factors, like more home for your dollar [in the whitopias], beautiful natural amenities and safety, and the perceived comfort that comes with homogeneity."

Benjamin is not the first to describe this phenomenon. In his 2008 book *The Big Sort*, journalist Bill Bishop detailed how Americans have been parceling themselves out into increasingly homogeneous

communities in which everyone votes for the same political party, goes to the same church and holds the same values.

This situation, Bishop says, has its good and bad points. "The good part is you get this incredible variety from place to place; places zoom off into their own cultural trajectories. But what happens is people lose touch with those who disagree with them. What happens is a nation incapable of compromise; you have this kind of national stalemate."

Both Bishop and Benjamin trace this to the 1960s. That was a time when, Bishop writes, "Americans lost their sense of a nation, by accident, in the sweeping economic and cultural shifts that took place." And, Benjamin adds, "once the courts demanded racial integration, many whites fled to the suburbs."

Now that many of those inner suburbs have become increasingly minority, a significant number of whites have fled further out to what Benjamin refers to as "exurban" counties like Forsyth (an hour's drive north of Atlanta), which are 83 percent non-Hispanic white.

Yet Benjamin says he found "racism without racists" in these towns.

"I very much believe we do have structural racism in our communities, yet we don't have racists. The good news is we don't have interpersonal racism. But structural racism is harder to attack."

Benjamin also notes that a significant proportion of the people moving to these white enclaves are older folks with specific fears and agendas. And the Obama presidency has only heightened those qualms and, in some cases, brought out nativist impulses.

"When you look at the tea bag protests, and the birther movement, this is an existential crisis facing conservative white Americans," Benjamin says. "They don't want to expand government dependence, and they link big government to city people and minorities who are perceived to be on the dole. These Americans are fearing where the country is going economically, racially and government-wise."

That 40 percent of Americans under 24 are non-white, and that whites will no longer be in the majority by 2042, only serves to make this unease more palpable. So in the near future "there may be a democracy gap where older whites, who are more inclined to vote, have the power to determine the outcome of politics," Benjamin says. "That means there will be spending for older people, like Medicare and Social Security, and the lack of spending for young brown people, like public education. There will be different priorities in funding."

And whether or not the younger generation will have different political values than their elders is, Benjamin says, up in the air. He feels Obama's popularity among young people could mean "long-term brand loyalty to the Democrats, and progressive values. But it's equally likely white members of this generation can be anti-government in a way that's racialized. When you poll on immigration, for example, the difference between the young and their parent's views is indiscernible."

In the meantime, Bishop believes that the crazy quilt of cultures and values the big sort has created just "makes any sort of national change harder. We get by, but what we lack is an ability to do things that are transformative. The metro and state areas are where the action is in terms of new policy. Who has the first universal health insurance? Massachusetts. Cities are doing experiments in power production; school districts are experimenting with buying food locally.

"At the local level you will have this experiment in policy, and at the national level you will have this congestion."

http://www.miller-mccune.com/culture_society/re-crafting-the-united-states-as-disunited-ducies-1478?utm_source=Newsletter77&utm_medium=email&utm_content=1006&utm_campaign=newsletters

Planetary Boundaries? Go Ask the Romans

By: Michael Todd



At the turn of the century, atmospheric chemist Paul Crutzen introduced a new phrase for the current age: Anthropocene. It was a nod to the "Holocene," the geologic term for the existing time period that began about 12 millennia ago; it substituted the prefix "anthro-" to reflect humankind's impact on the planet.

Like all scientific terms, Anthropocene is ostensibly a neutral coinage to reflect the scale of change that human activity has had on the geologic landscape. But in reality, it's anything but a compliment.

Now Crutzen, a professor at Germany's Max Planck Institute for Chemistry, has joined an all-star lineup of scientists from various disciplines to point out what they believe are the "planetary boundaries" of abuse that ol' Mother Earth can take.

Robert Constanza, an ecological economist and director of the University of Vermont's Gund Institute for Ecological Economics, was among those all-stars present last summer in Sweden to kick off discussion on the boundaries. "You get a group of scientists and other stakeholders together for a week or two, and they focus on synthesis rather than simply generating more data — which is what scientists tend to do," he explained with a chuckle, "and you put that data together, and you make some real information or knowledge out of it."

Their synthesis was condensed into a four-page paper, "A safe operating space for humanity," which appeared in last week's edition of the influential journal *Nature*. Accompanying it are seven commentaries from luminaries such as William H. Schlesinger and Cristian Samper.

Hard Number for Hard Truths

It's not comforting reading, and once you get past the "eroded resiliency" and "undesired traits" of science-speak, you realize it wasn't meant to be.

"Now, largely because of a rapidly growing reliance on fossil fuels and industrialized forms of agriculture, human activities have reached a level that could damage the systems that keep Earth in the desirable Holocene state," the paper warns right off the bat. "The result could be irreversible and, in some cases, abrupt environmental change, leading to a state less conducive to human development."

The 29 co-authors, led by [Johan Rockstrom](#) of the [Stockholm Resilience Center](#), subdivided the world's human-caused woes into nine areas reflecting planetary processes under assault, ranging from old favorites like climate change and the thinning ozone layer to shortfalls in fresh water and acidifying oceans.

For each process they hammered out an actual measurable boundary — a "safe distance from dangerous thresholds" — for a key process or state that essentially defined the problem. Examples are the percentage of global land cover converted to cropland or the amount of nitrogen removed from the atmosphere for human use. Boundaries for two of the nine — "atmospheric aerosol loading" (i.e. junk in the air) and chemical pollution — have yet to be determined.

"The underlying paradigm was this idea of tipping points or thresholds," Constanza explained. "We know that complex systems have those kinds of dynamics; our goal was to say that each of these nine probably has a tipping point. We don't know exactly where it is, but we're better off not getting too close to it, so that's where the guardrails were set.

"Once we did that, we sort of said we've already gone outside the guardrails; the question is, how long can we stay outside the guardrails without causing real problems?"

The scientists' data crunching determined that mankind has jumped the guardrails in three areas. First Worlders have been reading about two of them, climate change and loss of biodiversity, over breakfast for decades. The third is the [nitrogen cycle](#), which when out of whack, among other things, pollutes water and generates additional greenhouse gases.

On climate change, the authors noted that the scientific community is converging on the "2-degree guardrail" approach, which would contain global warming to no more than 2 centigrade degrees above where the mean temperature was in the pre-industrial days. To achieve that ambitious goal, the authors created one of their hardest boundaries, suggesting that the carbon dioxide in the air not exceed 350 parts per million (it's currently 387, they report) and that the gap between energy radiation reaching the Earth and that leaving through the upper atmosphere (known as "[radiative forcing](#)") not exceed one watt per square meter. That figure is currently 1.5 watts, and before the Industrial Revolution it was roughly at equilibrium.

On biodiversity, the authors propose a loss rate of 10 species each year per million species on Earth — a rate at least one-tenth of the current carnage but still an estimated 10 to 100 times the preindustrial rate. Despite this accelerated destruction, finding a boundary here proved elusive.

"From an Earth-system perspective," the paper reads, "setting a boundary for biodiversity is difficult. Although it is now accepted that a rich mix of species underpins the resilience of ecosystems, little is known quantitatively about how much and what kinds of biodiversity can be lost before this resilience is eroded."

Excessive nitrogen, the authors figure, is being removed from the atmosphere at about four times the highest rate it should (121 million tons per year, compared to the 35 million tons boundary and the zero of preindustrial days). Setting a useful value on this nitrogen (and phosphorus) cycle perplexed the authors, and they term their published boundary as a "first guess."

Commentators in Nature generally responded that the planetary boundaries concept was valuable, but did ask pointed questions about numbers assigned or the methods applied in their areas of expertise -- the kinds of criticisms the authors expected and welcome.

Schlesinger, president of the Cary Institute of Ecosystem Studies, was more biting, implying that boiling the nuances down to a single value was akin to teaching to the test. "Unfortunately, policymakers face difficult decisions," he wrote, "and management based on thresholds, although attractive in its simplicity, allows pernicious, slow and diffuse degradation to persist nearly indefinitely. ... Setting boundaries is fine, but waiting to act until we approach these limits merely allows us to continue with our bad habits until it's too late to change them."

Learning From Imperial Rome

That a group of 29 have arbitrarily assigned boundaries to human development might in itself seem like hubris, but Costanza ascribes a more modest — but terribly serious — intent. It might be summed up as, "Get off your duff, world."

"We acknowledge that [this is] more of a call to arms, a way of looking at it, rather than the last word," he explained. "There's a lot of work that needs to be done. Look at the amount of work that's been done on the climate questions over the last couple decades. Well, if we did the same amount of work on each of the other nine, we'd probably be in a better position to say whether those guardrails should be placed."

This Stockholm group isn't the first team of researchers to try and establish global integrated models; the urge goes at least as far back as the Club of Rome's *The Limits to Growth* in the early 1970s.

"The problem is," Costanza asked, "how do we know those models are telling us anything other than making projections into the future? So the only way to test and really calibrate those integrated models, we think, is to go back historically and look at civilizations' interactions that have occurred over a long-enough time period so that we see whether our models capture those complex interactions."

Another collaborative project — and which shares Crutzen, Costanza and paper co-authors ecologist [Carl Folke](#), archaeologist [Sander van der Leeuw](#) and oceanographic biologist [Katherine Richardson](#) — is the "Integrated History and future Of People on Earth," or [IHOPE](#). (The secretariat for IHOPE is hosted by the Stockholm Resilience Centre, which is directed by Rockstrom and has paper co-author Carl Folke as its science director.)

IHOPE reverse-engineers history, comparing what computer models suggest must have happened with what actually happened.

"It's an attempt to put together an emerging environmental and climate history, put together with human history, to try to build some integrated models that can help us to ... look into the future," said Costanza, speaking during a morning coffee break with an IHOPE working group at the [National Center for Ecological Analysis and Synthesis](#) in Santa Barbara, Calif. "... We can use those same kind of models to help us build a more sustainable and desirable future."

Their three main case studies have been the Roman Empire, the Mayan empire and the American Southwest. "We're only now sort of capable of applying some of these ideas from complex systems bearing to these historical problems in the past," he continued, and then took aim at single-variable explanations like, say, lead in their cookware. "It's been largely descriptive or fairly simple causal models that have been used. I think we take a whole different approach: that modern science and computing and simulation tools [bring new information] to bear on these types of problems."

While ecological reasons have been posited for the Maya and the Anasazi collapses, those raised on a steady diet of Gibbons and Grant may balk at this approach being applied to the Romans and their

Western-styled imperium. But as Gen. Omar Bradley once said, "Amateurs study strategy, professionals study logistics," and what is ecology but logistics at its most basic?

Costanza adds: "By building a dynamic computer model that we apply to, for example, the Roman Empire, and then if we can test that against what really happened and say, 'Well, this model reproduces what we know happened there,' then we can start playing all sorts of interesting games with it. We can start saying, 'What if the Romans, instead of trying to expand the reach of the empire at a certain point, what if they had decided to consolidate and stay where they were. Would that have led to a very different result?"

"What if the climate, something called the 'Roman climate optimum,' ... throughout the Roman Empire was particularly stable and was particularly amenable to growing grains in southern Germany that didn't occur either before or after the empire? So, what influence did that have on the growth and decline of the empire, and what if the climate had been different? What if that period had extended? Would the empire have gone on longer or would it have collapsed anyway?"

If talk like that prompts memories of Jared Diamond's 2005 best-seller *Collapse*, Costanza for one won't deny it. "We're sort of taking the Jared Diamond idea forward. We're kind of applying science to the task of helping us to learn from the past to help us build a better future."

http://www.miller-mccune.com/science_environment/planetary-boundaries-go-ask-the-romans-1510?utm_source=Newsletter77&utm_medium=email&utm_content=1006&utm_campaign=newsletters

Chest Pains in the USA

By: Kirk Nielsen



I'm somewhat embarrassed to report a second fearful trip through an emergency room in four months — this time for chest pains — and that I emerged with an even cleaner bill of health than the first time. I'm beyond grateful to all the professionals who cared for me, and I'd recommend them for all your emergency needs in a heartbeat. If I were the health care industry, though, I'd also be embarrassed — about how much these efforts cost.

As chronicled [here](#) previously, my first emergency room admission, in the dead of Minnesota winter last December, followed my collapse onto the carpet of a St. Paul theater lobby during intermission of a Christmastime musical show. After a mile-long, \$1,400 ambulance ride to United Hospital, 12 hours of overnight monitoring for certain enzymes released into the blood during a heart attack, plus my first-ever echocardiogram the next day: zilch. Conclusion: dehydration-induced syncope. Total billed: \$10,260.

Still, it's easy to have doubts about one's coronary health. Cholesterol is only an indicator, mind you. Thus, the specter of a blocked artery entered my 51-year-old noggin one late afternoon in April at my parent's house in a wooded rural suburb about 30 miles west of Minneapolis. All day, off and on, I had felt a dull, pulsating pain just inches above my heart and palpitations.

The record can conjure up paranoia. My maternal grandfather died of a heart attack at age 64; my paternal grandfather from heart and respiratory complications at 61. My dad underwent open heart surgery for a triple (or was it quadruple?) bypass at age 47; he was 76 when he succumbed from a web of cardiovascular issues.

This past January, during a talk about genetics at the University of Miami, the dean of the medical school projected a photographic image showing the cross-section of a coronary artery that was entirely clogged with plaque. It belonged to 28-year-old Russian figure skating champion [Sergei Grinkov](#), whose unremarkable cholesterol levels and otherwise clean bill of cardiovascular health belied the fatal heart attack he suffered in 1995 before he could celebrate his 29th birthday. Who hasn't heard the story of some superbly fit person, who felt really great one day and then dropped dead an hour later?

So I went for a midday run, which was a little harder than usual, but not alarmingly so. And then afterward the dull, throbbing chest pains continued, again in that one spot. They worsened as the afternoon passed. The dull pain spread into my left shoulder and then my left hand was tingly and weirdly cool. I was eerily lightheaded and suddenly filled with a sense of doom. What the hell?

The sun was low in the woods when my mom pulled her Passat into the garage, after a three-hour drive from Rochester. Having just turned 80, she had treated herself to a thorough several-day long examination at the Mayo Clinic. (Medicare and Blue Cross Blue Shield covered everything).

She ordered a pizza for dinner. I grew more worried. The pizza arrived. We sat down at the dining table. I felt even stranger. After forcing down one slice, I couldn't hold my tongue.

"I think I should go to an urgent care center," I said.

Pause. "Really?"

It was now past 8 p.m. Was one even open? My mom made a call.

After a 15-minute drive east towards Minneapolis, we arrived at a nice suburban clinic called WestHealth. Soon, a doctor and a nurse were concerned not only about the chest pains I was reporting but also about a little valley on my electrocardiogram indicating "early repolarization." That can mean the heart's electrical system is screwy. But it can also owe to physical conditioning, as I learned in December, if the heart belongs to someone who runs about 5 miles, four to six times a week (as does your correspondent). Incredibly, I heard the doctor say calmly, "I'm not sure that you're not having a heart attack." He wanted me to go to a hospital emergency room. By ambulance.

Since I'd had my fill of paramedic-propelled stretcher rides, rapid intravenous tube insertions and oxygen mask placements that night in December, I opted to transfer by family car. To prove it, I signed a release one of the nurses handed me in the hall on my way out. My travel-weary mom, foreseeing a late-night wait outside an emergency room, opted to head home and enlisted my sister for the next leg of my journey, a 15-minute drive south to Park Nicollet Methodist Hospital.

West Health had phoned ahead, alerting the head triage nurse of my imminent arrival. I checked in with a receptionist at a desk located in the waiting area, which was packed. She told me to take a seat. The pains above my heart continued, but were no longer worsening. A middle-aged woman lay on the floor, in the fetal position. Ten minutes passed. Recalling the doctor's words — I'm not sure that you're not having a heart attack — I thought I'd better reconfirm my presence, this time with the triage nurse, who was seated on the other side of a counter with a big window overlooking the waiting area. Yes, she was aware of my arrival. A few minutes later a nurse called me in.

For the next hour a team of impressive nurses and medical technicians took my pulse and blood pressure, read my blood oxygen, drew several blood samples, X-rayed my chest, jammed an intravenous tube into my arm and affixed me with electrocardiogram wires. Then I told a doctor the whole story. He asked me to show him the spot from which my chest pain was emanating. He pressed two fingers into it.

"Does that hurt?" Affirmative.

"That's good," he said. Because topical pain like that was almost certainly musculoskeletal, as opposed to myocardial.

I brightened at the prospect of going home. But, no. Doc wanted me to stay overnight for more monitoring. My sister left. A nurse wheeled me down a hall to a cavernous room with three beds separated by curtains where I would try to sleep for a few hours.

"The more diffuse chest discomfort into his left arm could conceivably be myocardial," he would soon write. "The patient is a good candidate for our chest pain evaluation unit, low risk." I was booked for an early morning stress echocardiogram.

A Whole Lot of Money for a Whole Lot of Nothing

I'd been putting off a cardiovascular stress test for years, in part because my hospitalization/emergency plan doesn't cover one, unless it occurs during an emergency hospitalization. An echocardiogram per se, like the one I had in December and during which the patient remains motionless, is not as effective as a stress echocardiogram in discerning, say, coronary artery blockage. That's because the stress echo is administered while the patient pedals a difficult exercise bike while laying on his back, frock open, until his heart rate is, say, more than 144 but less than 169 beats a minute.

About 10 minutes later, as the patient continues to pedal furiously, a flirtatious technician presses her transducer (which resembles a small plastic microphone) into the nooks and crannies of the ribcage covering the patient's heart area for several minutes.

Echocardiogram results are immediately available. Mine that morning indicated my heart had normal chamber size, wall motion and thickness, and appropriate hyperkinesis and ejection fraction increases. Conclusion: no evidence of inducible ischemia.

In other words: no signs that any portion of my heart was freaking out, and, by extension, no evidence of coronary artery blockage.

Still, I elicited a couple of disappointing facts from my stress-echo tech. You can't really know if you have a half-blocked artery. One could pass a stress-echo with flying colors but still have a coronary vessel that is 50 or 60 percent blocked, she said. That's because stress-echoes generally detect only the degree of arrhythmia, ischemia and other irregularities that a 75 percent or worse blockage can cause.

If doctors really want to see the arterial blockages of a living human being they order an angiogram, a very costly, invasive procedure requiring general anesthesia and the insertion of an almost invisible catheter into a vessel, often in the groin, forearm or neck. The surgeon somehow guides it to the suspected area and deposits a radioactive dye that turns up in X-rays. Doctors (and insurance companies) tend to reserve angiograms for folks whose echocardiograms indicate a 75 percent blockage or more. In other words, you don't get an angiogram unless your cardiovascular system is ultra-messed up.

Still, I was very happy about my results and for a moment, as I lay catching my breath, the euphoria displaced any thought of how much this crash course in coronary medicine was going to cost me. Self-underemployed me, I have the kind of policy that experts say is the wave of the future: premiums that nearly double in two years, high deductibles, and still you have to pay \$450 out-of-pocket for an annual physical.

A talkative guy from the Dominican Republic wheeled me to the elevator and down to my bed in the emergency facility. I put on my normal clothes, waited for the discharge doctor and chatted with my nurse, a friendly immigrant from Poland.

"Do you know how many people come in with exactly the same symptoms you had and the doctors find nothing?" she said. "A lot." I felt less dumb.

The doc soon arrived, said my heart was fine and handed me an instruction sheet with two recommendations: ibuprofen or Tylenol, and antacids. Who knew? Gastroesophageal phenomena can cause dull, throbbing pains above your heart and make your left hand feel cold and tingly. Better safe than sorry.

And who knew that all of this costs only \$4,712?



Still, America's private health care system, while wildly expensive, can have silver linings for some. Whether in the spirit of fiscal conservatism, cost containment commitments or Minnesotan altruism, the hospital accepted much less than it billed. BCBS informed me it paid about \$2,370, presumably under a discount agreement with the hospital. My share, in addition to the roughly \$1,500 in premiums I send BCBS annually, was to be \$1,019, a reasonable fraction of the total if only the total were reasonable. But thanks to a generous financial aid program, Park Nicollet Methodist Hospital reduced my charges to under \$300. (I still owe the urgent care clinic about \$150 because BCBS's emergency/hospitalization coverage doesn't cover urgent care.)

Similarly, after receiving about \$2,580 from BCBS and \$200 from me this past winter, United Hospital in St. Paul recently waived the balance of my after-insurance bills, under its financial aid program. However, a BCBS appeals coordinator has reaffirmed the exclusion of my mile-long, \$1,400 ambulance ride last December from its emergency/hospitalization coverage.

Meanwhile, I promise to avoid all chest pains, hospitalizations and ischemia, and to not join the unlucky millions who'd have to produce \$14,972 for two emergency room visits all by themselves.

http://www.miller-mccune.com/health/chest-pains-in-the-usa-1464?utm_source=Newsletter77&utm_medium=email&utm_content=1006&utm_campaign=newsletters

Forgive and Get Healthy

By: Ryan Blitstein



Forgive yourself. Forgive your parents and siblings. Forgive your best friend. Forgive the jerk that cheated on you in high school.

Your life may actually depend on it.

At least, that's what Loren Toussaint's research seems to say. The ostensibly trivial act of forgiving can make you healthier and happier, but failing to forgive might pose a danger to your well-being, according to work by the Luther College psychology professor and other leaders in the promising interdisciplinary field of forgiveness.

Toussaint's laboratory, on a campus whose lush, green Driftless Area foothills are more Ivy League than Iowa, seems an unlikely location for an international hub of a burgeoning area of research. It comprises a trio of tiny rooms with a handful of computers and monitoring equipment, along with two black leather lounge chairs for experimental subjects.

And the bashful young professor, a self-described Iowa farm boy, acts the part. He looks like a lanky high school basketball player, and he's prone to earnestly dropping phrases like "by golly" into conversation. Yet Toussaint's enthusiasm and early successes have led to collaborations with giants of the discipline, including Harvard University sociologist David R. Williams and Stanford University professor Frederic Luskin, one of the field's founders.

Finding Roots

Though the concept of forgiveness has deep roots in Western culture, modern studies of it rose to prominence during the 1990s as academics began to tap new government and private funding. They examined subject matter ranging from resolving conflict between family members to helping survivors cope with the aftermath of brutal civil war in places like Rwanda.

Toussaint and others among the second generation of forgiveness experts built on that work to better understand why forgiveness is good for us. Now, they're translating scientific conclusions into projects aimed at helping Americans become healthier by forgiving.

The son and grandson of farmers, Toussaint majored in psychology at Minnesota's tiny Southwest State University, fascinated by the quest to understand why people acted the way they did. After graduate work in stress and coping at the University of Wisconsin-Milwaukee, Toussaint wanted to do more meaningful research - something more spiritual, in line with his upbringing in a fundamentalist Christian church.

He stumbled upon a few job postings seeking researchers to focus on forgiveness, a core tenet in Christianity. After studying forgiveness as a postdoctoral researcher at the University of Michigan and a brief stint at Idaho State, in 2004 he moved to Luther, a college with religious faith as part of its mission. It was the natural home for a professor like Toussaint, whose ideas and goals often arise from a spiritual foundation, but whose methods echo his secular counterparts.

"I have no problem being construed as someone who's interested in religious work or religious ideas. But what I do does not rest on theological assumptions. What I do rests on the data," says Toussaint.

He's since supervised a series of small lab studies examining forgiveness among different groups of people, from normal college students to victims of spinal cord injuries. Toussaint has also co-directed some of the largest epidemiological analyses searching for links between forgiveness and health. That work, along with comprehensive literature reviews, has Toussaint convinced that not forgiving can mean long-lasting stress, which causes mental and physical problems.

Take, for instance, Toussaint's own experiences during high school, when he dealt with emotionally painful taunting and teasing (though no more, he stresses, than most kids face).

"When somebody offends you, it's a pretty significant thing. You notice it. If it's significant enough that you notice it and can remember it, it must've been fairly traumatic, or you wouldn't remember it," he says. "These things don't just tend to go away."

In an ongoing relationship, such recollections might lead to interpersonal stress. In Toussaint's case, the actions of people he hasn't seen for two decades occasionally replay in his thoughts. "We have an amazing ability to retain that and play it back in vivid detail," he says.

Any time such an event runs through Toussaint's stream of consciousness, his body responds in similar ways to how it reacted 20 years ago when the incident first occurred - releasing stress hormones or raising his heart rate, probably not by as much as when it first happened, but by enough to matter.

A growing body of research demonstrates that long-term stress causes difficulties ranging from major depression to cardiovascular disease. Toussaint's theories connect forgiveness to those conclusions. Wrongs that go unforgiven, he says, become chronic stressors.

For an adult, a childhood skinned knee or broken arm may have long since healed, but without forgiveness, the emotional wounds of a brutal teenage breakup or other traumatic experience may remain. Unforgiving people are at up to 10 times the risk for mental illness as the forgiving and twice the odds of cardiovascular disease as the average population. Folk idioms such as saying a problem is "eating away at me" might not be far from the truth.

"We'd like to say those are just catchy phrases, metaphors," Toussaint says. "Those things are all too realistic."

Some of Toussaint's more recent studies examine how and why different types of forgiveness impact health. For example, psychologists have long known that men tend to be self-focused, and women are

more other-focused. The same is true of forgiveness: Toussaint found that self-forgiveness is more protective of mental health among men, while forgiving others' actions is more protective for women.

Forgiveness Among the Ruins

He has begun to apply this knowledge to interventions. The most celebrated came in 2007, after an American who runs a Sierra Leone nonprofit asked Toussaint if forgiveness training could help residents of the West African country. The situation was extreme: Sierra Leone ranks among the world's least developed nations, and the civil war that ended in 2002 left tens of thousands dead and hundreds of thousands maimed or disabled. Toussaint and two students — with no graduate schools at Luther, professors often collaborate with undergrads on research — adapted a forgiveness education program that Luskin had used with victims of violence in Northern Ireland.

They traveled to Sierra Leone on a shoestring-budget grant to instruct a group of schoolchildren and their teachers, some of whom had seen their houses burned down or family members murdered. Toussaint's goal wasn't to get them to forget or excuse such behavior. He aspired only to teach stress-reduction techniques to change the way they felt about traumatic events and their perpetrators.

Before the first week of training ended, though, thieves broke into the school and stole a computer, among other supplies, along with cash for teacher salaries. The school was abuzz with these events, and Toussaint at first tried to use the forgiveness training to help them come to terms with what had happened. But he and his students soon fled, fearing for their own safety. Post-training surveys had to be smuggled out of the country in the ensuing months.

And yet, despite trauma piled upon trauma, the experimental results were encouraging. Compared with teachers who hadn't received training, those who completed the abbreviated course saw significant increases in benevolent motivation and gratitude, and lower levels of negative mood and anger, based on standard self-reported psychological measurements.

"If we can do this in Sierra Leone," says Toussaint, "We can do it anywhere."

Toussaint and Luskin saw it as a model program, and this fall, Toussaint will bring a similar curriculum to the Mayo Clinic in nearby Rochester, Minn. Working with a colleague from Luther's nursing school, Toussaint will conduct an intervention with Mayo patients who suffer from two diseases: chronic fatigue syndrome and the widespread pain disorder called fibromyalgia.

Both ailments are debilitating and life altering, but doctors often struggle to accurately diagnose them, shuffling patients from specialist to specialist and clinic to clinic over the course of months until they end up at a place like Mayo. It's a recipe for bitterness and resentment that may worsen the diseases' symptoms, which most physicians believe have at least some psychological component.

Because of time constraints, the training sessions will last just four hours per patient, but Toussaint thinks even such limited efforts will produce significant effects.

Interventions like these — and, indeed, just about any forgiveness research — raise a host of concerns that Toussaint can't yet answer. The field research has demonstrated a moderate correlation between health and forgiving or being able to forgive, but it's difficult to assess the strength of that relationship.

As Toussaint says, the statistical correlations between forgiveness and any given measure of health may be a 0.3 or 0.4 (on a scale of 0 to 1.0) — typical of psychology research, but not unassailable. In addition, there isn't enough longitudinal research (though Toussaint is trying to change that) to definitively suggest that the act of forgiving causes changes in health. In fact, at least one recent study shows the reverse effect — that happiness causes people to be more forgiving.

Toussaint's forgiveness interventions, as well as others by Luskin and University of Wisconsin psychology professor Bob Enright in places from Israel to California, do show more dramatic effects, but the researchers have all faced skepticism. Even the field's top investigators sometimes struggle to find funding. "Forgiveness is still a tough sell," says Luskin. "It has not been an easy road to get openness to it."

Toussaint often has conversations in which people tell him his theories don't resonate with the way they live their lives. Perhaps, he says, the reasons are cultural. "We live in a society that's largely governed by retributive justice and an 'eye for an eye' mentality," he laments. "I don't think our culture promotes forgiveness very well."

America isn't alone, though. Even the oft-praised [South African Truth and Reconciliation Commission](#) and other government-brokered programs seem more focused on emotional confrontations than forgiveness and understanding.

"They believe that through truth comes reconciliation, and through reconciliation comes peace. I would say that through truth often comes nothing but hurt," Toussaint explains. "The aim is good, but reconciliation requires forgiveness."

Toussaint has grand designs on expanding his work well beyond pilot projects. During the next few years, if the Mayo project functions as well as hoped, Toussaint wants to conduct large-scale forgiveness interventions with cardiovascular patients, diabetics, people with eating disorders and others who might benefit from the apparent health benefits of forgiveness. He and Luskin recently raised enough money to bring Sierra Leonean teachers to Stanford for more training, and they want to someday create an institute that educates thousands of people and tracks the outcomes.

Luskin will soon begin teaching psychotherapists to integrate forgiveness into their sessions with patients. Toussaint also sees hospital chaplains as logical people to help patients forgive for health. Eventually, he expects the concept to be as viable a method for helping to combat chronic illnesses as visiting a nutritionist.

To bolster the case that such ideas are worth funding, Toussaint continues to analyze data of ever-bigger epidemiological surveys and tests, including one that marries forgiveness data with stress hormone levels and blood panel measurements, and another that examines South Africans.

Toussaint knows that learning to forgive isn't easy. Even now, images of high school antagonists appear in his mind's eye once or twice per month. "Just because somebody studies something doesn't mean they do it," he says.

But Toussaint is consoled by the fact that people of all races, ages and ethnic groups have learned to forgive and improved their lives with relatively modest efforts. "Unlike in many other areas, you have a lot of control," he says. "It's really up to you."

http://www.miller-mccune.com/health/forgive-and-get-healthy-1486?utm_source=Newsletter77&utm_medium=email&utm_content=1006&utm_campaign=newsletters

Rail's 150-Year Wait for Safety

By: Joan Trossman Bien



When passengers hear the cry of "All aboard!" they rarely give any thought to whether they will arrive safely at their destination. There have been many advances in railway safety, and, when compared with other means of transportation, the railroad safety record is stellar.

On Sept. 12, 2008, the 222 passengers who were riding Metrolink No. 111 from downtown Los Angeles to the Ventura County Moorpark train station probably felt that way. After all, the idea that those who were responsible for running the train could abandon all caution and fail to follow basic operating procedures, risking the lives of all on board, was unthinkable.

But engineer Robert Sanchez, who alone controlled the movement of No. 111, was completely absorbed in texting friends. He ran two red lights and failed to yield to the oncoming freight train using the same single track; his train smashed head-on into a Union Pacific freight train just outside the suburban Chatsworth station. He never even applied the brakes. The force of the collision shoved the locomotive straight into the first passenger car, derailing the rest of the train. Twenty-five people died, including Sanchez, and 135 people were injured in the mangled wreck. None of the crew aboard the Union Pacific train died.

Human error has been and remains a major, yet entirely avoidable, cause of some of the worst train wrecks in U.S. history.

Even back in the mid-19th century, two days after the Great Train Wreck of 1856, *The New York Times* ran an editorial that blamed the railroads and said that trains going in opposite directions should never share a single track.

Now, one year after the Metrolink catastrophe — and 152 years after the New York tragedy — laws have been passed, money has been allocated, and a few small changes have been made in operating procedures. But the one system that would have prevented this catastrophe, "positive train control," known as PTC,

will not be fully implemented before 2012. That is three years earlier than the Rail Safety Improvement Act of 2008, which mandates PTC on all passenger rails in the United States.

Is it really that simple? Policymakers say so.

In testimony at a California State Senate hearing on rail safety about a month after the crash, U.S. Sen. Dianne Feinstein said, "A technology called positive train control is in place on other rail systems to prevent human error from causing fatal disaster, but trains in California currently don't have it. If positive train control had been in place on Metrolink on September 12th, I believe 25 people would still be alive today."

A year later, in announcing the appropriation of funds for a new railroad safety program, her colleague Sen. Barbara Boxer was quoted in a release saying, "Facts revealed by the National Transportation Safety Board investigation indicated that PTC could have prevented the tragic crash of a Metrolink commuter train and a freight train in Chatsworth, California last year."

In Development For Nearly A Century

The federal government in 1922 originally mandated some form of automatic train stopping, yet, to this day, many passenger and commuter lines are without any meaningful and effective form of protection from simple human error. Trains are legally permitted to remain without positive train control until Dec. 31, 2015, the deadline mandated in the Rail Safety Improvement Act of 2008.

According to the Federal Railroad Administration, PTC systems are "integrated command, control, communications and information systems for controlling train movements with safety, security, precision, and efficiency. PTC systems will improve railroad safety by significantly reducing the probability of collisions between trains," danger to railway workers and derailments caused by excessive speed.

By utilizing the technology of global positioning satellites, PTC would automatically override dangerous train movements, remain continuously updated on train locations and stop a train if the crew was incapacitated. For the railroads, the agency writes, the benefits are "improved running time ... higher asset utilization, and greater track capacity."

And there are working systems out there. "Pilot versions of PTC were successfully tested a decade ago, but the systems were never deployed on a wide scale. Deployment of PTC on railroads is expected to begin in earnest later this decade."

All of the train disasters cited in the sidebar, at right, could have been prevented by some system of automatic train control that would override human error. Given PTC's benefits and track record, why is it taking so long for such a system to be installed and operating on all railroad tracks in the United States?

Wait Until 2015

There have been many different automatic train-stopping systems in existence going back to the early part of the 20th century. Europe has had a form of automatic train control operating in some countries, including Great Britain, Germany and France, since the 1930s.

Under the Transportation Act of 1920, the Interstate Commerce Commission required 49 railroads to have an operating train-stop or train-control system on at least a portion of their passenger train routes. What happened to keep that from coming to fruition?

In the 1980s, the Association of American Railroads developed detailed plans for an advanced train-control system using digital radio communication and microprocessor controls. And in 1987, the Burlington Northern Railroad in tandem with Rockwell International developed a similar system using GPS called Advanced Railroad Electronics System. In 1991, teams from Harvard Business School twice

studied the \$350 million Burlington Northern system. The outsiders were enthusiastic — Harvard described their "zealous advocacy of the project" — that the system would save the freight hauler lots of money. But company executives at the then-cash-strapped company were leery about the actual savings and feared their traditional system couldn't adapt to PTC.

Subsequent studies have back up the business case for PTC. The consultancy Zeta-Tech Associates studied PTC for the railroad administration in 2004 and reported its results "suggest that the railroad industry should carefully consider the opportunity presented by PTC technology, especially in view of its ongoing shortage of line capacity and the need to increase the return on invested capital." Both systems, it said, provide "significant business benefits to the freight railroads, as well as unquestioned safety benefits through positive enforcement of movement authorities."

After the 2008 Chatsworth crash, the magazine *Design News* published a series of articles on PTC titled, "Railroad Safety at What Price?" Then-editor John Dodge recalls being stunned by Burlington's actions years before.

"There was a proof of concept [for their PTC system] and [Burlington] tried it out, and it worked. It was a \$350 million rollout. You can talk to all of the people in the railroad industry, and they will rationalize it, but for more than 20 years there has been a viable safety system that BNSF has been sitting on."

"Those people who lost their lives in L.A. didn't have to lose their lives," Dodge said. "That was my view. Railroads are extremely risk-averse and very regimented. Everything is about moving freight at a lower cost, and that is how it has been for more than 150 years."

And yet, Metrolink still has no automated system of any sort on its trains, leaving primary responsibility for the safety of hundreds of passengers each trip to the engineer. In the Chatsworth case, engineer Sanchez, was known by supervisors to text or call friends while running the train alone but no action was taken to stop the prohibited behavior.

Feinstein told the California Senate Hearing on Rail Safety, "Not a single mile of California track has modern collision avoidance Positive Train Control systems — though these systems are in place on more than 3,100 miles of American track. ... In the past 10 years, the National Transportation Safety Board has investigated 52 rail accidents where the installation of a positive train control system would likely have prevented the accident."

When Will Passengers Be Safer?

PTC has been on the National Transportation Safety Board's "Most Wanted List for Transportation Safety Improvements" since 1990. The NTSB has emphasized that such systems are especially needed where passenger trains and freight trains share a single track.

And the concept isn't totally foreign to U.S. tracks: Amtrak has a system fully implemented in the Northeast Corridor between Washington and Boston, while Alaska and New Jersey are actively developing their own versions. In the case of the Metrolink, small safety improvements have been initiated, according to the president of the Metrolink Transportation Board, Keith Millhouse. However, most of the new safety measures have yet to be fully implemented. They include: placing a "Second Set of Eyes," or a second trained engineer in the cab, although only a small percentage of the trains actually have this in action; inward-facing video cameras, which are facing serious resistance from the railroad workers' unions; ordering new passenger cars and cabs that would decrease injuries during a crash, the delivery of which has been delayed; and changing the operating company from Connex to Amtrak, which will not happen until the end of the current contract next year.

Today, Metrolink officials were to announce that video cameras have been installed on all locomotives in the Metrolink system at a cost of \$1 million. That included two inward-facing video cameras, the presence of which is intended to prevent engineers from using cell phones, texting or having unauthorized

personnel inside the cab while operating the train.

However, these cameras are not being monitored in real time, but the video will be downloaded each day for random review. Therefore, the cameras cannot directly prevent a crash similar to the 2008, train wreck. Only the possibility of an engineer fearing that he will be identified after the fact for breaking Metrolink rules will translate to possible accident prevention.

One more system that is about to be activated is called "automatic train stop."

"When the train passes a device, a signal is sounded in the cab that requires the operator to acknowledge the signal that is generated," Millhouse explained. "If the operator fails to acknowledge the signal then the train will be slowed down. We're just at the point where we're ready to turn on the system." But automatic train stop is not a new system. "It is somewhat outdated technology," Millhouse said, and it has limitations. Between money, technology and geography, Millhouse said Metrolink can't install and implement PTC by itself. "We have the largest and most densely congested operating system in the country. Within the Metrolink operating system we have Metrolink, Amtrak, Union Pacific, Burlington Northern Santa Fe and the Coaster system in San Diego, so any equipment that is west of Chicago has the potential to enter this area. We have been proceeding at Metrolink to equip all of our locomotives and trains by 2012."

Union Pacific has declared that it will implement PTC by 2012, three years before the federal mandate. Additionally, the major railroads, Union Pacific, Suffolk Northern and Burlington Northern Santa Fe, reported they have reached an agreement on establishing interoperability standards for PTC.

Despite that agreement, on Aug. 25, Burlington Chief Executive Officer Matt Rose told Bloomberg News that it would be extremely difficult for his company to meet the 2015 deadline. Calling the Railroad Safety Act of 2008 "heavy-handed," he said, "This is just one of those examples of regulation gone awry where there will be unintended consequences."

He asked that lawmakers allow the carriers to implement PTC only on its busiest lines. "Implementing PTC on the specified routes by 2015 will be a logistical, technical and financial challenge," a Burlington spokesperson told Miller-McCune. "The Rail Safety Transportation Act of 2008 is an unfunded mandate. However, BNSF has always said it will make all reasonable efforts to comply with the law."

Rose said PTC will cost the railroads \$10 billion and that Burlington would prefer to install the new technology on its own timetable. In its 2004 report, Zeta-Tech wrote, "PTC is a large investment by any measure. A cost of \$1.3 billion to \$4.4 billion might seem daunting to an industry with gross revenues of only \$35 billion. However, the projected annual savings of \$2 billion to \$3.6 billion provides a rapid payback period."

Epilogue

On Sept. 10, Metrolink ran a test to see how much safety improvement has been made on its tracks in the year since the Chatsworth tragedy. Operators intentionally turned what would normally be a green light during rush hour to a red light. The train blew right through it and the engineer, who is required to call out the signals to the conductor, apparently called out the red light as being a green light.

So whether the railroads will actually move forward in the future with an effective and technologically advanced PTC system or whether human error will continue to have the final word on passenger safety, will be determined only by the legal deadline of 2015.

http://www.miller-mccune.com/business_economics/rail-s-150-year-wait-for-safety-1513?utm_source=Newsletter77&utm_medium=email&utm_content=1006&utm_campaign=newsletters

Brain Waves Surge Moments Before Death

Irene Klotz, Discovery News



Oct. 6, 2009 -- A study of seven terminally ill patients found identical surges in brain activity moments before death, providing what may be physiological evidence of "out of body" experiences reported by people who survive near-death ordeals.

Doctors at George Washington University Medical Faculty Associates recorded brain activity of people dying from critical illnesses, such as cancer or heart attacks.

Moments before death, the patients experienced a burst in brain wave activity, with the spikes occurring at the same time before death and at comparable intensity and duration.

Writing in the October issue of the *Journal of Palliative Medicine*, the doctors theorize that the brain surges may be tied to widely reported near-death experiences which typically involve spiritual or religious attributes.

At first, doctors thought the electrical surges picked up by electroencephalographs were caused by other machines or cell phones in the rooms of dying patients, lead author Lakhmir Chawla told Discovery News.

The EECs were being used to monitor patients' level of consciousness as doctors and families wrestle with end-of-life issues.

"We did it when patients want to withdraw life support, to make sure patients are comfortable, as we withdraw care," Chawla said.

The medical staff kept seeing spikes in patients' brain waves just before death.

"We thought 'Hey, that was odd. What was that?'" Chawla said. "We thought there was a cell phone or a machine on in the room that created this anomaly. But then we started removing things, turning off cell phones and machines, and we saw it was still happening."



The doctors believe they are seeing the brain's neurons discharge as they lose oxygen from lack of blood pressure.

"All the neurons are connected together and when they lose oxygen, their ability to maintain electrical potential goes away," Chawla said. "I think when people lose all their blood flow, their neurons all fire in very close proximity and you get a big domino effect. We think this could explain the spike."

It's possible a cutoff of oxygen would trigger a similar but recoverable event that becomes seared into memory.

"Not everyone reports this light sort of business. What you hear most often reported (in near-death experiences) is just a vivid memory," Chawla said.

Brain researcher Kevin Nelson at the University of Kentucky, who studies near-death experiences, said it's well known that when the brain is abruptly deprived of blood flow it gives off a burst of high voltage energy.

"It's unlikely with conventional brain wave recordings during death that they're going to see something that hasn't been seen already," Nelson said.

Chawla and colleagues would like to follow up their case study with a larger pool of patients outfitted with more sophisticated brain activity sensors.

<http://dsc.discovery.com/news/2009/10/06/near-death-brain.html>

The Yawn Explained: It Cools Your Brain

Jennifer Viegas, Discovery News



Dec. 15, 2008 -- If your head is overheated, there's a good chance you'll yawn soon, according to a new study that found the primary purpose of yawning is to control brain temperature.

The finding solves several mysteries about yawning, such as why it's most commonly done just before and after sleeping, why certain diseases lead to excessive yawning, and why breathing through the nose and cooling off the forehead often stop yawning.

The key yawn instigator appears to be brain temperature.

"Brains are like computers," Andrew Gallup, a researcher in the Department of Biology at Binghamton University who led the study, told Discovery News. "They operate most efficiently when cool, and physical adaptations have evolved to allow maximum cooling of the brain."

He and colleagues Michael Miller and Anne Clark analyzed yawning in parakeets as representative vertebrates because the birds have relatively large brains, live wild in Australia, which is subject to frequent temperature swings, and, most importantly, do not engage in contagious yawning, as humans and some other animals do.

Contagious yawning is thought to be an evolved mechanism for keeping groups alert so they "remain vigilant against danger," Gallup said.

For the study, the scientists exposed parakeets to three different conditions: increasing temperature, high temperature and a moderate control temperature. While the frequency of yawns did not increase during the latter two conditions, it more than doubled when the researchers increased the bird's ambient temperature.

A paper on the findings has been accepted for publication in the journal *Animal Behavior*.

"Based on the brain cooling hypothesis, we suggest that there should be a thermal window in which yawning should occur," Gallup said. "For instance, yawning should not occur when ambient temperatures exceed body temperature, as taking a deep inhalation of warm air would be counterproductive. In addition, yawning when it is extremely cold may be maladaptive, as this may send unusually cold air to the brain, which may produce a thermal shock."

The parakeets yawned as predicted.

It's now believed yawning operates like a radiator for birds and mammals.

If air in the atmosphere is cooler than brain and body temperatures, taking it in quickly cools facial blood that, in turn, cools the brain and may even alter blood flow. Prior studies reveal yawning leads to a heightened state of arousal, so a morning yawn may function somewhat like a cup of coffee in providing a jolt of energy.

The new findings also explain why tired individuals often yawn, since both exhaustion and sleep deprivation have been shown to increase deep brain temperatures, again prompting a yawn-driven cool down. Yawning additionally appears to facilitate transitional states of the brain, such as going from sleep to waking periods.

Gordon Gallup, Jr., a State University of New York at Albany psychologist, did not work on the study, but, as Andrew Gallup's father, paid close attention to the research. The senior Gallup also happens to be a leading expert on the science of yawning and other widespread evolved traits.

"It is interesting to note that instances of excessive yawning in humans may be indicative of brain cooling problems," Gallup, Jr., told Discovery News, pointing out that patients with multiple sclerosis often experience bouts of excessive yawning "and MS involves thermoregulatory dysfunction."

"Bouts of excessive yawning often precede the onset of seizures in epileptic patients, and predict the onset of headaches in people who suffer from migraines," he added.

In the future, researchers may focus more on brain temperature and its role in diseases and their symptoms. But the new study on yawning changes the popular notion that yawns are mere signs of boredom.

On the contrary, as Gallup said, "yawning more accurately reflects a mechanism that maintains attention, and therefore should be looked at as a compliment!"

<http://dsc.discovery.com/news/2008/12/15/yawn-brain-head.html>

Warning over global oil 'decline'

By Sarah Mukherjee
Environment correspondent, BBC News

There is a "significant risk" that global production of conventional oil could "peak" and decline by 2020, a report has warned.



The UK Energy Research Centre study says there is a consensus that the era of cheap oil is at an end.

But it warns that most governments, including the UK's, exhibit little concern about oil depletion.

The report's authors also state that the 10 largest oil producing fields in the world are all in decline.

Reliable gauge

As this report points out, the debate about peak oil is a polarised one.

“ More than two-thirds of current crude oil production capacity may need to be replaced by 2030 ”
UK Energy Research Centre

On one side, there are those who say that global supplies have already reached their zenith, and we are unprepared for the crisis that will hit world economies in the years to come.

On the other, there are oil companies and many energy analysts who dismiss the notion that supplies are running out.

The report's authors admit it is hard to tell who is right, as the world lacks a reliable gauge with which to measure oil depletion.

Problems are created by "inconsistent definitions", it says, noting the "paucity of reliable data, the frequent absence of third-party auditing of that data and the corresponding uncertainty surrounding the data that is available".

It goes on: "The difficulties are greatest where they matter most, namely the oil reserves of Opec countries.

"But they also apply at a much more basic level, such as uncertainties over the amount of oil produced by a given country in a given year.

THE PEAK OIL DEBATE

- There is little consensus about when the global oil production curve will hit its peak - or if it has already done so
- Modelling the curve takes into account proven reserves and varying estimates of oil stored in wells, shale, oil sands etc.
- Some estimates suggest a production "plateau" instead of a simple decline
- Global market factors like the uptake of renewable energy sources strongly influence the oil production curve

"The resulting confusion both fuels the peak oil debate and creates substantial risk in relying on any particular set of numbers."

Part of the difficulty in estimating the amount of oil left is that those with the reserves are often unwilling to divulge what can be commercially very sensitive information.

Countries and companies are notoriously reticent about their oil reserves.

But the report suggests the easy oil has already been found, and new reserves will become increasingly difficult and expensive to extract, and will not make up for the current major oil fields as they decline.

It says: "More than two-thirds of current crude oil production capacity may need to be replaced by 2030, simply to keep production constant.

"At best, this is likely to prove extremely challenging."

More attention urged

This report does not contain new research, but is a review of data already available.

But the authors say the risk presented by global oil depletion deserves much more serious attention by the research and policy communities.

"Much existing research focuses upon the economic and political threats to oil supply security and fails to either assess or to effectively integrate the risks presented by physical depletion," they argue.

"This has meant that the probability and consequences of different outcomes has not been adequately assessed."

Despite the evidence, the report notes with some surprise that the UK government rarely mentions the issue in official publications.

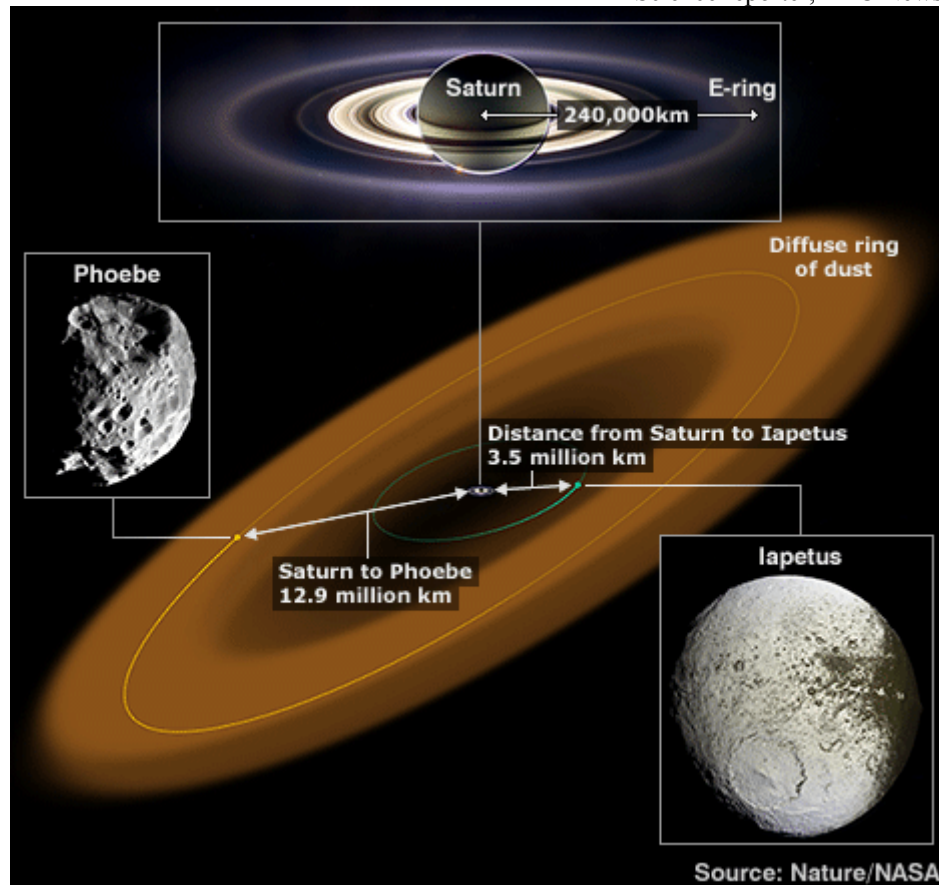
Story from BBC NEWS:

<http://news.bbc.co.uk/1/hi/science/nature/8296096.stm>

Published: 2009/10/08 02:50:40 GMT

New ring detected around Saturn

By Jonathan Amos
Science reporter, BBC News



A colossal new ring has been identified around Saturn.

The dusty hoop lies some 13 million km (eight million miles) from the planet, about 50 times more distant than the other rings and in a different plane.

Scientists tell the journal *Nature* that the tenuous ring is probably made up of debris kicked off Saturn's moon Phoebe by small impacts.

They think this dust then migrates towards the planet where it is picked up by another Saturnian moon, Iapetus.

“

The particles smack Iapetus like bugs on a windshield ”

Dr Anne Verbiscer, University of Virginia

The discovery would appear to resolve a longstanding mystery in planetary science: why the walnut-shaped Iapetus has a two-tone complexion, with one side of the moon significantly darker than the other.

"It has essentially a head-on collision. The particles smack Iapetus like bugs on a windshield," said Anne Verbiscer from the University of Virginia, US.



Observations of the material coating the dark face of Iapetus indicate it has a similar composition to the surface material on Phoebe.

The scale of the new ring feature is astonishing. Nothing like it has been seen elsewhere in the Solar System.

The more easily visible outlier in Saturn's famous bands of ice and dust is its E-ring, which encompasses the orbit of the moon Enceladus. This circles the planet at a distance of just 240,000km.

The newly identified torus is not only much broader and further out, it is also tilted at an angle of 27 degrees to the plane on which the more traditional rings sit.

This in itself strongly links the ring's origin to Phoebe, which also takes a highly inclined path around Saturn.

Scientists suspected the ring might be present and had the perfect tool in the Spitzer space telescope to confirm it.

The US space agency observatory is well suited to picking up the infrared signal expected from cold grains of dust about 10 microns (millionths of a metre) in size.

The ring would probably have a range of particle sizes - some bigger than this, and some smaller.

Modelling indicates the pressure of sunlight would push the smallest of these grains towards the orbit of Iapetus, which is circling Saturn at a distance of 3.5 million km.

"The particles are very, very tiny, so the ring is very, very tenuous; and actually if you were standing in the ring itself, you wouldn't even know it," Dr Verbiscer told BBC News.

"In a cubic km of space, there are all of 10-20 particles."

Indeed, so feeble is the ring that scientists have calculated that if all the material were gathered up, it would fill a crater on Phoebe no more than a kilometre across.

The moon is certainly a credible source for the dust. It is heavily pockmarked. It is clear that throughout its history, Phoebe has been hit many, many times by space rocks and clumps of ice.

"We've got a 'smoking gun'," said Professor Carl Murray, a scientist working on the US-European Cassini probe, which is currently touring the Saturnian system.

"We know now that this is where this coating at Iapetus comes from. Phoebe is the source. Something has hit Phoebe, produced lots of material that moves around the orbit of Phoebe and then gradually spirals in. We've solved several mysteries with this observation," the UK researcher told BBC News.

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Story from BBC NEWS:
<http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8291905.stm>

Published: 2009/10/07 08:10:46 GMT



Children draw own visions of 2020

Children asked to come up with ideas for life in 2020 have designed labour-saving devices, magic pencils to do their homework and, of course, robots.



Some 85,000 young inventors have submitted ideas to the UK's Intellectual Property Office, formerly the Patent Office.

The best of the ideas will be buried in a time capsule, to be opened in 2020.

It follows the Intellectual Property Office's sponsorship of The Science Museum's Cracking Ideas Exhibition.

The Cracking Ideas exhibition offers children a chance to see inside the famous home of Wallace and Gromit and some of Wallace's own inventions.

Ideas from children who visited the exhibition include a robot chef who can prepare any dish "on demand".

Magic pencils

Billy the Chef is made of recycled tin cans and has arms of disposable stacking cups.

As the roads get ever more crowded, Tyona Higgins, aged 14, has come up with an underwater solution. Her flotation device comes complete with a password activated navigation system and "super-vision" lights.



Caring for the environment was high on many youngsters' agendas with eco-friendly devices such as a solar-powered lawn mower and TVs operated by pedal power.

But one thing remains unchanged - the desire for children to find a quick solution to the burden of homework.

Pencils that do homework for you and paintbrushes that automatically paint masterpieces were among some of the ideas.

Lawrence Smith-Higgins, head of education at the Intellectual Property Office, is hopeful that one of the great inventors of the future could be among the youngsters.

"We'll dig up the time capsule to see how the cracking ideas shape up in a world that's sure to be different from today," he said.

The time capsule will be buried at the Intellectual Property Office on 14 October. The Cracking Ideas exhibition runs until 1 November.

Story from BBC NEWS:

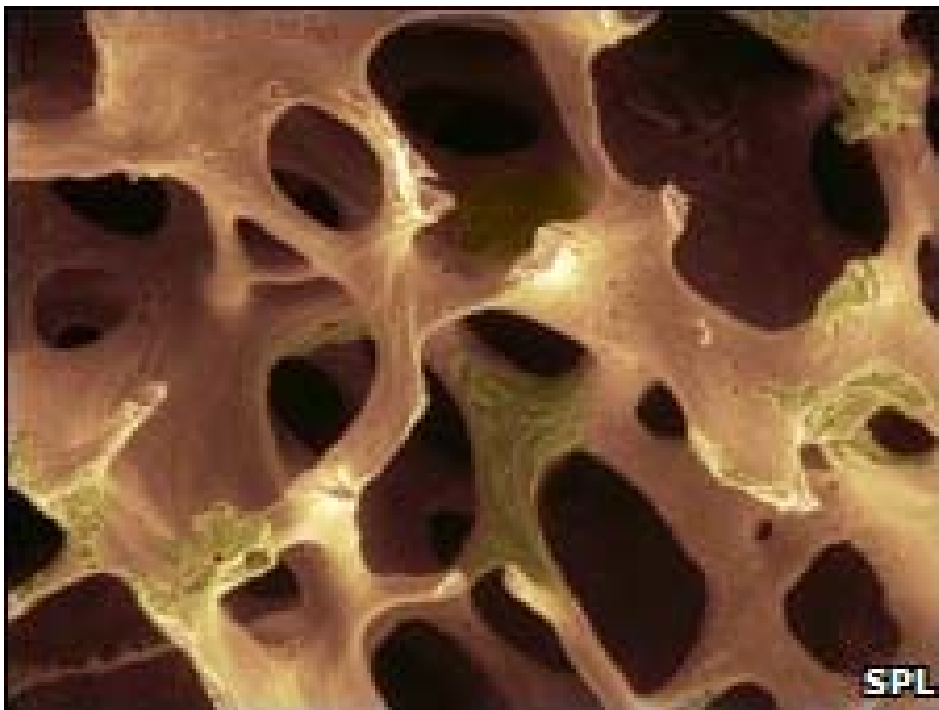
<http://news.bbc.co.uk/go/pr/fr/-/2/hi/technology/8295607.stm>

Published: 2009/10/07 23:43:40 GMT



Coeliac bone loss link uncovered

People with coeliac disease may be more susceptible to osteoporosis because their own immune system attacks their bone tissue, a study suggests.



Osteoporosis is a known risk of coeliac disease and has been explained by a failure to absorb calcium or vitamin D.

But a study in the New England Journal of Medicine suggests coeliac patients produce antibodies which attack a key protein that maintains bone health.

They could easily be treated with drugs to prevent bone loss, researchers say.

It also explains why osteoporosis in those with the digestive disorder may not respond to calcium and vitamin D.

Coeliac disease is caused by a reaction to gluten, a protein found in wheat, which damage the small finger-like villi that line the small intestine and play a key role in digestion.

When damaged and inflamed, the villi are unable to absorb food properly, causing diarrhoea and malnutrition.

It affects one in 100 people, and of these a significant proportion may go on to develop osteoporosis - a disease of bone that leads to an increased risk of painful and disabling fractures.

Protein clue

Scientists at the University of Edinburgh say it may be a protein called osteoprotegerin which holds the key to the link between coeliac disease and osteoporosis.

“ Our traditional understanding of its cause has left some people with the condition with little hope that their symptoms and quality of life will improve ”

Sarah Sleet Coeliac UK

In 20% of the coeliac patients tested, antibodies were produced which stopped this protein - crucial for maintaining bone strength - from working effectively.

Lead researcher Professor Stuart Ralston from the Institute of Genetics and Molecular Medicine, said: "This is a very exciting step forward. Not only have we discovered a new reason to explain why osteoporosis occurs in coeliac disease, but we have also found that it responds very well to drugs that prevent bone tissue removal.

"Testing for these antibodies could make a real and important difference to the lives of people with coeliac disease by alerting us to the risk of osteoporosis and helping us find the correct treatment for them."

Sarah Sleet, head of Coeliac UK said: "Osteoporosis is a damaging complication of coeliac disease and our traditional understanding of its cause has left some people with the condition with little hope that their symptoms and quality of life will improve.

"This new breakthrough in understanding and treatment will give renewed hope to our members struggling with their condition."

Dr Claire Bowring, medical policy officer with the National Osteoporosis Society said: "We already know that coeliac disease is a risk factor for osteoporosis and that early diagnosis and treatment of coeliac disease gives the best chance of improving bone density.

"A better understanding of the relationship between coeliac disease and osteoporosis will enable clinicians to manage both conditions more effectively.

"Although this research is at an early stage it is certainly interesting and we look forward to more extensive work to identify how prevalent this antibody is in people with coeliac disease."

Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8295438.stm>

Published: 2009/10/08 00:11:06 GMT

India pregnancy deaths 'needless'

Tens of thousands of women die in India during pregnancy or childbirth or soon after giving birth, a new report says.



The Human Rights Watch (HRW) report says the deaths occur despite government programmes guaranteeing free maternal health care.

The focus of the study is on Uttar Pradesh - India's most populous northern state - where a large number of women die from "preventable causes".

The state is among the most backward in India with abysmal health care systems.

The 150-page report - *No Tally of the Anguish: Accountability in Maternal Health Care in India* - documents repeated failures both in providing health care to pregnant women in Uttar Pradesh and in taking steps to identify and address gaps in care, HRW said in a press release.

The state has one of the highest maternal mortality ratios in India, but government surveys show it is not alone in struggling with these problems, including a failure even to record how many women are dying.

'Life and death'

"Unless India actually counts all the women who die because of childbirth, it won't be able to prevent those thousands of unnecessary deaths," says Aruna Kashyap, lead researcher of Human Rights Watch.

"Accountability might seem like an abstract concept, but for Indian women it's a matter of life and death," she says.

India has made reducing maternal deaths a major health priority by making maternal health care free for poor women, and providing cash incentives for those delivering at health facilities instead of at home.



Despite this "priority" status, monitoring is so poor there is no reliable record of how many women are dying each year, and whether these initiatives are reaching those who need it the most, the report says.

It cites numerous examples where a breakdown in the system ended tragically.

India created a flagship programme - the National Rural Health Mission - in 2005 to improve rural health, with a specific focus on maternal health.

But the system is not working as it should in many cases, the report says.

It blames corruption and a lack of awareness among women for the sorry state of affairs.

Story from BBC NEWS:

http://news.bbc.co.uk/go/pr/-/2/hi/south_asia/8294132.stm

Published: 2009/10/07 09:25:52 GMT

My little zebra: The secrets of domestication

- 05 October 2009 by **Henry Nicholls**
- Magazine issue 2728.

So far attempts at domestication have failed with these beasts (Image: Marcie Jan Bronstein / Getty)

[1 more image](#)

Editorial: *Old MacDonald's new farm: What animals should we tame next - or has domestication gone too far already?*



IN 2003, while geneticist Svante Pääbo was visiting Novosibirsk, Russia's third-largest city, he decided to look in on a famous experiment run by the Institute of Cytology and Genetics, which is based in the city. Fifty years ago, the then head of the IC&G, geneticist Dmitry Belyaev, had begun breeding silver foxes to see how easily they could be tamed. What Pääbo didn't know, though, is that Belyaev had also set up another experiment in the 1970s involving rats. This time, one line of rats was selected for tameness and another selected for aggression.

When Pääbo saw them, he was stunned. After just 30 years of selection, the IC&G researchers had fashioned two populations that could hardly be more different. "I could take the tame ones out of the cage with my bare hands. They would creep under my shirt and seemed to actually seek and enjoy contact," recalls Pääbo. "The aggressive animals were so aggressive I got the feeling that 10 or 20 of them would probably kill me if they got out of the cages."

The aggressive rats were so aggressive I got the feeling that 10 or 20 of them would kill me if they got out of the cage

Here was a great opportunity to uncover the genetic changes responsible for the behavioural differences, Pääbo realised. Back at the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany, Pääbo and his team have been trying to do just this. If they succeed, their findings could have far-reaching consequences.

The zebra, for instance, is a stubborn beast, one that has thwarted all efforts to domesticate it, as have the cheetah, the African buffalo and the rhinoceros. Understanding the genetic basis of tameness might make it possible to domesticate the undomesticatable and turn exotic species into farm animals or even pets. It could also help us understand what makes some people overly aggressive - and perhaps even lead to treatments for behavioural disorders.

The zebra has thwarted all efforts to domesticate it, as have the cheetah, the African buffalo and the rhinoceros

Most domesticated mammals are really rather different from their wild ancestors: they often have a radically different body shape, frequently sport unusual fur patterns or markings, and it is not uncommon for them to be able to breed all year round. Surely it must have taken many, many generations for all these differences to accumulate?

Charles Darwin certainly thought so, suggesting the process of domestication was "insensibly slow". But Belyaev thought otherwise. He proposed that many of the features typical of domesticates arose because our distant human ancestors made their initial selection of wild animals on the basis of just one, rather practical characteristic: tameness. If this were the case, domestication was not only simple, it might also have taken far fewer generations than imagined.

A simple thought experiment will give an idea of how Belyaev probably saw things. Imagine yourself back some 10,000 years. You've been hunting and gathering for as long as you can remember, and quite frankly you're sick of it. There, on the horizon, is a herd of herbivores. Wouldn't it be nice, you think, if you could keep and breed a few close to home? You'd have ready access to meat and milk all year round. Life would be so much easier.

You slowly approach the herd. The skittish animals stamp and back off. The unflustered ones blink and stay their ground. The upshot is that the animals you end up taking home are the ones that are least perturbed by human company. If this behavioural trait has a genetic basis, you have already selected animals boasting genes for tameness. That, the bold Russian hypothesised, is a crucial step in domestication. All the other stuff that characterises most domesticated mammals - the floppy ears, varied coat markings and altered reproduction - are simply by-products of selecting for tameness.

In 1959, Belyaev set out to test his idea. He obtained 130 relatively friendly silver foxes from a fur farm in Estonia and installed them at a farm near the small town of Kainskaya Zaimka, on the outskirts of Novosibirsk. He began to breed them, but in each generation only allowed the very tamest animals to reproduce. Within four generations, some of the foxes had started to wag their tails; after eight generations new spots and markings began to appear on some of the offspring; then ears flopped, tails shortened, skulls widened and the foxes became more relaxed about when they bred. After just 20 years, Belyaev's team had created a domestic fox.

They began to wag their tails, new markings appeared, and ears flopped. After just 20 years, the foxes had been tamed

Further investigations into the animals' physiology were revealing. Compared with wild silver foxes, the tame foxes have reduced activity of the hypothalamic-pituitary-adrenal axis, a complex set of nervous and hormonal signals that, among other things, controls an animal's response to stress. Tame foxes also have higher levels in their brains of serotonin, a neurotransmitter that inhibits aggressive behaviour. These and other subtle modifications go some way to explaining why the tame foxes are so chilled-out.

The silver fox is just one animal, though. Would selection for tameness bring about similar rapid changes in other mammals, too? It was to address this that Belyaev obtained a group of wild rats in 1972 and set about creating the two lineages.

Next, Belyaev turned his attention to American mink. He approached a fur farm housing 30,000 animals and came away with 200 relatively tame individuals. After just four generations of selective breeding, there was clear evidence that domestication was under way. Not only were the animals easier to approach, but novel coat colours and other anatomical features had started to appear, just as they had done with the foxes.

Tame otters

Starting in 1980, the researchers began to capture wild river otters, bringing them to the farm from Sakhalin Island, north of Japan. Thirteen years and three generations later, the percentage of tame river otters at the farm had more than tripled, from around 10 per cent initially. These animals also boasted lighter markings, earlier reproduction and changes in brain chemistry.

The results of these experiments suggest that Belyaev was right: far from the characteristic features of domesticated mammals requiring hundreds of generations of selective breeding, they start to appear in just a few. With all the animals, selecting for tameness brought with it new colour variants and altered reproduction, in fact pretty much all the features typical of a domesticated species. According to Lyudmila Trut, who took charge of the experiments after Belyaev's death in 1985, part of the reason is that breeding for tameness produces changes in the timing of developmental processes.

With the break-up of the Soviet Union in the early 1990s, these ground-breaking experiments ran into difficulty. By the end of the decade, with little money for food or salaries, the IC&G was forced to reduce the number of breeding foxes from 700 to just 100 and the number of mink from over 6000 to around 1000. The otter programme did not survive the funding crisis, though some of the tame animals and their descendants can still be seen at Moscow Zoo.

Things began to look up after Pääbo came to see the foxes. After some negotiation, Trut agreed to establish colonies of tame and aggressive rats in Germany to allow the genetic changes in the animals to be identified. "It took over a year to get everything in place," says Pääbo. When, in late 2005, 15 tame and 15 aggressive rats left Novosibirsk, they were chaperoned all the way to Leipzig by IC&G staff. One of the first things the team in Germany did was to check that the differences in the rats' behaviour really are due to nature, not nurture. To do this, they swapped the offspring shortly after birth, so pups born of tame parents were being reared by aggressive mothers and vice versa. If the post-natal environment has an influence, aggressive pups reared by tame mothers would become tamer. "We did not see that at all," says Frank Albert, who led the study (*Hormones and Behaviour*, vol 53, p 413). The cross-fostered rats behaved exactly like their genetic parents, he says.

There is still the possibility that the hormones sloshing around during pregnancy might alter fetal development and hence behaviour. Ruling this out requires switching embryos between mothers, which has yet to be done in rats. It has, however, been done in the silver foxes and had no obvious effect.

So, confident that the differences in behaviour are down to gene variants, the researchers set out to find them. They could not simply compare the DNA of the tame and aggressive strains, since many of the differences would have nothing to do with their behaviour - any two populations kept apart will diverge genetically even without selection, due to random mutations. Instead, they cross-bred the rats. The second generation of hybrids had a spectrum of behaviour from exceedingly tame to monstrously aggressive. The next task was to measure tameness, for which they used the "glove test". Wearing two cotton gloves and a third made from chain mail, a researcher moves his or her hand slowly towards the rat, attempts to touch it and pick it up. "You can do anything with the tame rats," says Albert. "You can touch them, you can pick them up, you can move them around, you can move their arms and legs." The chain mail is there for the aggressive rats. "The moment you open the cage door some of them will come flying at the glove, bite it, latch on and scream," he says. "After testing you sometimes have bruises on your fingers."

Each glove test is videoed, so researchers who have no direct contact with the rats can objectively rate how tame or aggressive they are. The team then compared the behavioural scores with 200 genetic markers. Their preliminary findings, published in June this year (*Genetics*, vol 182, p 541), highlight several key regions of the genome that have a strong effect on tameness. "There are at least five genes, probably more, that are having a very complex interaction," says Albert.

The mission is now to home in on what these genes are and exactly what they do. If there are multiple mutations, each with a small effect on behaviour, this will be pretty challenging, says Leif Andersson, a geneticist at Uppsala University in Sweden involved in the project. "However, one of our loci has a major effect and influences both behaviour and the size of the adrenal gland," he says. "I am

optimistic that we will be able to reveal the mutation and the gene underlying this major effect within a couple of years."

Network of genes

Given enough time, more painstaking work and a bit of luck, it seems likely the researchers will identify the entire network of genes responsible for tameness and aggression in rats. "Once we have them, we will of course see if the same genes and the same physiological pathways differentiate domesticated animals from their wild relatives," says Albert. "It might be a general thing."

Indeed, the same genes might turn out to underlie social behaviour in a wide range of mammals - including us (see "[The tame ape](#)"). Trut sees many similarities between the silver foxes and humans, for instance. "The range of behaviours in these foxes has significant parallels to that of normal and disordered patterns of human sociability," she says. She hopes pharmaceutical companies will start using the silver foxes to investigate potential therapies for behavioural problems. Selling the foxes as pets could be another potential source of income for the struggling IC&G. According to Trut, they make good pets, as devoted as dogs but as independent as cats.

If there is a common genetic basis for domestication, the work of Pääbo and Albert could make it much easier to domesticate other species. Take the African buffalo, for example. It is notoriously aggressive, killing more people each year than lions. The benefits of creating a line of less volatile - even friendly - buffalo would be enormous. As these animals are well adapted to local conditions, they would make for a more robust herd than domesticated cattle. Domesticating them might simply be a question of screening buffalo to find some with the right genes, and setting up some suitable pairings. If this failed, there would be the prospect of tinkering more directly with the African buffalo genome. Some people will object to the very notion of domesticating more wild species, whether for farms or as pets. But many tame animals, such as dogs, cats, horses, sheep, now far outnumber their wild relatives. Wouldn't it be better if some threatened animals survived as pets or farm animals rather than not at all?

There is also a certain appeal to the idea of taming exotic creatures. Take zebras. While a few individuals have managed to ride them, they have never been fully tamed. "Maybe we have not tried hard enough to find zebras that are suitable for domestication," suggests Andersson. If Pääbo's genetic quest reveals the secret to taming the zebra, Royal Ascot might never be the same again.

The tame ape

Perhaps we are also a product of domestication. Over the last 30,000 years, human brain size, tooth size and jaw size have all been on the decrease - exactly the same kind of changes that have occurred as animals such as dogs were domesticated, says Richard Wrangham, a biological anthropologist at Harvard University. This raises the intriguing possibility that humans have been on an evolutionary journey from aggressive chimpanzee-like ancestor to the relatively tame species we are today.

If this is the case, who did the domesticating? The answer, suggests Wrangham, is that we did. Humans, he argues, are "self-domesticated apes", with natural selection favouring individuals that showed tame and cooperative behaviour, and weeding out the more aggressive and antagonistic among us.

Henry Nicholls is a science journalist based in London. He is writing Political Animal, a book about pandas and China to be published by Profile in 2010

<http://www.newscientist.com/article/mg20427281.500-my-little-zebra-the-secrets-of-domestication.html?page=1>

Chronic fatigue syndrome linked to 'cancer virus'

- 19:00 08 October 2009 by Ewen Callaway

Chronic fatigue syndrome, the debilitating condition once dismissed as "yuppie flu", has been linked to a virus that is also common in people with a certain type of prostate cancer.

It's still not clear if the virus, called XMRV, causes chronic fatigue syndrome (CFS), or is just more common in people with the disorder. But the discovery is sure to reignite the debate over whether CFS is fundamentally a psychological condition or a physiological one.

"It's a contentious area that lies somewhere between medicine and psychiatry," says Simon Wessely, a psychiatrist at King's College London who has been vilified by patient groups for his scepticism of cut-and-dried explanations for CFS and his assertion that psychological factors may play an important role.

CFS is characterised by cramps, sleeplessness, weakness and headaches. It affects more than a million Americans and a quarter of a million Britons, yet its cause remains elusive.

Virus clues

Previously a number of viruses, including herpesviruses, enteroviruses and Epstein-Barr virus – which also causes glandular fever, or mononucleosis – have been suggested as triggers for CFS. But these have only been found in a small minority of people with the disorder.

A team led by Judy Mikovits at the Whittemore Peterson Institute in Reno, Nevada, decided to investigate whether XMRV (or xenotropic murine leukaemia virus-related virus, to give it its full name) might be linked to CFS after the virus was reported in 2006 to be present in the tumour tissue of patients with a hereditary form of prostate cancer.

It is still not clear what effect the virus has on people. But the fact that this type of prostate cancer and CFS have both been linked to changes in the same antiviral enzyme led Mikovits to wonder whether XMRV could be playing a role in CFS too.

Sensitive test

When her team analysed blood taken from 101 CFS patients, 68, or two thirds, tested positive for XMRV genes, compared with just eight out of 218 healthy controls. The next step will be working out whether XMRV causes CFS or just grows particularly well in people who have it.

Mikovits suspects that XMRV causes CFS. She says her team has found antibodies against XMRV in 95 per cent of the nearly 300 patients they have tested, but these results have yet to be published in a journal. Antibodies are a more sensitive test than looking for viral genes, as they pick up people who have had XMRV in the past, not just those who still have it.

What's more, some characteristics of the virus match up with the syndrome's symptoms, she says. Viruses related to XMRV can cause blood vessels around the body to leak, a common symptom of CFS. Mikovits also notes that in mice, a protein that coats the shell of the virus causes the animals' nerves to degenerate. A class of immune cells called natural killer cells, which are thought to go wrong in CFS, are known to be susceptible to infection by the virus.

"XMRV infection of [natural killer] cells may affect their function," says Jonathan Kerr, a researcher at St George's, University of London, who was not involved in the study. "This does fit." He adds, however, that "an independent study to confirm these findings is very much needed".

Childhood trauma

That sentiment is echoed by John Coffin, a virologist at Tufts University in Boston. "This looks like a very, very interesting start," he says. "It's not impossible that this could cause a disease with neurological and immunological consequences, but we don't know for sure."

Wessely points out, however, that XMRV fails to account for the wide variety of other factors associated with the CFS, including childhood trauma and other infections such as viral meningitis. "Any model that is going to be satisfactory has to explain everything, not just little bits," he says.

If XMRV does turn out to contribute to CFS, this could point to new treatments. In the UK, patients are prescribed exercise and cognitive therapy, which seems to work for some patients, but not for most. Such failings underscore the need for therapies that go after the root cause of chronic fatigue syndrome – whatever it turns out to be.

Journal reference: *Science*, DOI: [10.1126/science.1179052](https://doi.org/10.1126/science.1179052)

<http://www.newscientist.com/article/dn17947-chronic-fatigue-syndrome-linked-to-cancer-virus.html>

Has the pill changed the rules of sexual attraction?

- 17:23 07 October 2009 by Linda Geddes

The contraceptive pill alters monthly fluctuations in hormones associated with the menstrual cycle, mimicking the more stable hormonal conditions associated with pregnancy. This might not only disrupt the natural processes which influence women's choice of partner, but it could also make them less able to compete with women who have a natural menstrual cycle, a paper published this week in *Trends in Ecology and Evolution* suggests.

How worried should we be, and what other strategies can men and women use to tip the odds in their favour? *New Scientist* investigates.

What do we know about how women choose a mate?

Recent studies have confirmed that women tend to prefer taut bodies, broad shoulders, clear skin and defined, masculine facial features – all of which may indicate sexual potency and good genes. Women also tend to be attracted to men who look as if they have wealth, or the ability to acquire it.

Smell may also be a factor: women seem to prefer the scent of men who have immune systems dissimilar to their own, as measured by genes for the major histocompatibility complex (MHC). A number of companies have sprung up recently that even claim to be able to match couples on the basis of their genes.

How might the contraceptive pill interfere with this?

Levels of the sex hormones oestrogen and progesterone fluctuate throughout a woman's monthly menstrual cycle. At the start of the cycle – when the egg is maturing – the body releases oestrogen. During the second half of the cycle, after the egg has been released and might implant, progesterone is secreted. A woman's most fertile period comes in between these two phases, shortly before and immediately after the egg is released.

Women's preferences for certain male scents and features are thought to change during their cycle. For example, as they approach ovulation, women prefer men with more masculine features, possibly because these reflect high sexual potency and better genes. During non-fertile periods they prefer more feminine facial features and attributes, perhaps because such men may be more nurturing and therefore better at helping to raise children, even if they are not their own.

The pill may throw a spanner in the works. It stops this cyclical release of oestrogen and progesterone, and so may interfere with women's natural choice of partner. Some studies have suggested that while women usually prefer the scent of men with immune profiles dissimilar to their own, those on the pill preferred men with similar immune profiles.

Should women on the contraceptive pill be worried?

Although studies have hinted that women's choice of partner may be affected by the pill, such basic mechanisms of mate choice likely evolved in very different conditions to today's society. Our ancestors lived in far smaller communities and rarely had the chance to meet outsiders. This means the chances of inbreeding would have been much higher, and subtle cues like smell might well have reduced the chances of this happening.

Today, our communities are far more diverse, so the chances of inbreeding are more remote. Many would argue that personality is a far better way to choose a life partner than what they smell like. One recent study involving speed-dating experiments suggested that although women might say they prefer the scent of men with dissimilar immune systems, this doesn't correspond with the men they actually chose to go out with.

As the authors of the new *Trends in Ecology and Evolution* paper point out, more studies are needed to establish whether mate preferences in lab experiments actually correlate with how men and women behave in the real world.

Don't men have any say in the matter?

As a general rule, men tend to desire women with features that suggest youth and fertility, including a low waist-to-hip ratio, full lips and soft facial features.

Some studies have looked at men's preferences for women at different stages of the menstrual cycle. For example, women's voices are thought to be more attractive during the most fertile period of their cycle. During this part of their cycle, lap dancers also reportedly earn more than at other times.

The contraceptive pill might in theory iron out some of these differences. The problem is that many of these studies have relied on artificial conditions – by asking men to rate women's walks in video clips, for example.

It's unlikely that we pay such close attention to these cues in the real world. Even if we do, it's obvious that the majority of women who are on the pill have no problem attracting or retaining a partner. In the case of the lap dancers, those on the pill earned similar tips to those with normal cycles during the non-fertile periods of their menstrual cycle, suggesting that men found them equally attractive.

Is there anything men can do to make themselves more attractive to women?

If you're not tall, toned and masculine-looking, don't despair. Whether they are looking for a one-night stand or a long-term relationship, women tend to go for intelligence as well as good looks. Showing your creative side also helps: both artists and poets seem to attract a lot of sexual partners.

There is also empirical evidence that women find wealthy men attractive, and one recent study concluded that richer men father more children.

If all else fails, try surrounding yourself with beautiful female friends or slipping a wedding ring on your finger. Both men and women find members of the opposite sex more attractive, if others seem attracted to them too.

Journal reference: *Trends in Ecology and Evolution*, DOI: 10.1016/j.tree.2009.08.003

<http://www.newscientist.com/article/dn17934-has-the-pill-changed-the-rules-of-sexual-attraction.html>

Review: *Tormented Hope* by Brian Dillon

- 06 October 2009 by [Amanda Gefter](#)

Magazine issue [2728](#)



Reaching for the medicine cabinet unnecessarily? (Image: Seth Joel/Getty)

- **Book information**
- *Tormented Hope* by Brian Dillon
- Published by: Penguin, (published in US by Faber in February)
- Price: £18.99

FOR me it all began with headaches. Brief, sharp pangs seemed to emanate from deep within the folds of grey matter and every so often I could swear I heard something snap. I was overwhelmed by a vague but inexorable dread that some unseen, malevolent thing - tumour? aneurysm? - lurked inside my skull. Eventually, I volunteered for a research study in which I was given a brain MRI. A kind neuroradiologist looked over the images and assured me that my brain was perfectly healthy.

I was relieved - and therefore I don't fit the strictest definition of a hypochondriac. According to the *Diagnostic and Statistical Manual of Mental Disorder (DSM)*, hypochondria is an excessive fear of disease for which a doctor's reassurances are ineffective. But I do fit somewhere along the spectrum of hypochondria specific to our modern times, egged on by the abundance of medical information online, by pharmaceutical adverts targeted at consumers, by doctors' fear of litigation and resultant over-testing, and by advances in diagnostic technologies that seem to urge the study of one's own body down to the grittiest details.

Yet hypochondria is far from a modern disorder, as Brian Dillon shows in the beautifully written *Tormented Hope*, a collection of biographical sketches of some of history's most notable hypochondriacs, from Florence Nightingale to Andy Warhol.

Dillon's thesis is that hypochondria served an artistic or professional purpose for these people, usually by providing them with an excuse to retreat from the world, though he warns against reducing art to mental illness. Charles Darwin's symptoms - fear, indigestion, shivering and sinking sensations - excused him from social obligations but "do not seem to have seriously affected his work schedule". Marcel Proust, who suffered from asthma but also exaggerated his symptoms and invented new ones, spent all his time in bed, where he could write. Of Charlotte Brontë, Dillon writes, "It is only by falling ill that she can find for herself the right kind of solitude, in which to invent her future self."

Retroactively diagnosing historic figures is always a thorny task, but Dillon uses each subject's own diary entries and letters to construct compelling cases. Particularly interesting is that of judge Daniel Paul Schreber, who believed that his organs were being stolen and that, for the purpose of immaculate conception, his male body was being turned into a female's.

Schreber's case was extreme - and later studied by Freud - but all of these cases stem from a fundamental misunderstanding of the body. "The hypochondriac's historical mistake," Dillon writes, "is to imagine a condition of bodily being that is physically and psychically null or neutral...According to this fantasy, nothing happens inside the body and yet it continues to function...It does not occur to the hypochondriac that the state he or she describes is a kind of living death."

But hypochondria is also rooted in the desire for certainty and control in a world where both are impossible. It is no wonder, then, that hypochondria is believed to be related to obsessive-compulsive disorder. Darwin and Proust kept to highly rigid daily schedules, while pianist Glenn Gould diligently logged his vital signs and symptoms.

Ironically, for a hypochondriac the ultimate sense of control can come in the form of an actual diagnosis. Thus Alice James, sister of Henry, was overjoyed when she learned she was dying of breast cancer. "To him who waits, all things come!" she wrote.

For a hypochondriac the ultimate sense of control can come in the form of an actual diagnosis
As for me, the headaches have subsided, but I'll find something new to worry about. And is it really so irrational? A broken clock is right twice a day, and a hypochondriac is bound to get sick sometime. What sage advice can dissuade me from the fear of death and the perplexity of feeling like an infinite mind trapped in a finite body?

"Hypochondria makes dupes of us all," Dillon writes, "because life, or rather death, will have the last laugh."

Amanda Gefter is an Opinion editor at New Scientist

<http://www.newscientist.com/article/mg20427281.700-review-tormented-hope-by-brian-dillon.html>

Carrying a gun increases risk of getting shot and killed

- 15:26 06 October 2009 by **Ewen Callaway**
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Offering protection, or creating perilous situations? (Image: Deborah Raven/Getty)
Packing heat may backfire. People who carry guns are far likelier to get shot – and killed – than those who are unarmed, a study of shooting victims in Philadelphia, Pennsylvania, has found. It would be impractical – not to say unethical – to randomly assign volunteers to carry a gun or not and see what happens. So Charles Branas's team at the University of Pennsylvania analysed 677 shootings over two-and-a-half years to discover whether victims were carrying at the time, and compared them to other Philly residents of similar age, sex and ethnicity. The team also accounted for other potentially confounding differences, such as the socioeconomic status of their neighbourhood.

Despite the US having the highest rate of firearms-related homicide in the industrialised world, the relationship between gun culture and violence is poorly understood. A recent study found that treating violence like an infectious disease led to a dramatic fall in shootings and killings. Overall, Branas's study found that people who carried guns were 4.5 times as likely to be shot and 4.2 times as likely to get killed compared with unarmed citizens. When the team looked at shootings in which victims had a chance to defend themselves, their odds of getting shot were even higher.

While it may be that the type of people who carry firearms are simply more likely to get shot, it may be that guns give a sense of empowerment that causes carriers to overreact in tense situations, or encourages them to visit neighbourhoods they probably shouldn't, Branas speculates. Supporters of the Second Amendment shouldn't worry that the right to bear arms is under threat, however. "We don't have an answer as to whether guns are protective or perilous," Branas says. "This study is a beginning." Daniel Webster, co-director of the Johns Hopkins Center for Gun Policy and Research in Baltimore, Maryland, thinks it is near-sighted to consider only the safety of gun owners and not their communities. "It affects others a heck of a lot more," he says.

Journal reference: *American Journal of Public Health*, DOI: 10.2105/AJPH.2008.143099

<http://www.newscientist.com/article/dn17922-carrying-a-gun-increases-risk-of-getting-shot-and-killed.html>

Mammoth black holes push universe to its doom

- 05 October 2009 by Rachel Courtland

Magazine issue 2728.



A composite Chandra image of Centaurus A showing the effects of an active supermassive black hole (Image: NASA/CXC/CfA/R.Kraft et al/NSF/VLA/Univ.Hertfordshire/M.Hardcastle/ESO/VLT/ISAAC/M.Rejk uba et al.)

THE mammoth black holes at the centre of most galaxies may be pushing the universe closer to its final fade-out. And it is all down to the raging disorder within those dark powerhouses.

Disorder is measured by a quantity called entropy, something which has been on the rise ever since the big bang. Chas Egan and Charles Lineweaver of the Australian National University in Canberra used the latest astrophysical data to calculate the total entropy of everything in the universe, from gas to gravitons. It turns out that supermassive black holes are by far the biggest contributors to the universe's entropy. Entropy reflects the number of possible arrangements of matter and energy in an object. The number of different configurations of matter a black hole could contain is staggering because its internal state is completely mysterious.

Egan and Lineweaver found that everything within the observable universe contains about 10^{104} units of entropy (joules per Kelvin), a factor of 10 to 1000 times higher than previous estimates that did not include some of the biggest known black holes (www.arxiv.org/abs/0909.3983, submitted to *The Astrophysical Journal*).



If entropy were ever to reach a maximum level, that would mean the heat death of the universe. In this scenario no energy can flow, because everything is the same temperature and so life and other processes become impossible. "Our results suggest we're a little further along that road than previously thought," Egan says.

But although black holes do boost the universe's total entropy, it is not clear whether they will hasten its heat death. Supermassive black holes don't contribute much to the flows of heat that even out temperature throughout the universe, says physicist Stephen Hsu at the University of Oregon in Eugene.

It's true that these black holes will slowly evaporate by releasing Hawking radiation, particles created near the boundary of the black hole. And this radiation could move the universe towards heat death.

Black holes may evaporate via Hawking radiation, tipping the universe towards its heat death. However, it will take some 10^{102} years for a supermassive black hole to evaporate. "The entropy inside those black holes is effectively locked up in there forever," Hsu says. So we may have reached a state approaching heat death long before, as stars burn out and their matter decays

<http://www.newscientist.com/article/mg20427284.200-mammoth-black-holes-push-universe-to-its-doom.html?full=true&print=true>



Science and the arts need not be strangers

Fifty years ago C. P. Snow described the gulf between the two cultures. Today we can be more optimistic about bridging it

William Waldegrave

Leavis was right: C. P. Snow was not a great intellect, or a great novelist. But you do not have to be either to say something that is true: and Snow did say something which was true, in his Rede lecture of 50 years ago, entitled *The Two Cultures*. There is something wrong with a civilisation, he said, where knowledge is so compartmentalised that people can count as highly educated and yet be wholly ignorant of huge swathes of what other highly educated people know. How could scientists not read Shakespeare? How could literary people never have heard of the second law of thermodynamics?

Obviously, there has always been specialised knowledge: Cicero would doubtless have been out of his depth in the further reaches of Archimedean mathematics; Richard Bentley would probably have found Newtonian calculus as obscure as did some of the classicists of my day who could read his Horace easily enough a century and a half later but not get the hang of dy *by* dx . Carlyle it was who talked about political economy as the dismal science. There is little new under the sun.

But the high ambition of cultured people was once to know the geography, at least, of all knowledge. Aristotle had a try at actually doing it all; Virgil, in his own great poem about agriculture, wrote that wonderful line about Lucretius, whose epic has the atom as its hero: *Felix qui potuit rerum cognoscere causas* (Happy the man who could understand the causes of things).

Newton wrote as much about early Christian doctrines as about optics; Coleridge and Davy planned to share out all literature and science between them; Shelley turned his brilliant classical mind and poetic sensibility to the celebration of reason and science, which he taught himself in his own time while he was at Eton.

So how come, 50 years after Snow, and just as he said, we still meet people who would think it shaming to admit difficulty in reading but who boast (sometimes untruthfully) about their incompetence at basic mathematics? How come the phrase “computer nerd” runs off the tongue more easily than “painting nerd”? Or that a cultured dinner party in W8 might find it odd if no one knew the name of the director of the Tate but not of the Science Museum? (It would not be our dinner party, I must add, as I am privileged to be Professor Chris Rapley’s chairman.) Some of the cause lies in the intense and exclusive nature of the science community itself. Science and medicine and engineering are, except in rare cases, co-operative, social activities. They require long and often extremely challenging training, at the end of which people share a powerful common culture and language that excludes others, not least because so much time is physically spent together in the workplaces of laboratory, hospital or design centre. At the end of it you are part of a priesthood; it would be contrary to human nature not to have a certain contempt for those outside the pale.

The police do this, and the Armed Forces; other kinds of scholars do it; people who think about nothing but horses or golf or steam engines do it. As a junior manager in an old-style British engineering firm thirty years ago I once sat down at a table in the canteen at the engineers’ table; I was soon on my way back to the nether regions where the purchasing department humbly ate. If you have spent fifteen years learning your art, and are fascinated by it, explaining it to someone who spent their time doing something easy like reading Herodotus can seem a waste of your time. What has Herodotus got to say about the high pressure end of a gas turbine? He can go below the salt.

Then there is the fact that it is difficult. I got quite a good degree, a long time ago admittedly, in classics and philosophy, and thought I could understand Plato’s *Theaetetus* and Wittgenstein’s *Tractatus* and other showily difficult texts. But string theory? Or the structure of DNA? I can’t pick up a first-year undergraduate text book and understand a word of it. It has often been said that the last time when a

reasonably intelligent lay person could envisage what the particle physicists were talking about was in the days of Niels Bohr. I can understand Fermat's Last Theorem, but I have about as much chance of understanding Wiles's solution to it as I do of running faster than Usain Bolt.

This is the other side of the priesthood phenomenon: the mysteries are indeed pretty mysterious, and we lay congregations are willing to say that only the holy man can understand them. Nobel laureates are our new cardinals.

And yet I am incurably optimistic. We can learn at least the shape of the landscape occupied by even the most advanced scientists and mathematicians. We can learn why the Higgs boson matters, or read a narrative telling us of the excitement of what Wiles has done, or look into the heart of the cell over the shoulder of a biologist with an electron microscope. In the way wider culture is developing, there are plenty of signs that the walls can be broken down and the common pursuit of true judgment includes all the objects of human curiosity and creativity, not just the motives of Anna Karenina but the meaning of dark matter too.

A very great deal has got better since Snow's day, although much remains to be done. We have Richard Holmes writing his brilliant *The Age of Wonder* about science in the time of the romantic poets, celebrating Joseph Banks and the Herschels. We have fine novelists writing about science and medicine such as Ian McEwan in *Saturday*. We have Tom Stoppard filling theatres with a play with chaos theory at its heart in *Arcadia*.

Coming to meet them the other way, we have lucid scientists writing elegantly for the general reader such as Matt Ridley and Stephen Jay Gould and Graham Farmelo. If anyone has succeeded to Isaiah Berlin's position as Britain's best-beloved intellectual, it is David Attenborough.

Richard Dawkins and the Archbishop scrap away about evolutionary theory every bit as much in the public eye as their predecessors in Darwin's day. There is more good science writing in the papers than ever there was — and thanks to *The Times* there will now be more. We should not despair.

Perhaps there is an even more fundamental confluence taking place. Anish Kapoor sculpts objects of scientific precision, while photographs from the Hubble telescope are as beautiful as Turner seascapes; or look at the Turner Prize exhibition opening tomorrow: Roger Hiorns, one of the four shortlisted, is known for his installation where he poured thousands of litres of copper sulphate into a London flat. Indeed, artists and scientists seem to have swapped roles when it comes to aesthetics: Richard Long tries to make us think about the natural world, and conceptual artists make analytical essays out of objects; they leave man-made beauty to scientists and engineers whose equations and machines meet A. E. Housman's criterion for the beautiful — that the hairs on the back of the neck stand up as they do for Bach or Mozart.

The reason that Leavis went for Snow with an almost insane degree of vituperation was that Leavis saw scientific method as a dreary Benthamite calculus that was the antipathy of all sensibility, morality and cultural tradition; and he saw it winning a two-horse competition, with all that he thought important on the losing side. Science was never, in fact, like that, any more than literary culture was confined to the artificial Victorian poetry that Leavis himself despised; the binary competition was an illusion. All forms of creativity have the same complex roots in human curiosity, imagination, sense of beauty, memory and capacity to dream. Science often seems now dreamlike, and art a matter of curiosity; previous roles swapped, and methods overlapping.

As science becomes more like art, and art like science, perhaps at last the divisions between the two cultures will finally dissolve.

Lord Waldegrave of North Hill is chairman of the Science Museum

http://www.timesonline.co.uk/tol/comment/columnists/guest_contributors/article6862299.ece

3-D Structure Of Human Genome: Fractal Globule Architecture Packs Two Meters Of DNA Into Each Cell



Researchers have found that the genome adopts a "fractal globule" organization, enabling the cell to pack DNA incredibly tightly while avoiding the knots and tangles that might interfere with the cell's ability to read its own genome. (Credit: Image by Bang Wong, Broad Institute)

ScienceDaily (Oct. 11, 2009) — Scientists have deciphered the three-dimensional structure of the human genome, paving the way for new insights into genomic function and expanding our understanding of how cellular DNA folds at scales that dwarf the double helix.

In a paper featured this week on the cover of the journal *Science*, they describe a new technology called Hi-C and apply it to answer the thorny question of how each of our cells stows some three billion base pairs of DNA while maintaining access to functionally crucial segments. The paper comes from a team led by scientists at Harvard University, the Broad Institute of Harvard and MIT, University of Massachusetts Medical School, and the Massachusetts Institute of Technology.

"We've long known that on a small scale, DNA is a double helix," says co-first author Erez Lieberman-Aiden, a graduate student in the Harvard-MIT Division of Health Science and Technology and a researcher at Harvard's School of Engineering and Applied Sciences and in the laboratory of Eric Lander at the Broad Institute. "But if the double helix didn't fold further, the genome in each cell would be two meters long. Scientists have not really understood how the double helix folds to fit into the nucleus of a human cell, which is only about a hundredth of a millimeter in diameter. This new approach enabled us to probe exactly that question."

The researchers report two striking findings. First, the human genome is organized into two separate compartments, keeping active genes separate and accessible while sequestering unused DNA in a denser storage compartment. Chromosomes snake in and out of the two compartments repeatedly as their DNA alternates between active, gene-rich and inactive, gene-poor stretches.

"Cells cleverly separate the most active genes into their own special neighborhood, to make it easier for proteins and other regulators to reach them," says Job Dekker, associate professor of biochemistry and molecular pharmacology at UMass Medical School and a senior author of the Science paper.

Second, at a finer scale, the genome adopts an unusual organization known in mathematics as a "fractal." The specific architecture the scientists found, called a "fractal globule," enables the cell to pack DNA incredibly tightly -- the information density in the nucleus is trillions of times higher than on a computer chip -- while avoiding the knots and tangles that might interfere with the cell's ability to read its own genome. Moreover, the DNA can easily unfold and refold during gene activation, gene repression, and cell replication.

"Nature's devised a stunningly elegant solution to storing information -- a super-dense, knot-free structure," says senior author Eric Lander, director of the Broad Institute, who is also professor of biology at MIT, and professor of systems biology at Harvard Medical School.

In the past, many scientists had thought that DNA was compressed into a different architecture called an "equilibrium globule," a configuration that is problematic because it can become densely knotted. The fractal globule architecture, while proposed as a theoretical possibility more than 20 years ago, has never previously been observed.

Key to the current work was the development of the new Hi-C technique, which permits genome-wide analysis of the proximity of individual genes. The scientists first used formaldehyde to link together DNA strands that are nearby in the cell's nucleus. They then determined the identity of the neighboring segments by shredding the DNA into many tiny pieces, attaching the linked DNA into small loops, and performing massively parallel DNA sequencing.

"By breaking the genome into millions of pieces, we created a spatial map showing how close different parts are to one another," says co-first author Nynke van Berkum, a postdoctoral researcher at UMass Medical School in Dekker's laboratory. "We made a fantastic three-dimensional jigsaw puzzle and then, with a computer, solved the puzzle."

Lieberman-Aiden, van Berkum, Lander, and Dekker's co-authors are Bryan R. Lajoie of UMMS; Louise Williams, Ido Amit, and Andreas Gnirke of the Broad Institute; Maxim Imakaev and Leonid A. Mirny of MIT; Tobias Ragozy, Agnes Telling, and Mark Groudine of the Fred Hutchison Cancer Research Center and the University of Washington; Peter J. Sabo, Michael O. Dorschner, Richard Sandstrom, M.A. Bender, and John Stamatoyannopoulos of the University of Washington; and Bradley Bernstein of the Broad Institute and Harvard Medical School.

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Journal reference:

1. Lieberman-Aiden et al. **Comprehensive mapping of long-range interactions reveals folding principles of the human genome.** *Science*, 2009; DOI: [10.1126/science.1181369](https://doi.org/10.1126/science.1181369)

Adapted from materials provided by [Harvard University](http://www.harvard.edu). Original article written by Steve Bradt, Harvard University.

<http://www.sciencedaily.com/releases/2009/10/091008142957.htm>

Gene Data Tool Advances Prospects For Personalized Medicine

ScienceDaily (Oct. 11, 2009) — A sophisticated computational algorithm, applied to a large set of gene markers, has achieved greater accuracy than conventional methods in assessing individual risk for type 1 diabetes.

A research team led by Hakon Hakonarson, M.D., Ph.D., director of the Center for Applied Genomics at The Children's Hospital of Philadelphia, suggests that their technique, applied to appropriate complex multigenic diseases, improves the prospects for personalizing medicine to an individual's genetic profile. The study appears in the October 9 issue of the online journal *PLoS Genetics*.

Genome-wide association studies (GWAS), in which automated genotyping tools scan the entire human genome seeking gene variants that contribute to disease risk, have yet to fulfill their potential in allowing physicians to accurately predict a person's individual risk for a disease, and thus guide prevention and treatment strategies.

The authors say that for many diseases, the majority of contributory genes remain undiscovered, and studies that make selective use of a limited number of selected, validated gene variants yield very limited results. For many of the recent studies, the area under the curve (AUC), a method of measuring the accuracy of risk assessment, amounts to 0.55 to 0.60, little better than chance (0.50), and thus falling short of clinical usefulness.

Hakonarson's team broadened their net, going beyond cherry-picked susceptibility genes to searching a broader collection of markers, including many that have not yet been confirmed, but which reach a statistical threshold for gene interactions or association with a disease. Although this approach embraces some false positives, its overall statistical power produces robust predictive results.

By applying a "machine-learning" algorithm that finds interactions among data points, say the authors, they were able to identify a large ensemble of genes that interact together. After applying their algorithm to a GWAS dataset for type 1 diabetes, they generated a model and then validated that model in two independent datasets. The model was highly accurate in separating type 1 diabetes cases from control subjects, achieving AUC scores in the mid-80s. The authors say it is crucial to choose a target disease carefully. Type 1 diabetes is known to be highly heritable, with many risk-conferring genes concentrated in one region—the major histocompatibility complex. For other complex diseases, such as psychiatric disorders, which do not have major-effect genes in concentrated locations, this approach might not be as effective.

Furthermore, the authors' risk assessment model might not be applicable to mass population-level screening, but rather could be most useful in evaluating siblings of affected patients, who already are known to have a higher risk for the specific disease. The authors say that their approach is more effective, and costs less, than human leukocyte antigen (HLA) testing, currently used to assess type 1 diabetes risk in clinical settings. The researchers used data provided by the Wellcome Trust Case Control Consortium and the Genetics of Kidneys in Diabetes study. Hakonarson's co-authors from The Children's Hospital of Philadelphia were Kai Wang, Ph.D., Struan Grant, Ph.D., Haitao Zhang, Jonathan Bradfield, Cecilia Kim, Edward Frackleton, Cuiping Hou, Joseph T. Glessner, and Rosetta Chiavacci, all of the Center for Applied Genomics; Charles Stanley, M.D., of the Division of Endocrinology; and Dimitri Monos, Ph.D., of the Department of Pathology and Laboratory Medicine. Other co-authors were Constantin Polychronakos, M.D., and Hui Qi Qu, of McGill University, Montreal; and Zhi Wei, of the New Jersey Institute of Technology.

Adapted from materials provided by [Children's Hospital of Philadelphia](#), via [EurekAlert!](#), a service of AAAS.

<http://www.sciencedaily.com/releases/2009/10/091009090426.htm>

Tropical Regions To Be Hardest Hit By Fisheries Shifts Caused By Climate Change



Fishing boats at sea near China. Regions with the biggest loss in catch potential include Indonesia, the United States (excluding Alaska and Hawaii), Chile and China. (Credit: iStockphoto/Sander Meilink)

ScienceDaily (Oct. 11, 2009) — Major shifts in fisheries distribution due to climate change will affect food security in tropical regions most adversely, according to a study led by the Sea Around Us Project at The University of British Columbia.

In the first major study to examine the effects of climate change on ocean fisheries, a team of researchers from UBC and Princeton University finds that climate change will produce major shifts in productivity of the world's fisheries, affecting ocean food supply throughout the world. The study is published October 7 in the journal *Global Change Biology*.

"Our projections show that climate change may lead to a 30 to 70 per cent increase in catch potential in high-latitude regions and a drop of up to 40 per cent in the tropics," says lead author William Cheung, a researcher at the University of East Anglia in the UK who conducted the study while at UBC.

"Many tropical island residents rely heavily on the oceans for their daily meals. These new findings suggest there's a good chance this important food source will be greatly diminished due to climate change."

Previous studies have looked at how climate change affects global food supply but were limited to land-based food sources. These studies have also predicted that tropical areas will see a decline in land productivity.

The team, led by UBC Fisheries professor Daniel Pauly, also found that regions with the highest increase in catch potential by 2055 include Norway, Greenland, Alaska and the east coast of Russia. Meanwhile, regions with the biggest loss in catch potential include Indonesia, the United States (excluding Alaska and Hawaii), Chile and China.

While greater catch potential in colder regions might appear beneficial, the authors caution that more research is needed to account for the multitude of dynamic factors that affect every ecosystem.

"We need to keep the big picture in mind when looking at the 'winners' and 'losers' of climate change," says Pauly. "Major shifts in fish populations will create a host of changes in ocean ecosystems likely resulting in species loss and problems for the people who now catch them."

"While warmer waters might attract new species to colder regions, the rise in temperature might make the environment inhospitable to current species in the region that cannot move to even higher latitudes. Often these species are important to the diets and culture of native subsistence fishermen."

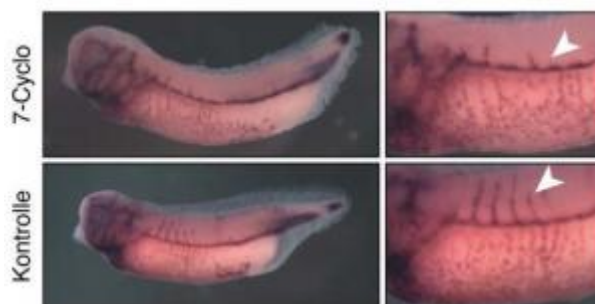
The team's projections also show that Canada's overall catch potential will remain approximately the same. The west coast may see a decrease of almost 20 per cent from 2005 to 2055 while the east coast may get a 10 per cent boost.

The study analyzed 1,066 species ranging from krill to sharks that constitute roughly 70 per cent of the world's catch. The authors used models that include a large number of environmental and biological factors that affect fisheries. They ran these models through two climate change scenarios, one more conservative than the other, and measured the impact of the scenarios on fish distribution from the years 2005 to 2055. The authors did not include the highest emission level scenario considered by the Intergovernmental Panel on Climate Change, which would have produced even more dramatic results.

Adapted from materials provided by [University of British Columbia](#), via [EurekAlert!](#), a service of AAAS.

<http://www.sciencedaily.com/releases/2009/10/091008073314.htm>

Novel Drug Screening Method: Informative Swellings



Blood vessel defects are visualized in *Xenopus* tadpoles. The bioactive compound with the abbreviation Cyclo-7 (top row) prevents the formation of new blood vessels (arrow). For comparison, pictures of the control animals are also shown (bottom row).

ScienceDaily (Oct. 11, 2009) — A screening method for bioactive small molecules to treat vascular diseases and an in vivo functional test in a whole animal at the same time: ETH Zurich researchers at the Institute of Pharmaceutical Sciences achieved this feat with the aid of the frog *Xenopus*.

How does one identify new bioactive compounds that can serve as a basis for the development of novel or more effective drugs? This question – which costs millions of dollars to answer – is a fundamental one for both academic scientists working in pharmaceutical sciences and the pharmaceutical industry. Accordingly, the search for new, low-cost, and effective drug screening methods is intense.

However, the search for novel drug candidates is anything but trivial. The predominant strategy used over the last decades consists, first of all, in clarifying the biochemical processes underlying a disease, then identifying an appropriate drug target, and finally developing an assay that allows the screening of chemical libraries for small molecules that interfere with the target. This approach is, however, very expensive and demands a great deal of background knowledge.

A great leap forward with a frog

It would be simpler, if one could use whole organisms to which small molecules would be administered and which would display an easily readable response in response to active substances affecting the development or function of a particular organ. The advantage of such an approach would be that the screening method would be directly linked to an experiment in a whole animal, a step that does not take place until much later in the standard approach of drug development.

Professor André Brändli's group at the Institute of Pharmaceutical Sciences of ETH Zurich has made a giant leap towards such a simple test method by using tadpoles of the African clawed frog *Xenopus laevis*. André Brändli, who was appointed to a chair at the Ludwig-Maximilians-Universität Munich in July, successfully developed in this animal model a test method for compounds that influence angiogenesis (vascularisation). The corresponding study was published recently in the scientific journal *Blood*. Compounds that disrupt angiogenesis are very important, because, among other things, they can also be used against various types of cancer. This is because tumor growth is dependent on newly forming blood vessels.

A two-step drug screening method

What is the basis of this novel drug screening method? Brändli and his team used tadpoles of the African clawed frog *Xenopus laevis*, which are a few millimetres long. The tadpoles are just under 36-hours old at this time, and thus at the developmental stage, when they form new vessels. Because the tadpoles' skin is permeable to small molecules, the researchers are able to add the test compounds directly to the liquid in

which the tadpoles are kept. Afterwards, they examine the animals under a microscope, without any further treatment, for any detectable signs indicating changes in the vascular system.

In practice, they look in the first step of the method for evidence of edema, tissue swellings that occur when there are defects in the formation of vessels or kidneys. These are easily detectable because *Xenopus* tadpoles are transparent. If there are other peculiarities, e.g. the tadpoles either die or show specific pigmentation defects, the researchers also record these facts. For each active compound identified in the first step of the method, the scientists analyse its effects on angiogenesis more precisely in a second step in which they specifically mark the lymph and blood vessels with stains. As a result, they can determine the exact changes, be it the reduction or absence of a vessel, under the microscope.

A frog finds its way to the library

André Brändli had already carried the idea for this elegant screening method around with him for several years. As a developmental biologist who had already worked with *Xenopus* for years, he knew the advantages of his favorite animal model: a short generation time, easy to handle, and the availability of thousands of tadpoles at a reasonable price. Importantly, tadpoles develop into vertebrate animals with four limbs and many of the developmental mechanisms used along this process are similar to those required for mammalian development.

However, to prove that the tadpoles really are suitable for drug screening purposes, more was needed, namely large collections of chemical substances. Brändli had access to these from 2006 onwards when the Institute of Pharmaceutical Sciences purchased various chemical libraries.

The researcher made use of this convenient situation, and, together with his team, he tested 1280 substances that were known to be bioactive. The screen revealed that 32 of them affected the vascular system. A few of them act on both lymph and blood vessels, others on only one vessel system. In this respect, the fact that there are substances that influence the lymph system specifically is particularly interesting because there had hitherto been no convenient *in vivo* test system for this vessel type.

However, the quality of the screening method became apparent not only in the number of 32 bioactive substances identified and the ability to make distinctions with regard to either activities, but also by the fact that the method reliably detected all the active compounds already known to have vessel-system relevance. Next, Brändli teamed up with his institute colleague Professor Michael Detmar, a specialist on vascular development in mice, to demonstrate that the identified compounds were effective not only in tadpoles but also in mammals, Detmar and his team successfully proved for one compound (7-chloro-4-hydroxy-2-phenyl-1,8-naphthyridine), which inhibits blood and lymph angiogenesis in *Xenopus*, that it also counteracts artificially stimulated angiogenesis in the mouse. This demonstrated unequivocally that the *Xenopus* drug screening method is also pertinent for mammals.

***Xenopus* drug screening convinces the industry**

Brändli is convinced that he has developed with *Xenopus* tadpoles a highly efficient, sensitive *in vivo* test method to discover novel small molecules that can affect angiogenesis. He says that his *in vivo* screening methodology, for which a patent application has been filed, also enables the discovery of substances that only become active in a whole organism and would therefore not be found with an *in vitro* test method using cell cultures. However, the researcher is not the only one who is convinced by the potential of drug screening in *Xenopus* tadpoles. Various pharmaceutical companies in Switzerland and abroad have also already expressed their interest in the new screening methodology.

Brändli now hopes that he will be able to build up a long-term partnership with the pharmaceutical industry. Drug candidates identified in the *Xenopus* drug screen are to be developed further in collaboration with the pharmaceutical industry to yield optimized variants that, ultimately, will be able to enter clinical trials. However, Brändli is under no illusions: even though the discovery of a drug candidate



and the initial tests in an animal model represent important, decisive steps, the road ahead to an approved drug is still long and rocky.

Journal references:

1. Wheeler et al. **Simple vertebrate models for chemical genetics and drug discovery screens: lessons from zebrafish and Xenopus.** *Developmental Dynamics*, 2009; 238 (6): 1287 DOI: [10.1002/dvdy.21967](https://doi.org/10.1002/dvdy.21967)
2. Kalin et al. **An in vivo chemical library screen in Xenopus tadpoles reveals novel pathways involved in angiogenesis and lymphangiogenesis.** *Blood*, 2009; 114 (5): 1110 DOI: [10.1182/blood-2009-03-211771](https://doi.org/10.1182/blood-2009-03-211771)

Adapted from materials provided by [ETH Zurich](http://www.ethz.ch).

<http://www.sciencedaily.com/releases/2009/09/090912145157.htm>



New Tumor Suppressor Destroys Key Link In Cancer Chain

ScienceDaily (Oct. 10, 2009) — A tumor-suppressing protein snatches up an important cancer-promoting enzyme and tags it with molecules that condemn it to destruction, a research team led by scientists at The University of Texas M. D. Anderson Cancer Center reports this week in the journal *Molecular Cell*.

"KEAP1 is a recently discovered tumor suppressor, but how it works has not been known. IKK β is a known oncoprotein that promotes cancer in at least two different ways, but we did not know how it was regulated. We think we've answered both questions with this research," said senior author Mien-Chie Hung, Ph.D., chair and professor of M. D. Anderson's Department of Molecular and Cellular Oncology.

The researchers showed that KEAP1, short for the tongue-twisting Kelch-like ECH-associated protein 1, binds to IKK β and attaches molecules known as ubiquitins to the oncoprotein, which targets it for dissolution by the cell's proteasome complex.

They also showed that underexpression of KEAP1 is associated with poor survival among breast cancer patients, and that it's mutated and inactivated in some breast, liver, lung and colon tumors.

"KEAP1 underexpression or inactivation is involved in multiple cancers, so we are working now to identify its activation mechanism, which could lead to development of new anti-cancer drugs," Hung said. He and his colleagues also want to know whether KEAP1 works on other known oncoproteins.

Blocking overexpression of IKK β , short for I κ B kinase β , is crucial for at least two reasons. Hung and colleagues have shown that the protein inhibits at least two other important tumor suppressors. More importantly, IKK β activates the NF κ B (nuclear factor κ B) signaling pathway, which regulates expression of genes involved in the immune response, cellular proliferation, growth of new blood vessels, cell survival, tumor invasion, and the lethal spreading of cancer known as metastasis.

Hung and colleagues first demonstrated that the presence of KEAP1 inhibits the NF κ B signaling pathway and then conducted a series of experiments to find out how that happens. They found that depletion of KEAP1 leads to the accumulation of IKK β , and then discovered that the tumor suppressor binds to a specific site on IKK β , capturing it to feed it to the proteasome.

Hung likens this snatching of IKK β to plucking stuffed animals with a mechanical claw out of an arcade game, imagery that wound up on the cover of *Molecular Cell*.

KEAP1 is a ubiquitin ligase that attaches to the target protein and works in a complex with another protein, CUL3, that connects the ubiquitins to the bound protein.

The team analyzed both KEAP1 and CUL3 expression in the tumors of 119 breast cancer patients and correlated the findings to overall survival. They found that underexpression of KEAP1 alone was associated with poor survival. Patients with strong expression of both KEAP1 and CUL3 had an 80 percent survival rate at five years while those with little expression of either had a 43 percent 5-year survival rate.

Next, they sequenced KEAP1's genes in 26 cancer lines (18 breast, four liver, four lung) and in 119 primary tumors (17 breast, 78 liver, 13 lung, 11 colon) and found two functional genetic mutations that shut down the protein's ability regulate IKK β . The mutations affected the portion of the protein that binds to IKK β .

The research in this paper was funded by grants from the National Cancer Institute, including M. D. Anderson's Specialized Program in Research Excellence (SPORE) grants in breast, pancreatic and ovarian cancers, the Breast Cancer Research Foundation, Kadoorie Charitable Foundations, Patel



Memorial Breast Cancer Endowment Fund, the National Breast Cancer Foundation, and by the Taiwan National Science Council.

Hung noted that first author Dung-Fang Lee, Ph.D., led his lab's research on IKK β as a doctoral candidate in The University of Texas Graduate School of Biomedical Sciences at Houston, a joint program of M. D. Anderson and The University of Texas Health Science Center at Houston. Lee received the GSBS Alfred Knudson Jr. Outstanding Dissertation Award when he graduated last year. Lee is now a postdoctoral fellow at Mount Sinai School of Medicine in New York.

Co-authors with Lee and Hung are Hsu-Ping Kuo, Ph.D., Mo Liu, Chao-Kai Chou, Ph.D., Weiya Xia, M.D., Yi Du, Jia Shen, Chun Te Chen, Longfei Huo, Ph.D., Ming-Chuan Hsu, Ph.D., Chia-Wei Li, Ph.D., and Qing-Qing Ding, all of M. D. Anderson's Department of Molecular and Cellular Oncology; Kuo, Liu, Chou, Du, Shen, and Chen are also students in the GSBS. Also, Tsai-Lien Liao, Ann-Chi Lin, Ya-Hui Chang, Shih Feng Tsai, M.D., Ph.D., all of the Division of Molecular and Genomic Science, National Health Research Institutes, Taiwan; Chien-Chen Lai, Ph.D., Division of Molecular and Genomic Medicine, National Health Research Institutes, and the Graduate Institute of Chinese Medical Science, China Medical University, both in Taiwan; and Long-Yuan Li, Ph.D., Center for Molecular Medicine and Graduate Institute of Cancer Biology, China Medical University and Hospital, and Asia University, both in Taiwan.

Adapted from materials provided by University of Texas M. D. Anderson Cancer Center

<http://www.sciencedaily.com/releases/2009/10/091009204100.htm>



Nasa team scours Moon crash data

By Paul Rincon
Science reporter, BBC News

Nasa scientists have been outlining their preliminary results after crashing two unmanned spacecraft into the Moon in a bid to detect water-ice.



A rocket stage slammed into the Moon's south pole at 1231 BST (0731 EDT).

Another craft followed just behind, looking for signs of water in debris kicked up by the first collision.

Instruments on the second spacecraft identified a flash from the initial impact as well as a crater, but the expected debris cloud was not evident.

The \$79m (£49m; 53m euro) US space agency mission is known as LCROSS (the Lunar Crater Observation and Sensing Satellite).

“ We have the data we need to address the questions we set out to address ”

Dr Anthony Colaprete, Nasa Ames Research Center

The first collision was expected to throw some 350 tonnes of debris up to altitudes of 10km (6.2 miles) or more.

No such dust plume was apparent in images sent back by the spacecraft, however, proving a disappointment to some watchers expecting a space spectacular.

"We need to go back and carefully look at the data to see what it says," Dr Anthony Colaprete, principal investigator on the LCROSS mission, told journalists at a post-impact news conference.

"Exploration has surprises. I'm glad we built our mission plan around all aspects of the impact... what's streamed on the video is not at the same fidelity as what we get fresh off the spacecraft. We need to look more closely before we conclude anything about an ejecta cloud, or not."

Wait for water

Dr Colaprete, from Nasa's Ames Research Center in California, added: "I see something in the spectrometer data - the spectrometers are more sensitive than the cameras. But I can't say anything more than that."

Earlier on Friday, Dr Vincent Eke, from Durham University, UK, told the BBC: "The interesting thing is whether the debris that gets thrown out will actually get thrown out of the crater and into the sunlight."

"Nasa predicts that the debris should rise [up to] nine miles, which should certainly take it over the crater rim. But if, for some unfortunate reason, the debris doesn't get into the sunlight, we won't be able to see it, which will be disappointing."

The LCROSS team was able to determine the temperature of the crater punched in the lunar surface.

But questions about the persistence of water-ice on the Moon will have to wait.

Dr Colaprete said: "We saw the impact, we saw the crater. We got good spectroscopic measurements which is what we needed of the impact event."

"We have the data we need to address the questions we set out to address."

The identification of water-ice in the impact plume would be a major discovery, not least because a supply of water on the Moon would be a vital resource for future human exploration.

LCROSS was to have helped pave the way for US astronauts to return to the Moon by 2020.

If ice is present in shaded craters, it could provide a valuable water source for future manned lunar bases.

But these lunar plans have been under scrutiny since President Barack Obama ordered a sweeping review of Nasa's manned spaceflight programme.

Dr Bernard Foing, executive director of the International Lunar Exploration Working Group (ILEWG), said it would be desirable to protect some of the polar ice, if it indeed exists.

"We will have to be careful to keep some areas as 'protected parks' on the Moon. This is so that we could, for instance, send a lander, drill down and obtain a core sample a few metres in depth," he told BBC News.

"Then we could eventually study the history of delivery of water to the Moon and the Earth."

The LCROSS mission consisted of an empty Centaur rocket upper stage and a "shepherding spacecraft".

The shepherding spacecraft was designed to guide the rocket to its target at the Moon's south pole, a shaded 100km-wide depression called Cabeus crater.

The Centaur hit the lunar surface first, at roughly twice the speed of a bullet.



With an energy equivalent to one-and-a-half tonnes of TNT, the collision was expected to carve out another crater inside Cabeus measuring some 20m (66ft) wide and about 4m (13ft) deep.

The shepherding spacecraft ploughed in behind, hitting the Moon four minutes later. Its onboard spectrometers were designed to look for signs of water in the debris kicked up by the Centaur collision.

It was looking for hydroxyl compounds (OH), salts, clays, hydrated minerals and organic molecules in the expected plume.

The impacts were watched by countless professional and amateur astronomers on the ground. They were also observed by Earth-orbiting satellites, including the Hubble Space Observatory and Odin, a Swedish-led astronomy and aeronomy mission.

But the Lunar Reconnaissance Orbiter (LRO), which was launched on the same rocket as LCROSS in June, has been playing a key supporting role.

Dr Jennifer Heldmann, who co-ordinated the LCROSS observation campaign, commented: "LRO has been taking observations during the impact - we have heard that this went well. They are also doing follow-up observations; they are in a great position to collect data that is complementary to that collected by the LCROSS shepherding spacecraft."

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Are you an amateur astronomer? Are you watching this event?

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<http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8299118.stm>

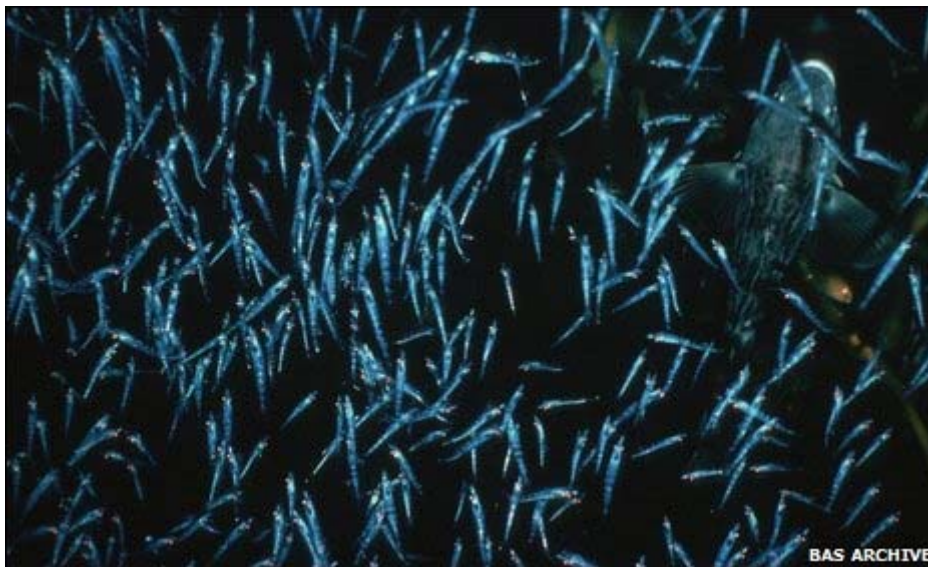
Published: 2009/10/09 16:57:14 GMT



How 'superswarms' of krill gather

By Matt Walker
Editor, Earth News

When krill come together, they form some of the largest gatherings of life on the planet.



Now scientists have discovered just how these small marine crustaceans do it.

Huge 'superswarms' containing trillions of krill are formed by juveniles not adults, and these swarms are even denser than experts supposed.

That suggests that all krill in the Southern Ocean are more vulnerable to overfishing than previously thought, the scientists warn.

Krill are small shrimp-like crustaceans that gather in huge numbers.

Previous research has found that some gatherings of Antarctic krill (*Euphausia superba*) can stretch for tens of kilometres.

It was astonishing how much biomass could be concentrated into such a small area

British Antarctic Survey scientist Dr Geraint Tarling

But while huge swarms are known to exist, scientists did not really understand why some swarms are bigger than others, and what drives krill to gather in this way.

So researchers working for the British Antarctic Survey (BAS) decided to investigate the phenomenon.

Led by Dr Geraint Tarling, a BAS researcher based in Cambridge, UK, the research team studied the composition and structure of 4525 separate krill swarms in the Scotia Sea, a vast expanse of water in the Southern Ocean.

The team used echo-sounding equipment, which works much like underwater radar, to find the krill across an area of water equivalent to the eastern half of the Atlantic Ocean.

What they found surprised them.

Krill tend to gather into two distinct types of swarm.

Some krill gather into smaller swarms, no longer than 50m long and up to 4m deep.

These swarms are not very tightly packed, with just ten individual krill per cubic metre, on average.

However, other much bigger swarms also occur.

Dubbed "superswarms", these are an order of magnitude larger in area, often stretching over one kilometre in length, and averaging almost 30m deep.

What is more, these superswarms are much more densely packed, containing up to ten times greater density of animals.

"I was coming at it thinking there might be small swarms tightly packed, and then large swarms that were a bit more diffuse," says Dr Tarling.

"But what we actually found was the opposite. There were small swarms that were quite diffuse and large swarms that were tightly packed."

That means that the majority of krill living in the Antarctic Ocean at any one time will exist within a few, huge superswarms.

"We talking trillions of krill in one aggregation," explains Dr Tarling.

"Ten or 12 swarms could explain 60 or 70% of the biomass in an area the size of the eastern Atlantic."

"It was astonishing how much biomass could be concentrated into such a small area."

Youthful gathering

The scientists then searched for reasons why such superswarms form.

Certain factors made superswarms more likely.

"The factors we identified included whether there was more likely to be a lot of food around or not, and when there wasn't that much food around, they tended to form larger swarms," says Dr Tarling.

The small, diffuse swarms are usually formed by mature, adult krill, the researchers discovered.

However, the huge superswarms are formed by juvenile krill.

"Where the animals were less mature, they were more likely to form the larger swarms," says Dr Tarling.

"Why they do that I don't know."

Nighttime mystery

One possible explanation could be that swarming together offers individual krill protection against marine predators such as whales or seals.

"All types of swarms are probably to a greater or lesser extent an antipredator response. There is safety in numbers, the predator confusion affect," Dr Tarling says.

But swarming comes at a cost, as each individual shrimp has to compete with millions of others for food.

Adult krill are quite negatively buoyant, and have to keep swimming to stay afloat. That takes a lot of energy, which must be supplied by food, so adult krill likely want to avoid competing with millions of others for their next meal.

But juvenile krill are more buoyant, and need to eat less. So they can afford to gather into huge superswarms for protection.

Another reason could be that researchers have previously shown it is more energetically efficient to be in swarm than be isolated.

"For a juvenile that wants to grow very quickly, saving energy could be a bonus for them," says Dr Tarling.

One mystery to emerge from the research, which is published in the journal *Deep Sea Research I*, is that superswarms are more likely to gather at night.

"That is more puzzling for us to explain," says Dr Tarling.

"Up until this point, most polar biologists believed that the swarms dispersed [at night], because that's the time they feed."

"When daylight comes they get back into the swarm again for the antipredator benefit. But we found the opposite to that."

Vulnerable to overfishing

The discovery that most krill in the Southern Ocean can be found gathered into just a few superswarms has significant implications for how the animals are fished, Dr Tarling warns.

Fishing fleets can efficiently locate and scoop up whole swarms of krill.

But by fishing out just a few huge superswarms, they may be removing the majority of krill living in the entire ocean.

"Focusing on large swarms can have a much larger effect on the environment than you would predict."

Story from BBC NEWS:

http://news.bbc.co.uk/go/pr/fr/-/earth/hi/earth_news/newsid_8299000/8299690.stm

Published: 2009/10/09 16:41:18 GMT

'Scary' climate message from past

By Richard Black
Environment correspondent, BBC News website

A new historical record of carbon dioxide levels suggests current political targets on climate may be "playing with fire", scientists say.



Researchers used ocean sediments to plot CO₂ levels back 20 million years.

Levels similar to those now commonly regarded as adequate to tackle climate change were associated with sea levels 25-40m (80-130 ft) higher than today.

Scientists write in the journal Science that this extends knowledge of the link between CO₂ and climate back in time.

The last 800,000 years have been mapped relatively well from ice cores drilled in Antarctica, where historical temperatures and atmospheric content have left a series of chemical clues in the layers of ice.

But looking back further has been more problematic; and the new record contains much more precise estimates of historical records than have been available before for the 20 million year timeframe.

Sustained levels

The new research was able to look back to the Miocene period, which began a little over 20 million years ago.

At the start of the period, carbon dioxide concentrations in the atmosphere stood at about 400 parts per million (ppm) before beginning to decline about 14 million years ago - a trend that eventually led to formation of the Antarctic icecap and perennial sea ice cover in the Arctic.

“ If anyone still doubts the link between CO₂ and climate, they should read this paper ”

Jonathan Overpeck University of Arizona

The high concentrations were probably sustained by prolonged volcanic activity in what is now the Columbia River basin of North America, where rock formations called flood basalts relate a history of molten rock flowing routinely onto the planet's surface.

In the intervening millennia, CO₂ concentrations have been much lower; in the last few million years they cycled between 180ppm and 280ppm in rhythm with the sequence of ice ages and warmer interglacial periods.

Now, humanity's emissions of greenhouse gases are pushing towards the 400ppm range, which will very likely be reached within a decade.

"What we have shown is that in the last period when CO₂ levels were sustained at levels close to where they are today, there was no icecap on Antarctica and sea levels were 25-40m higher," said research leader Aradhna Tripathi from the University of California at Los Angeles (UCLA).

"At CO₂ levels that are sustained at or near modern day values, you don't need to have a major change in CO₂ levels to get major changes in ice sheets," she told BBC News.

The elevated CO₂ and sea levels were associated with temperatures about 3-6C (5-11F) higher than today.

No doubting

The data comes from the ratios of boron and calcium in the shells of tiny marine organisms called foraminifera.

The ratio indicates the pH of sea water at the time the organisms grew, which in turn allows scientists to calculate the carbon dioxide content of the atmosphere.

The shell fragments came from cores drilled from the floor of the Pacific Ocean.

According to Jonathan Overpeck, who co-chaired the Intergovernmental Panel on Climate Change (IPCC) work on ancient climates for the organisation's last major report in 2007, this provides a more accurate look at how past CO₂ values relate to climate than previous methods.

"This is yet another paper that makes the future look more scary than previously thought by many," said the University of Arizona scientist.

"If anyone still doubts the link between CO₂ and climate, they should read this paper."

The new research does not imply that reaching CO₂ levels this high would definitely result in huge sea level changes, or that these would happen quickly, Dr Tripathi pointed out - just that sustaining such levels on a long timescale might produce such changes.

"There aren't any perfect analogies in the past for climate change today or in the future," she said.

"We can say that we've identified past tipping points for ice sheet stability; the basic physics governing ice sheets that we've known from ice cores are extended further back, and... I think we should use our knowledge of the physics of climate change in the past to prepare for the future."

Averting danger

At the Rio Earth Summit of 1992, governments pledged to stabilise greenhouse gas concentrations "at a level that would prevent dangerous anthropogenic interference with the climate system".



What that level is has been the subject of intense debate down the years; but one figure currently receiving a lot of support is 450ppm.

On Tuesday, for example, the International Energy Agency (IEA) released its prescription for tackling climate change, which sees concentrations of greenhouse gases peaking at the equivalent of 510ppm of CO2 before stabilising at 450ppm.

The Boxer-Kerry Bill, which has just entered the US Senate, also cites the 450 figure.

"Trouble is, we don't know where the critical CO2 or temperature threshold is beyond which ice sheet collapse is inevitable," said Dr Overpeck.

"It could be below 450ppm, but it is more likely higher - not necessarily a lot higher - than 450ppm.

"But what this new work suggests is that... efforts to stabilise at 450ppm should avoid going up above that level prior to stabilisation - that is, some sort of 'overshoot' above 450ppm on the way to stabilisation could be playing with fire."

Because of concerns about short-term sea level rise, the Association of Small Island States (Aosis), which includes low-lying countries such as The Maldives, Palau and Grenada, is pushing for adoption of the much lower figure of 350ppm.

But with concentrations already substantially higher, political support for that is scanty outside Aosis members.

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Story from BBC NEWS:
<http://news.bbc.co.uk/go/pr/ft/-/2/hi/science/nature/8299426.stm>

Published: 2009/10/10 12:02:15 GMT

New images of 'ghost forest' art

Computer images of a "ghost forest" art installation planned for Trafalgar Square show the vast scale of a project designed to highlight deforestation.



The artist's impressions were released as nine of the tropical tree stumps set to form the heart of the exhibit have been loaded on board a ship in Ghana.

The vessel is due to arrive at Tilbury in London on 17 October.

A tenth stump - the remains of a huge Denya tree - will be brought to the UK at a later date.

To meet trade controls, the stumps were cleaned by fire hose and then fumigated.

It is believed to be the first time that intact stumps of massive tropical trees - many with their roots still attached - have been brought to Britain.

'Extraordinary journey'

The artwork will be in Trafalgar Square from November 16-22 before being shipped to Copenhagen in time for the UN climate conference where new measures on deforestation may be agreed.

The installation is the work of artist Angela Palmer who has made repeated visits to western Ghana to search for the stumps.

She told the BBC: "It's been an extraordinary journey getting this far - finding the trees, securing all the permissions, getting the stumps transported by road from the forest to the port and then getting them on board.

"But it's been a fantastic combined effort by the timber company John Bitar, the teams in the forest, the Ghanaian authorities, the shipping line Grimaldi and rainforest and engineering specialists from Oxford University."

The project has been supported by a number of Ghanaian experts, with the extraction, cataloguing and cleaning of the trees supervised by Ntim Gyakar, former curator of the Herbarium in the Ghanaian city of Kumasi.

Transporting the largest stump from Suhuma to the port at Takoradi was not straightforward. Two trucks broke down in the forest, local elders had to be called to perform traditional blessings and then the huge load snagged on overhead cables.

Angela Palmer's hope is to raise awareness of the tropical rainforests and the connection with climate change - about 20% of global emissions are the result of deforestation.

"For most visitors, the scale, beauty and diversity of the stumps will be unlike anything they have experienced before. Nelson's Column stands over 50 metres (169 feet) tall, the approximate height many of these trees would have stood at in the wild.

"It will be impossible not to imagine what a space like Trafalgar Square would look like if populated by such massive examples of nature's work alongside man's, and to think about the destruction the missing trees represent."

Angela Palmer says she also hopes the installation will carry a message of optimism because although Ghana has lost 90% of its virgin rainforest in the past 50 years it is now trying to retain its remaining forests through selective logging.

"As a result, the forest canopy is retained, the young saplings regenerate naturally, leading to a thicker forest, and the timber industry continues.

"In order to reflect this, the 'Ghost Forest' will feature two or three logged stumps, and the rest would be naturally fallen trees complete with their root systems - protruding like the nerve-endings of the planet."

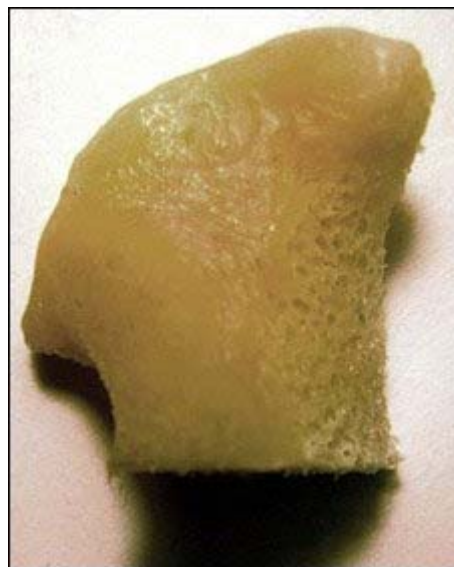
Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8300689.stm>

Published: 2009/10/10 17:38:44 GMT

Jaw bone created from stem cells

Scientists have created part of the jaw joint in the lab using human adult stem cells.



They say it is the first time a complex, anatomically-sized bone has been accurately created in this way.

It is hoped the technique could be used not only to treat disorders of the specific joint, but more widely to correct problems with other bones too.

The Columbia University study appears in Proceedings of the National Academy of Sciences.

The bone which has been created in the lab is known as the temporomandibular joint (TMJ).

“ The availability of personalized bone grafts engineered from the patient's own stem cells would revolutionise the way we currently treat these defects ”

Dr Gordana Vunjak-Novakovic Columbia University

Problems with the joint can be the result of birth defects, arthritis or injury.

Although they are widespread, treatment can be difficult.

The joint has a complex structure which makes it difficult to repair by using grafts from bones elsewhere in the body.

The latest study used human stem cells taken from bone marrow.

These were seeded into a tissue scaffold, formed into the precise shape of the human jaw bone by using digital images from a patient.

The cells were then cultured using a specially-designed bioreactor which was able to infuse the growing tissue with exactly the level of nutrients found during natural bone development.

Big potential

Lead researcher Dr Gordana Vunjak-Novakovic said: "The availability of personalised bone grafts engineered from the patient's own stem cells would revolutionise the way we currently treat these defects."

Dr Vunjak-Novakovic said the new technique could also be applied to other bones in the head and neck, including skull bones and cheek bones, which are similarly difficult to graft.

The option to engineer anatomically pieces of human bone in this way could potentially transform the ability to carry out reconstruction work, for instance following serious injury or cancer treatment.

She said: "We thought the jawbone would be the most rigorous test of our technique; if you can make this, you can make any shape."

She stressed that the joint created in the lab was bone only, and did not include other tissue, such as cartilage. However, the Columbia team is working on a new method for engineering hybrid grafts including bone and cartilage.

Another major challenge for scientists will be to find a way to engineer bone with a blood supply that can be easily connected to the blood supply of the host.

Professor Anthony Hollander, a tissue engineering expert from the University of Bristol who helped produce an artificial windpipe last year, said there was still a lot of work to be done before the new bone could be used on patients.

But he said: "One of the major problems facing scientists in this field is how to engineer a piece of bone with the right dimensions - that is critical for some of these bone defects.

"This is a lovely piece of tissue engineering which has produced bone with a high degree of accuracy in terms of shape."

Story from BBC NEWS:
<http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8290138.stm>

Published: 2009/10/10 23:07:03 GMT

Putting America's Diet on a Diet

By ALEX WITCHEL



On his first day in Huntington, W. Va., Jamie Oliver spent the afternoon at Hillbilly Hot Dogs, pitching in to cook its signature 15-pound burger. That's 10 pounds of meat, 5 pounds of custom-made bun, American cheese, tomatoes, onions, pickles, ketchup, mustard and mayo. Then he learned how to perfect the Home Wrecker, the eatery's famous 15-inch, one-pound hot dog (boil first, then grill in butter). For the Home Wrecker Challenge, the dog gets 11 toppings, including chili sauce, jalapeños, liquid nacho cheese and coleslaw. Finish it in 12 minutes or less and you get a T-shirt.

So much for local color. Earlier that day, Oliver met with a pediatrician, James Bailes, and a pastor, Steve Willis. Bailes told him about an 8-year-old patient who was 80 pounds overweight and had developed Type 2 diabetes. If the child's diet didn't change, the doctor said, he wouldn't live to see 30. Willis told Oliver that he visits patients in local hospitals several days a week and sees the effects of long-term obesity firsthand. Since he can't write a prescription for their resulting illnesses, he said, all he can do is pray with them.

Last year, an Associated Press article designated the Huntington-Ashland metropolitan area as the unhealthiest in America, based on its analysis of data collected in 2006 by the Centers for Disease Control and Prevention. Nearly half the adults in these five counties (two in West Virginia, two in Kentucky and one in Ohio) were obese, and the area led the nation in the incidence of heart disease and diabetes. The poverty rate was 19 percent, much higher than the national average. It also had the highest percentage of people 65 and older who had lost their teeth — nearly 50 percent.

All of which makes Huntington the perfect setting for the next Jamie Oliver Challenge. While he understands the allure of Home Wreckers and Big Macs alike, this British celebrity chef has made it his mission in recent years to break people's dependence on fast food, believing that if they can learn to cook just a handful of dishes, they'll get hooked on eating healthfully. The joy of a home-cooked meal, rudimentary as it sounds, has been at the core of his career from the start, and as he has matured, it has turned into a platform.

Oliver became famous at 23 for his television series "The Naked Chef," which was broadcast from 1999 to 2001, first in Britain, then here, on the Food Network. The title referred not to his lack of clothing but to his belief in stripping pretense and mystery from the kitchen — the idea that anyone can cook and everyone should. He was loose and playful, measuring olive oil not in spoonfuls but in "glugs," making a mess and having a ball. In the years since, that laddish charmer has morphed, somewhat unexpectedly, into a crusading community organizer. "Jamie's School Dinners," his award-winning four-part series, exposed the shameful state of school lunches in Britain and made for riveting television — he and the school cooks working feverishly to prepare dishes like tagine of lamb that the students either refused to try or dumped in the trash after one bite. When he eventually succeeded in getting them to abandon their processed poultry and fries and eat his food, the teachers reported a decrease in manic behavior and an

increase in concentration. The school nurses noted a reduction in the number of asthma attacks. Those findings, along with “Feed Me Better,” his online campaign and petition drive, were the impetus for the British government to invest more than a billion dollars to overhaul school lunches.

In addition to TV specials like “Jamie’s Fowl Dinners” and “Jamie Saves Our Bacon” (exposing the state of the British poultry and pork industries, respectively), Oliver got personal with his series “Jamie’s Kitchen,” based on the Fifteen Foundation, which he created in 2002. Each year it sponsors 15 (give or take a few) young adults from disadvantaged backgrounds, including those with criminal records or a history of drug abuse, and trains them in the restaurant business. To kick-start the program and to finance Fifteen, the upscale London restaurant that would employ them, he put up his own house as collateral — without telling his wife. In addition to the London flagship, whose customers have included Brad Pitt and Bill Clinton, branches of the restaurant have opened in Cornwall, Amsterdam and Melbourne. So far, the program has graduated 159 students at a cost of \$49,500 each. Oliver endowed the foundation with proceeds from his book “Cook With Jamie,” and it now operates as an independent entity.

If he were just a professional do-gooder, Oliver, who is 34, would be a bore. But food has given his life focus and meaning since childhood, and he has honored it ever since. Born and raised in Essex, northeast of London, Oliver, the son of a pub owner, grew up hyperactive and dyslexic. In school, he failed every subject except Art (he got an A) and Geology (a C). By the time he was 6, his tough-love father, Trevor, put him to work in the pub, cleaning up. His father’s work ethic was such that on summer vacations he would aim the garden hose through Jamie’s bedroom window, soaking his bed to get him out of it, at 6:30 a.m. “People die in bed,” he liked to say.

It seems to have worked. By the time he was 13, Jamie was turning out between 100 and 120 meals on a Sunday night alongside the pub’s chef. In a work-study program, he spent six weeks at a high-end restaurant, starting at the appetizers station. When the head chef quit, he took over.

Though his father was proud of him, Oliver says, he is mindful that the pub owner’s motto remains “You can’t make a silk purse from a sow’s ear.” Having started out as the ear, Oliver has worked hard to prove his father wrong. Cooking saved his life. He wants it save yours too. “Being in the kitchen is the most simple part of life,” he said. “People talk about it like it was some sort of science experiment.”

In last year’s U.K. series, “Jamie’s Ministry of Food,” Oliver expanded his reach past the school system into people’s homes. He chose Rotherham, an industrial town in northern England with a high rate of obesity and related illnesses, where 20 percent of the working-age population was on public assistance. He built a community center where residents could learn to cook inexpensively for their families while instilling the idea that healthful eating is not a luxury. “They thought that cooking a meal and feeding it to your family was for posh people,” he said. Some participants in the show had never even had a kitchen table. They ate takeout food on their floors.

That project has proved a success and the perfect model for Oliver’s mission in Huntington. The community center here will be called Jamie’s Kitchen and will teach both adults and children the basic skills for cooking healthful, economical meals at home. Oliver will also work with local schools on eliminating junk food in vending machines and in cafeterias, replacing reheated processed foods with meals cooked from scratch with fresh ingredients. But there is no guarantee of success. In spite of the resources the British government has allocated for school lunches, Oliver admits that only half the schools are functioning properly; the other half are still experiencing difficulty training cafeteria staff and enforcing new guidelines. And follow-up reports show that while students now understand the benefits of eating healthfully, many still opt out of their school-lunch plans, reverting to fast food instead.

What’s really happening is about more than old habits dying hard or the love of frying. The reason the world is still waiting for the Messiah is that most people don’t actually want one, no matter how many fresh fruits and vegetables he’s carrying. Oliver expects some of the same pushback in Huntington, whether it comes from recalcitrant teenagers, petty bureaucrats or parents who don’t like being told they’ve failed. It remains to be seen whether the contest between being threatened and resentful versus forthright and true can trump the American intoxication with show business: will this much-maligned area let a Member of the British Empire play Pygmalion and win? In this country, ordinary people seem willing to do or say almost anything to be immortalized in the latter-day vaudeville of reality shows. Oliver’s goals here, no matter how authentic, can be thwarted if the balance between camera hunger and social reform goes off-kilter. The series, “Jamie Oliver’s Food Revolution,” is a co-production of his company and Ryan Seacrest Productions. ABC will broadcast it in six parts in early 2010.

Like Rotherham’s, Huntington’s economy was buoyed for years by the coal mines nearby as well as by manufacturing jobs in the chemical industry, glassworks, steel foundries and locomotive-parts plants. In

1950 its population was near 90,000. Manual labor took care of excess calories, if not hardened arteries. When the coal industry was modernized and the changing economy resulted in the loss of manufacturing jobs, the population dropped to less than 50,000; hospitals became one of the city's largest employers. Another is Marshall University, home of the "Thundering Herd" football team and the subject of the 2006 film "We Are Marshall." Its students are aficionados of the delicacies at Hillbilly Hot Dogs (a sign out front reads, "If you hit it on the run, we'll put it on a bun"), and Oliver doesn't blame them.

"That was 15 pounds of madness," he said of the trademark burger, jumping into the car outside the restaurant. "But it tasted good." He had been shooting all afternoon and was 90 minutes behind schedule, an occurrence his publicist calls "Jamie Time." He gets so involved in what he's doing that he tends to lose track. He was due downtown in 30 minutes to hold a town-hall meeting to talk about the show. On the way there, he agreed to run through Kroger, a local supermarket, to see what Huntington residents were buying.

As we drove there, Oliver talked about his first day in town. He likes to say that the C.D.C. statistics on obesity in the Huntington-Ashland metropolitan area are only a few percentage points higher than the national average. In fact, the C.D.C.'s numbers vary from year to year: obesity rates in the last two years hovered near the national average, 34 percent, but the A.P. report that brought Oliver to West Virginia was based on 2006 figures that put the area's obesity rate at 45 percent. From what I saw in one day, the locals were plenty touchy about their collective waistlines, so Oliver was wise to tread lightly. That is typical of his style. Effortlessly charismatic, he has an easy warmth — happy to shake hands or pat a back, though he takes the business of listening to people quite seriously. When he finds a kindred spirit, a sharp focus, an open mind, he leaps, immediately connecting. He is genuinely polite, which is in itself so rare that it is genuinely winning. Though he is still hyperactive — if he's standing he's pacing; if he's sitting, a leg bounces — his mind seems insatiable.

Oliver is at the head of a multinational corporation that has produced 12 television series and assorted specials seen in 130 countries; he has written 10 cookbooks that have been translated into 29 languages and sold almost 24 million copies in 56 countries. In addition to the Fifteen Foundation and restaurants, he has opened six Jamie's Italian restaurants in the U.K. in the past two years, high-volume yet high-quality odes to a cuisine he loves; he sells his own brands of cookware, cutlery, tableware and gift foods; he publishes his own magazine; and he continues in his ninth year as spokesman for Sainsbury's, an upscale supermarket chain in England. Because his company is privately held, it does not release its annual earnings, but he is said to be personally worth at least \$65 million.

All told, 2,150 people work for his businesses. He keeps every fact and figure in his head — no reading, no writing, no notes. The format he has worked out for so many of his series — Jamie identifies a problem, Jamie sets out to fix the problem, Jamie encounters evil forces along the way, Jamie triumphs — comes naturally to him because that's exactly how he has lived his own life so far.

Once inside Kroger we started with produce. "I find it fascinating looking at people's trolleys," he said. "The ones here are twice the size they are at home." He picked up a bag of salad greens. "A lot of these are washed in chlorine, so they lose their nutrition," he said, tossing it back. "It takes no time to get lettuce and spin it about." He picked up a bottle of salad dressing. "Four dollars? You can make your own for less than half that price." He looked at its ingredients. "Water. I've never been taught to put water in any dressing."

Well, how about those packages of cut-up fresh fruit? He shrugged. "I don't understand why people can't cut it up themselves. Don't they own knives?"

Two little girls ran past us, playing tag while an older man trailed them, his cart bearing bananas and M&M's. "Two things happen when shopping with kids," Oliver said. "You either give in and buy everything they want, or if you're a strong parent you make certain choices."

We headed toward frozen foods. No one recognized him. Six weeks from now he'd be mobbed doing this. "Or punched," he said. "I'm a respectful person, and I'm going to try to do things in the nice way. But it's almost as if parents here have stopped saying no. It's as if the kids rule the roost." We came upon a table of Krispy Kreme doughnuts. "They're a treat, there to be loved," he said. "But start having them every day, job done. It's harsh to say, but these parents, when they've been to the doctor and keep feeding their kids inappropriate food, that is child abuse. Same as a cigarette burn or a bruise."

Town Hall awaited. Oliver is so practiced at doing these series that he spoke automatically in sound bites, sensing it was the moment to build suspense. "Ultimately, I'm a foreigner," he said. "I've got no place being here, but I've got all the right reasons." He headed for the door. "I just bloody hope I pull it out of the bag."

THE DAY IN Huntington wasn't my first meeting with Oliver. He came to New York in August on business and, in a borrowed apartment arranged by his publisher, cooked us some lunch before we sat down to talk. His new cookbook, "Jamie's Food Revolution: Rediscover How to Cook Simple, Delicious, Affordable Meals," is based on the "Ministry of Food" series and will be published by Hyperion on Oct. 13. He prepared a dish from it that he often makes for his daughters Poppy, who is 7, and Daisy, who is 6: Mini Shell Pasta With a Creamy Smoked Bacon and Pea Sauce.

A timeout here for self-anointed Health Nazis. Oliver cooks and eats all kinds of meat and feels free to use butter, cream and cheese, in sane amounts. He is not a diet cop; he's about scratch cooking, which to him means avoiding processed and fast food, learning pride of ownership, encouraging sparks of creativity and finding a reason to gather family and friends in one place. If you can make pancakes or an omelet, a pot of chili or spaghetti sauce and know how to perk up some vegetables, you can spend less and eat a more healthful meal that's delicious.

Oliver's hyperactivity finds its perfect expression when he's cooking. His movements were almost balletic, charged and graceful, even when he stuck his finger straight into the pot of water to feel if it was near boiling. It was. He cut the pancetta with lightning speed. "I swear I could do that at 10 years old," he said. "Tuck your fingers in, you never get cut."

He dressed the salad, which he filled with fresh herbs, tossing it with his hands. Then he threw frozen peas into the pan with the pancetta. Two women who work for him moved in and out of the kitchen, talking on cellphones. "The key to life is to surround yourself with lots of women," Oliver said. "Men would just lie to me. Girls say, 'Give me half an hour and I'll find out.' They're intelligent, more loyal and they make things happen. Everything I do is about team, really. So 90 percent of my team are women." The dish was done within minutes. (It was also done within minutes when I made it at home, at a more leisurely pace, the following day.)

We sat at the dining-room table. "The key to life is to know what you're good at and stay away from what you're bad at," he said. Well, the pasta was certainly delicious. As for the bad part, we talked about school. He said he recently ran into his "special needs" teacher, Mrs. Murphy, and actually blushed as he told me, "I gave her a big hug and kiss, and she said she was really proud of me." Oliver has often recounted the story of being one of five children out of 150 pulled from regular classes each week to learn how to read and write, as the other kids taunted them, singing the phrase "special needs" to the tune of "Let It Be."

He left school at 16 and graduated from Westminster Catering College. After a brief stint cooking in France, he returned to London to work at Antonio Carluccio's Neal Street Restaurant, where he met his mentor, Gennaro Contaldo, who taught him to make bread and pasta and to love all things Italian. (Contaldo now supervises bread- and pasta-making at the Jamie's Italian restaurants.) Then Oliver moved on to the trendy River Café, where a camera crew came to shoot one day and found him to be a natural. Since 2000, Oliver has been married to his longtime love, Juliette Norton. A former model, she is known to his viewers and fans as "the lovely Jools." They live in the Primrose Hill section of London and spend weekends at his farm in Essex, near where he grew up. His father's pub, the Cricketers, is still in business. Oliver says: "I have my two girls waitressing there. Poppy is gentle, sensitive. Daisy is sort of a bit mad, incredibly funny. She eats for England. She's only 6, and she'll eat squid, she'll try anything." Poppy and Daisy have an infant sister, Petal. Really.

"That's Jools," he said, easily. "My opinions in the name department don't get much of a look-in. We live very segregated sort of lives, really. Jools isn't into anything workwise that I do. It means that home is home, and when I'm there I don't talk about work. Like a lot of working mums or dads, I see the girls a bit in the morning, and then I really don't see them until the weekend, which is the way it's always been, so I don't feel bad. Mum does a great job of being a mum." But Oliver doesn't just come home from work; he comes home from being an international entertainment conglomerate. That seems hard to leave at the door.

"It's the battle of life isn't it, trying to get the right balance," he said. "The problem with me is, no one truly understands how I tick as a person, even my wife." That includes his parents, he added. "When I started the Fifteen Foundation and opened that restaurant, I spent all my savings. It was kind of reckless, and the key people around me, the business accountants and my parents, it took them five years to get it. That's why I try and take them to every graduation to meet the kids. You know my old man's saying was 'You can't make a silk purse out of a sow's ear,' but I've spent the last eight years disagreeing with that. I like giving people a bit of extra."



But his father still doesn't understand him? Oliver's leg bounced ferociously. "He's really proud, but he doesn't know how I manage to multitask. I don't know if it's part of my dyslexia, but I can jump from one place into another, into another. So whether it's the restaurant or the charity or the direct-sales business or the next book — there's probably 30 things going on now — I think it scares my dad because he's always been very good at one thing. But he's starting to relax. I think he thinks I'm happy, and ultimately you're only as happy as your most miserable child, aren't you?"

What is his mother, Sally, like? "She's hilarious. A hundred-miles-an-hour avalanche of energy. She's superbright and fairly encyclopedic about stuff, but at the same time she's a complete liability. She just worries and flusters and runs around the place, saying inappropriate things. She's fairly similar to me, really. But growing up, she was a brilliant mum and a great friend. Dad was strict, hard core, waking me up with the hose."

Oliver got his revenge — or at least tried to. Before he started cooking in the pub, he and his friends set off a stink bomb there during dinner time, sending 30 people out onto the street without paying their bills. "That was just stupid, really," Oliver said, chagrined that I mentioned it and seemingly still ashamed. "That was an attack on a family business by a moron child."

High jinks aside, he said that his parents consistently supported him and his younger sister, Anna-Marie. "I was brought up in a family where they would wish the best for you," he said. "But doing these projects like 'School Dinners' and 'Ministry of Food,' it amazed me that around so many of these people there was no positivity. With one woman, if she started doing good stuff for herself, people that were her own flesh and blood got jealous. With Fifteen, one of the biggest problems we have is the students' families, the lack of positive role models. That's why I disagree with Dad." He spoke proudly of his graduates, mentioning one who works in New York at the renowned gastropub the Spotted Pig and another who is about to become the head chef at Jamie's Italian in Guildford. Five years ago, Oliver said, he was on the South Bank of the Thames in a courtroom getting that young man out of jail.

"Look, I think the brilliant and beautiful thing in life is that anyone can do anything," he said. "When I used to go to special needs, we got laughed at, but we're not supposed to all be academic. What is education? A bunch of stuff that people think we should know. Ultimately if you can put a wall up, if you can paint, if you can work with other people and, most important, if you find out what you are good at, that's the key. Kids can do detailed, technical things, and they can do them well. Have you seen them on skateboards and surfing? It doesn't have to be a BMX, it can be a pot and a pan and a knife, but we wrap them up in cotton wool and treat them like babies and they're not."

It certainly didn't hurt him to have started early. "No," he said, "but it's ironic that the one thing I hated I sort of specialize in now," referring to the cookbooks. He added, good-naturedly, "When I do writing, it's more imagination than sentences as we know it." But he is very visual — remember that A in art — and he works on every aspect of the books' photography and design. "Almost 24 million copies, by someone who swore he'd never ever do any revolting reading and writing when he left school," Oliver said with smile of pure delight. "It's funny how things work out."

AFTER OUR DASH through Kroger, Oliver arrived at City Hall and disappeared backstage. The auditorium was less than half full, and the front rows were filled with local reporters. Mothers brought young children with an eye toward the camera. One even armed her daughter with an oversize school menu as a visual aid. Another woman seemed to have mistaken scratch cooking for "American Idol" — she raced back and forth, trying to persuade someone, anyone, to ask Oliver to listen to her daughter sing. Oliver picked up the mike. "Hi, guys," he began. "Some say this is the most unhealthy town in America. We're going to spend the next few days getting under the skin of the problem, and we're asking families, individuals, schools and churches to spread the word. Here, the odds are against you, you live an unhealthy life and die young. That's what the report said. So, this is not a sparkly, pretty show. It's about finding local ambassadors for change."

He asked people to raise their hands if friends or family were affected by obesity and bad health. Almost every hand went up. Oliver nodded. "What do you think the problems are?" Among the answers were: too much processed food in school cafeterias; a need for better prenatal nutrition; a call to stop putting Kool-Aid in toddlers' sippy cups (earlier, Oliver heard about infants' bottles filled with Coca-Cola); suggestions that restaurants offer smaller portions and that children's menus offer alternatives to burgers and fries.

Oliver took it in. "This isn't a freak show here," he said. "You're only a few percent away from the national average. Every child should be taught to cook in school, not just talk about nutrition all day."





Good food can be made in 15 minutes. This could be the first generation where the kids teach the parents.” That earned a round of applause.

“I got a billion dollars out of the British government and put it into the school system,” he went on. “But it’s still in transition, it’s not all glossy yet. When parents get angry anything can happen. So I’ll need your help. Hopefully over the next few months, we’ll do some really good things together.”

After he left the lectern, the crew restaged the applause they would use for his entrance. It was thin before, but now it ended with a standing ovation. The townsfolk seemed as quick a study on theatrics as they were on health reform; many angled to be interviewed, to establish themselves as characters. They were actually so intent on chasing the limelight that few seemed to notice an untended table outside the rear of the auditorium. There, in what seemed the ultimate mixed message, was the 15-pound burger Oliver helped make that afternoon. Sitting near a bowl of candy and a half-eaten plate of sandwiches, it filled an enormous platter. It had been cut into pieces, but hardly any had been taken.

As Oliver spoke to the camera downstairs and audience members jockeyed for position upstairs, the table stood ignored. Until two little boys stormed it, prompting their mother to pull herself free from the media hubbub. They stopped just short and stared at the bounty before them.

“Is it free?” one son asked. She looked around, nervously. “Yes,” she said. He reached past the burger and grabbed a box of Milk Duds. Then she got back in line, to be on TV.

Alex Witchel is a staff writer for the magazine.

http://www.nytimes.com/2009/10/11/magazine/11Oliver-t.html?_r=1&th&emc=th



Rules to Eat By

BY MICHAEL POLLAN



Every trip to the supermarket these days requires us to navigate what has become a truly treacherous food landscape. I mean, what are we to make of a wonder of food science like the new Splenda with fiber? (“The great sweet taste you want and a little boost of fiber.”) Should we call this progress? Is it even food?

And then, at the far other end of the nutritional spectrum, how are we to process (much less digest) the new, exuberantly caloric Double Down sandwich that KFC has introduced? This shameless exaltation of dietary fat actually redefines the very concept of a sandwich by replacing the obligatory bread with two slabs of fried chicken kept some distance apart by strips of bacon, two kinds of cheese and a dollop of sauce.

Deciding what to eat, indeed deciding what qualifies as food, is not easy in such an environment. When Froot Loops can earn a Smart Choices check mark, a new industrywide label that indicates a product’s supposed healthfulness, we know we can’t rely on the marketers, with their dubious health claims, or for that matter on the academic nutritionists who collaborate on such labeling schemes. (One of them defended the inclusion of Froot Loops on the grounds that they are better for you than doughnuts. So why doesn’t the label simply say that?)

Making matters worse, official government pronouncements about eating aren’t necessarily much more reliable, not when the food industry influences federal nutrition guidelines. But even when the “best science” prevails, that science can turn out to be misguided — as when the official campaign against saturated fat got us to trade butter for stick margarine loaded with trans fats, a solution that turned out to be worse than the problem.

If we can’t rely on the marketers or the government or even the nutritionists to guide us through the supermarket woods, then who can we rely on? Well, ask yourself another question: How did humans manage to choose foods and stay healthy before there were nutrition experts and food pyramids or breakfast cereals promising to improve your child’s focus or restaurant portions bigger than your head?

We relied on culture, which is another way of saying: on the accumulated wisdom of the tribe. (Which is itself another way of saying: on your mom and your friends.) All of us carry around rules of thumb about eating that have been passed down in our families or plucked from the cultural conversation. Think of this body of food knowledge as samizdat nutrition: an informal, unsanctioned way of negotiating our eating lives that becomes indispensable at a time when official modes of talking about food have suffered a serious loss of credibility.

Earlier this year I began gathering examples of these rules, or personal food policies, for a short book I’m publishing in January. My premise is that for all the authority we grant to science in matters of nutrition, culture still has a lot to teach us about how to choose, prepare and eat food, and that this popular wisdom



is worth preserving — perhaps today more than ever, in this era of dazzling food science, supersize portions and widespread dietary confusion.

In March, I posted [a request for readers' rules about eating](#) on Well, Tara Parker-Pope's [health blog](#) on [nytimes.com](#). Within days, I received more than 2,500 responses — more than any Well post had ever received. My aim was to collect genuinely useful, and nutritionally sound, examples of popular wisdom about eating. I found some for my book, but I also found something else — a banquet of food policies that even when they made little, if any, nutritional sense (and therefore didn't belong in the book) nevertheless opened a window on our current thinking about food: the stories we tell ourselves, the games we play and the taboos we invoke to organize our eating lives. Some of the rules have stood the test of time and have been confirmed by science, but all of them have something to teach us about our continuing efforts to pick a healthful and happy path through the minefields of the modern-food marketplace or restaurant menu.

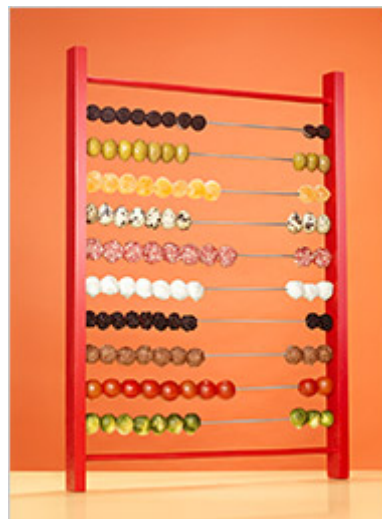
Michael Pollan is a contributing writer. His new book, "Food Rules: An Eater's Manual," will be published in January.

<http://www.nytimes.com/2009/10/11/magazine/11food-rules-t.html?th&emc=th>



The Calorie-Restriction Experiment

By JON GERTNER



AS AMERICANS become fatter and fatter — a study published in July revealed that obesity rates increased in 23 states last year and declined in none — a select group of men and women under the watchful care of medical professionals have spent the past few years becoming thinner and thinner. There are 132 of them, located in and around Boston, St. Louis and Baton Rouge, La. All are enrolled in a large clinical trial that is financed by the [National Institutes of Health](#) and known as Calerie, which stands for Comprehensive Assessment of Long-Term Effects of Reducing Intake of Energy. A few years ago, researchers at [Washington University](#) in St. Louis, [Tufts](#) in Boston and the Pennington Biomedical Research Center in Baton Rouge began recruiting subjects to examine what happens to people who reduce their daily calories by 25 percent for two years. Admissions are rolling, so not all recruits begin and end at the same time. A few of the early participants, in fact, have just completed their two-year stint. The final recruits began their regimens last month.

In late summer, in St. Louis and Boston, I met with nearly two dozen subjects in the study. At the Washington University medical complex, Doug Hansen was reclining on his hospital bed one afternoon when I walked in to say hello. Hansen, who is 45 and had been in the Calerie study for six months, seemed the picture of good health: tan, tall, friendly, energetic. Maybe a little thin. “Let me pull up some chairs,” he said, and he jumped out of bed. He was dressed in jeans that struck me as noticeably baggy. His T-shirt hung loosely on his frame. After checking in 24 hours earlier, Hansen told me, he went through a battery of tests, which were required of participants at the half-year mark. Some of these were cognitive: interviews and questionnaires, administered by a behavioral researcher, that evaluated his memory and perceptions. Others were mildly invasive. His blood was drawn repeatedly, and his bone-mineral density was measured by scanning equipment that utilized low-levels of radiation. Early that morning, his resting-metabolic rate was calculated by medical technicians who asked him to remain motionless on his bed for 45 minutes as they put a ventilated plastic tent over his head and measured his respiratory output. Also that morning, Hansen swallowed a pink capsule that was slowly passing through his digestive tract. As we spoke, the pill was measuring his core internal temperature and transmitting the information via radio signal to a small, boxlike receiver strapped to his belt. “I’ve got to wear it until 5 p.m.,” he said. Then he shrugged. “It’s really not a big deal.”

At the start, the recruits taking part in what is called calorie restriction were told they would likely see their weight decrease by around 15 percent during the first year. (A smaller number of recruits were put in a control group and instructed to continue their normal eating habits for two years.) After their weight drop, they would plateau at a “weight stability” level. This was Hansen’s experience, as well as that of most of the Calerie subjects I met. After six months in the study, Hansen told me, he dropped to 168 pounds from 198, or near his plateau.

A curious aspect of the Calerie project, though, is that it is not meant to study weight loss or if one type of diet is better than another. Instead, Calerie is investigating how (and if) a spartan diet affects the aging process and its associated diseases. To the Calerie researchers, these are quite distinct. The aging process, which researchers sometimes call “primary” or “intrinsic” aging, refers to the damage that ordinarily accumulates in our cells as we grow older, a natural condition that seems to have limited the maximal lifespan of humans to 120 years. Diseases that accompany the aging process — often called “secondary aging” — are those afflictions increasingly prevalent in the elderly, like cancer, diabetes and cardiovascular disease.

There seems little doubt that calorie restriction can have significant effects on secondary aging. A recent spate of papers in some of the world’s leading medical journals demonstrate that in small studies, human subjects following such diets experience astounding drops in cardiovascular risk factors; a forthcoming review on cancer risks in animals with such diets, moreover, suggests a stark correlation — fewer calories mean fewer tumors. This explains why the stakes for Calerie are high. Essentially, the study asks whether calorie restriction allows people to grow older in better health — with less disease, fewer drugs and shorter hospital stays — through a method that neither medicine nor scientific technology have yet come close to approximating. Meanwhile, the experiment aims to shed some light on the more complex and still-unsettled question of whether calorie restriction affects primary aging, and thus longevity, in humans. Going back more than a half century to an experiment at [Cornell University](#) in the mid-1930s, calorie restriction has been shown again and again to extend the lives of mice, rats and other animals. An ongoing experiment at the [University of Wisconsin](#) on rhesus monkeys, which began in 1989, portends similar results: compared with normal-weight primates on a regular calorie regimen, the monkeys on restricted diets are healthier and more vigorous and seem destined (at least at the moment) for a longer life.

A clinical trial that follows human subjects through their entire lives, much as the primate study in Wisconsin does, would be impossible. For one thing, it would be ethically problematic to restrict calories in children (though with animals, the earlier that calorie restriction begins, the longer they live). For another, we already live a long time now, thanks to advances in medicine, surgery and public health, so “if you wanted to do longitudinal studies in humans, it would take 125 years,” Eric Ravussin, who leads the team doing the Calerie experiment at Pennington in Baton Rouge, told me. Thus the researchers in the two-year study are instead looking at changes in what they call biomarkers. A decline in Doug Hansen’s core internal temperature, for instance, would suggest a slowdown in his primary aging process (data from a respected study on aging shows individuals with lower temperatures generally live longer). Other characteristics related to secondary aging are just as important. As Hansen curtails his calories for the next 18 months, doctors and medical technicians will measure, among other variables, inflammation, insulin levels and blood pressure. Reductions in any of these things would indicate a lessened vulnerability to heart disease and diabetes.

Another problem humans present is their susceptibility to temptation. Primates and mice are kept in cages and eat what they are fed; none have ever had to choose to forswear a spring roll or a cupcake. The medical literature on calorie restriction sometimes cites an experiment conducted in Minnesota in the 1940s to study the effects of starvation, especially with the war-torn populations of Europe in mind. The men — all lean to begin with, all volunteers (they were conscientious objectors to World War II) — were subjected to about a 40 percent decrease in caloric consumption. The state of near starvation led a few of the subjects to the threshold of insanity. They became irritable and depressed; some began to lie and cheat; at least one engaged in acts of self-mutilation. Some of the potential insights of the Calerie study, therefore, are psychological as much as physiological. If ordinary Americans want to cut their energy intake by a more modest 25 percent — whether to slow down the aging process or seek a pharmaceutical-free way to reduce the risks of, say, cardiovascular disease — can they actually do it? The feasibility of long-term food reduction has never been adequately investigated. “Here there are really three things we want to know,” Susan Roberts, a professor of nutrition and psychiatry who is in charge of the Calerie team at Tufts, told me. “The first is, can we really implement human [caloric restriction](#)? The second is, can we really implement it in a way that doesn’t neglect the biology? People can’t walk around hungry, so is hunger a necessary part of the biology of calorie restriction? The third is, are there unacceptable side effects that you wouldn’t pick up in animals that you would pick up in humans?” Roberts went on to say: “And if we found that caloric restriction was healthy and everyone can do it? The goal of the trial is to see if this is ready for prime time.”

THERE'S A JOKE that says calorie restriction may or may not extend your life, but it will most assuredly make your life feel longer. At least in theory, you must accept endless days of grinding asceticism. Starbucks ventis without a breakfast scone (460 calories). Sandwiches without Swiss (106), mayo (57) or potato chips (155). Coffee breaks without a cookie (130). Work parties and weddings that, limited to just a single glass of cabernet (127), become tedious affairs. Some aspects of calorie-deprivation diets may sound familiar because of the Calorie Restriction Society, a group of several hundred men and women who have acquired a degree of notoriety by harshly curtailing their food consumption. For self-starters, there are now books about calorie-restriction methodology like "The C.R. Way," which favors recipes like Caraway Cabbage. (To prepare, boil for 6-10 minutes one head red cabbage, two tablespoons caraway seeds, one bay leaf; strain; serve.) On a recent "60 Minutes" segment about a group of calorie-restricting Argonauts, a dinner party began with hors d'oeuvres of flour-free bread smeared with baby food.

For the subjects in the Calerie experiment, there was little about their diets that seemed freakish. They ate normal foods, hosted dinner parties for friends and generally went about their lives normally. The subjects do not represent a cross section of American society, however. Whereas 66 percent of Americans are currently classified as overweight or obese, no one allowed into the study was seriously overweight by medical definitions: everyone began the experiment with a body-mass index that fell within a normal to slightly overweight range of 22 to 28. There were scientific reasons for this. The effects of calorie restriction may simply be an evolutionary legacy, "a metabolic, hormonal and molecular adaptation" to a world of sparse resources, as Luigi Fontana, one doctor in charge of the Washington University trial who also holds a position at the National Institute of Health in Italy, described it to me. By slowing aging and increasing resistance to disease during periods of food scarcity, the adaptive responses to fewer calories increased the odds that animals and humans that lived short lives might survive until they could reproduce. In laboratory settings, calorie restriction seems to "work" — that is, it seems to influence primary and secondary aging — when the diet of an animal of normal weight is curtailed by a significant percentage. The degree of calorie restriction can't exceed 50 percent, which is when laboratory animals begin to die. Until that point, however, the more severe the calorie-restriction regimen, the greater the health benefit — a lifespan 50 percent again as long in studies on mice and rats. These results might not apply to the overweight. As Fontana told me, moving a heavyset person's body-mass index from, say, 35 to 29 might increase his longevity by reducing the risk for diseases like diabetes. Yet it is not "triggering the anti-aging pathways" that have been observed at the cellular and molecular levels in animals of normal weight when placed on a calorie-restricted diet.

And why set the restriction at 25 percent? Why not 20 percent? Or 30 percent? Or why not reduce calorie intake by 10 percent and increase exercise (and calories burned) by 15 percent, so that a subject's calorie deficit still equals about 25 percent? All were viable options. But the study's architects determined that 25 percent was both humanly feasible and, based on data from previous experiments, could have noticeable effects on the rate and diseases of aging. It is possible, meanwhile, that a sustained decrease in calories coupled with a sustained increase in exercise might have a potent effect on aging (at the moment there are no large-scale studies under way, Fontana told me). Such a combination, however, could complicate efforts to understand, in isolation, the effects of calorie restriction on humans.

The researchers in Boston, Baton Rouge and St. Louis screened the Calerie recruits in ways other than body-mass index. They looked for subjects who were motivated and highly organized — desirable traits if you have to keep a journal record for two years of every morsel of food you eat. They sought people who had strong moral support at home. They ruled out anyone who counselors surmised might have a predisposition toward anorexia or bulimia — disorders that might conceivably be triggered by the new diet. They also wanted participants who had stable jobs without too much travel, yet were flexible enough to allow them to visit the hospital centers weekly for weigh-ins, counseling and medical tests. All the subjects are being paid: \$5,000 at Tufts and Pennington, \$2,400 at Washington University. But screeners rejected those who said they were attracted to the study for the money — an unnecessary precaution, perhaps, given that enrollment in Calerie is effectively an arduous part-time job that pays third-world wages. "I figured out that \$5,000 for two years for the 70 times I have to come in here worked out to a dollar an hour," Tom Jacobs, a participant at Tufts, told me.

Getting someone started on a calorie-restriction diet is far more involved than it might first appear. For the past seven years, Fontana has been collecting data on about 50 members of the Calorie Restriction Society; Fontana estimates that these men and women have cut their calories by 25 to 30 percent. Yet this can't be said with precision or authority. Nor is it clear what their prediet biomarkers or vital signs were.

At the start of the Calerie experiment, a first order of business was to rigorously determine how many calories each recruit ate and burned on a typical day. This required a methodical (and expensive) two-week laboratory test: participants drank water containing rare isotopes that, when excreted and analyzed, allowed researchers to discern a subject's carbon-dioxide production (and his or her calorie burn) to a precise degree. After that, each subject received an individualized target. Most of the subjects I spoke with called this the Number. At the start, researchers determined that Doug Hansen burns (and thus ingests) what he told me was around 2,600 calories a day. So he was put on a diet of 1,950 calories. Jeffrey Peipert, an Ob-Gyn who is nine months into the study in St. Louis, was found to burn 3,300 a day — and thus given a number of just under 2,500. Many of the women, meanwhile, required far fewer calories. Liz Ewen, a molecular biologist who is 18 months into the Tufts study, told me her number was 1,670 calories, down from 2,226. It seemed a common experience that no one had any idea before the study began what his or her caloric requirements were. “My wife and I both took a guess and we both got it wrong,” Peipert told me.

At the start, the subjects were informed that although they would receive help with menus and recipes from the study's dieticians, they would be responsible for buying and cooking all their own meals for the next two years. For each participant's first 28 days, however, all meals and snacks are free, custom cooked (based on each individual's calorie requirements) and packaged in large coolers to be picked up every few days and taken home. “That way we can be sure the subjects are getting the exact dietary prescription while they're learning how to do it,” Morgan Schram, the study manager in St. Louis, told me. The great challenge, at least for that first month, is to create food for the subjects that is simultaneously satiating, appealing and — most crucially — low in calories. At both Tufts and Washington University, meals for new participants are prepared in facilities that resemble laboratory-kitchen hybrids. The food is not particularly exotic: Mediterranean-style combinations of fish with Greek-style potatoes, for instance, or sweet-and-sour chicken with rice. Whether the meals are bad or good is somewhat beside the point. The meals are precise. When I visited the kitchen in St. Louis, a nutritionist was cooking and weighing, to a tenth of a gram, each ingredient of a dish of farfalle with pesto and diced chicken. Most of the recipes seem to steer participants toward foods that are nutrient-rich but low in calories, or what dieticians refer to as “low in energy density.” A number of recent experiments — notably by Barbara Rolls at [Penn State](#) — demonstrated that humans tend to eat a consistent weight of food from day to day, but not necessarily a consistent number of calories. For the Calerie study, this has proved a useful tool in the defense against hunger. By building a diet around foods with a low-energy density, especially vegetables, fruits and soups, participants can conceivably ingest the same weight of food as they might on a regular diet while taking in fewer calories.

Apples are superb in this regard. At the medical centers running Calerie, you see a lot of people walking around eating apples. Even subjects who disliked apples have discovered that calorie restriction, which generally has the effect of making food taste better, has given them a surprising desire for the fruit. By contrast, alcohol — many calories, not much nutrition — isn't much use at all. But it isn't expressly forbidden. If you wish, you can indulge in drinking or in energy-dense foods (nuts or sweets, for instance), but probably not both nor in excess in either case. “I enjoy a regular glass of wine or drink at the end of the day,” Peipert said. “But I think what I've learned on this diet is that I enjoy food more. I'd rather have a Häagen-Dazs bar at 190 calories than a gin and tonic at night at 170.”

Subjects willing to re-engineer their eating habits appear to have an easier time on the diet. When I asked Susan Roberts, who runs the Tufts study, if there was a danger in Americans trying calorie restriction on their own, without a dedicated team of medical experts offering advice, she suggested that there are built-in safety mechanisms. Roberts said she didn't think anyone would be successful by reducing portion size. “If you don't change your diet to a high-satiety diet, you will be hungry, and you will fail,” she told me. A high-satiety diet, she said, was bound to be a healthful diet with a lot of vegetables, fruits and insoluble fiber — the kind found in some breakfast cereals, like Fiber One — that her research indicates has a unique effect in helping calorie-restriction subjects feel fuller, probably because they activate certain receptors in the lower intestine. Roberts added, “If people are doing this on their own and succeeding, well, I'd be surprised if they're eating a lot of Hostess Twinkies.”

ONE MORNING in St. Louis, I watched as Peipert, at Week 33, met with his counseling team: a behavioral therapist, Cherie Massmann, and a dietician, Kathleen Obert. “Let's take a look at your weight loss,” Obert said, looking at a chart that showed a downward-curving line that was beginning to level off. Peipert began at 174 pounds and had just hit 151; by Week 52, the chart projected he would plateau at

147 pounds, which ideally he would maintain for a full year. Apparently he was a model subject, losing weight right on schedule, just as the research team hoped he would.

In general, the complaints I heard from subjects in Calerie had less to do with raging hunger — most told me they felt hungry for the first few weeks and then acclimated to their diets — than the logistical demands of calorie restriction itself. They were tired of conflating meals and mathematics; they looked forward to a day when they wouldn't need to check the caloric content of every course (usually on a Web site called calorieking.com) and record it for the researchers. In his counseling session, however, Peipert told Obert and Massmann that he was struggling with hunger. It was real hunger, the kind that woke him from his sleep. Sometimes he couldn't get through the night unless he went downstairs and had a bowl of cereal.

Massmann asked Peipert to tell them about his daily activities. Peipert happens to have a relatively high calorie prescription, and his diet the day before was surprisingly indulgent. There was no red cabbage or strained peas. Among other things, he consumed two granola bars, a caramel Frappuccino, a bowl of soup, a tuna sandwich and pasta from Pizzeria Uno. While golfing, he also ate a sausage-and-egg sandwich from Burger King.

Massmann asked Peipert about his physical activities. He paused to think for a moment. It had been his day off from work. There were the 18 holes of golf. He biked eight miles to and from his job at the hospital, he told them, because he had to pick something up at the office. He cut the grass in his yard, which was about an acre in size. He and his son spent more than an hour ripping out tree roots. And after dinner he and his wife took a 40-minute walk around the neighborhood. The silence in the room was amusing. Obviously, the day before, Peipert was a calorie-incinerating machine. Massmann gently suggested that perhaps this was why he was hungry. "But it was a beautiful day," Peipert argued. Massmann nodded and then waited a beat before saying, "But maybe — maybe — you could just try to turn the daytime activities down a notch?"

The session ended in a stalemate. Afterward, Peipert told me he didn't think he would cut down on the exercise. Suffering through a bout or two of hunger was a fair trade-off for doing what he liked on a sunny afternoon. And in any case, he told me, he remained enthusiastic about the study. "My blood pressure when I started was at 130 over 80, and now I think I'm 110 or 115 over 54." He hadn't been at this weight since high school. Other than the nighttime pangs, he did not find the trial nearly as difficult as he imagined. He was eating a lot of apples, he noted — indeed, he was eating one as we spoke.

THE MAJORITY OF subjects in Calerie have so far succeeded in achieving their weight-loss goals. The ones I spoke with seemed to think the most effective tool for sticking with the diet is simply the study's accountability factor: they not only have to produce their food diary each week; they also have to be weighed in. Moreover, once or twice a week they attend individual counseling sessions, like Peipert's, as well as group counseling sessions in which they talk with their fellow dieters about strategies like how to separate food from special events and celebrations. They're also encouraged to "bank" calories if they know they will have a day of excess in the future. "If I'm going to the ballgame on the weekend, I know I'm going to have a bratwurst," Doug Hansen told me. So he eats 100 fewer calories on the days leading up to the game.

People like Hansen and Peipert almost make it sound easy. The question is how many other Americans could do the same. To put it to the medical doctors overseeing the study — could this ever be prescribed to a larger population, either as a preventive tool or a treatment? — is to walk into a wall of skepticism. "Ninety-nine percent can't do it," John Holloszy, a medical doctor who is the lead investigator at Washington University, told me. "The people in the study are not going to stick with it" after they leave. Other medical doctors involved with Calerie told me they were also dubious, believing that a low-calorie regimen requires too much in the way of individual effort and too much in the way of medical resources and counseling to make it practical for many Americans. When I spoke with Robert Krikorian, a longtime Calorie Restriction Society member who is not in the Calerie study but who happens to be a neuropsychologist, he pointed me to some behavioral studies that showed how inattentive we are in regard to what we ingest on any given day. "I don't think humans are designed to pay attention to how much they eat," he said, adding that for most people this natural tendency would chafe against the organizational requirements of calorie restriction, thus limiting its appeal.

Some professors of nutrition and psychology who are involved in Calerie were more optimistic. Most seemed surprised as well as encouraged by the high level of compliance among the subjects. And all of the subjects I spoke with told me they intended to continue with calorie restriction after they were finished. "I think that this can be just as successful as Weight Watchers," Liz Ewen said — not for

everyone, she added, but arguably suitable for larger numbers if there were an infrastructure of online tools, group meetings and dieticians to aid in the process. “It’s really not much more than embarking on a diet that teaches you how to eat normal foods but make better choices.”

Still, a not insignificant number of subjects in the study have struggled to achieve their weight-loss targets. For them, the Calerie team sometimes suggests they go back on the hospital-kitchen meal plan for nine days, so their caloric intake can get back on track. Meanwhile, a few stragglers in the study have not even made it that far. A few have left because of pregnancies and job transfers; a few have been asked to stop because tests showed they were suffering from anemia or because their bone-mineral loss (a known danger of calorie restriction) was becoming substantial. Another negative side effect that subjects share is feeling chilled. This isn’t dangerous — these people are, after all, burning less energy. Counselors tell them to put on a sweater.

I asked Holloszy why he thought some members of the Calorie Restriction Society succeeded for years with a restriction diet. “Fear of death,” he said. The flip side of that, of course, would be love of life, which seemed closer to the sentiments of the Calerie subjects I met. A number of them joined the study not out of a desire for superlongevity, but because they had young children and wanted to maintain their own health as long as they could. In the meantime, they encountered some pleasant surprises. When I sat in on a group counseling session one day in St. Louis, a participant, Brad Beggs, told the group that he had finally decided to buy new clothes, because his old ones no longer fit. Everyone in Calerie reaches this question at some point: is my lower weight a new normal or just a temporary state? “I’ve never gotten so much pleasure in my life,” Beggs told the group, adding that it only confirmed his resolve. “I’m wearing a medium shirt now. I haven’t worn a medium since high school.” Mediums are always on sale, he added, which was in fact his point. “It’s the stuff nobody in America buys anymore.”

IT MAY TURN OUT that the medical doctors are right and the trial subjects are wrong. Calorie restriction — or simply living a life of less in a culture of more — is extremely difficult to achieve and even more difficult to maintain. Americans’ seemingly inexorable slide toward obesity tends to indicate as much: for the majority of us, the desire to eat can easily overwhelm personal willpower and (so far) any messages from public-health campaigns. At the same time, debates over the viability of calorie restriction might ultimately seem academic. Why spend time worrying over whether normal-weight subjects or slightly overweight subjects should lose weight, anyway? These are generally the healthiest of Americans. Perhaps the dollars would be better spent on cancer or heart research.

Of course, calorie research is now intimately related to all those other kinds of disease research. When I sat down with Holloszy and Fontana, the Calerie investigators at Washington University, they pointed out that Holloszy had conducted some of the pioneering experiments on exercise, health and weight. In a study on rats, he compared animals that were lean because of exercise with those that were equally lean from calorie restriction. “Both had an increase in average life span,” Fontana said, but only calorie restriction was able to slow down aging and increase maximal life span. That suggested that “leanness” was not in and of itself determining the rate of aging. “Speaking of humans,” Fontana added, “if you are lean because you are exercising, of course you are doing good, because you’re preventing types of diabetes, some kinds of cardiovascular disease and maybe some types of cancers. But the data suggest that calorie restriction is more powerful. And the people on C.R. are more powerfully protected from diseases than the exercisers.”

Fontana connected his point to his continuing observations of some Calorie Restriction Society members. “In terms of cardiovascular diseases — the No. 1 cause of death; 4 out of 10 people die of it in the U.S. and Europe — we know that they will not die of cardiovascular death,” Fontana said. His subjects have cholesterol around 160, blood pressure around 100 over 60, high HDL, low triglycerides and very low levels of inflammation. “So these people won’t develop these diseases,” he said. “And I think that’s an important finding. Because every day doctors are publishing hundreds of papers on circulation research and medications that are lowering blood pressure or cholesterol by a small bit. And here we have such a powerful intervention that is basically cleaning out the arteries.” At Tufts, Susan Roberts, the lead investigator, echoed this position, saying that the study will probably have greater effects than the average clinical trial. “I don’t know why anyone would take drugs when they could do something like this,” Roberts said, referring to Calerie.

You could spin that around, however. Why should you do something like calorie restriction if you could take a pill that somehow reproduces its effects? Nothing of the kind exists at the moment. Yet the development of such a drug would almost certainly be an immense medical advance. Instead of trying to seek cures and treatments for the individual diseases of aging, it would conceivably address all of them in

one grand application. The hope of some people involved in the Calerie study — Eric Ravussin, for instance, who heads the research team in Baton Rouge — is that a better understanding of the mechanisms of calorie restriction will hasten the development of a drug. This is why, in addition to taking measurements, the researchers are collecting blood, muscle and fat samples from the subjects. “If you find the mechanism, you can mimic the mechanism” is how Ravussin put it to me.

Fontana is doubtful. “My perception right now is the effects of calorie restriction are multiple,” he said, “so I think it’s highly difficult to find one, or two or three drugs that will mimic such a complex effect.” And to say that in five years a cocktail of calorie-restriction mimetics will increase maximal lifespan? “I don’t believe that,” he said. Fontana also wasn’t optimistic that a diet involving a 25 percent reduction in calories could find much traction in the general population. While he said a more modest caloric-reduction diet might enjoy some popularity, he believes the larger lesson to come out of his research might be fairly simple, if perhaps a bit conventional: eating less is better than eating more, especially if it’s a nutritious mix of whole grains, fruits, vegetables and the like. “The evidence is overwhelming now that it will improve your health and will improve your chances of living healthier and probably longer,” he said.

In the meantime, this fall will be the first time that some of the Calerie subjects, their two-year regimen completed, will go out on their own — without weigh-ins, without counseling, without nutritionists at their beck and call. There are no immediate plans to continue collecting data on those who have finished the experiment — the N.I.H. budget did not provide financing for a follow-up study — yet the investigators told me they hope to check in with the subjects in the future to see how they fared. As it happened, I ran into several participants in St. Louis who were in the homestretch. None planned on an ice-cream binge. Instead, they told me, they would continue with their diets while looking forward to estimating, rather than counting, their calories. “I’ll probably do that for a week or two,” Josh McMichael told me. About a month later, in late September, I sent McMichael a note to see how he was faring. He gained eight pounds in the weeks after finishing, he said, but later shed most of that weight. “I tried the new massive burgers from Burger King,” he said. “Twice. Wasn’t worth the side effects.”

Then he added: “I think I’ve gotten over things like that. For the most part.”

Eating much, much less helped rats live longer. Will it work on humans?

Jon Gertner, a contributing writer, last wrote about high-speed rail for the magazine.

<http://www.nytimes.com/2009/10/11/magazine/11Calories-t.html?th&emc=th>

The Red Book

C. G. Jung (Author), Sonu Shamdasani (Editor, Translator, Introduction by), Mark Kyburz (Translator), John Peck (Translator)



The most influential unpublished work in the history of psychology.

“The years, of which I have spoken to you, when I pursued the inner images, were the most important time of my life. Everything else is to be derived from this. It began at that time, and the later details hardly matter anymore. My entire life consisted in elaborating what had burst forth from the unconscious and flooded me like an enigmatic stream and threatened to break me. That was the stuff and material for more than only one life. Everything later was merely the outer classification, the scientific elaboration, and the integration into life. But the numinous beginning, which contained everything, was then.”

These are the words of the psychologist C. G. Jung in 1957, referring to the decades he worked on *The Red Book* from 1914 to 1930. Although its existence has been known for more than eighty years, *The Red Book* was never published or made available to the wide audience of Jung’s students and followers. Nothing less than the central book of Jung’s oeuvre, it is being published now in a full facsimile edition with a contextual essay and notes by the noted Jung scholar Sonu Shamdasani and translated by Mark Kyburz, John Peck, and Sonu Shamdasani.

It will now be possible to study Jung’s self-experimentation through primary documentation rather than fantasy, gossip, and speculation, and to grasp the genesis of his later work. For nearly a century, such a reading has simply not been possible, and the vast literature on his life and work has lacked access to the single most important document. This publication opens the possibility of a new era in understanding Jung’s work. It provides a unique window into how he recovered his soul and constituted a psychology. It is possibly the most influential hitherto unpublished work in the history of psychology.

This exact facsimile of *The Red Book* reveals not only an extraordinary mind at work but also the hand of a gifted artist and calligrapher. Interspersed among more than two hundred lovely illuminated pages are paintings whose influences range from Europe, the Middle East, and the Far East to the native art of the new world. *The Red Book*, much like the handcrafted “Books of Hours” from the Middle Ages, is unique. Both in terms of its place in Jung’s development and as a work of art, its publication is a landmark.

books.wwnorton.com/books/detail.aspx?ID=12004

Banded Rocks Reveal Early Earth Conditions, Changes



Pictured in 2008, a banded iron formation about 2.5 billion years old near Soudan Underground Mine State Park in Minnesota shows alternating layers of silica-rich (red) and iron-rich (gray) minerals. This type of ancient rock formation dominated the global ocean floors for more than two billion years, but abruptly disappeared 1.7 billion years ago. (Credit: Huifang Xu/UW-Madison)

ScienceDaily (Oct. 12, 2009) — The strikingly banded rocks scattered across the upper Midwest and elsewhere throughout the world are actually ambassadors from the past, offering clues to the environment of the early Earth more than 2 billion years ago.

Called banded iron formations or BIFs, these ancient rocks formed between 3.8 and 1.7 billion years ago at what was then the bottom of the ocean. The stripes represent alternating layers of silica-rich chert and iron-rich minerals like hematite and magnetite.

First mined as a major iron source for modern industrialization, BIFs are also a rich source of information about the geochemical conditions that existed on Earth when the rocks were made. However, interpreting their clues requires understanding how the bands formed, a topic that has been controversial for decades, says Huifang Xu, a geology professor at the University of Wisconsin-Madison.

A study appearing October 11 as an advance online publication in *Nature Geoscience* offers a new picture of how these colorful bands developed and what they reveal about the composition of the early ocean floor, seawater, and atmosphere during the evolution of the Earth.

Previous hypotheses about band formation involved seasonal fluctuations, temperature shifts, or periodic blooms of microorganisms, all of which left many open questions about how BIFs dominated the global marine landscape for two billion years and why they abruptly disappeared 1.7 billion years ago.

With Yifeng Wang of Sandia National Laboratories, Enrique Merino of Indiana University and UW-Madison postdoc Hiromi Konishi, Xu developed a BIF formation model that offers a more complete picture of the environment at the time, including interactions between rocks, water, and air.

"They are all connected," Xu explains. "The lithosphere affects the hydrosphere, the hydrosphere affects the atmosphere, and all those eventually affect the biosphere on the early Earth."

Their model shows how BIFs could have formed when hydrothermal fluids, from interactions between seawater and hot oceanic crust from deep in the Earth's mantle, mixed with surface seawater. This mixing triggered the oscillating production of iron- and silica-rich minerals, which were deposited in layers on the seafloor.

They used a series of thermodynamic calculations to determine that the source material for BIFs must have come from oceanic rocks with a very low aluminum content, unlike modern oceanic basalts that contain high levels of aluminum.

"The modern-day ocean floor is basalt, common black basalt like the Hawaiian islands. But during that time, there was also a strange kind of rock called komatiites," says Xu. "When ocean water reacts with that kind of rock, it can produce about equal amounts of iron and silica" — a composition ideally suited to making BIFs.

Such a mixture can create distinct alternating layers — which range in thickness from 10 micrometers to about 1 centimeter — due to a constantly shifting state that, like a competition between two well-matched players, resists resolving to a single outcome and instead see-saws between two extremes.

BIFs dominated the global oceans 3.8 to 1.7 billion years ago, a time period known to geologists as the Archaean-Early Proterozoic, then abruptly disappeared from the geologic record. Their absence in more recent rocks indicates that the geochemical conditions changed around 1.7 billion years ago, Xu says.

This change likely had wide-ranging effects on the physical and biological composition of the Earth. For example, the end of BIF deposition would have starved iron-dependent bacteria and shifted in favor of microbes with sulfur-based metabolisms. In addition, chemical and pH changes in the ocean and rising atmospheric oxygen may have allowed the emergence and spread of oxygen-dependent organisms.

The new study was partly funded by the NASA Astrobiology Institute, and Xu hopes to look for biosignatures trapped in the rock bands for additional clues to the changes that occurred 1.7 billion years ago and what may have triggered them.

Additional support was provided by the National Science Foundation and the U.S. Department of Energy.

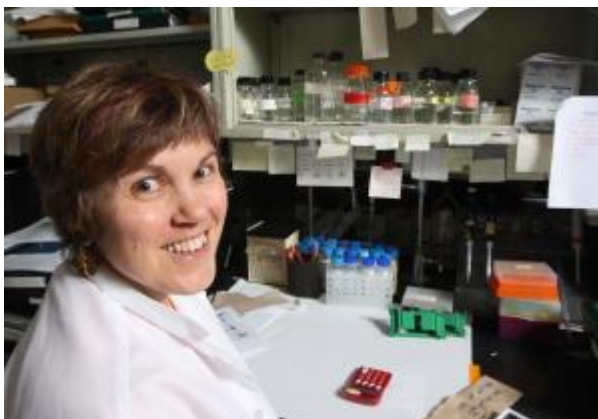
Adapted from materials provided by [University of Wisconsin-Madison](#), via [EurekAlert!](#), a service of AAAS.

<http://www.sciencedaily.com/releases/2009/10/091011184428.htm>

Enzyme May Be A Key To Alzheimer's-related Cell Death

Sandra Rossie found that an enzyme blocks a mechanism that can lead to neural cell death. (Credit: Purdue Agricultural Communication photo/Tom Campbell)

ScienceDaily (Oct. 12, 2009) — A Purdue University researcher has discovered that the amount of an enzyme present in neurons can affect the mechanism thought to cause cell death in Alzheimer's disease patients and may have applications for other diseases such as stroke and heart attack.



Sandra Rossie, a professor of biochemistry, found that increasing the amount of protein phosphatase 5, or PP5, in rat neural cells resulted in less cell death associated with reactive oxygen species, which chemically damage cell molecules. Conversely, decreasing PP5 caused greater cell death. The results of Rossie's study are published in the early online version of *The Journal of Neurochemistry*.

Alzheimer's, a degenerative neurological disease affecting around 5 million people, results in memory loss and dementia. One theory on the cause of Alzheimer's is that overproduction of certain forms of amyloid beta protein by neurons leads to the generation of reactive oxygen species, which activate stress pathways.

"If stress pathways remain active for a prolonged period, the cell will die," Rossie said.

Rossie's lab found that PP5 overexpression prevents neuronal death by amyloid beta and shuts off the stress pathways. When reactive oxygen that wasn't created by amyloid beta was used on the cells, the results were the same. In contrast, neurons with reduced PP5 are more sensitive to death caused by amyloid beta.

"That suggests to us that PP5 protects neurons from cell death induced by reactive oxygen species, not just the presence of amyloid beta," Rossie said. "This means that PP5 may protect against other health problems involving reactive oxygen species as well, such as stroke and heart attacks."

It is possible, Rossie said, that finding a way to increase PP5 activity could help prevent the loss of neurons by amyloid beta.

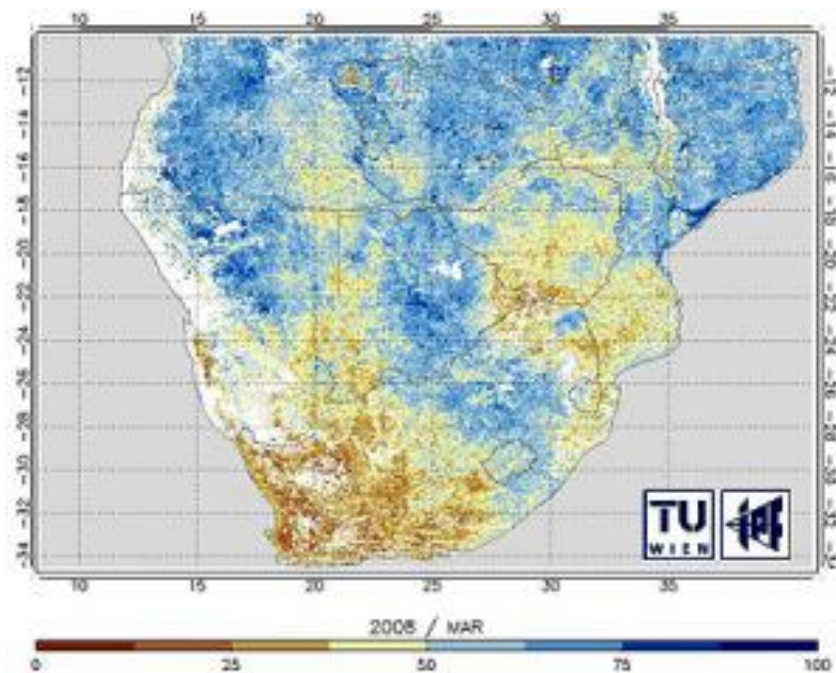
Rossie said PP5 also could play a role in inhibiting other responses of neurons to amyloid beta. Her lab will work to determine which pathways PP5 affects, and which of those is most responsible for neural protection by PP5.

The National Institutes of Health funded Rossie's research.

Adapted from materials provided by Purdue University. Original article written by Brian Wallheimer.

<http://www.sciencedaily.com/releases/2009/10/091007103032.htm>

Satellite Data Instrumental In Combating Desertification



Surface soil moisture at 1 km resolution retrieved from the Advanced Synthetic Aperture Radar (ASAR) instrument on ESA's Envisat satellite, operating in Global Mode, for the southern African Development Community Region (March 2008). These results were obtained from ESA's SHARE project. (Credit: ESA, TU Wien)

ScienceDaily (Oct. 12, 2009) — With land degradation in dryland regions continuing to worsen, the UN Convention to Combat Desertification has agreed on scientist-recommended indicators for monitoring and assessing desertification that signatory countries must report on.

The landmark agreement was reached after two weeks of negotiations involving hundreds of scientists and government ministers attending the Ninth Session of the Conference of the Parties (COP 9) of the UN Convention to Combat Desertification (UNCCD) in Buenos Aires, Argentina, from 21 September to 2 October.

Desertification, land degradation and drought deprive people of food and water and force millions to leave their homes. Desertification refers to the creation of new deserts through the degradation of drylands, which cover 40% of the world's land surface. Land degradation, caused by over-cultivation, over-grazing, deforestation and inefficient irrigation, affects roughly 20% of Earth's drylands.

Since dryland desertification can be remedied or even reversed by using appropriate management techniques, scientists attending the first scientific session of the COP, held from 22 to 24 September, stressed the importance of developing science-based methods for monitoring the areas most at risk to support land and water management decisions. Satellite technologies were recognised as playing an important role in achieving this objective.

ESA has been working closely with the UNCCD secretariat for nearly 10 years, developing and demonstrating innovative information services based on satellite Earth observation (EO) technologies that allow land degradation processes to be monitored over time.

Monitoring desertification, land degradation and droughts requires the continuous evaluation of a complex set of parameters and indicators, some of which can be retrieved with EO technologies and state-

of-the-art geo-spatial applications. For instance, the status of land cover – one of the 11 indicators defined by COP – can be monitored from space.

In 2004, ESA launched a large pilot project called DesertWatch to develop a set of land degradation indicators based principally on land surface parameters retrieved from satellite observations. These indicators were developed with the support of Italy, Portugal and Turkey – three of the European countries mostly affected by desertification.

DesertWatch also helped these countries fulfil their UNCCD reporting requirements by combining satellite data with weather and in-situ data, numerical models and geo-information systems to create standardised geo-information products.

ESA recently extended the project so that its methodology may be adapted and put to wider use. To demonstrate its applicability, the methodology will be applied to arid and semi-arid areas in Portugal, Brazil and Mozambique.

According to the UNCCD, soil moisture is another key parameter that should be monitored, because it is an indicator of water scarcity and vegetation stress. Soil moisture data can also be used for assessing drought risk.

The ESA-backed SHARE (Soil Moisture for Hydrometeorological Applications in the Southern African Development Community Region) project has developed a pre-operational soil moisture monitoring service with the long-term goal of supplying free soil moisture information for all of Africa, at a resolution of 1 km, via the Internet. SHARE was developed under ESA's TIGER initiative, which helps African countries to overcome water problems. DesertWatch and SHARE are funded by the Data User Element (DUE) under ESA's EO Envelope Programme.

ESA hosted an exhibition booth and a side event at COP 9 entitled 'Earth observations from space for the UNCCD', where the latest DesertWatch findings and results were presented. The side event also served as a platform for demonstrating the benefits of EO technology for the UNCCD Convention.

Speaking of DesertWatch, Dr Lucio do Rosario of the Portuguese delegation said: "We recommend the UNCCD Contracting Parties to adopt these methodologies. The benefits are multiple. They improve the monitoring and assessment of land degradation, provide more efficient decision-making and facilitate the reporting to the Convention on the indicators adopted by COP 9."

In a message to COP 9, UN Secretary General Banki-Moon said: "In addressing climate change, the international community has tended, quite understandably, to focus on cutting greenhouse-gas emissions. But tackling the issue in all its complexity also requires to go beyond mitigation and take into account the intrinsic linkages between desertification, land degradation and climate change."

ESA will continue to act on both fronts by helping the UNCCD community develop monitoring and assessing tools and supporting the UN Framework Convention on Climate Change (UNFCCC) community with long-term trend analyses of essential climate variables.

The Tenth Conference of the Parties of the UNCCD will be hosted by the Republic of Korea in October 2011.

Adapted from materials provided by [European Space Agency](http://www.esa.int).

<http://www.sciencedaily.com/releases/2009/10/091007081625.htm>

Simple Tool Can Boost Motivation, Improve Health In Older Adults

ScienceDaily (Oct. 12, 2009) — Researchers from Boston University School of Medicine (BUSM) have identified a tool -- the "Getting-Out-of-Bed (GoB) measure" -- to assess motivation and life outlook in older adults. The study, which appears in the October issue of the *Journal of Psychosocial Oncology*, shows that the tool has the potential to be an easy-to-use measure to bolster motivation and thus improve health behaviors and outcomes in the growing population of older adults.

The demographics of aging in the United States continues to change dramatically. In 2006, 37 million Americans, 12 percent of the population were 65 years or older. By 2030, those 65 years and older are projected to number 71.5 million representing nearly 20 percent of the US population. Furthermore, between 1992 and 2004 average inflation-adjusted health care costs for older Americans increased from \$8,644 to \$13,052 and are expected to continue to rise considerably. According to the researchers, such numbers underscore the importance of understanding common diseases and health behaviors of older adults, because many conditions can be prevented and/or modified with behavioral interventions.

"Motivation and life outlook play an important part in an older adult's ability to recover from illness or disabling events and to maintain and/or adopt health-promoting behaviors," said lead author Kerri Clough-Gorr, DSc, MPH, from the Section of Geriatrics at BUSM.

The researchers conducted telephone interviews on a sample of 660 women with breast cancer from four geographic regions of the country at three and six months intervals. Motivation and life outlook was assessed using GoB questions. Women with GoB scores ≥ 50 (representing higher motivation) at baseline were statistically significantly more likely at 6 months to have good health-related quality of life, good self-perceived health and report regular exercise than those with scores < 50 , indicating good predictive ability.

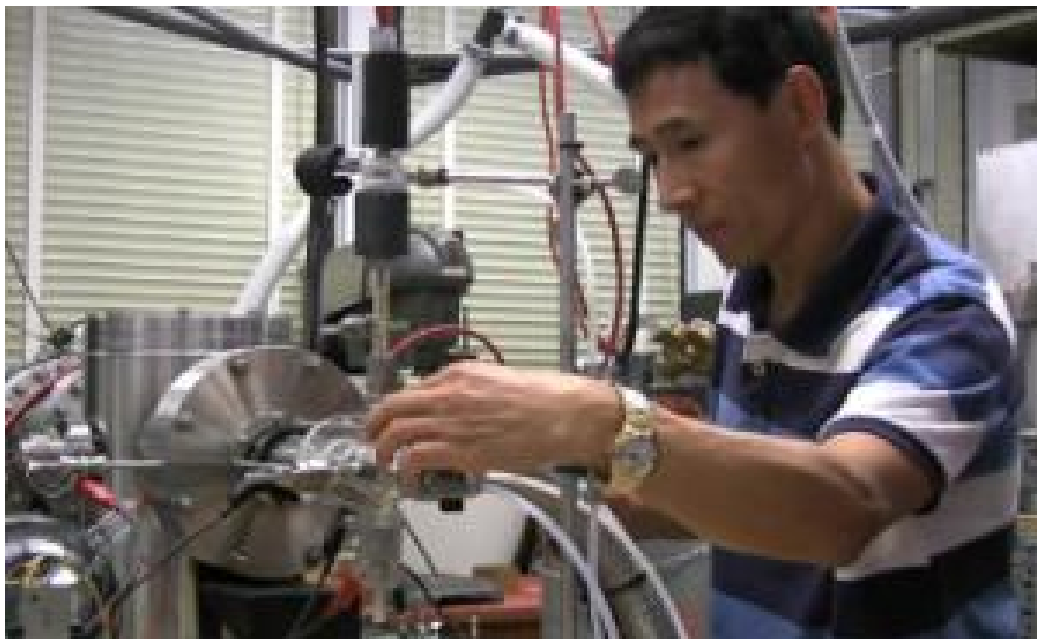
"The ability to identify patients with low motivation establishes an opportunity for health care providers to develop and implement interventions to improve older adults' motivation and to help them attain and maintain a higher quality of health and life. The GoB may help target adequate interventions to bolster motivation and thus improve health behaviors and outcomes in older adults," added Clough-Gorr.

This study was supported by grants from the National Cancer Institute.

Adapted from materials provided by Boston University Medical Center, via EurekAlert!, a service of AAAS.

<http://www.sciencedaily.com/releases/2009/10/091008113315.htm>

Going Green On Hold: Human Activities Can Affect 'Blue Haze,' World's Weather



Blue haze (tiny particles or aerosols suspended in the air) can be negatively affected by human activities such as power plants or fossil-fuel burning, according to Renyi Zhang, professor of atmospheric sciences. (Credit: Image courtesy of Texas A&M University)

ScienceDaily (Oct. 12, 2009) — “Blue haze,” a common occurrence that appears over heavily forested areas around the world, is formed by natural emissions of chemicals, but human activities can worsen it to the point of affecting the world’s weather and even cause potential climate problems, according to a study led by a Texas A&M University researcher.

Renyi Zhang, professor of atmospheric sciences who has studied air chemistry for more than 20 years, says blue haze (tiny particles or aerosols suspended in the air) can be negatively affected by human activities such as power plants or fossil-fuel burning.

Team members included researchers from Brookhaven National Laboratory in New York, the Molina Center for Energy and Environment in La Jolla, Calif., and the Massachusetts Institute of Technology. Their work is published in the current *Proceedings of the National Academy of Sciences* and the project was funded by the Welch Foundation and the U.S. Department of Energy.

Zhang says man-made activities, mainly large power plants that emit huge amounts of particles into the air, can worsen blue haze and cause previously unforeseen problems.

“The study shows that the natural way of blue haze formation is rather inefficient and that human activities make blue haze conditions worse,” he confirms.

“What happens is that a mix of natural and man-made chemicals speeds up the formation of these particles in the Earth’s atmosphere, and there, they reflect sunlight back into space. The results can affect cloud formations and ultimately, much of the world’s climate.”

When you walk through a forest or even a large grassy area, it’s not uncommon to be able to smell the plants around you, such as pine trees or other vegetation. That smell is nature’s way of naturally making organic gases produced by the plants themselves, often millions of tons per day.



Plants, especially trees, emit such gases through their leaves and when an overabundance of such gases is produced, it creates a blue aura, commonly called a “blue haze.” Perhaps the best example occurs in the Great Smokey Mountains National Park area of the Southeast United States, where blue haze exists almost on a daily basis, but the condition also occurs all over the world.

When man-made activities emit sulfur dioxide into the air, they contribute to blue haze, usually in a negative way, Zhang explains. Aerosols can be produced by many different processes that occur on land and water or in the atmosphere itself, he notes.

“Weather patterns can be affected worldwide and the blue haze can worsen the breathing problems of many people, such as those who suffer from asthma or emphysema,” he adds.

“The chemistry of Earth’s atmosphere can be directly affected by these aerosols. From cloud formations to health problems and air pollution, much of it can be traced back to these aerosol particles,” he adds, noting that aerosol particles can influence the size and rate of cloud droplets, directly affecting cloud cover and precipitation.

Coal plants, Zhang says, often produced sulfur dioxide, a highly toxic substance that reach the Earth’s atmosphere and helps the formation of aerosol particles.

The problem is not new. Zhang says former President Ronald Reagan mentioned it during a speech almost 30 years ago.

“About 80 percent of our air pollution stems from hydrocarbons released by vegetation,” Reagan noted during a 1980 speech to an environmental group.

Zhang says more research is needed to “study the full extent of how blue haze is affected by human activities, and perhaps to look at ways to control the situation. It’s a problem that can have global consequences.”

Adapted from materials provided by [Texas A&M University](http://www.tamu.edu).

<http://www.sciencedaily.com/releases/2009/10/091006112846.htm>



Physicians Bust Myths About Insulin



Dr. Ildiko Lingvay. (Credit: UT Southwestern Medical Center)

ScienceDaily (Oct. 12, 2009) — People diagnosed with type 2 diabetes often resist taking insulin because they fear gaining weight, developing low blood sugar and seeing their quality of life decline.

A study recently completed at UT Southwestern Medical Center suggests that those fears are largely unfounded and that patients and physicians should consider insulin as a front-line defense, as opposed to a treatment of last resort for non-insulin-dependent diabetes.

"We found that those patients who received insulin initially did just as well, if not better, than those who didn't receive insulin," said Dr. Ildiko Lingvay, assistant professor of internal medicine at UT Southwestern and lead author of the study appearing online and in a future issue of *Diabetes Care*. "This reinforces the idea that insulin treatment is a viable and safe option for patients, even in the very initial stages of their diagnoses.

"There is a myth out in the community, especially among certain ethnicities, that insulin is the last resort, and that somebody started on insulin is going to die," Dr. Lingvay added. "We as physicians are responsible for teaching the patient that that's not the case."

More than 20 million Americans have type 2 diabetes. Obesity, age and lack of exercise all increase the risk for the disease, which is characterized by a progressive loss of insulin-producing beta cells. Diabetes is the single greatest independent risk factor for heart disease, as well as a contributor to a number of other medical problems, including blindness and kidney disease.

The standard initial treatment for type 2 diabetes is a single drug, often metformin, followed by the addition of more oral hypoglycemic agents as needed.

For this study, researchers evaluated the effectiveness of offering insulin-based therapy as an initial treatment option to newly diagnosed type 2 diabetes patients. They compared rates of compliance, satisfaction, effectiveness, safety and quality of life among the patients, who were randomized to receive either the standard triple oral therapy or insulin plus metformin, an oral drug that helps regulate blood sugar levels.

The patients, ranging in age from 21 to 70 years old, had been diagnosed with type 2 diabetes within the past two months. Researchers recruited study participants from Parkland Memorial Hospital or by self-referral to the Clinical Diabetes Research Clinic at UT Southwestern between November 2003 and June 2005.

After enrollment, every participant followed an insulin and metformin regimen for three months. The patients were then randomized to continue taking insulin and metformin or begin the triple oral therapy regimen. All participants were checked monthly for the first four months, at six months after randomization, and every three months thereafter for three years. Of the 58 patients randomized, 24 of the insulin-treated group and 21 of the triple oral therapy group completed the study.

The researchers found that the patients taking insulin plus metformin had fewer low-blood-sugar, or hypoglycemic, events, gained less weight and reported high satisfaction with the insulin.

Dr. Lingvay said she hopes physicians use these findings as the rationale to offer insulin-metformin as the first, rather than last, line of defense.

"Modern medicine uses insulin as a very effective and safe treatment tool," she said. "With the new devices that we're using, giving yourself an insulin shot is not much harder than taking pills."

The data represent the first three years of a six-year study still under way at UT Southwestern. The next step, Dr. Lingvay said, is to begin analyzing how the insulin plus metformin and oral triple therapy regimens affect insulin production in beta cells.

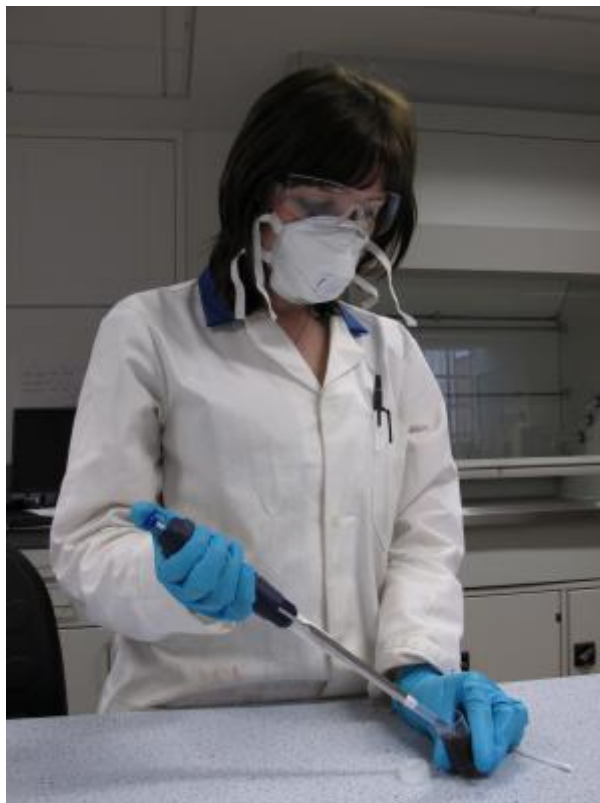
Other UT Southwestern researchers involved in the study included Jaime Legendre, recipient of a Clinical Research Fellowship from the Doris Duke Charitable Foundation; Dr. Polina Kaloyanova, former fellow in endocrinology; Dr. Song Zhang, assistant professor of clinical sciences; and Beverley Adams Huet, assistant professor of clinical sciences.

The study was supported by Novo Nordisk Inc., the National Institutes of Health and the Doris Duke Charitable Foundation.

Adapted from materials provided by UT Southwestern Medical Center, via EurekAlert!, a service of AAAS.

<http://www.sciencedaily.com/releases/2009/08/090811015711.htm>

New Technology Detects Chemical Weapons In Seconds



Preparation of a solution of sensor nanoparticles. (Credit: Image courtesy of Engineering and Physical Sciences Research Council)

ScienceDaily (Oct. 11, 2009) — Scientists at Queen's University Belfast are developing new sensors to detect chemical agents and illegal drugs which will help in the fight against the threat of terrorist attacks.

The devices will use special gel pads to 'swipe' an individual or crime scene to gather a sample which is then analysed by a scanning instrument that can detect the presence of chemicals within seconds. This will allow better, faster decisions to be made in response to terrorist threats.

The scanning instrument will use Raman Spectroscopy which involves shining a laser beam onto the suspected sample and measuring the energy of light that scatters from it to determine what chemical compound is present. It is so sophisticated it can measure particles of a miniscule scale making detection faster and more accurate.

Normally this type of spectroscopy is not sensitive enough to detect low concentrations of chemicals, so here the sample is mixed with nanoscale silver particles which amplify the signals of compounds allowing even the smallest trace to be detected.

Dr Steven Bell from Queen's University Belfast who is leading the research said:

"Although we are still in the middle of the project we have finished much of the preliminary work and are now at the exciting stage where we put the various strands together to produce the integrated sensor device. For the future, we hope to be able to capitalise on this research and expand the range of chemicals and drugs which these sensors are able to detect."



It is hoped the new sensors will also be the basis for developing 'breathalyzer' instruments that could be of particular use for roadside drugs testing in much the same way as the police take breathalyzer samples to detect alcohol.

At present, police officers are only able to use a Field Impairment Test to determine if a person is driving under the influence of drugs. The accuracy of this method has been questioned because of concerns that it is easy to cheat.

To ensure the technology is relevant, senior staff members from FSNI (Forensic Science Northern Ireland) will give significant input into the operational aspects of the technology and give feedback as to how it might be used in practice by the wider user community.

Stan Brown, Chief Executive of FSNI said:

"We consider the work being carried out by researchers at Queen's University extremely important and potentially very useful in driving forward the effectiveness, efficiency and speed of forensic science practice. The combination of leading edge research and hands-on experience of FSNI's practitioners has already proven very fruitful and is likely to lead to significant developments in forensic methodologies across a range of specialisms."

In the future this technology could have a number of important applications and according to Dr Bell: "There are numerous areas, from medical diagnostics to environmental monitoring, where the ability to use simple field tests to detect traces of important indicator compounds would be invaluable."

Adapted from materials provided by Engineering and Physical Sciences Research Council, via EurekAlert!, a service of AAAS.

<http://www.sciencedaily.com/releases/2009/10/091005102708.htm>



Identifying Cows That Gain More While Eating Less

Cows eat at a special bunk, or trough, that records how much they eat and how long they stand at the bunk. MU Researcher Monty Kerley says that if farmers can selectively breed cattle, they could cut their feed costs by as much as 40 percent. (Credit: University of Missouri)



ScienceDaily (Oct. 11, 2009) — With more than 2 million cows on 68,000 farms, Missouri is the third-largest beef producer in the nation. Due to rising feed prices, farmers are struggling to provide feed for the cows that contribute more than \$1 billion to Missouri's economy. University of Missouri researcher Monty Kerley, professor of animal nutrition in the College of Agriculture, Food and Natural Resources, is studying how cows might be able to gain more weight while consuming less, potentially saving farmers up to 40 percent of feed costs.

Two years ago, MU researchers started studying which biological processes could make cows feed-efficient. They examined the basic compound that cells use for energy, commonly known as ATP, using previous research that demonstrated how DNA influences weight gain in cows. Some animals can synthesize ATP faster than others, helping them to use energy more efficiently and, thus, gain more weight with less food. Kerley hopes that farmers will use this research to breed more feed-efficient cattle.

"We would love to go to the rancher and say, 'you can reduce your feed cost 40 percent with the same weight gain,'" Kerley said.

Kerley and his team are using a feed and weighing system that records individual intake and body weight of cattle daily. This research is being done at the Beef Research and Teaching Farm facility in MU's South Farm Agricultural Experiment Station. Whenever an animal steps to the bunk, or a trough, a computer notes the cows' arrival and departure times and how much they eat. When they drink, they stand on scales that keep track of their weights. If a beef producer just selected the top one-third of their most efficient cows, forage intake would be reduced by 20 percent, Kerley said.

Kerley said that when feed intake is reduced, methane emissions and manure production also decrease.

"If 'cap and trade' regulations, in some form, become part of America, it is likely that cattle producers will have to defend themselves against claims of methane emission by ruminants," Kerley said. "If a farmer can demonstrate reduced carbon production, then he or she might be able to 'sell' production credits on an exchange. That could provide the farmer with an additional income stream."

Beef producers are using this research to make genetic selections in their beef herds. Missouri was one of the first states to have a private bull testing facility that tests for efficiency. The Division of Animal Sciences also has a research emphasis to study genetic control of feed efficiency and methods to predict animal efficiency.

Kerley's research has been published in a variety of scientific journals.

Adapted from materials provided by [University of Missouri-Columbia](http://www.science.org).

<http://www.sciencedaily.com/releases/2009/10/091001101352.htm>

Researchers Probe Computer 'Commonsense Knowledge'



Few can challenge a simple pocket calculator at arithmetic. But even the most sophisticated computer cannot match the reasoning of a youngster. (Credit: iStockphoto)

ScienceDaily (Oct. 11, 2009) — Challenge a simple pocket calculator at arithmetic and you may be left in the dust. But even the most sophisticated computer cannot match the reasoning of a youngster who looks outside, sees a fresh snowfall, and knows how to bundle up for the frosty outdoors.

For artificial intelligence scientists, enabling computers to have such human-level intelligence requires a commonsense knowledge base that can evolve and learn new things. But it's an elusive goal.

"It's been the Holy Grail of artificial intelligence research since its early days to answer questions that a young child can answer about the world," says Robert Sloan, professor and head of computer science at the University of Illinois at Chicago. "We're still a long way from that."

Sloan and colleague Gyorgy Turan, professor of mathematics, statistics and computer science at UIC, hope to build theoretical foundations that will bring artificial intelligence closer to everyday human reasoning. They were recently awarded a three-year, \$500,000 National Science Foundation grant to develop algorithms for use in building commonsense knowledge bases that can evolve.

"You can view this evolving process as a kind of learning about the world by a computer," said Turan. "Our task is to understand the problem, find useful mathematical models, understand the basic mathematical properties and, hopefully, provide some efficient computational methods and algorithms in those models."

Part of the work will involve looking at the construction of current Web-based commonsense knowledge base systems, such as Cycorp's "Cyc" and MIT's "Open Mind Common Sense," that allow any user to enter bits of knowledge considered relevant, useful or interesting.

Turan and Sloan will consider questions such as how to deal with contradictory information that is entered and how to organize knowledge in formats that are useful for deriving further knowledge.



"The issue is how to process new information that comes in over time," said Sloan. "One crisply defined algorithmic problem is how do you incorporate the new information both efficiently and in a reasonable way? Of course, defining the meaning of 'reasonable' is a challenging problem in itself."

The UIC researchers will work with graduate students and postdoctoral staff to concentrate on the interaction between different subtasks of evolving commonsense knowledge bases and on developing efficient computational methods.

Sloan and Turan hope their work will find applications in the artificial intelligence field, possibly through improved robots and other automated devices.

"Currently we're studying abstract mathematical versions of these problems, but we hope the conclusions will lead to useful, practical tools," said Turan.

Adapted from materials provided by University of Illinois at Chicago.

<http://www.sciencedaily.com/releases/2009/10/091006202858.htm>



Nitrogen Cycle: Key Ingredient In Climate Model Refines Global Predictions



ORNL's Peter Thornton is helping climate scientists incorporate the nitrogen cycle into global simulations for climate change. (Credit: Image courtesy of DOE/Oak Ridge National Laboratory)

ScienceDaily (Oct. 11, 2009) — For the first time, climate scientists from across the country have successfully incorporated the nitrogen cycle into global simulations for climate change, questioning previous assumptions regarding carbon feedback and potentially helping to refine model forecasts about global warming.

The results of the experiment at the Department of Energy's Oak Ridge National Laboratory and at the National Center for Atmospheric Research are published in the current issue of *Biogeosciences*. They illustrate the complexity of climate modeling by demonstrating how natural processes still have a strong effect on the carbon cycle and climate simulations. In this case, scientists found that the rate of climate change over the next century could be higher than previously anticipated when the requirement of plant nutrients are included in the climate model.

ORNL's Peter Thornton, lead author of the paper, describes the inclusion of these processes as a necessary step to improve the accuracy of climate change assessments.

"We've shown that if all of the global modeling groups were to include some kind of nutrient dynamics, the range of model predictions would shrink because of the constraining effects of the carbon nutrient limitations, even though it's a more complex model."

To date, climate models ignored the nutrient requirements for new vegetation growth, assuming that all plants on earth had access to as much "plant food" as they needed. But by taking the natural demand for nutrients into account, the authors have shown that the stimulation of plant growth over the coming century may be two to three times smaller than previously predicted. Since less growth implies less CO₂ absorbed by vegetation, the CO₂ concentrations in the atmosphere are expected to increase.

However, this reduction in growth is partially offset by another effect on the nitrogen cycle: an increase in the availability of nutrients resulting from an accelerated rate of decomposition – the rotting of dead plants and other organic matter – that occurs with a rise in temperature.

Combining these two effects, the authors discovered that the increased availability of nutrients from more rapid decomposition did not counterbalance the reduced level of plant growth calculated by natural nutrient limitations; therefore less new growth and higher atmospheric CO₂ concentrations are expected.

The study's author list, which consists of scientists from eight different institutions around the U.S. including ORNL, the National Center for Atmospheric Research, the National Oceanic and Atmospheric Administration Earth System Research Laboratory, and several research universities, exemplifies the broad expertise required to engage in the multidisciplinary field that is global climate modeling.

"In order to do these experiments in the climate system model, expertise is needed in the nitrogen cycle, but there is also a need for climate modeling expertise, the ocean has to be involved properly, the atmospheric chemistry . . . and then there are a lot of observations that have been used to parameterize the model," said Thornton, who works in ORNL's Environmental Sciences Division.

"The biggest challenge has been bridging this multidisciplinary gap and demonstrating to the very broad range of climate scientists who range everywhere from cloud dynamicists to deep ocean circulation specialists that [incorporating the nitrogen cycle] is a worthwhile and useful approach."

A 15-year study of the role nitrogen plays in plant nutrition at Harvard Forest was an important observational source used to test their mathematical representation of the nitrogen cycle--a long experiment by any standards, but still an experiment that, according to Thornton, could improve the accuracy of the simulation if conducted even longer.

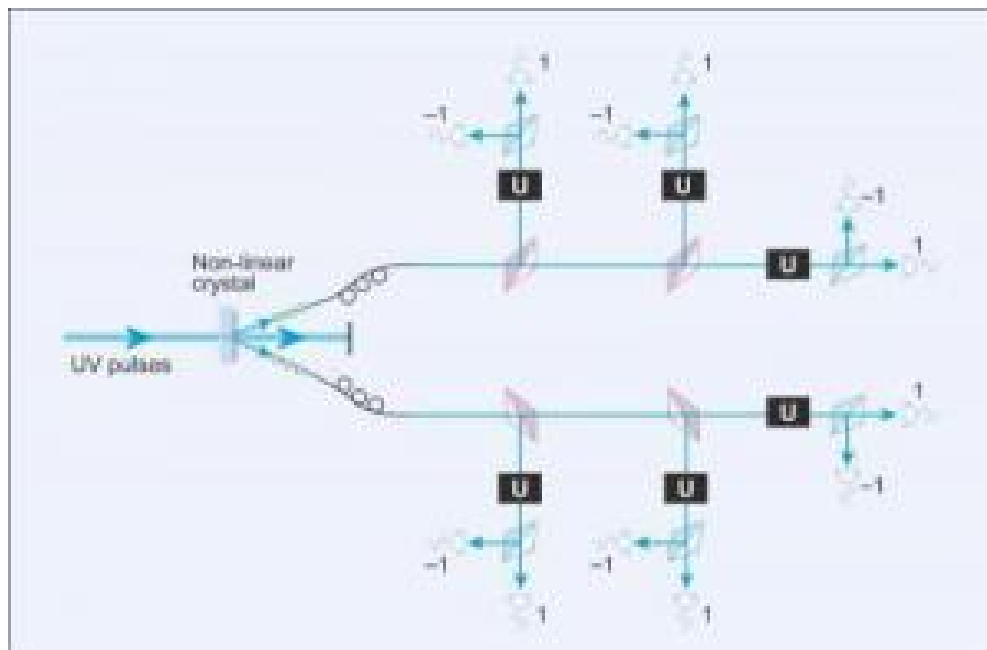
Other shortcomings of climate simulations include the disregard of changing vegetation patterns due to human land use and potential shifts in types of vegetation that might occur under a changing climate, although both topics are the focus of ongoing studies.

The research was funded by the DOE Office of Science. Additional resources were contributed by NASA Earth Science Enterprise, Terrestrial Ecology Program; National Center for Atmospheric Research through the NCAR Community Climate System Modeling program and the NCAR Biogeosciences program.

Adapted from materials provided by DOE/Oak Ridge National Laboratory.

<http://www.sciencedaily.com/releases/2009/10/091009204032.htm>

Building A Better Qubit: Combining Six Photons Avoids Quantum Data Scrambling



A new method for combining six photons together results in a highly robust qubit capable of transporting quantum information over long distances. (Credit: Image courtesy of Carin Cain)

ScienceDaily (Oct. 11, 2009) — Exploiting quantum mechanics for transmitting information is a tantalizing possibility because it promises secure, high speed communications. Unfortunately, the fragility of methods for storing and sending quantum information has so far frustrated the enterprise. Now a team of physicists in Sweden and Poland have shown that photons that encode data have strength in numbers.

Their experiment is reported in *Physical Review Letters* and *Physical Review A* and highlighted in the October 5 issue of *Physics* (<http://physics.aps.org>).

In classical communications, a bit can represent one of two states - either 0 or 1. But because photons are quantum mechanical objects, they can exist in multiple states at the same time. Photons can also be combined, in a process known as entanglement, to store a bit of quantum information (i.e. a qubit).

Unlike data stored in a computer or typically sent through conventional fiber optic cables, however, qubits are extremely fragile. A kink in a cable, the properties of the cable material, or even changes in temperature can corrupt a qubit and destroy the information it carries. But now a group lead by Magnus Rådmark at Stockholm University has shown that six entangled photons can encode information that stands up to some knocking around.

Rådmark and his team proved experimentally that their six photon qubits are robust and should be able to reliably carry information over long distances. The technology to encode useful information on the qubits and subsequently read it back is still lacking, but once those problems are solved, we will be well on our way to secure, reliable, and speedy quantum communication.

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

<http://www.sciencedaily.com/releases/2009/10/091005123050.htm>

Receptor Activated Exclusively By Glutamate Discovered On Tongue



Ripe tomatoes and aged cheeses are high in natural glutamate. (Credit: SINC)

ScienceDaily (Oct. 10, 2009) — One hundred years ago, Kikunae Ikeda discovered the flavour-giving properties of glutamate, a non essential amino acid traditionally used to enhance the taste of many fermented or ripe foods, such as ripe tomatoes or cheese. New research now reveals that the tongue has a receptor that is exclusively activated by glutamate.

"Although other receptors have been found on the tongue that are also aroused by glutamate, they are not specific. That is, they need to be in contact with nucleotides and many other amino acids to be activated. Our study reveals the first receptor on the tongue exclusively for glutamate," Ana San Gabriel, the main author of the article and a scientist belonging to the Spanish Network of Researchers Abroad, based at the Institute of Life Sciences in Ajinomoto, Kawasaki (Japan), explained.

According to the study, which was published in the latest issue of the *American Journal of Clinical Nutrition*, glutamate is a non-essential amino acid that is used commercially as glutamate sodium salt, monosodium glutamate (MSG) E-621, because it is stable and easy to dissolve. This added glutamate, identical to the 'natural glutamate', is sometimes used to reduce cooking and meal preparation time and to provide more flavour.

MSG is also used to reduce the sodium in meals: table salt contains 40% sodium, whereas MSG contains 13%. Many fermented or ripe foods are rich in natural MSG, such as ripe tomatoes (250-300 mg/100g), parmesan cheese (1600 mg/100g), Roquefort cheese (1600 mg/100g) and Gouda cheese (580 mg/100g). Manchego cheese and Iberian cured ham have a similar taste.

One hundred years ago, Kikunae Ikeda, a lecturer at the Imperial University of Tokyo, discovered the flavouring properties of glutamate after extracting it from the seaweed *Laminaria japonica*, calling its taste 'umami' (savoury). Since then, MSG has been one of the condiments that has received the most

attention from researchers, along with its effects. All the international food safety agencies consider it safe for human consumption.

Regarding whether glutamate is possibly toxic, the researcher is categorical. "If food safety is evaluated with scientific rigor, MSG is entirely safe for human consumption. If people talk about it being toxic and MSG continues to receive negative publicity, it is because results are extrapolated from administration routes and doses that do not correspond to reality. In fact, it is less toxic than salt."

Even in breast milk

We are exposed to free glutamate from childhood. The most abundant amino acid in breast milk has 0.02% of glutamate, so a 5kg baby who takes 800 ml of breast milk a day, consumes 0.16g of glutamate. "The amount of glutamate consumed by babies that only breastfeed is equivalent to the MSG of Korea or Taiwan," the researcher concludes.

Total consumption of glutamate (both free and joined to proteins) in an adult diet amounts to around 10 grams a day (100-150mg/kg/day assuming a weight of 70kg), whereas the consumption of glutamate as a condiment in the form of MSG varies from 0.4g in the US, 1.5g in Japan and Korea and 3g in Taiwan (from 6 to 43mg/kg/day). MSG consumption in Spain has not been estimated, but the United Kingdom is calculated to consume 0.6 g on average and 2g in a minority segment of the population (three times more than average).

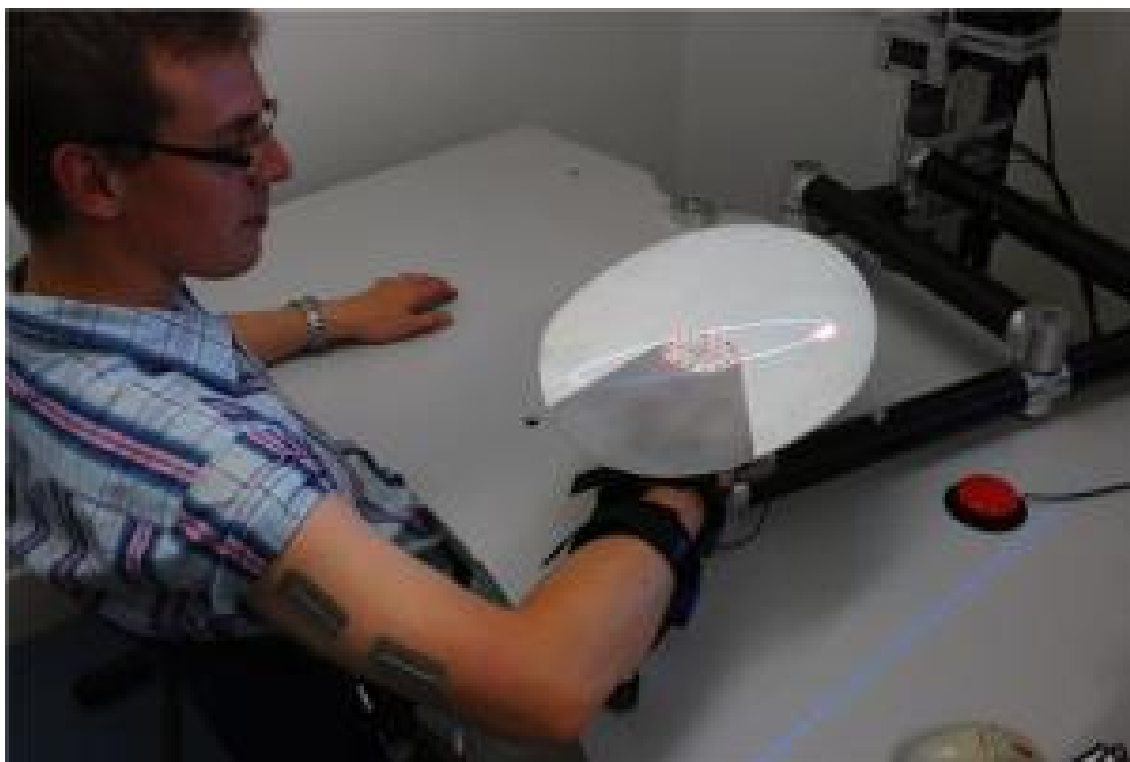
Journal reference:

1. Ana San Gabriel, Takami Maekawa, Hisayuki Uneyama, y Kunio Torii. **Metabotropic glutamate receptor type 1 in taste tissue**. *American Journal of Clinical Nutrition*, 2009; 90 (3): 743S
DOI: [10.3945/ajcn.2009.27462I](https://doi.org/10.3945/ajcn.2009.27462I)

Adapted from materials provided by [FECYT - Spanish Foundation for Science and Technology](http://www.fecyt.es/), via [EurekAlert!](http://www.eurekalert.com/), a service of AAAS.

<http://www.sciencedaily.com/releases/2009/10/091009092344.htm>

Stroke Rehabilitation Technology That's Fun And Can Be Used At Home



Using tracking tasks to assess movement problems in the arm after a stroke. (Credit: Image courtesy of University of Southampton)

ScienceDaily (Oct. 10, 2009) — Stroke rehabilitation technology which patients can operate in their own homes while playing computer games, is being developed by academics at the University of Southampton.

Therapists, doctors, engineers and psychologists at the University have come together to set up ARM (Assessment, Rehabilitation, Movement) – a unique initiative that is using ideas from industrial robots to help patients regain and control movement of the arm and hand after a stroke.

"We felt it was important for people to have fun while they recovered," said Professor Jane Burrige of the University of Southampton's School of Health Sciences. "In fact we find it's often difficult to get them to stop playing the computer games!"

"As far as we know no-one has tried using this technique – Iterative Learning Control – to help people move again after a stroke and much of the research and rehabilitation into the effects of stroke has focussed on walking. We believe ARM is a great example of how state-of-the-art control theory, normally used for industrial robots, can be applied to challenges in rehabilitation."

Professor Burrige is leading the ARM team, which is the first group to take such a comprehensive approach to upper limb stroke rehabilitation. The pioneering system developed by researchers at the University's School of Electronics and Computer Science, working with colleagues in Health Sciences, aims to retrain weak or paralysed arm muscles in patients who have suffered brain damage as a result of a stroke.



After initial successful trials at the University, the ARM researchers are now applying the system to retrain hand and arm function using computer games technology. Their research has attracted considerable attention and interest, including national and international awards.

"We can use state-of-the-art engineering discoveries to make a real difference to people's lives," said Professor Burrige. "We are also breaking new ground in understanding how the brain recovers the ability to control movement of the arm and hand after stroke. This is essential knowledge to enable us to develop and test new treatments."

In collaboration with the ARM team, NHS hospitals and the Universities of Bournemouth and Keele, have already attracted a grant of £2M from the National Institute for Health Research (NIHR) to take rehabilitation technology out of the laboratory and into healthcare practice nationally.

"By assembling a multidisciplinary team and bringing together their insights and expertise we want to improve people's quality of life after stroke by helping them regain the use of their arms,' said Professor Burrige. 'With this new technique our patients can actually see their progress and work to improve their performance, and have fun at the same time!"

Adapted from materials provided by [University of Southampton](#), via [AlphaGalileo](#).

<http://www.sciencedaily.com/releases/2009/09/090910084143.htm>

Rising Sea Levels Are Increasing Risk Of Flooding Along South Coast Of England



This image shows flooding at Gurnard on the Isle of Wight, UK. (Credit: Centre for Coastal Processes, Engineering and Management)

ScienceDaily (Oct. 10, 2009) — A new study by researchers at the University of Southampton has found that sea levels have been rising across the south coast of England over the past century, substantially increasing the risk of flooding during storms.

The team has conducted a major data collection exercise, bringing together computer and paper-based records from across the south of England, from the Scilly Isles to Sheerness, to form a single data set of south coast sea levels across the years.

Their work has added collectively about 150 years worth of historic data to the existing record of English Channel sea-level change and extended the data along the south coast. Their findings are published in the latest edition of the journal *Continental Shelf Research*.

The data shows that both average sea levels and extreme sea levels have been rising at a similar rate through the 20th Century. The rate of rise is in the range 1.2 to 2.2 mm per year, with 1.3 mm per year recorded at Southampton.

Coastal engineering expert Professor Robert Nicholls, of the University's School of Civil Engineering and the Environment, who conducted the study, comments: "While these changes seem small, over a century they accumulate and substantially increase the risk of flooding during storms, unless there have been corresponding upgrades to flood defences. A water level that had an average likelihood of occurring once every 100 years in 1900 now has an average likelihood of occurring on average every 10 to 25 years, depending on the site considered. As sea levels continue to rise and probably accelerate, this increase in the likelihood of flooding will continue."

The most significant extension to the records is that of sea level changes at Southampton where the record now begins in 1935.



Paper-based records at St Mary's on the Isles of Scilly, Weymouth, Southampton and Newhaven have been used to greatly extend existing computer-based records, while the records at Devonport and Portsmouth have both been extended and corrected for previous errors of interpretation.

This new data is feeding into ongoing efforts to increase the understanding and management of flooding.

The work was conducted by Professor Robert Nicholls, Dr Neil Wells from the University's School of Ocean and Earth Science based at the National Oceanography Centre, Southampton and Dr Ivan Haigh, formerly of the University of Southampton and now at the University of Western Australia.

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

<http://www.sciencedaily.com/releases/2009/10/091009092348.htm>



Patients Who Received Donated Pacemakers Survive Without Complications, Study Suggests



Patients who received refurbished pacemakers donated from Detroit area funeral homes survived without complications from the devices, according to a case series reported by the University of Michigan Cardiovascular Center. (Credit: Image courtesy of University of Michigan Health System)

ScienceDaily (Oct. 10, 2009) — Patients who received refurbished pacemakers donated from Detroit area funeral homes survived without complications from the devices, according to a case series reported by the University of Michigan Cardiovascular Center.

The pacemakers were implanted in 12 patients at the University of Philippines- Philippine General Hospital who could not afford advanced cardiac care and were confined to their beds as they waited for a permanent pacemaker.

All donated pacemakers functioned normally at six months, and most importantly there were no device complications such as infections. The study appears online ahead of print in the Oct. 13 issue of the *Journal of the American College of Cardiology*.

The argument for pacemaker reuse has been debated for decades. But the idea is gaining ground as U-M cardiology experts report promising results of providing donated pacemakers to underserved nations.

"In light of the widening health care disparity seen between the industrialized world and developing nations, we feel that pacemaker reuse is an ethical obligation to address the medical needs of those who could not afford therapy otherwise," says co-author Timir Baman, M.D., cardiology fellow at the U-M Cardiovascular Center.

Based on surveys showing a majority of heart patients were interested in donating their pacemakers after death, U-M has launched Project My Heart Your Heart.



Project My Heart Your Heart is a joint collaboration between the University of Michigan Cardiovascular Center, Michigan funeral homes, and World Medical Relief, a Detroit-based non-profit organization that specializes in the delivery of used medical equipment.

"Ongoing research is needed to evaluate the feasibility of regional and potentially nationwide pacemaker donation programs," says co-author Kim Eagle, M.D., director of the U-M Cardiovascular Center.

In recent decades, industrialized nations have seen a drop in deaths from heart attacks and strokes, but those in low- and middle-income nations continue to experience an epidemic of cardiovascular disease.

The prevalence of cardiovascular disease is expected to increase 137 percent between 1990 and 2020 for those living in low- and middle- income countries, authors write. It's estimated that as many as 1 million people worldwide die annually from slow heart rates.

"Many of these countries lack the financial resources to address this epidemic of cardiovascular disease," says co-author Hakan Oral, M.D., director of electrophysiology at the U-M cardiovascular center. "As a result, resources are often directed away from high-cost treatment strategies, such as implantable cardiac rhythm management devices."

Pacemakers and other implantable cardiac devices are implanted to regulate an irregular or slow heart beat, or act as an insurance policy by automatically shocking the heart back to a normal rhythm. They can last up to 10 years and cost \$10,000 to \$50,000.

Only pacemakers with 70 percent battery life were included in the study and informed consent was obtained from all patients' families in order to remove and donate the pacemakers after death. A total of 50 pacemakers were donated by funeral homes to WMR. Of them, 12 with adequate battery life were implanted in poor patients at Philippine General Hospital in Manila.

U-M is exploring partnerships with the Philippine General, Vietnam Heart Institute in Hanoi, and Komfo Medical Center in Ghana, which is in the process of developing an arrhythmia therapy program, for allocation of used pacemakers. The international hospitals have had on-site reviews for quality and clinical excellence by U-M cardiology experts.

In the next phase, the U-M Cardiovascular Center will seek approval from the U.S. Food and Drug Administration to embark on a large scale clinical trial to show that pacemaker reuse is safe and effective.

Authors: Timir S. Baman, M.D.; Al Romero, M.D.; James N. Kilpatrick, M.D.; Joshua Romero, BA; David C. Lange, M.D.; Eric O. Sison, M.D.; Rogelio V. Tangco, M.D.; Nelson S. Abelardo, M.D.; George Samson, M.D.; Rita Grezlik; Edward B. Goldman, J.D.; Hakan Oral, M.D., and Kim Eagle, M.D.

Funding: Hewlett Foundation, Mardigan Foundation, U-M Cardiovascular Center.

Adapted from materials provided by [University of Michigan Health System](http://www.umich.edu).

<http://www.sciencedaily.com/releases/2009/10/091009090423.htm>



Capital Secrets

By MAUREEN DOWD

THE LOST SYMBOL

By Dan Brown

Illustrated. 509 pp. Doubleday. \$29.95



The new Dan Brown puzzler is the scariest one yet.

It's not so much the barbarous machinations of the villain, another one-dimensional, self-mortifying hulk, that sends chills down your spine. Or the plot, which is an Oedipal MacGuffin.

No, the terrifying thing about "The Lost Symbol" is that Brown — who did not flinch when the Vatican both condemned the "The Da Vinci Code" and curtailed the filming of "Angels & Demons" in Rome — clearly got spooked by that other powerful, secretive ancient sect, the Masons.

His book is a desperate attempt to ingratiate himself with the Masons, rather than to interpret the bizarre Masonic rites and symbols that illuminate — as in Illuminati! — how the ultimate elite private boys' club has conspired to shape the nation's capital and Western civilization ever since George Washington laid the cornerstone for the Capitol building in a Masonic ritual wearing full Masonic regalia, including a darling little fringed satin apron. If the Masons are more intimidating than the Vatican, if Brown has now become part of their semiotic smoke screen, then all I can say is, God help us all.

Or as Brown, who is more addicted to italics than that other breathless Brown, Cosmo Girl Helen Gurley, might put it: What the hell?

Of course, who can blame him? How can you not be frightened by a brotherhood that includes Mel Blanc, the voice of Bugs Bunny; Buzz Aldrin; and Dave Thomas, the founder of Wendy's?

During the five years he researched this book, did Brown begin to believe those sensational stories about how, if you expose the secrets of the Masons, they will slit your throat? Did he discover that the Masons are not merely a bunch of old guys dressed up in funny costumes enjoying a harmless night away from the wives? Could they really be, as a recent Discovery Channel documentary on the ancient order wondered, "Godless conspirators bound to a death pledge who infiltrate institutions and run the world"?

Did Brown decipher the cryptic documents locked in a safe at the C.I.A. — founded by another Mason, Harry Truman! — and figure out that some of those wild tales were true? That Jack the Ripper was a Mason whose identity was covered up by the Masonic police commissioner? That Salieri and others murdered Mozart after the young Masonic composer revealed some of the order's secret symbols in "The Magic Flute"?

I was really looking forward to Brown's excavation of Washington's mystical power, ancient portals, secret passageways and shadow worlds. As a native, I've loved the monuments here since I was little. I've often driven past the Scottish Rite Masonic temple with its two sphinxes on 16th Street. And my first memory as a little girl was picking up my dad from work at night from the brightly lighted Capitol. I was eager to learn occult lore about our venerable marble temples and access the lost wisdom of the ages. So I happily curled up with Robert Langdon, the author's anodyne, tweedy doppelgänger, and suppressed my annoyance that the Harvard symbologist was still wearing his Mickey Mouse watch, hand-grinding his Sumatra coffee beans and refusing to entangle with the latest brainy babe who materializes to help untangle ancient secrets.

This book's looker, Katherine Solomon, is a lithe, gray-eyed expert in Noetic science, the study of "the untapped potential of the human mind." Brown must also want to explore the untapped potential of the human body, since he has made his heroine 50 years old, something that no doubt caused the Hollywood studio suits to spritz their Zico coconut water. Katherine, a few years older than Langdon, may be a tribute to Brown's wife and amanuensis, Blythe, who is 12 years older and helped him write "187 Men to Avoid: A Survival Guide for the Romantically Frustrated Woman."

Emotions are the one thing Dan Brown can't seem to decipher. His sex scenes are encrypted. Even though Katherine seems like Langdon's soul mate — she even knows how to weigh souls — their most torrid sex scenes consist of Robert winking at her or flashing her a lopsided grin.

Brown's novels are obviously inspired by Indiana Jones and "Raiders of the Lost Ark." But he can only emulate the galloping narrative drive and the fascination with mythological archetypes, pyramids, Holy Grails, treasure maps and secret codes; he can't summon the sexy, playful side of the Spielberg-Lucas legacy.

His metaphors and similes thud onto the page. Inoue Sato, an intelligence official investigating a disembodied hand bearing a Masonic ring and iconic tattoos that shows up in the Capitol Rotunda, "cruised the deep waters of the C.I.A. like a leviathan who surfaced only to devour its prey." Insights don't simply come to characters: "Then, like an oncoming truck, it hit her," or "The revelation crashed over Langdon like a wave." And just when our hero thinks it's safe to go back in the water, another bad metaphor washes over him: "His head ached now, a roiling torrent of interconnected thoughts."

You can practically hear the eerie organ music playing whenever Mal'akh, the clichéd villain whose eyes shine "with feral ferocity," appears. He goes from sounding like a parody of a Bond bad guy ("You are a very small cog in a vast machine," he tells Langdon) to a parody of Woody Allen ("The body craves what the body craves," he thinks).

But Brown tops himself with these descriptions: "Wearing only a silken loincloth wrapped around his buttocks and neutered sex organ, Mal'akh began his preparations," and "Hanging beneath the archway, his massive sex organ bore the tattooed symbols of his destiny. In another life, this heavy shaft of flesh had been his source of carnal pleasure. But no longer."

Brown has always written screenplays masquerading as novels, but now he's also casting. Warren Bellamy, the Masonic architect of the Capitol, is described as an elderly African-American man with close-cropped, graying hair who enunciates his words with crisp precision: "Bellamy was lithe and slender, with an erect posture and piercing gaze that exuded the confidence of a man in full control of his surroundings." Morgan Freeman, call Ron Howard.

The Bellamy character provides another opportunity for Brown to burnish the Masons, as when the architect tells Langdon: "The craft of Freemasonry has given me a deep respect for that which transcends human understanding. I've learned never to close my mind to an idea simply because it seems miraculous."

The author has gotten rich and famous without attaining a speck of subtlety. A character never just stumbles into blackness. It must be inky blackness. A character never just listens in shock. He listens in utter shock.

And consider this fraught interior monologue by the head of the Capitol Police: "Chief Anderson wondered when this night would end. A severed hand in my Rotunda? A death shrine in my basement? Bizarre engravings on a stone pyramid? Somehow, the Redskins game no longer felt significant."



My dad always said in his day that the Masons were not welcoming to Catholics. The Catholic Church once considered the Masons so anti-Catholic, Catholics who joined were threatened with excommunication. Now the church hierarchy merely disapproves. (They like secret rites, blood rituals and the exclusion of women only when they do it.) But Langdon suggests to his Harvard students that the Masons are “refreshingly open-minded” and do not “discriminate in any way.” To a student protesting that Masonry sounds like a “freaky cult,” Langdon counters that it’s “a system of morality.” He notes, “The Masons are not a secret society . . . they are a society with secrets.”

He debunks stories of the founding fathers’ supposedly building a Satanic pentacle and the Masonic compass and square into the capital’s street design, scoffing, “If you draw enough intersecting lines on a map, you’re bound to find all kinds of shapes.”

The Masons are represented in the dazzling person of Peter Solomon, Katherine’s older brother, a handsome, wealthy historian and philanthropist who runs the Smithsonian Institution and inspired the young Langdon’s interest in symbols.

In interviews, Brown has said he was tempted to join the Masons, calling their philosophy a “beautiful blueprint for human spirituality.” In the next opus, Langdon will probably be wearing a red Shriner’s fez with his Burberry turtleneck and Harris tweed.

In this book, Langdon helps stop the villain from releasing a video to YouTube that he has surreptitiously taped during his Masonic initiation rites. The blindfolded initiate drinks blood-red wine out of a human skull and has a dagger pressed to his bare chest; he has to take part in an enactment of his own brutal murder — “there were simulated blows to his head, including one with a Mason’s stone maul” — and hear a biblical reference to human sacrifice, “the submission of Abraham to the Supreme Being by proffering Isaac, his firstborn son.” These are meant partly as warnings about what can befall anyone who leaks the order’s secrets — warnings Dan Brown clearly took to heart.

“Langdon could already tell that the video was an unfair piece of propaganda,” Brown writes, adding that the symbologist thought to himself, “the truth will be twisted . . . as it always is with the Masons.” Brown skitters away from giving us the book we expected: one that might have clued us in on which present-day politicians are still Masons and what mumbo jumbo they’re up to.

That job was left to Eamon Javers of Politico, who uncovered a list of Freemasons in Congress that reads like a vast right-wing conspiracy. Joe “You lie!” Wilson is a member of the Sinclair Lodge of West Columbia, S.C. Representative Eric Cantor of Virginia, the House minority whip, who’s trying to suffocate President Obama’s health care plan, is a member of a Richmond lodge his dad and uncle belonged to. Senator Charles E. Grassley of Iowa, who chimed in against “death panels,” urged Javers: “Don’t judge us by the funny hats we wear.”

Even more ominously, President Obama suddenly left the White House on a recent night and went to the Washington Monument, the obelisk that figures in Brown’s climactic scene, and stayed inside for 20 minutes. If you add the 13 minutes it probably took to walk to the limo and drive back to the White House and return to his residence, you reach the magic Masonic number of 33!

In the end, as with “The Da Vinci Code,” there’s no payoff. Brown should stop worrying about unfinished pyramids and worry about unfinished novels. At least Spielberg and Lucas gave us an Ark and swirling, dissolving humans. We don’t get any ancient wisdom that “will profoundly change the world as you know it” — just a lot of New Agey piffle about how we are the gods we’ve been waiting for. (And a father-son struggle for global domination, as though we didn’t get enough of that with the Bushes.)

What the hell, Dan?!

Maureen Dowd is an Op-Ed columnist for The Times.

<http://www.nytimes.com/2009/10/11/books/review/Dowd-t.html?nl=books&emc=booksupdateema1>



Up to Her Neck in Pink Ribbons and Smiley Faces

By JANET MASLIN

BRIGHT-SIDED

How the Relentless Promotion of Positive Thinking Has Undermined America

By Barbara Ehrenreich

235 pages. Metropolitan Books. \$23.

When Barbara Ehrenreich became a breast cancer patient, she found herself infuriated by the disease's upbeat, infantilizing culture of pink ribbons and teddy bears. When she found that there were patients' message boards that extolled breast cancer as a blessing, she signed on and expressed her indignation. Along came "a chorus of rebukes" from other patients, one of whom condescendingly addressed her as Barb. The word "barb" can be associated with Ms. Ehrenreich, but it works better to describe her favorite kind of rhetorical weapon than as a nickname.

Flinging the vituperative barb is a specialty for this writer, whose book titles include "The Snarling Citizen," "The Mean Season" and "The Worst Years of Our Lives" (as well as the snappier, better-known "Bait and Switch" and "Nickel and Dimed"). She thrives on righteous indignation, and she may seem to have found the perfect target with "Bright-Sided." Here is her chance to make a frontal assault on the institutionalized American version of good cheer and to wipe that dopey smile off the happy-face symbol that pervades American culture.

"Bright-Sided" does have a point to make. And it's a point so simple that it can be aptly summarized by the book's subtitle, "How the Relentless Promotion of Positive Thinking Has Undermined America." Ms. Ehrenreich thinks the prevalence of bogus optimism has weakened America, and she is willing to shoot fish in barrels to make that case. There is no shortage of megachurch preachers, self-help gurus, business coaches and positive-thinking academics whose idiocy and avarice can be exposed by Ms. Ehrenreich's high beams.

Her argument has the makings of a tight, incisive essay. And each chapter eventually delivers a succinct reiteration of the central point. But this short book is also padded with cheap shots, easy examples, research recycled from her earlier books and caustic reportorial stalking. Ms. Ehrenreich starts out with her ideas firmly in place, then goes out hunting for crass, benighted individuals whose perniciousness helps her accentuate the negative.

There's no arguing with Ms. Ehrenreich's sense that false optimism is a form of stupidity. Nor is there reason to dispute her idea that such false optimism can be profitably exploited. But it's a little late for her to tell her readers about the decade-old mouse parable "Who Moved My Cheese?," let alone explain that corporations use that book to convince the downsized employee that losing a job is a backhanded form of good fortune. The good-cheer baloney business has long since gone on to embrace the great news that this recession can be a blessing.

"Bright-Sided" begins with Ms. Ehrenreich's highly humanizing chapter about her illness and with her legitimate scorn for "the ultrafeminine theme of the breast cancer marketplace." ("Certainly men diagnosed with prostate cancer do not receive gifts of Matchbox cars.") After that it takes a downhill trajectory. The next chapter concerns the cultural validation of "magical thinking," as in the book "The Secret," which makes another barn-sized target. What is the real meaning of that book's assertion that we can attract whatever we want by wishing for it? "Bright-Sided" rightly says that the meaning is twofold: that we are encouraged to override the wishes of anyone else, and that we become failures when the process doesn't pay off.

But as part of her skewering of magical thinking, Ms. Ehrenreich digs up one motivational speaker who advises increasing business by rereading one's mailing list and "loving each name," and another who boastfully proclaims "my life is what I would consider the definition of success." She is simply too smart for this bottom-feeding, just as she is too smart to be citing the number of Google searches for "positive thinking" or to be quoting something fatuous said by Larry King. Her valuable insight about the solipsism

of magical thinking and about the loneliness of a world that will grant any wish is obscured by the caliber of the evidence that supports it.

This book's chapter on the historical roots of the optimism business and on the stern Calvinist values that are at the heart of it (since the self that can be improved must be inherently flawed) is sturdy. But it gives way to a smorgasbord of sneering illustrations. The canned optimism of the megachurch minister Joel Osteen actually involves asking God for help in getting seated in a crowded restaurant ("Father, I thank you that I have favor with this hostess, and she's going to seat me soon"), and Ms. Ehrenreich rightly wonders what this has to do with Christian values. But her own values make it easier for her to infiltrate and ridicule an Osteen sermon than to ask parishioners about their responses to such gibberish. She would rather speak for the victims of trumped-up optimism than speak to them.

In its search for egregious silliness, "Bright-Sided" also unearths an academic (who has been written about by Ms. Ehrenreich before and thus goes to great lengths to dodge her), Martin E. P. Seligman, a former president of the American Psychological Association, whose book "Authentic Happiness" is tailor-made for her purposes. She finds Mr. Seligman's ideas of cultural uplift to be laughable; he plays into her hands by suggesting that they go to an art museum and look at the Monets. Ms. Ehrenreich describes trying to take notes with a pen, being told she can't use one in the museum and thinking privately that she dislikes Monets for their "middle-class notions of coziness," but doesn't "hate them enough to stab them with my felt-tip pen."

All in all, this encounter offers more caustic humor than enlightenment. And it paves the way for saying that positive psychology has become a moneymaking enterprise, which is hardly a startling observation in the midst of this book's parade of saccharine hucksters. The more important point, which is also here but coarsened by too much distraction, is that it is dangerous to lose sight of unpleasant realities and that we have ignored too many real-world danger signals in recent years. That's as obvious on this book's last page as it was on the first.

<http://www.nytimes.com/2009/10/12/books/12maslin.html?ref=books>

Author's Personal Forecast: Not Always Sunny, but Pleasantly SkepticalBy **PATRICIA COHEN**

Barbara Ehrenreich wants to make clear that she is not a spoilsport.

“No one can call me a sourpuss,” she declared. “I have a big foot in the joy camp.” She is the author of “Dancing in the Streets,” a history of “collective joy,” she notes, and a lot of fun at parties. So her new book, “Bright-sided: How the Relentless Promotion of Positive Thinking Has Undermined America,” should not be mistaken for a curmudgeonly rant. It is serious social history. Many of the 17 books that Ms. Ehrenreich has written during the past three and half decades have taken her into alien worlds. In her fantastically successful 2001 book, “Nickel and Dimed,” for example, she details her experience of trying to get by on the salary of an unskilled, minimum-wage worker. By contrast, this newest volume is based on her stay in a world that she became intimately familiar with: the smiley-faced, pink-ribboned, positive-thinking culture that surrounds breast cancer patients. Ms. Ehrenreich found out she had the disease in 2000, and the news left her dazed, fearful and, most of all, angry. What she found when she sought information and support, however, was cheerfulness, and that shocked her.

“There were exhortations to be positive,” Ms. Ehrenreich said. She had stopped for lunch recently in Manhattan’s theater district after meeting with her publisher at Metropolitan Books, and before returning to Alexandria, Va., where she moved two years ago to be close to her daughter and grandchildren. Smartly dressed in pants and a sweater with black rectangular glasses that frame her blue eyes, Ms. Ehrenreich, 68, looks like someone who is content to be fashionable rather than fashion forward. The unrelenting message was “that you had to be cheerful and accepting and that you would not recover unless you were,” said Ms. Ehrenreich, who also writes frequently for The New York Times. Most infuriating, she added, was the advice to “consider your cancer a gift.”

Every rosy affirmation — the advertisements for breast cancer teddy bears and other tchotchkes, the inspirational slogans (“When life hands out lemons, squeeze out a smile”), and the politically correct language (“victim” and “patient” are avoided because they suggest passivity) — sharpened her keen sense of outrage.

“I have to say I took it personally,” she said. At one point she wrote a rant on Komen.org, a Web site that focuses on breast cancer education and research, about her anger over environmental carcinogens, endless battles with insurance agencies, toxic treatments and “sappy pink ribbons.” She recalled a typical response to her post: “You need to run, not walk, to get therapy. You can’t get better without poisoning your system.”

Her eyes widened at the memory. “If I don’t get better, it’s my fault,” she continued. “It’s a clever blame-the-victim sort of thing.”

Ms. Ehrenreich underwent a mastectomy and chemotherapy and wore a wig to cover her hair loss during her book tour for “Nickel and Dimed.”

Over the next few years, however, she kept encountering the same smiling insistence elsewhere that a positive outlook itself was the solution to problems. It had infiltrated the large career-counseling industry that serves the unemployed; the Ivy League, where “positive psychology” has nested in the curriculum; the best-seller list, where “The Secret” has taken up residence; mega-churches run by evangelists; and conferences for motivational speakers.

Then the financial crisis hit. “Wham,” she said. “It was so clear to me that it was connected.” The relentlessly optimistic forecasts about subprime mortgages and endless increases in real estate values were the product of the positive-thinking culture. One of the fundamental tenets of the literature, Ms. Ehrenreich said, is to surround yourself with other positive thinkers and “get rid of negative people.” “We’ve been weeding out anybody capable of rational thinking, of realism,” said Ms. Ehrenreich, a longtime activist in leftist politics. “That was, for me, ‘Wow!’ ”

Meanwhile, a background in science — she has a Ph.D. in biology — made Ms. Ehrenreich especially skeptical of pseudoscientific claims that positive thinkers often cite.

In “Bright-sided,” she traces the roots of the nation’s blithe sunniness to a reaction against Calvinist gloom and the limits of medical science in the first half of the 19th century. Starting with Phineas Parkhurst Quimby, perhaps one of the first American New Age faith healers, she draws a line to Mary Baker Eddy, the founder of Christian Science; the psychologist William James; Ralph Waldo Emerson; Norman Vincent Peale, who published “The Power of Positive Thinking” in 1952; and the toothy television minister Joel Osteen, who preaches the gospel of prosperity.

To Ms. Ehrenreich, the reliance on one’s personal disposition shifts attention from the larger social, political and economic forces behind poverty, unemployment and poor health care. “It can’t all be fixed by assertiveness training,” she said wryly.

Ms. Ehrenreich found that the more she listened, the surlier she became. All that shiny optimism, she said, was “like sitting in a warm bubble bath for too long.” Luckily she found other churlish comrades, scholars and doctors who were similarly skeptical of undimmed positivity.

“We began to call ourselves the Negatives,” said Micki McGee, a sociologist at Fordham University and the author of “Self-Help, Inc.: Makeover Culture in American Life.” The group would meet on occasion and discuss their research and the news of the day. The thread of positive thinking that runs through self-help culture says, “If you dream it and believe it, it becomes reality,” Professor McGee explained. “That kind of thinking contributes to the economic bubble that we just saw explode in enormous ways.

Barbara’s take on it is very important.”

Richard Sloan, a professor of behavioral psychology at Columbia, is a more recent member of the Negatives. He has written at length about the absence of scientific evidence showing links between prayer and healing in his book “Blind Faith: The Unholy Alliance Between Religion and Medicine.”

“There is some relatively recent evidence of the benefits of positive affect, but not the simplistic approach that is advocated by coaches that all you need to do is be happy,” he said. “There is no evidence that trying to put on a happy face makes a difference.” Rather, those who are characteristically more optimistic may have an advantage over those who aren’t, but, he said, “you just can’t change who you are very easily.”

The Negatives are quick to note that they are positive about some things. Despair is not the only alternative to positive thinking, Ms. Ehrenreich maintains; a spiral of negativism can be just as bad as a positive one. She is, as Mr. Osteen would say, living her “best life.”

Still, if people insist on seeing her as a “messenger of doom,” she gracefully accepts the role: “I will see what I can do to awaken us to this mass delusion.”

<http://www.nytimes.com/2009/10/10/books/10ehrenreich.html?ref=books>

New Tower Takes Shape on Columbia Campus

By **ROBIN POGREBIN**



The Pritzker Prize-winning architect José Rafael Moneo has had to contend with difficult sites before. At the National Museum of Roman Art in Mérida, Spain, for example, a project completed in 1986, he built a modern exhibition space over a still-buried portion of a largely excavated Roman town. In 2007 he finished an underground expansion of the early-19th-century main building of the Prado Museum in his hometown, Madrid.

But few sites have proved as challenging as his latest, at Broadway and West 120th Street, for which he has designed a \$200 million interdisciplinary science building, now under construction, for Columbia University. It's not just that this project involves inserting contemporary glass-and-aluminum architecture into a corner of Columbia's main Morningside Heights campus, a landscape dominated by the historic masonry of McKim, Mead & White. Mr. Moneo, who had never before designed a building in New York City, also had to grapple with placing a tall building on top of the existing gymnasium without crushing it or even interrupting the basketball season — a daunting engineering task.

"It isn't an easy building," Mr. Moneo said one day recently, as he walked through the construction site. "The conditions were so difficult."

The building, to open next fall, will rise 14 stories and contain 50,000 square feet of laboratories; a science library for physics, chemistry, biology and psychology; a 170-seat lecture hall; and a cafe visible from the street and open to the public. To put nine stories of that content above the gym, Mr. Moneo and his engineers devised a truss system, partly visible in the diagonal lines that punctuate the facade, which transfers the weight of the 120-foot span to columns at either end.

"It is a complete building, spanning over the gymnasium but not touching the gymnasium," Mr. Moneo said. "The building is literally floating."

Beyond the structural issues, the project included a complex set of mandates, which Columbia's president, Lee C. Bollinger, enumerated in an interview last week: to support, and make a statement about, Columbia's commitment to interdisciplinary science; to open the university to its neighborhood and animate its backyard; and to complement the planned campus extension, designed by Renzo Piano, for a 17-acre area to the northwest.

Although the building also needed to get along with its immediate neighbors, Mr. Bollinger said, it was not meant to blend in seamlessly with the rest of the campus.

"This had to be great architecture in itself," he said, designed both to "revitalize that area of the campus" and "integrate with the surrounding communities." Rather than brick and granite, he added, it would be

built with “light, open, modern materials,” even if that meant courting controversy among preservationists.

Given all these criteria, Mr. Bollinger felt he had to choose someone of Mr. Moneo’s stature and experience. “I wanted it to be daring but I wanted it to be by a major architect,” Mr. Bollinger said. “I didn’t want to select someone in the process of being established.”

In a way, Mr. Moneo’s years of teaching at the Harvard Graduate School of Design, where he also spent five years as chairman of the architecture department (1985-90), prepared him for this task.

“It was almost like an academic assignment — something you would give your best brain,” said Mark Wigley, the dean of Columbia’s architecture school. In this case the exercise was somehow both to “give dignity to the site and honor the ongoing ambition of a university.”

Not everyone is happy with the results. Reacting to the renderings on the Columbia Web site bwog.net in 2007, a poster called “arch. major” wrote, “McKim, Mead & White will roll over in their graves,” adding that the building made Uris Hall, the widely derided main building of Columbia’s business school, completed in 1961, “look like the Pantheon.”

The Morningside Heights neighborhood also has a strong preservation contingent, some members of which are bound to object to the Moneo building. But in the architecture world the early reviews are promising.

“It’s really provocative,” said Barry Bergdoll, chief curator of architecture and design at the Museum of Modern Art, who is also an author of “Mastering McKim’s Plan: Columbia’s First Century on Morningside Heights,” published in 1997 by Columbia University Press.

“It holds that corner in such a powerful place that for the first time 120th Street is not saying, ‘This is the back of Columbia,’ ” said Mr. Bergdoll, a former chairman of Columbia’s art history department. “It’s so exciting that 120th Street will finally have an entrance that’s lively, instead of just having leaves blowing around in a corridor of blank walls.”

For his part, Mr. Moneo, speaking last month in an interview at his modest office in Madrid, said he was excited about finally designing his first building in New York City. He said that for all the attention to openness, he had made a serious effort to maintain “the sense of enclosure that has been given to the campus by McKim, Mead & White,” which drafted the university’s master plan, first drawn up in 1893 and extended in 1903.

Mr. Moneo, who won the Pritzker in 1996, doesn’t have the air of a famous architect seeking to impose his stamp. At 72, he has an unassuming physical presence; slightly stooped and professorial, he speaks in low tones, his English heavily accented. And although he has a roster of major projects behind him — including the Davis Art Museum at Wellesley College in Massachusetts (1993); the Cathedral of Our Lady of the Angels in Los Angeles (2002); and the Chace Center gallery at the Rhode Island School of Design art museum in Providence, R.I. (2008) — he seems to have approached the Columbia building with humility.

“He takes time to educate his team about what he’s trying to accomplish,” said Dan Brodtkin, a principal at the engineering firm Arup, which worked on the project. “We weren’t just stuffing the mechanicals into the building. He was trying to honor the original master plan.”

That plan called for an even taller building on the site, Mr. Wigley, the dean, noted. “In some sense this is a lower and I think much more respectful building,” he said. “It has a collegial relationship to the existing campus and to the corner — therefore to the community.”

Touring the building in New York, Mr. Moneo said he was glad to see how it was coming along.

“Buildings are always better than drawings and models,” he said. “I am pleased to realize once more the importance of the building in the entire frame of the campus. It is much more perceptible now.”

However jarring the Moneo structure may seem at first when juxtaposed with the McKim buildings that surround it, Mr. Wigley, who advised on the selection of Mr. Moneo, said he believed that it would end up something of a classic. When its long western facade begins to be seen regularly in the soft light of sunset, he predicted, the building “will become beloved.”

“Architects should aim for building something whose beauty is clear but deepens with time, so that later on you couldn’t imagine the city without it,” Mr. Wigley added. “I can feel that coming.”

<http://www.nytimes.com/2009/10/13/arts/design/13moneo.html?ref=design>

On a Mission to Loosen Up the Louvre

By **CAROL VOGEL**

Paris

IN a subterranean space far below the swarms of tourists crowding the Louvre's famed pyramid are remnants of a medieval fortress. Here, along a 12th-century sandstone passage, the American artist Joseph Kosuth is about to suspend 15 sentences in giant white neon tubing. The show, "Neither Appearance Nor Illusion," which opens this month, is a first for the 64-year-old Mr. Kosuth. "You only get to do something at the Louvre once in a lifetime," he said, explaining that he picked the museum's catacombs rather than a conventional gallery because "it's a place I've always loved, it gets a lot of traffic and has never been used for contemporary art before."

Neither has the 16th-century Salle des Bronzes, which will soon be famous not just for its magnificent collection of ancient bronzes but for its ceiling, which is about to be painted by another celebrated figure of American art: Cy Twombly.

"I'm really not doing something new," Henri Loyrette, the Louvre's director, said as he was sprinting through the museum's galleries one recent morning. "I'm trying to revive a tradition."

Mr. Loyrette — who arrived at the Louvre in 2001 after 18 years at the Musée d'Orsay— was referring to 1953, when Georges Braque decorated the ceiling in an ornate gallery that was once Henri II's antechamber. Since then the Louvre has been primarily focused on burnishing the reputation of dead artists, not promoting new ones, especially if they're American.

But there seems to be an infusion of many things American at the Louvre these days.

In addition to seeing site-specific installations by high-profile contemporary artists, one might also hear American writers like Toni Morrison or see performances by the choreographer and dancer Bill T. Jones. Memberships conferring extra privileges, long a standard option at American museums, started here in 2006. Mr. Loyrette also ushered in free admission on Friday nights to anyone under 26. (To make Americans feel even closer to home, a McDonald's restaurant and McCafé are planned to open near the Louvre next month.)

Mr. Loyrette has also been charging about the world in what many might call an American manner — drumming up donations from Cincinnati to Hong Kong, as well as trading on the Louvre's brand and collection to raise cash from Atlanta to Abu Dhabi.

Not surprisingly, his approach has not been popular with everyone. Critics seem to view the idea of branding the Louvre as both crass and unnecessary, and are particularly dismissive of Mr. Loyrette's outreach abroad. Supporters believe that he is merely doing what any museum director has to do these days to make the institution a financially stable place. For Mr. Loyrette's part, he said he is simply, "making the museum more modern."

Regardless of his methods and motives, what does seem clear is that Mr. Loyrette, with major plans for expansion, satellite franchises and new partnerships that would have been unheard of even a decade ago, is overseeing the most drastic rethinking of the Louvre's place and purpose in at least 20 years. (It was 1989 when I. M. Pei finished the then-controversial glass pyramid for the museum's entrance courtyard.) On a private tour given over the summer, Mr. Loyrette, lanky, 57, and spry in a dark suit, seemed unencumbered by the weight of the world's most august and treasured art collection. Instead he seemed preoccupied with the details, spouting facts and figures as he dashed through the seemingly endless halls and galleries. "If you want to see everything you must walk 14 kilometers," he announced — more than eight miles. Then: "Forty percent of our visitors are under the age of 26." And on a more worrisome note: "80 percent of the people only want to see the Mona Lisa."





Much of what he has been trying to do at the museum has been to fuse those numbers so that they are not working at cross purposes: to push the visitors — especially young ones — past the Mona Lisa to explore the miles of largely unexplored artworks beyond it.

Looking at yet another set of numbers, it is hard to argue with his results. Since he arrived a little over eight years ago, attendance at the museum is up 67 percent, with 8.5 million visitors recorded in 2008 and 10 million expected by 2014. (The Metropolitan Museum of Art has nearly 5 million visitors, and the British Museum 5.9 million.)

At the same time he has created an endowment, which right now stands at nearly \$175 million, largely to compensate for gradual decrease in contributions from the French government; in 2008 it covered only 47 percent of the museum's \$315 million costs, down from 60 percent in 2001.

Not that Mr. Loyrette hasn't had some help. His predecessor, Pierre Rosenberg, had started clearing out many of the institution's cobwebs — introducing corporate financing (a relatively new phenomenon for French museums), hiring a fund-raising staff (also novel) and supervising an ambitious exhibition schedule — in the years before Mr. Loyrette arrived.

While there is a long and ingrained history of philanthropy in America, not so in France, where until recently it was assumed that the government was responsible for the country's museums.

Mr. Loyrette received some help on this front too. In 2003 a new tax was introduced permitting individuals to deduct 66 percent of the value of any artwork given to cultural institutions and allowing corporations to deduct 60 percent to 90 percent if the work is deemed an historic treasure. The change quickly netted the Louvre 130 Italian Renaissance drawings from the Carrefour retail group — the value of which, Mr. Loyrette said, exceeded the museum's annual acquisitions budget. More recently the insurance company AXA donated a 17th-century painting by the Le Nain brothers to the museum, and Pierre Bergé gave the Louvre a Goya portrait in memory of Yves Saint Laurent, his partner, who died last year.

Outside of France Mr. Loyrette has embarked on multiple partnerships with the intention of raising both cash and the museum's profile. Some, like next year's planned exhibition devoted to the German sculptor Franz Xaver Messerschmidt at the tiny Neue Galerie in Manhattan, seem relatively benign. Others have many worried that he is diluting the Louvre brand at best and cheapening it at worst.

In 2004 he struck a three-year agreement with the High Museum of Art in Atlanta that includes seven temporary exhibitions from the Louvre's collection in exchange for a \$6.4 million donation earmarked for the refurbishment of the Louvre's 18th-century French furniture galleries.

More controversially, he made a deal two years ago with Abu Dhabi in the United Arab Emirates to create the Louvre Abu Dhabi — a 260,000 square-foot museum designed by the French architect Jean Nouvel and expected to open in 2013 on Saadiyat Island, off the city's coast. In an arrangement that echoes the Solomon R. Guggenheim Foundation's deal with the city of Bilbao, Spain, Abu Dhabi will pay the Louvre \$572.1 million for the use of the Louvre's name and give the French museums another \$786.5 million for loans, exhibitions and management advice.

Mr. Loyrette said that the funds will enable him to establish the first-ever endowment for a French museum and pay for special projects that the government will not, but critics were not appeased. "One can only be shocked by the commercial and promotional use of masterpieces of our national heritage," wrote a group of leading art historians in the newspaper Le Monde in 2007. Similar outrage has been expressed over a plan to build a satellite branch of the Louvre in Lens, an economically depressed mining town northwest of Paris. His critics say a museum there is unnecessary; there are already two provincial museums nearby, one in Lille, another in Arras, both with art from the Louvre.

Mr. Loyrette defends the project. "For people living in Lens there is nothing to see," he said. In addition to rotating exhibitions from the Louvre's collection it will also be a laboratory for contemporary art with galleries big enough to showcase large-scale installations.

Others say both praise and criticism of Mr. Loyrette is misplaced, as he is merely carrying out projects initiated by the French government, which has always overseen the running of the museums. Marc Fumaroli, an art historian who is president of the Friends of the Louvre in Paris, pointed out that although Mr. Loyrette is very powerful, he is also "a functionary of the state."

"The deal with Abu Dhabi was conceived by the government," Mr. Fumaroli added. "Lens was too."

But Mr. Loyrette's biggest challenge might be the Louvre itself. If attendance increases at the rate it has been, in five years 10 million visitors a year will be crowding through an entrance designed for less than half that number. Already there is an exasperating and potentially discouraging crush at the Pei-designed pyramid as visitors vie to get in. Indeed, being told about the line outside the museum was the only thing



that made Mr. Loyrette bristle. He said he had asked Mr. Pei's office to reconfigure the interior space to make it more visitor friendly.

Another troubling reality is that the vast majority of those millions of people come to see only one — or three — pieces of art. "Everyone wants to see the same three things: the Mona Lisa; the Venus de Milo and the Winged Victory," he moaned.

To make people more aware of the rest of the Louvre's offerings, he recently released a new audio guide highlighting other works of art. To the same end he is also making sure that contemporary art continues to be subtly installed throughout the museum. His first commission was a painting and two sculptures by the German artist Anselm Kiefer that can be found in a stairwell linking the Egyptian and Mesopotamian antiquities. He recently asked the French artist François Morellet to create stained-glass windows for a Second Empire staircase.

One of the museum's biggest shortcomings, he realizes, is the lack of American art. "It's a scandal," Mr. Loyrette said. "We're supposed to be a universal museum, yet we only have three American paintings in our collection. So besides showing Mr. Kosuth and commissioning Mr. Twombly's ceiling, the museum has set up an English language version of its online database, and soon it is expected to announce the expansion of a comprehensive online catalog of works created by American artists in French public collections.

But his most noticeable contribution will likely be the \$67 million wing to house the Louvre's world-class collection of Islamic art, something no other Louvre director has tried to do, and the most radical architectural addition since Pei's glass pyramid.

"It was not even a department when I arrived," said Mr. Loyrette. "We did not want to make this a separate museum because Islamic art is so artistically and politically important. It's so closely linked with all of Western art."

At 8:30 one summer morning, Mr. Loyrette could be found briefing some of the project's backers. In addition to the Saudi Arabian Prince Alwaleed bin Talal, a grandson of King Abdul Aziz, Saudi Arabia's founder, who has donated \$20 million towards its construction (the largest gift ever made by an individual in France.), the French government has pledged \$28.5 million, while Total, the oil company, has agreed to put up \$4.8 million. The rest is coming from other French companies including Lafarge, the world's largest cement maker.

The Italian architect Mario Bellini and the French architect Rudy Ricciotti have designed a translucent undulating roof fashioned from small glass disks, which will sit in the center of the Visconti courtyard, a majestic, neo-Classical space in the middle of the Louvre's south wing.

Inside, the two-story wing will house a good portion of the Louvre's collection of about 10,000 objects from the Islamic collection, roughly four times its current space, which has only room to show some 1,300 works.

Mr. Loyrette, a trained art historian, appears as comfortable discussing Anselm Keiffer's paintings as he does the oldest known celestial globe. He decided to join the museum world because he "didn't want to become a teacher," he said.

Growing up in Paris, he recalls playing in the Tuileries as a child. "I can't remember a time when I wasn't going to the Louvre," he said. His mother, an Egyptologist, worked there; his father is a lawyer.

He never forgets that the Louvre was originally a palace before it was transformed into a museum in 1793. And he treats it as if it were his home. "I spend every Sunday here," Mr. Loyrette said. "I don't have the time during the week." Each visit he inspects a different set of galleries, looking at the installations, taking note of things he thinks should be changed, making sure nothing is out of place.

"I figure it takes me a month to get through the whole museum," he said and paused before adding, "Cezanne once said, 'The Louvre is the book in which we learn to read.' It's exactly like that for me too."

<http://www.nytimes.com/2009/10/11/arts/design/11voge.html?ref=design>

White House Art: Colors From a World of Black and WhiteBy **HOLLAND COTTER**

As you'd expect, questions hovered in the art world air last week after the White House released the list of paintings that the Obamas have borrowed from various Washington museums for their presidential home.

How, people mused, did the choices stack up, coolness-wise? Fair. Jasper Johns and Ed Ruscha have a certain senior chic. Mark Rothko and Richard Diebenkorn are a bit blue-chip bland. Still, if there was nothing rad on the list, at least there was nothing bad.

Political art? Some would say that all art is political, by design or default, but there was one pretty direct statement about racism in Glenn Ligon's 1992 "Black Like Me #2." The painting consists of a single, reiterated phrase — "All traces of the Griffin I had been were wiped from existence" — that grows darker with each repetition until it disappears, black against a black ground. It is taken from a book by the white journalist John Howard Griffin, who passed himself off as black to see how living as a black man in America felt. It didn't feel good. It hurt.

Why were there so few women? Why no Hispanics or Asian-Americans? And why, a few art-worldlings fretted, did the Obamas stick with the stodgy old medium of painting? Couldn't they have opted for, maybe, a video installation in the Oval Office? Or a Sound Art piece in the Rose Garden? Or a Jeff Koons bunny in the Lincoln Bedroom?

I had one pressing question. If the offer were made, which artist from the White House list would I choose for my New York City apartment? I knew the answer: Alma W. Thomas.

Thomas was born in Columbus, Ga., in 1891, and moved to Washington in her teens. Her family settled in a house at 1530 15th St. N.W., and she lived there until her death in 1978. Her parents had relocated for two reasons: racial violence was on the rise in Georgia and Washington had excellent public schools. Thomas got a solid, though segregated, education, and taught art in one of the city's junior high schools for 35 years.

Before taking that job, though, she did other things. In 1921, she enrolled in a home economics program at Howard University, with an interest in making theater costumes. One of her instructors suggested she study art instead. She became Howard's first fine art major, with a specialty in painting.

The painting continued sporadically during her teaching years. In the 1950s, she took weekend studio classes at American University, working briefly with Jacob Kainen, one of a group of abstract painters — Gene Davis, Morris Louis, and Kenneth Noland were others — gaining national attention as the Washington Color School. Thomas, who loved color above all else in art, always felt a kinship with them.

Only when she retired could she finally start to paint full time. She was 69. She used her kitchen as her studio. For subjects she took the trees outside her windows and floral plantings in local parks. She had once been an academic realist; then a semi-Cubist. Now she was ready for abstraction.

You can see her making the leap in the earlier of her two paintings on the White House list, “Watusi (Hard Edge),” from 1963. It’s an out-and-out steal of a Matisse collage. Thomas just shifts the pieces around, cools the colors down, and adds a title that refers to a Chubby Checker song. But through copying Matisse, she began to work out a format she would use again and again.

This consisted of short, block-like strokes of color lined up, like mosaic tesserae, in columns and bands set against a different color or unpainted ground. The second Thomas painting on the list, “Sky Light” (1973), is a classic, if somewhat somber and monotonous, example of the type: a wall — more like a fabric hanging — of close-together vertical columns made of linked blue strokes, with a white ground showing through, like light through cracks.

She kept playing with this model. She intensified the colors; laid light colors over dark. She went through a jazzy rainbow phase. She shaped the blocky strokes into chips, like puzzle pieces or pavement stones. She made the strokes sinuous and calligraphic, so they float and suddenly disperse like leaves in a wind. Thomas herself was a popular favorite in her late-blooming career. Howard gave her a retrospective in 1966. In 1972, at 80, she was the first African-America woman to have a solo at the Whitney Museum. Critics raved. There was a second retrospective in 1977, and Jimmy Carter invited her to the White House. People couldn’t get enough of her. Why?

Her art was accessible. Her abstraction was never really abstract: you could always see the nature in it: flowers, wind. Her paintings were modern but part of some older tradition too, as close to quilts as to Matisse. In a racially charged era, her art wasn’t political, or at least not overtly so. When asked if she thought of herself as a black artist, she said: “No, I do not. I’m a painter. I’m an American.”

Instead of talking anger, she talked color: “Through color I have sought to concentrate on beauty and happiness, rather than on man’s inhumanity to man.” American museums, under the gun after their neglect of black artists, breathed a sigh of thanks.

But when Thomas said color what was she really saying? She vividly remembered being barred from museums as a child because of her race. A lifetime later, she acknowledged that things were still hard. “It will take a long time for us to get equality,” she said in an interview. “But what do you expect when whites closed up all the schools and libraries on us for so long? They know that schooling would give us our salvation.”

In many ways she’s an ideal artist, and power of example, for the Obama White House: forward-looking without being radical; post-racial but also race-conscious; in love with new, in touch with old. A genuine rainbow type. She would have enjoyed being in Rothko’s company, and she would have understood where Mr. Ligon was coming from.

<http://www.nytimes.com/2009/10/11/weekinreview/11cotter.html?ref=design>

Capturing a Nation's Thirst for Energy

By **RANDY KENNEDY**



The photographer Mitch Epstein, thin and professorial with gray hair and glasses, does not exactly cut a menacing figure. When he ducks beneath the dark cloth of his 8-by-10 view camera, the words that come most readily to mind are late Victorian, not potentially violent.

But one afternoon several years ago in the tiny Ohio River Valley town of Poca, W. Va., he found himself and his assistant surrounded by police cruisers, watching as sheriffs searched their rental car and came up with a stack of Polaroids of power plants much like the coal-fired one that towered across the river. This discovery led to the summoning of an F.B.I. agent, who concluded after much deliberation that Mr. Epstein had broken no laws by taking pictures near the plant, but told him, as he later recalled, “If you were Muslim, you’d be cuffed and taken in for questioning.”

As a well-regarded artist whose work is represented in major collections like those of the J. Paul Getty Museum and the Metropolitan Museum of Art, Mr. Epstein might have found the incident a little shocking. But by that point, deep into a six-year project he was to call “American Power” — a nomadic exploration of the nation’s production of energy and its hunger for it, and what both might mean for America’s political power in the world — the drill had become almost routine.

In 2004 in Shippingport, Pa., near the site of a nuclear plant, someone called the police to report a man on Main Street carrying a missile launcher. Mr. Epstein, traveling with his big camera and tripod, was escorted out of town and told not to return. The project had first taken shape a year earlier in Cheshire, Ohio, where he had been hired by The New York Times Magazine to document the small town’s dismantling by the American Electric Power company, which had bought it for \$20 million amid concerns about emissions from its coal-burning plant. The police there quickly informed him that he was violating company policy by photographing in the town.

“That set the pattern,” Mr. Epstein said in an interview in his home and studio on the Lower East Side of Manhattan, where he recently displayed huge 70-by-92-inch prints of the project’s photographs, which will be published in book form later this month by Steidl. “It got to the point later where I would almost have an anxiety attack every time I pulled over to the side of the road to take a picture.”

Mr. Epstein’s work over more than 30 years has always been marked by political and social awareness, from his documentation of Americans at leisure to his deeply personal 2003 book, “Family Business” (Steidl), about the demise of his father’s real estate and retail concerns in Holyoke, Mass., where he was

raised. The critic Vince Aletti has written that Mr. Epstein's combination of subtlety and assurance leads to photographs that feel "not just ideal but inevitable."

When he became interested in a book about the energy needs that underpin the American way of life, Mr. Epstein said, "I didn't start it with any kind of specific political agenda."

"I mean, I'm not much of an environmentalist," he said. "But as I worked and traveled, I came away troubled by the implications of what I was seeing and what happened to me."

What he saw — during the first and second administrations of George W. Bush, years deep in the shadows of 9/11 — was a country that could be both largely ignorant of the immense environmental and political costs of its energy consumption and profoundly suspicious of anyone paying too much attention to the sources of that energy.

"I traveled numerous times to photograph the repercussions of westward expansionism on the landscape," Mr. Epstein, 57, writes in the book's afterword, describing visits to the Hoover Dam and the Trans-Alaska Pipeline, to the cavernous truck stop in Walcott, Iowa, that bills itself as the world's largest, and the Yucca Mountain nuclear waste repository in Nevada (which he was allowed inside to photograph), and to both the Democratic and Republican national conventions (neither of which he was allowed inside to photograph, though he points out that the Secret Service agents were much friendlier at the Republican convention).

"Humankind's technical prowess has etched itself into nature's grandeur," he adds in the essay. "But settlers did not expect that their American Dream of material ease would ultimately require more energy than the land could give."

The project eventually took Mr. Epstein to 25 states, many of which he returned to several times, revisiting places like the Kern River oil field in Oildale, Calif., a serene expanse of the San Joaquin Valley where networks of pipelines and oil-pump jacks seem to stretch past the horizon.

As the work proceeded, Mr. Epstein and his studio manager, Ryan Spencer, put together what came to look like a war room in his New York studio, a giant map of the country with red pushpins for coal, blue for nuclear, green for wind, and yellow for "been there." Combing the Web (where in many cases the power plants in his photographs can easily be seen from the same distance or often closer, on Google's Street View pictures), he would pick sites to visit and then go about the painstaking and generally unsuccessful task of writing letters to companies and government officials seeking permission to photograph.

"This project was, in part, about not getting in," he said, adding that his lawyer's advice about dealing with police questioning was remarkably straightforward, if not always easy to follow for someone with a slight authority problem: "Don't get arrested, at all costs."

Sometimes what Mr. Epstein came across in his research — the bright blue gas pump in Omaha labeled "terror-free oil" — led him directly to what he would photograph. But often, the pictures and articles and printouts he compiled in a fat ring-binder notebook were just starting points for trips that took him serendipitously to things like a lakeside baptism in Herald, Calif., where the cooling towers of the Rancho Seco nuclear power plant can be seen rising in the distance like a cathedral.

He came across a father-and-son motocross outing near Midland, Tex., both riders suited up and helmeted head to toe like "Star Wars" storm troopers, staring into the camera. Emerging from his motel in Snyder, Tex., on a misty morning, he took an almost romantic shot of a defunct gas station, one of whose pumps had been consumed by weeds.

None of the pictures add up to anything like a simple polemic, but Mr. Epstein said that perhaps for the first time in his career, he felt the need to shed artistic detachment. He and his wife, Susan Bell, have designed public-service-type messages that they intend to place around the country, pairing some of the book's images with literary quotations, like one from Mark Twain that hovers above a shot of a slab of new Nevada highway: "Civilization is a limitless multiplication of unnecessary necessities."

"I have tried to convey in these pictures," Mr. Epstein said, "the beauty and terror of early-21st-century America, as it clings to past comforts and gropes for a more sensible future."

Correction: October 10, 2009

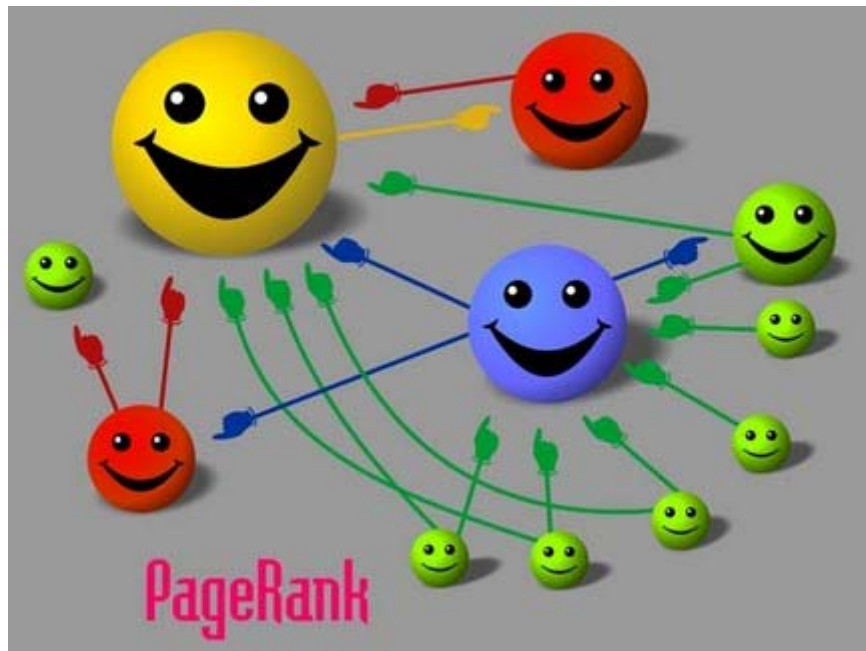
A previous version of this article misstated the location of the town of Cheshire. It is in Ohio, not Pennsylvania.

<http://www.nytimes.com/2009/10/10/arts/design/10epstein.html?ref=design>

Can PageRank Help Save the Planet?

The algorithm behind rating World Wide Web pages for authority may provide a useful way of figuring out the key species in the web of life.

- By: [Enrique Gili](#) | October 08, 2009 |



Two researchers suggest the algorithm behind ranking Web pages may provide a useful way of figuring out the key species in the circle of life.

The study of who eats whom - known as "food webs" — is essential to understanding and preserving habitats. The traditional way to evaluate the overall health of an ecosystem is to conduct a biological inventory, note the robustness of keystone species and establish a pecking order. Photosynthesis produces grass, zebras eat grass, and lions eat the zebras until the circle of life is complete. Such practices have been the foundation of resource management plans for commercial fisheries and national parks for decades. If links in the chain are broken, the thinking goes, the entire food web starts to unravel, leading to famine, disease and ultimately environmental collapse.

The demise of seemingly unrelated animals can have a devastating cascading effect on entire food systems, leading scientists to wonder, for example, whether the mighty lion trumps the lowly dung beetle in providing necessary environmental services on the African savanna. Figuring this out in advance has proven to be difficult. Since building accurate computer models based on the myriad ways species interact is daunting. Until recently there have been more variables to the diversity of life than there is adequate processing power.

Drs. [Stefano Allesina](#) of the [National Center for Ecological Analysis and Synthesis](#) and [Mercedes Pascual](#) of the University of Michigan may have a partial solution to that problem by finding the quickest way to dismantle an ecosystem - at least on paper. Their [research](#), published Sept. 4 in the academic journal *PLoS Computational Biology*, identifies with deadly accuracy which species are essential to the survival of ecosystems.

"Species are not isolated in deep space. They are always interacting with each other, and therefore any modification we make on the environment or any impact we have on a single species is important," Allesina said.

The co-authors are food web experts. Their novel approach to co-extinction is associated with the emerging field of computational ecology. It's an academic discipline that takes field biology into the realm of networks and super computers, applying the logic behind higher math to address ecological questions.

In computer lingo, each species is a node, connective points in vast network. Disrupting nodes leads to a loss in functionality and eventual system failure. His "aha" moment arrived while reading a paper in a journal of applied math that explained how the Google algorithm PageRank worked. "I realized it was almost the same idea," said Allesina. "Species are important if they point to other species." Software developers rely on PageRank to measure the utility and value of Web pages. It's premised on the reasoning that incoming links indicate the intrinsic worth of Web pages to other pages — more links means the page is valued, fewer means it's not.

Inspired by PageRank, their Google-like algorithm is designed to mimic the effect of the loss of a species has on a food web. It's adapted to determine the importance of species to each other, taking into account not just their primacy of place, but the number flora and fauna that rely on it for survival and counting the number of links in order to determine a species' value to the overall health of an ecosystem.

Key to understanding their algorithm is understanding the sensitive equilibrium of ecosystems. The researches had to adapt the algorithm to match the hierarchical nature of food webs. Energy expended to grow grass that zebras eat ends with the lion. In order to approximate dead ends in the food chain, they factored in the "brown cycle," the decomposition of organic matter, which Allesina termed a "root node," based on the premise that all animals excrete and eventually die, recycling nutrients back into the ecosystem.

When tested against published accounts of ecosystem collapse their algorithm proved to be accurate in 11 out of 12 cases, outpacing previous models designed to measure the effects of stress placed on food webs due to species loss. The PageRank tweak arrived at the same outcome. The researchers ran their algorithm across a broad spectrum of ecosystems where the effects of species loss are known, ranging from the Coachella Valley near Palm Springs to the Chesapeake Bay in the Mid-Atlantic region. They achieved similar results in marine, rain forest and grassland regions.

In the 12th case, Allesina attributed its failure to "confounding" anomalies in the food chain such as cannibalism, which is not reflected in the algorithm and which could be compared to "gaming the system" in the online world in order to gain a higher page rank.

Math and ecology working together have been around a long time; the computer models mimicking complex foods systems are just beginning to have the same predictive success as field biology studies, surmised Neo Martinez, the director of the Pacific Ecoinformatics and Computational Ecology Lab at Berkeley. According to Martinez, the PageRank-inspired algorithm is a refinement of existing computer models. "The Google algorithm is a quick and efficient way of pretty precisely figuring out who's most important," he said. In the field, the algorithm could be used to make preliminary assessments regarding ecosystems under stress. Giving resource managers the ability to allocate resources where they are most needed, if they can.

"It's a first step," said Allesina.

http://www.miller-mccune.com/science_environment/can-pagerank-help-save-the-planet-1493?utm_source=Newsletter78&utm_medium=email&utm_content=1013&utm_campaign=newsletters

Blinded by the Light

In every corner of the globe tonight, our nighttime sky shines brighter than it did less than 10 years ago with potentially serious consequences to humans, animals and ecosystem.

- By: [Judith Stock](#) | October 11, 2009



Light pollution has always been a problem for astronomers, and it is increasingly affecting the health and well-being of humans and animals alike by disrupting their circadian rhythm.[stockxchange.com](#)

Plants, animals and humans developed with an internal clock — the circadian rhythm. It's a 24-hour cycle that affects physiological, biochemical and behavioral processes in almost all organisms.

Civilization brought with it artificial light to homes in every village, town and city across the world, and as more buildings and factories came online, industrialization increased and the population continued to expand, our nighttime sky looked a lot like the day, changing our deep, dark sleep patterns and altering that 24-hour internal timekeeper.

With that, all living creatures' lives changed in ways only now becoming clear to us.

Dawns the light

To understand light pollution, it's important to know there are two different types: First, there is astronomical light pollution that obscures the view of the night sky, and the second kind is ecological light pollution, which alters natural light systems in terrestrial and aquatic ecosystems.

"Light pollution started to be identified in the 1800s when we realized that birds flew into the sides of lighthouses and consequently died," says Travis Longcore, science director of the [Urban Wildlands Group](#), research associate professor at the USC geography department and a lecturer at the UCLA Institute of the Environment in Los Angeles. (Beginning in the 1940s, radio and television towers become "the spiral of death for birds that regrettably hit the [guy-wires](#)," he added.)

Twenty years later, it was discovered that artificial coastal lighting in Florida was disorienting and disrupting the rhythm of sea turtles that bury their eggs in the sand. When the eggs hatch, the hatchlings must go toward the water and beachside nests for their survival, but the babies were being distracted by the light and diverted from their natural course, often ending up facing dehydration, being eaten by predators or even wandering along the highway.

As more animals encountered night lighting, it became evident that while night light might benefit people, it wasn't helping wildlife.

Light pollution has had disastrous effects on migrating birds, resulting in millions dying each year, and that figure increases with the combination of outdoor light and fog. Birds use the light at the horizon to migrate at night. When the birds see a brightly lit building, they become confused and fly around and around — in essence becoming trapped in the light — eventually dropping dead from exhaustion.

The term photopollution — artificial light that has adverse effects on wildlife — was coined in a watershed paper by Dutch ecologist F.J. Verheijen in 1985. In the paper, Verheijen says that many nocturnally active animals need a natural light field between sunset and sunrise as a requirement for survival.

"When we think about the night and the extent of light pollution in the last 20 years, it's growing far faster than the human population and has changed the environment significantly," explained Longcore.

But light pollution's harmful effects aren't restricted to animals.

"Women who work at night, change shifts often or don't get proper sleep at night suppress their melatonin production and have higher rates of breast cancer," explained Dr. Mario Motta, president of the Massachusetts Medical Society and associate at the North Shore Cardiovascular Associates. "It's a fact. The exact cause is speculative, but we think it's because of the changes in the melatonin production due to disruption of their circadian rhythm."

Disrupting the circadian rhythm can cause insomnia, depression and increase the risk of cancer and cardiovascular disease.

Fallout from the disruption of your circadian rhythm can be harsh medicine to swallow, but so can simply living in the glare of the night's lights. Straining to see at night in the face of glare from oncoming traffic or streetlights that shine over the landscape can be irritating and uncomfortable, but it also can be dangerous.

"If I shined a light on your eyes in a dark room you wouldn't be able to see the rest of the room," Motta observed. "Every time you pass a bright light on the highway or the street your pupils constrict," causing decreased nighttime visibility.

Adults between the ages of 40 to 50 start to notice glare more, when the lens of the human eye begins to harden and calcify. Cataracts may develop, which can exacerbate the glare, and require surgery to remove.

Citing energy efficiency and glare reduction, the American Medical Association in June officially approved a resolution advocating light pollution control. Dr. Motta introduced the resolution saying, "This is just what the doctor ordered."

Transforming the Night

"The one thing most responsible for our nighttime sky looking like the middle of the day is there's an unwarranted volume of streetlights that aren't necessary for our safety," said Leo Smith, the northeast

regional director of the International Dark-Sky Association, a nonprofit focused on preserving the night sky through smarter outdoor lighting. "In many cases, we don't need streetlights, but streetlight manufacturers are pushing their products."

"In Connecticut," said Smith, a member of the Illuminating Engineering Society of North America and a roadway lighting committee member in Suffield, "we have sections where the road is 30 miles long and is continually illuminated. There's a tremendous amount of energy loss from unneeded streetlights and ones that don't need to be on when there's no traffic."

In comparison, Interstate 20 in Atlanta has no overhead roadway lights outside the beltway, with five lanes of traffic in each direction, but it does have a 4-foot median barrier that blocks the glare from oncoming headlights.

When it comes to dusk-to-dawn outdoor lighting, one solution that's been offered is to light streets only until 10 p.m. After that time, programmable photocell lights would turn off. Also, it is suggested that private residences use only fully shielded lighting fixtures for porches or driveways.

Smith also pointed to a solution that helps those migrating birds: "Eventually, we will have motion-sensor controls, so when you're in the building and using it, lights will be on and when the building isn't in use, the lights will be off."

He estimates that more than 100 cities in the United States have ordinances on the books regarding outdoor lighting. One such a town is Stowe, Vt.

The Stowe City Council passed standards for outdoor lighting in 1998. The regulations require outdoor lighting be cutoff fixtures, as they direct light downward where it is needed, not sideways or upward. "We do have height restrictions of 16 feet for parking lot lighting," said Stowe Zoning Director Rich Baker, "and we don't allow sodium vapor lights or internally illuminated signage."

"This is a tourist area. People come here for outdoor recreation and for the aesthetics. We needed to cut down bright outside lighting."

New on the energy horizon and ready to take the bite out of squandered light is the federal government's new planned matrix for Energy Star qualification or fitted target efficiency. The old Energy Star qualification system factored how much energy would you get out of a light bulb. Soon, it will factor how much energy is going to the target, reducing squandered light energy.

The Dark-Sky Association estimates that wasted light squanders the equivalent of 32 million barrels of oil or 9 million tons of coal each year in the United States alone. Some other industrialized nations might point the way toward improvement: Longcore said much of Europe is ahead of the U.S. on confronting this issue, particularly the Czech Republic, which has a nationwide light pollution law on the books.

"Lighting the night is a purely manmade condition," Motta says. "We can't do anything about the sun, but we can do something about the nighttime lighting situation."

Of all the complex environmental problems that so desperately need our attention and a solution, light pollution is the most easily remedied.

http://www.miller-mccune.com/science_environment/blinded-by-the-light-1501?utm_source=Newsletter78&utm_medium=email&utm_content=1013&utm_campaign=newsletters

What Really Happened in Rwanda?

By: Christian Davenport and Allan C. Stam



In 1998 and 1999, we went to Rwanda and returned several times in subsequent years for a simple reason: We wanted to discover what had happened there during the 100 days in 1994 when civil war and genocide killed an estimated 1 million individuals. What was the source of our curiosity? Well, our motivations were complex. In part, we felt guilty about ignoring the events when they took place and were largely overshadowed in the U.S. by such "news" as the O.J. Simpson murder case. We felt that at least we could do something to clarify what had occurred in an effort to respect the dead and assist in preventing this kind of mass atrocity in the future. We were both also in need of something new, professionally speaking. Although tenured, our research agendas felt staid. Rwanda was a way out of the rut and into something significant.

Although well-intentioned, we were not at all ready for what we would encounter. Retrospectively, it was naïve of us to think that we would be. As we end the project 10 years later, our views are completely at odds with what we believed at the outset, as well as what passes for conventional wisdom about what took place.

We worked for both the prosecution and the defense at the International Criminal Tribunal for Rwanda, trying to perform the same task — that is, to find data that demonstrate what actually happened during the 100 days of killing. Because of our findings, we have been threatened by members of the Rwandan government and individuals around the world. And we have been labeled "genocide deniers" in both the popular press as well as the Tutsi expatriate community because we refused to say that the only form of political violence that took place in 1994 was genocide. It was not, and understanding what happened is crucial if the international community is to respond properly the next time it becomes aware of such a horrific spasm of mass violence.

Like most people with an unsophisticated understanding of Rwandan history and politics, we began our research believing that what we were dealing with was one of the most straightforward cases of political violence in recent times, and it came in two forms: On the one hand was the much-highlighted genocide, in which the dominant, ruling ethnic group — the Hutu — targeted the minority ethnic group known as

the Tutsi. The behavior toward the minority group was extremely violent — taking place all over Rwanda — and the objective of the government's effort appeared to be the eradication of the Tutsi, so the genocide label was easy to apply. On the other hand, there was the much-neglected international or civil war, which had rebels (the Rwandan Patriotic Front or RPF) invading from Uganda on one side and the Rwandan government (the Armed Forces of Rwanda or FAR) on the other. They fought this war for four years, until the RPF took control of the country.

We also went in believing that the Western community — especially the United States — had dropped the ball in failing to intervene, in large part because the West had failed to classify expeditiously the relevant events as genocide.

Finally, we went in believing that the Rwandan Patriotic Front, then rebels but now the ruling party in Rwanda, had stopped the genocide by ending the civil war and taking control of the country.

At the time, the points identified above stood as the conventional wisdom about the 100 days of slaughter. But the conventional wisdom was only partly correct.

The violence did seem to begin with Hutu extremists, including militia groups such as the Interahamwe, who focused their efforts against the Tutsi. But as our data came to reveal, from there violence spread quickly, with Hutu and Tutsi playing the roles of both attackers and victims, and many people of both ethnic backgrounds systematically using the mass killing to settle political, economic and personal scores.

Against conventional wisdom, we came to believe that the victims of this violence were fairly evenly distributed between Tutsi and Hutu; among other things, it appears that there simply weren't enough Tutsi in Rwanda at the time to account for all the reported deaths.

We also came to understand just how uncomfortable it can be to question conventional wisdom.

We began our research while working on a U.S. Agency for International Development project that had proposed to deliver some methodological training to Rwandan students completing their graduate theses in the social sciences. While engaged in this effort, we came across a wide variety of nongovernmental organizations that had compiled information about the 100 days. Many of these organizations had records that were detailed, identifying precisely who died where and under what circumstances; the records included information about who had been attacked by whom. The harder we pushed the question of what had happened and who was responsible, the more access we gained to information and data.

There were a number of reasons that we were given wide-ranging access to groups that had data on the 100 days of killing. First, for their part of the USAID program, our hosts at the National University of Rwanda in Butare arranged many public talks, one of which took place at the U.S. embassy in Kigali. Presumably put together to assist Rwandan NGOs with "state-of-the-art" measurement of human rights violations, these talks — the embassy talk, in particular — turned the situation on its head. The Rwandans at the embassy ended up doing the teaching, bringing up any number of events and publications that dealt with the violence. We met with representatives of several of the institutions involved, whose members discussed with us in greater detail the data they had compiled.

Second, the U.S. ambassador at the time, George McDade Staples, helped us gain access to Rwanda government elites —directly and indirectly through staff members.

Third, the Rwandan assigned to assist the USAID project was extremely helpful in identifying potential sources of information. That she was closely related to a member of the former Tutsi royal family was a welcome plus.

Once we returned to the U.S., we began to code events during the 100 days by times, places, perpetrators, victims, weapon type and actions. Essentially, we compiled a listing of who did what to whom, and when

and where they did it — what Charles Tilly, the late political sociologist, called an "event catalog." This catalog would allow us to identify patterns and conduct more rigorous statistical investigations.

Looking at the material across space and time, it became apparent that not all of Rwanda was engulfed in violence at the same time. Rather, the violence spread from one locale to another, and there seemed to be a definite sequence to the spread. But we didn't understand the sequence.

At National University of Rwanda, we spent a week preparing students to conduct a household survey of the province. As we taught the students how to design a survey instrument, a common question came up repeatedly: "What actually happened in Butare during the summer of 1994?" No one seemed to know; we found this lack of awareness puzzling and guided the students in building a set of questions for their survey, which eventually revealed several interesting pieces of information.

First, and perhaps most important, was confirmation that the vast majority of the population in the Butare province had been on the move between 1993 and 1995, particularly during early 1994. Almost no one stayed put. We also found that the RPF rebels had blocked the border leading south out of the province to Burundi. The numbers of households that provided information consistent with these facts raised significant questions in our minds regarding the culpability of the RPF relative to the FAR for killing in the area.

During this period, we confirmed Human Rights Watch findings that many killings were organized by the Hutu-led FAR, but we also found that many of the killings were spontaneous, the type of violence that we would expect with a complete breakdown of civil order. Our work further revealed that, some nine years later, a great deal of hostility remained. There was little communication between the two ethnic groups. The Tutsi, now under RPF leadership and President Paul Kagame, dominated all aspects of the political, economic and social systems.

Lastly, it became apparent to us that members of the Tutsi diaspora who returned to Rwanda after the conflict were woefully out of touch with the country that they had returned to. Indeed, one Tutsi woman with whom we spent a day in the hills around Butare broke down in tears in our car as we drove back to the university. When asked why, she replied, "I have never seen such poverty and destitution." We were quite surprised at the degree of disconnect between the elite students drawn from the wealthy strata of the Tutsi diaspora, who were largely English-speaking, and the poorer Rwandans, who spoke Kinyarwanda and perhaps a bit of French. It was not surprising that the poor and the wealthy in the country did not mix; what struck both of us as surprising was the utter lack of empathy and knowledge about each other's condition. After all, the Tutsi outside the country claimed to have invaded Rwanda from Uganda on behalf of the Tutsi inside — a group that the former seemed to have little awareness of or interest in. Our work has led us to conclude that the invading force had a primary goal of conquest and little regard for the lives of resident Tutsis.

As the students proceeded with the survey, asking questions that were politically awkward for the RPF-led government, we found our position in the country increasingly untenable. One member of our team was detained and held for the better part of a day while being interrogated by a district police chief. The putative reason was a lack of permissions from the local authorities; permissions were required for everything in Rwanda, and we generally had few problems obtaining them in the beginning. The real reason for the interrogation, however, seemed to be that we were asking uncomfortable questions about who the killers were.

A couple of weeks later, two members of our team were on a tourist trip in the northern part of the country when they were again detained and questioned for the better part of a day at an RPF military facility. There the questioners wanted to know why we were asking difficult questions, what we were doing in the country, whether we were working for the American CIA, if we were guests of the Europeans and, in general, why we were trying to cause trouble.

On one of our trips to Rwanda, Alison Des Forges, the pre-eminent scholar of Rwandan politics who has since died in an airplane crash, suggested that we go to the International Criminal Tribunal for Rwanda in Tanzania to seek answers to the questions we were raising. Des Forges even called on our behalf.

With appointments set and with Mount Kilimanjaro in the distance, we arrived in Arusha, Tanzania, for our meeting with Donald Webster, the lead prosecutor for the political trials, Barbara Mulvaney, the lead prosecutor for the military trial, and others from their respective teams. As we began to talk, we initially found that the prosecutors in the two sets of cases — one set of defendants were former members of the FAR military, the other set of trials focused on the members of the Hutu political machine — had great interest in our project.

Eventually, Webster and Mulvaney asked us to help them contextualize the cases that they were investigating. Needless to say, we were thrilled with the possibility. Now, we were working directly with those trying to bring about justice.

The prosecutors showed us a preliminary database that they had compiled from thousands of eyewitness statements associated with the 1994 violence. They did not have the resources to code all of the statements for computer analysis; they wanted us to do the coding and compare the statements against the data we had already compiled. We returned to the U.S. with real enthusiasm; we had access to data that no one else had seen and direct interaction with one of the most important legal bodies of the era.

Interest by and cooperation with the ICTR did not last as long as we thought it would, in no small part because it quickly became clear that our research was going to uncover killings committed not just by the Hutu-led former government, or FAR, but by the Tutsi-led rebel force, the RPF, as well. Until then, we had been trying to identify all deaths that had taken place; beyond confidentiality issues, it did not occur to us that the identity of perpetrators would be problematic (in part because we thought that all or almost all of them would be associated with the Hutu government). But then we tried to obtain detailed maps that contained information on the location of FAR military bases at the beginning of the civil war. We had seen copies of these maps pinned to the wall in Mulvaney's office. In fact, during our interview with Mulvaney, the prosecutor explained how her office had used these maps. We took detailed notes, even going so far as to write down map grid coordinates and important map grid sheet identifiers.

After the prosecution indicated it was no longer interested in reconstructing a broad conception of what had taken place — prosecutors said they'd changed their legal strategy to focus exclusively on information directly related to people charged with crimes — we asked the court for a copy of the maps. To our great dismay, the prosecution claimed that the maps did not exist. Unfortunately for the prosecutors, we had our notes. After two years of negotiations, a sympathetic Canadian colonel in a Canadian mapping agency produced the maps we requested.

As part of the process of trying to work out the culpability of the various defendants charged with planning to carry out genocidal policies, the ICTR conducted interviews with witnesses to the violence over some five years, beginning in 1996. Ultimately, the court deposed some 12,000 different people. The witness statements represent a highly biased sample; the Kagame administration prevented ICTR investigators from interviewing many who might provide information implicating members of the RPF or who were otherwise deemed by the government to be either unimportant or a threat to the regime. All the same, the witness statements were important to our project; they could help corroborate information found in CIA documents, other witness statements, academic studies of the violence and other authoritative sources.

As with the maps, however, when we asked for the statements, we were told they did not exist. Eventually, defense attorneys — who were surprised by the statements' existence, there being no formal discovery process in the ICTR — requested them. After a year or so, we obtained the witness statements, in the form of computer image files that we converted into optically readable computer documents. We then wrote software to search through these 12,000 statements in our attempts to locate violence and killing throughout Rwanda.



The first significant negative publicity associated with our project occurred in November 2003 at an academic conference in Kigali. The National University of Rwanda had invited a select group of academics, including our team, to present the results of research into the 1994 murders. We had been led to believe that the conference would be a private affair, with an audience composed of academics and a small number of policymakers.

As it turned out, the conference was anything but small or private. It was held at a municipal facility in downtown Kigali, and our remarks would be simultaneously translated from English into French and the Rwandan language, Kinyarwanda. There were hundreds of people present, including not just academics but members of the military, the cabinet and other members of the business and political elite.

We presented two main findings, the first derived from spatial and temporal maps of data obtained from the different sources already mentioned. The maps showed that, while killing took place in different parts of the country, it did so at different rates and magnitudes — begging for an explanation we did not yet have. The second finding came out of a comparison of official census data from 1991 to the violence data we had collected. According to the census, there were approximately 600,000 Tutsi in the country in 1991; according to the survival organization Ibuka, about 300,000 survived the 1994 slaughter. This suggested that out of the 800,000 to 1 million believed to have been killed then, more than half were Hutu. The finding was significant; it suggested that the majority of the victims of 1994 were of the same ethnicity as the government in power. It also suggested that genocide — that is, a government's attempts to exterminate an ethnic group — was hardly the only motive for some, and perhaps most, of the killing that occurred in the 100 days of 1994.

Halfway into our presentation, a military man in a green uniform stood up and interrupted. The Minister of Internal Affairs, he announced, took great exception to our findings. We were told that our passport numbers had been documented, that we were expected to leave the country the next day and that we would not be welcomed back into Rwanda — ever. Abruptly, our presentation was over, as was, it seemed, our fieldwork in Rwanda.

The results of our initial paper and media interviews became widely known throughout the community of those who study genocides in general and the Rwandan genocide in particular. The main offshoot was that we became labeled, paradoxically, as genocide "deniers," even though our research documents that genocide had occurred. Both of us have received significant quantities of hate mail and hostile e-mail. In the Tutsi community and diaspora, our work is anathema. Over the past several years, as we have refined our results, becoming more confident about our findings, our critics' voices have become louder and increasingly strident.

Of course, we have never denied that a genocide took place; we just noted that genocide was only one among several forms of violence that occurred at the time. In the context of post-genocide Rwandan politics, however, the divergence from common wisdom was considered political heresy.

Following the debacle at the Kigali conference, the ICTR prosecution teams of Webster and Mulvaney let us know in no uncertain terms that they had no further use of our services. The reasons for our dismissal struck us as somewhat outrageous. From the outset, the prosecution claimed it was not interested in anything that would prove or disprove the culpability of any individuals in the mass killings. Now, they said, the findings we'd announced in the Kigali conference made our future efforts superfluous.

Shortly after our dismissal, however, Peter Erlinder, a defense attorney for former members of the FAR military who were to be tried, contacted us. This was after several others from the defense had also attempted to contact us, with no success.

We had misgivings about cooperating or working with the defense, the gravest being that such work might be seen as supporting the claim we were genocide deniers. After months of negotiating, we finally met Erlinder at a Starbucks in Philadelphia, Pa. The defense could have made a better choice for roping



us in. Erlinder, a professor at the William Mitchell College of Law, was an academic turned defender for the least likable suspects.

After we obtained lattes and quiet seats in the back of the coffee shop, Erlinder came straight to the point: He was, of course, interested in establishing his client's innocence, but he felt it would help the defense to establish a baseline history of what had taken place in the war in 1994. As he explained, "My client may be guilty of some things, but he is not guilty of all the things that any in the Rwandan government and military during 1994 is accused of. They have all been made out to be devils."

What he asked was reasonable. In fact, he made the same essential offer the prosecution had: In exchange for our efforts at contextualizing the events of 1994, Erlinder would do the best he could to assist us in getting data on what took place. With Erlinder's assistance, we were able to obtain the maps we'd seen in Mulvaney's office and the 12,000 witness statements. With this information, we were able to better establish the true positions of both the FAR and RPF during the civil war. This greater confidence of the location of the two sides' militaries made — and makes — us more certain about the culpability of the FAR for the majority of the killings during the 100 days of 1994. At the same time, however, we also began to develop a stronger understanding of the not insignificant role played by the RPF in the mass murders.

About this time, we were approached by an individual associated with [Arcview-GIS](#), a spatial mapping software firm that wanted to take the rather simplistic maps that we had developed and improve them, thereby showing what the company's program was capable of. Our consultant at Arcview-GIS said the software could layer information on the map, providing, among other things, a line that showed, day by day, where the battlefield of the civil war was located, relative to the killings we had already documented.

This was a major step. In line with the conventional wisdom, we had assumed that the government was responsible for most all of the people killed in Rwanda during 1994; we initially paid no attention to where RPF forces were located. But it soon became clear that the killings occurred not just in territory controlled by the government's FAR but also in RPF-captured territory, as well as along the front between the two forces. It seemed possible to us that the three zones of engagement (the FAR-controlled area, the RPF-controlled area and the battlefield between the two) somehow influenced one another.

In his book, *The Limits of Humanitarian Intervention*, Alan Kuperman argued that given the logistical challenges of mounting a military operation in deep central Africa, there was little the U.S. or Europe could have done to limit the 1994 killings. To support his position, Kuperman used [U.S. Defense Intelligence Agency](#) information to document approximate positions of the RPF units over the course of the war. We updated this information on troop locations with data from CIA national intelligence estimates that others had obtained through the [Freedom of Information Act](#) and then updated it again, incorporating interviews with former RPF members, whose recollections we corroborated with information from the FAR.

Our research showed the vast majority of the 1994 killing had been conducted by the FAR, the Interahamwe and their associates. Another significant proportion of the killing was committed not by government forces but by citizens engaged in opportunistic killing as part of the breakdown of civil order associated with the civil war. But the RPF was clearly responsible for another significant portion of the killings.

In some instances, the RPF killings were, very likely, spontaneous retribution. In other cases, though, the RPF has been directly implicated in large-scale killings associated with refugee camps, as well as individual households. Large numbers of individuals died at roadblocks and in municipal centers, households, swamps and fields, many of them trying to make their way to borders.

Perhaps the most shocking result of our combination of information on troop locations involved the invasion itself: The killings in the zone controlled by the FAR seemed to escalate as the RPF moved into the country and acquired more territory. When the RPF advanced, large-scale killings escalated. When the RPF stopped, large-scale killings largely decreased. The data revealed in our maps was consistent with

FAR claims that it would have stopped much of the killing if the RPF had simply called a halt to its invasion. This conclusion runs counter to the Kagame administration's claims that the RPF continued its invasion to bring a halt to the killings.

In terms of ethnicity, the short answer to the question, "Who died?" is, "We'll probably never know." By and large, the Hutu and the Tutsi are physically indistinct from one another. They share a common language. They have no identifiable accent. They have had significant levels of intermarriage through their histories, and they have lived in similar locations for the past several hundred years. In the 1920s and 1930s, the Belgians, in their role as occupying power, put together a national program to try to identify individuals' ethnic identity through phrenology, an abortive attempt to create an ethnicity scale based on measurable physical features such as height, nose width and weight, with the hope that colonial administrators would not have to rely on identity cards.

One result of the Belgian efforts was to show — convincingly — that there is no observable difference on average between the typical Hutu Rwandan and the typical Tutsi Rwandan. Some clans — such as those of the current president, Paul Kagame, or the earlier Hutu president, Juvenal Habyarimana — do share distinctive physical traits. But the typical Rwandan shares a mix of such archetypal traits, making ethnic identity outside of local knowledge about an individual household's identity difficult if not impossible to ascertain — especially in mass graves containing no identifying information. (For example, Physicians for Human Rights exhumed a mass grave in western Rwanda and found the remains of more than 450 people, but only six identity cards.)

In court transcripts for multiple trials at the ICTR, witnesses described surviving the killings that took place around them by simply hiding among members of the opposite ethnic group. It is clear that in 1994, killers would have had a difficult time ascertaining the ethnic identity of their putative victims, unless they were targeting neighbors.

Complicating matters is the displacement that accompanied the RPF invasion. During 1994, some 2 million Rwandan citizens became external refugees, 1 million to 2 million became internal refugees, and about 1 million eventually became victims of civil war and genocide.

Ethnic identity in Rwanda is local knowledge, in much the same way that caste is local knowledge in India. With the majority of the population on the move, local knowledge and ethnic identity disappeared. This is not to say that the indigenous Tutsi were not sought out deliberately for extermination. But in their killing rampages, FAR, the Interahamwe and private citizens engaged in killing victims of both ethnic groups. And people from both ethnic groups were on the move, trying to stay out in front of the fighting as the RPF advanced.

In the end, our best estimate of who died during the 1994 massacre was, really, an educated guess based on an estimate of the number of Tutsi in the country at the outset of the war and the number who survived the war. Using a simple method — subtracting the survivors from the number of Tutsi residents at the outset of the violence — we arrived at an estimated total of somewhere between 300,000 and 500,000 Tutsi victims. If we believe the estimate of close to 1 million total civilian deaths in the war and genocide, we are then left with between 500,000 and 700,000 Hutu deaths, and a best guess that the majority of victims were in fact Hutu, not Tutsi.

This conclusion — which has drawn criticism from the Kagame regime and its supporters — is buttressed by the maps that we painstakingly constructed from the best available data and that show significant numbers of people killed in areas under control of the Tutsi-led RPF.

One fact is now becoming increasingly well understood: During the genocide and civil war that took place in Rwanda in 1994, multiple processes of violence took place simultaneously. Clearly there was a genocidal campaign, directed to some degree by the Hutu government, resulting directly in the deaths of some 100,000 or more Tutsi. At the same time, a civil war raged — a war that began in 1990, if the focus is on only the most recent and intense violence, but had roots that extend all the way back to the 1950s. Clearly, there was also random, wanton violence associated with the breakdown of order during the civil

war. There's also no question that large-scale retribution killings took place throughout the country — retribution killings by Hutu of Tutsi, and vice versa.

From the beginning, the ICTR's investigation into the mass killings and crimes against humanity in Rwanda in 1994 has focused myopically on the culpability of Hutu leaders and other presumed participants. The Kagame administration has worked assiduously to prevent any investigation into RPF culpability for either mass killings or the random violence associated with the civil war. By raising the possibility that in addition to Hutu/FAR wrongdoing, the RPF was involved, either directly or indirectly, in many deaths, we became in effect *persona non grata* in Rwanda and at the ICTR.

The most commonly invoked metaphor for the 1994 Rwandan violence is the Holocaust. Elsewhere, we have suggested that perhaps the English civil war, the Greek civil war, the Chinese civil war or the Russian civil war might be more apt comparisons because they all involved some combination of ethnic-based violence and the random slaughter and retribution that can occur when civil society breaks down altogether.

Actually, though, it is difficult to make authoritative comparisons when it remains unclear exactly what happened in the Rwandan civil war and genocide.

Contemporary observers — including Romeo Dallaire, the commander of the ineffective U.N. peacekeeping force for Rwanda in 1993 and 1994 — claim that much of the genocidal killing had been planned by the Hutu government as early as two years in advance of the actual RPF invasion. Unfortunately, we have not been able to gain access to the individuals who have information on that score to either corroborate or to refute the hypothesis. The reason? Convicted genocidaires who have been implicated in the planning of the slaughter now reside out of contact with potential interviewers in a U.N.-sponsored prison in Mali.

We wanted to put questions to these planners, specifically to ask them what their goals were. Was the genocide plan an attempt at deterrence, an effort that the FAR leadership thought might keep the RPF at bay in Uganda and elsewhere? Did the FAR government actually hope for war, believing — incorrectly as it turned out — that it would win? Was the scale of the killing beyond its expectations? If so, why do FAR leaders believe events spun so badly out of control, compared to previous spasms of violence in the 1960s, '70s and '80s?

Unfortunately, the U.N. prosecutors in Tanzania told us they could not arrange a meeting with the convicted planners and killers, but we were free to go to Mali on our own. We were told we would probably get in to see the prisoners, but the prison is in the middle of nowhere, in a country where we had no contacts. We had to let go.

Even without access to convicted genocidaires, we continued to piece together what had happened in 1994 with the help of a grant from the National Science Foundation. The grant allowed us to be more ambitious in our pursuit of diverse informants who started popping up all over the globe, to refine our mapping and to explore alternative ways of generating estimates about what had taken place. While our understanding has advanced a great deal since our first days in Kigali, it is hard not to see irony in a current reality: Some of the most important information about what occurred in Rwanda in 1994 has been sent — by the very authorities responsible for investigating the violence and preventing its recurrence, in Rwanda and elsewhere — to an isolated prison, where it sits unexamined, like some artifact in the final scene of an Indiana Jones movie.

http://www.miller-mccune.com/culture_society/what-really-happened-in-rwanda-1504?utm_source=Newsletter78&utm_medium=email&utm_content=1013&utm_campaign=newsletters

Mason Lane Farm Showcases Beautiful Bamboo Construction

by Bridgette Meinhold, 10/06/09



Farms are close to nature – places to harvest the fruit of the land and care for animals and livestock. As such they should be built and operated with respect for life through sustainable construction and operation. The Mason Lane Farm Operations Facility in North Carolina is just such an example. Designed by De Leon & Primmer Architecture Workshop out of Louisville, KY, the beautiful eco farm facility supports 2,000 acres of agriculture, recreation, wildlife habitat and conservation land as part of the University of North Carolina. Two barns were designed and constructed on a well planned site using sustainable materials like locally-sourced bamboo and prefab panels and trusses.

Two barns, “A” and “B” operate side by side but serve different purposes. Barn A acts as a work facility and is insulated to keep workers protected and warm, while Barn B is an open air shed, covered to protect equipment and store hay. The site of the barns was designed to maximize space while providing air circulation and accessibility for large farm equipment. Porous pavement is used exclusively to allow water to infiltrate, while rain water from the roofs is collected in a system of shallow concrete ‘site gutters’ located below each roof eave. The storm water runoff from the buildings and the driveway area is directed towards collection basins. The landscape surrounding the buildings is planted with native and regionally-adapted plants that don’t require irrigation.

Barn A is clad in corrugated metal and serves as the operations office and workspace for the farm. It was constructed from prefabricated wood trusses and pre-finished metal panels. The concrete slab contains fly ash, and in one section, the building is insulated and utilizes radiant floor coils heated by an external boiler that runs off wood waste collected on site. The interior is modern, simple, and architecturally pleasing, incorporating finish screws, metal ties and varying materials as design elements.



Barn B, meanwhile is an open-air shed made from a lattice frame of locally harvested bamboo. Architecturally, the barn is symmetrically appealing and incredibly practical. The beautiful eco-barn is long and narrow with roll down doors on either side facilitating easy drive-through of large farm equipment, which aids in the circulation of the facility. On either end, hay is stored, and the openness of the barn allows the hay to breathe and dry.

Natural ventilation and daylighting are important elements in both buildings, which helps reduce energy use. Environmentally friendly and recycled materials are used extensively throughout the facilities, and all materials were sourced locally and within a 500 mile radius. The design for the new farm was guided by a regional focus as well as low cost and low maintenance. The Farm is currently seeking LEED Gold certification.

+ De Leon & Primmer Architecture Workshop

Via Archinect

<http://www.inhabitat.com/2009/10/06/mason-lane-farm-showcases-beautiful-bamboo-construction/#>

San Francisco Set to Harness the Power of the Bay

by [Diane Pham](#), 10/05/09



The Pacific Ocean could soon be lighting up the beautiful city of [San Francisco](#) as a [tidal-energy](#) project planned for the waters near the Golden Gate Bridge is now in the final stages of acquiring the necessary permits for implementation. The project, which has been in the works for over four years, will produce 10 to 30 megawatts of energy with the potential of up to **100 megawatts**, and is anticipated to be the largest [energy generator](#) off the California Coast.

Currently, San Francisco officials are examining over 50 different types of wave devices currently under development to better understand what technology will best suit San Francisco's waters. Impressively, the list is rife with options, ranging from "pitching" devices ([Pelamis](#)) and "over topping" devices ([Wave Dragon](#)) to oscillating water columns ([OceanLinx](#)) and "heaving" devices ([Aquabuoy](#)). Some of these devices are based on [biomimicry](#) principles, which imitate natural designs and processes ([bioWave](#), [WaveRoller](#)), while others can even provide both wave power and desalination ([CETO](#)).

Given that the technology remains new — almost all of the existing designs remain prototypes or pilot projects — issues have arisen about not only the level of energy that can effectively be generated, but the cost as well. According to a 2008 study developed for the [California Renewable Energy Transmission Initiative](#) by infrastructure consulting firm [Black and Veatch](#), wave and marine power generation within California specifically can run quite high, clocking in at as much as \$445 per MWH and \$410 per MWH, respectively. Alternatively, other renewables like [wind](#), solid biomass, hydroelectric and geothermal have clean energy generation costs nearing **\$150 per MWH**. The gap in price proves to be a sticking point with many individuals, even if the general sentiment for the tidal project is positive.



However, despite these challenges, San Francisco's mayor Gavin Newsom remains 100% committed to bringing this technology forward and increasing the city's green-factor. As of late San Francisco has been making numerous strides in increasing its sustainability with some stellar initiatives including mandatory LEED certification for commercial rehabs, compulsory composting for residents, a new loan program for renewable power, energy-efficiency and water-conservation projects for homes and businesses, and sizable rebates for individual solar usage. These simple steps have turned out a reduction of greenhouse gases by 6% of the 1990 levels, and boosted solar generation by nearly **five times**. Factoring in the ocean-power project, San Francisco is surely becoming the model eco-city that others will strive to imitate.

+ San Francisco Mayor's Office

Via Earth2Tech

<http://www.inhabitat.com/2009/10/05/san-francisco-set-to-harness-the-power-of-the-bay/>

Norfolk Southern Unveils Zero Emission Plug-in Electric Train

by Ariel Schwartz, 10/06/09



We've covered plenty of plug-in hybrid electric cars, and now Norfolk Southern Corp. is extending the same technology to locomotives with its prototype battery-powered train, the NS 999. The 1,500 horsepower switching train is powered exclusively by a series of 1,080 lead-acid 12-volt batteries. The best part – since the NS 999 doesn't have a diesel engine, it releases **zero emissions**.

The train, developed in conjunction with the US Department of Energy, the Federal Railroad Administration, and Penn State, recharges its batteries during braking. When fully juiced up, the locomotive can operate three shifts before recharging.

The \$1.3 million NS 999 may just be a prototype now, but it could radically cut down on the railroad system's carbon footprint if widely deployed. The transportation sector in the US accounts for nearly a third of greenhouse gas emissions. Let's hope the NS 999's plug-in technology is commercialized before the US expands the national railroad system.

Via Boston Herald

+ NS Corp

<http://www.inhabitat.com/2009/10/06/norfolk-southern-unveils-zero-emission-plug-in-electric-train/>

New Super Efficient Pharox 60 LED Bulbs Last for 25 Years

by Piper Kujac, 10/05/09



One of the most exciting new products we found at West Coast Green this past weekend is the latest innovation by Lemnis Lighting, the Pharox 60 LED Dimmable Lightbulb, that uses just **6 Watts** and has the equivalent luminescence of the traditional **60 Watt incandescent bulb**. The Pharox 60 fits a standard sized household light fixture, is made of recyclable material, and is the most energy efficient bulb of comparable light quality on the market today with a light output of 300 lumens and a warm white light of 3000K. A patented heat sink keeps the bulb temperature low (we think it's the aluminum housing surround) and it is the most environmentally safe option on the market as well, containing NO lead, mercury, or wolfram, unlike it's compact fluorescent competitors. Compared to the incandescent bulb, which lasts an average 1,000 hours, the Pharox 60 is expected to last a 35,000 hour lifespan. According to Lemnis, if every American household switched just one 60W light bulb to a Pharox light, **\$1.4 Billion** in electricity costs and **9 billion kilowatt hours** would be saved annually. This would equate to a carbon emissions reduction of 5.2 billion kg annually. Though it may not be practical or economical to switch out all of a home's light bulbs to the relatively expensive Pharox bulb, switching out a few (especially those in light-sensitive areas) is a more accessible energy savings strategy than investing in solar power, and it makes more sense to cut down on the energy load before finding alternative energy sources.

Lemnis claims the Pharox 60 will last 6 times longer than a CFL and 35 times longer than an incandescent bulb, with an estimated **25-year lifespan**. In a line up with three other competitors currently on the market, the Zetalux EarthLED (retail \$38.95); the Crane GeoBULB (retail \$99.95); and the Philips EnduraLED (retail \$40.00), the Pharox 60 beats them out in cost, weight, power factor, wattage, and most notably, its ability to be dimmed. At West Coast Green, we were presented with the Pharox 60 by none other than Lemnis' founder Warner Philips, the great grandson of Anton Philips, who founded Philips Electronics and brought the incandescent bulb to homes world wide in the last century. So it's no surprise that the latest generation of Philips family should bring us the warm hue we are used to with the substantial energy savings that households need. The kicker, you might say, is the price tag, at **\$39.95** a bulb... but compared to the hefty price of lesser quality lighting debuting this time last year, we can only expect the price to go down as these bulbs reach mass market. Pharox 60 bulbs are currently available at mypharox.com and will be coming soon to Amazon.

+ Pharox

<http://www.inhabitat.com/2009/10/05/new-super-efficient-pharox-60-led-bulbs-last-for-25-years/>

France Announces \$2.2 Billion Electric Car Charging Network

by Sarah Parsons, 10/05/09



As the United States government continues to drag its heels on passing climate change legislation, it's encouraging to see folks in Europe making moves in the right direction. Last week, the French government announced it would dedicate **\$2.2 billion** to creating a network of battery-charging stations for electric vehicles. The plan came as part of a much larger initiative that aims to move France towards a cleaner transportation system involving electric vehicles.

In addition to using tax money to create a network of battery-charging stations where drivers can juice their EVs, the plan also requires all parking lots to contain battery charging stations by 2015. All new apartment buildings with lots must also include charging stations by 2012.

The initiative also aims to boost EV production. France will provide significant funding for the creation of a new battery manufacturing plant at a Renault facility west of Paris. The plant can produce about 100,000 batteries each year, which it will use for its own line of EVs and to supply other car companies like PSA Peugeot-Citroen, which plan to produce several new electric vehicles between 2010-2012.

To really get EVs to take off, two things need to happen: Infrastructure and EV production must be boosted *and* drivers need to embrace EVs. France is certainly doing its part to figure out the first piece of the EV puzzle — only time will tell if drivers will do their part, too.

The Wall Street Journal Via Treehugger

<http://www.inhabitat.com/2009/10/05/france-announces-2-2-billion-electric-car-charging-network/>

Is a Virus the Cause of Fatigue Syndrome?

By DENISE GRADY



Could a virus be the cause of chronic fatigue syndrome?

A study published last week in the journal *Science* suggested that might be the case, reporting that many patients who had the syndrome were infected with a recently discovered virus.

Chronic fatigue syndrome has long been a medical mystery and the subject of debate, sometimes bitter, among doctors, researchers and patients. It affects at least one million Americans, causing extreme fatigue, muscle and joint pain, sleep problems, difficulty concentrating and other symptoms. Its cause is unknown, symptoms can last for years and there is no effective treatment. Researchers disagree about whether it is one disease or a collection of symptoms that may have different causes in different patients. It has sometimes been stigmatized as more mental than physical, with patients labeled neurotic, depressed or hypochondriacal. Many patients find even the name of the disorder offensive, a not-so-subtle hint that it is not a real disease.

The new report has intrigued scientists, been seen as vindication by some patients and inspired hope for a treatment.

“I just feel like the whole future has changed for us,” said Anne Ursu, 36, a writer living in Cleveland who has had the syndrome in the past.

But the new study is not conclusive, and a great deal of work remains to be done to find out whether the new virus really does play a role. Just detecting it in patients does not prove it is what made them sick; people with the syndrome may have some other underlying problem that makes them susceptible to the virus, which could be just a passenger in their cells.

Even so, thousands of patients have already contacted scientists, asking to be tested, said Dr. Judy Mikovits, the first author of the study and the research director at the Whittemore Peterson Institute in Reno, a research center created by the parents of a woman who has the syndrome. Dr. Mikovits said she expected a test to become available “within weeks.”

The new suspect is a xenotropic murine leukemia virus-related virus, or XMRV, which probably descended from a group of viruses that cause cancer in mice. How or when XMRV found its way into humans is unknown. But it has also been linked to cancer in people: it was first identified three years ago, in prostate cancer, and later detected in about one-quarter of biopsies from men with that disease (and in only 6 percent of benign biopsies). It is a retrovirus, from the same notorious family that causes AIDS and leukemia in people.

Dr. Mikovits and researchers from the National Cancer Institute and the Cleveland Clinic reported in *Science* that 68 of 101 patients with chronic fatigue syndrome, or 67 percent, were infected with XMRV, compared with only 3.7 percent of 218 healthy control subjects. Further testing after the paper was written found the virus in nearly 98 percent of about 300 patients with the syndrome, Dr. Mikovits said.

She said she believed that the virus would eventually be found in every patient with chronic fatigue syndrome. XMRV affects the immune system, can probably cause a variety of illnesses and may join forces with other viruses to bring on the syndrome, she said.

The study received a mixed review from Dr. William C. Reeves, who directs public health research on the syndrome at the Centers for Disease Control and Prevention. He called the research exciting but preliminary, and said he was surprised that a prestigious journal like *Science* had published it, because the researchers did not state the ages or sex of the patients and controls, or describe the duration of the illness or how it came on.

“If I don’t know the nature of the cases and controls, I can’t interpret the findings,” Dr. Reeves said.

“We and others are looking at our own specimens and trying to confirm it,” he said, adding, “If we validate it, great. My expectation is that we will not.”

He noted that there had been false starts before, including a study in the 1990s linking the syndrome to another retrovirus, which could not be confirmed by later research.

Many patients and a community of doctors and researchers who specialize in the syndrome take issue with the disease centers’ approach to the illness and the way it defines who is affected. They claim that the C.D.C. includes people whose problems are purely psychiatric, muddying the water and confounding efforts to find a physical cause.

Frustration with the lack of answers led Annette and Harvey Whittemore, whose 31-year-old daughter has had the syndrome for 20 years, to spend several million dollars to set up a research institute at the University of Nevada in Reno in 2004, and to hire Dr. Mikovits to direct it.

Mrs. Whittemore said she had long believed that the syndrome was an infectious disease, but that scientists had rejected the idea.

She finally decided, she said, “if there was a place of our own where we could find the answers, we could do it more quickly.”

Dr. William Schaffner, an infectious disease expert at Vanderbilt University, said that the notion of a lingering viral infection was plausible. He said that although some patients claiming to have the syndrome seemed more likely to have a psychological problem, others seemed to have a physical illness.

“There is a group who are young, healthy, active and engaged, and all of a sudden they are laid low by something,” Dr. Schaffner said. “Everyone tells the physicians these are people who are functional and productive, and this is totally out of character. They are frustrated and often quite disheartened. You feel that medical science hasn’t caught up with their illness yet.”

To determine whether XMRV is to blame, more studies are needed, said Dr. John Coffin, a professor of molecular biology and microbiology at Tufts University. It would help to find an animal model, he said, and to look at stored blood samples to find out if there were people who became ill some set amount of time after contracting the virus. If antiviral drugs make patients improve, that will also help make the case against the virus, he said.

The National Cancer Institute is taking XMRV seriously, said Dr. Stuart Le Grice, head of its Center of Excellence in HIV/AIDS and Cancer Virology.

He said health officials became especially concerned last spring when several research teams looking at prostate cancer reported finding XMRV in 3 percent to 4 percent of blood samples from healthy people in control groups. That could translate into 10 million American being infected with a newly discovered, poorly understood retrovirus that has already been linked to two diseases.

“Any virus at that level is obviously cause for concern,” Dr. Le Grice said, adding that it was important to find out if the virus was associated with any more diseases, and how closely.

He said that just carrying the virus did not necessarily mean a person was at high risk for disease, noting that people may harbor other viruses that will never harm them. The immune system probably keeps the viruses in check.

But he asked: “If it is a problem, how well can we diagnose it and how well can we treat it?”

Even though antiretroviral drugs have already been developed to treat H.I.V. infection, he said this virus was different and might need its own line of drugs.

He said more studies were needed to find out how common the virus is and how it is being transmitted. It is not known whether people can catch the disease from mice, or can infect one another. Retroviruses are often spread by blood and bodily fluids.

“How significant a risk is this to blood banks?” Dr. Le Grice asked. “Do we need to consider large-scale screening in blood banks?”

He said the institute would be working to develop reliable diagnostic tests.

Dr. Le Grice emphasized that there is no evidence that the virus is spreading through the population.

“I don’t want to scare anyone at the moment,” he said.

http://www.nytimes.com/2009/10/13/health/13fatigue.html?_r=1&nl=health&emc=healthupdateema1



Overeating on Pocket Change

By RONI CARYN RABIN

Is the corner store making some children fat?

Low-income children in Philadelphia with about one dollar in pocket money managed to purchase almost 400 calories worth of snack food at convenience stores on the way to and from school, according to study published on Monday in the journal Pediatrics.

Their top choice on their way to school in the morning: candy, including favorites like Sour Patch Kids and Peanut Chews, often sold in cheap, individually wrapped pieces. The kids' favorite after-school snack was chips. The children spent \$1.07 on average each day, the researchers found.

“One of the most surprising findings was how many calories a dollar and seven cents can buy,” said Kelley E. Borradaile, the paper's lead author and a professor at the Center for Obesity Research and Education at Temple University. She worked on the study with The Food Trust, a community-based organization in Philadelphia that promotes healthy eating options.

The neighborhood stores offer a wide variety of cheap packaged snacks that contain little nutrition but are high in fat and sugar, the study found. For a total tab of \$1.07, a child could purchase an 8-oz. sugary drink and a single serving bag of potato chips, plus a popsicle and several pieces of individually wrapped candy. The sum total of calories: 356 calories on average per day.

Most of the kids in the study were from low-income families and qualified for free or reduced-price meals at school, and many belonged to minority groups with high obesity rates, the study said.

The researchers tracked and analyzed over 800 purchases made by children in the fourth through sixth grades at 24 stores in Philadelphia's inner city between Jan. and June 2008. About half the kids went to the stores every day, the study found. Some went twice a day.

Most of the convenience stores were located near to the children's elementary schools.

<http://www.nytimes.com/2009/10/13/health/13calorie.html?ref=health>



Texting, Surfing, Studying?

By PERRI KLASS, M.D.



Certain subjects make self-righteous parents of us all: our children thinking they are doing homework when in reality the text messages are flying, the Internet browsers are open, the video is streaming, the loud rock music is blaring on the turntable — oh, wait, sorry, that last one was our parents complaining about us.

Heaven knows, I understand the feeling. And not just as a pediatrician. I have my own children — a high school student, a college student and a medical student — and I know the drill.

But if you ask the experts, they are pretty unanimous that we don't know much.

“The literature looking at media and its impact on attentional skills is just in its infancy,” said Renee Hobbs, a professor of mass media and communications at Temple University and a specialist in media literacy.

Another expert, Dr. Dimitri Christakis, a professor of pediatrics at the University of Washington who is a leading researcher on children and the media, agreed. “The pace of science has not kept up with technology,” he told me.

And Dr. Victor C. Strasburger, a professor at the University of New Mexico School of Medicine, said, “Kids are spending an extraordinary amount of time with media,” but added: “We don't really know what they pay attention to, what they don't. We don't know how it impacts their school performance, whether it impacts their school performance.”

A recent and much-discussed study showed decreased productivity in adults who were multitasking — or as Dr. Christakis put it, “The truth is you don't really multitask, you just think you do; the brain can't process two high-level cognitive things.” What you are actually doing, he went on, is “oscillating between the two.”

So are teenagers any better at oscillating?

“It may be that multitasking is more of a problem for us old brains,” Professor Hobbs said. Dr. Christakis speculated that teenagers might have some advantages, partly because of their presumably greater mental dexterity and partly — “and this is the part we don’t understand,” he said — “because they really have come of age with these technologies.”

That generational and technological gap reflects all the unanswered questions about what it means to grow up in this era, and probably accounts for some of the bewilderment many parents feel as they watch their children navigate the many and varied connections of modern adolescence.

Parents are digital immigrants, Dr. Christakis said; children are digital natives. “In the 20th century, you worried about a digital divide separating rich from poor,” he said. “That’s narrowed, and the one that’s emerging is separating parents from their children. We’re fairly clueless about the digital world they inhabit.”

So where does all this leave parents trying to help their own digital natives develop good study habits? Harris M. Cooper, a professor of psychology at Duke who has spent many years studying homework and its effects, says it’s important to keep in mind the overarching purpose of the assignment.

“One of the things that homework is supposed to do for us is help us generalize where we feel we can learn,” he told me, adding that part of successful adult functioning is “matching the task to the context.” In other words, you have to learn how you work and under what circumstances.

So I decided to test my digital immigrant biases — which tell me that no one can study effectively while watching, listening, surfing, messaging — against my professional experience, which tells me that medical students who don’t study effectively can’t learn the huge and complex body of material they have to master, and will therefore not pass their frequent tests. In other words, I asked my son and his friends, people in their early to middle 20s who do an awful lot of studying.

These medical students did sound like expert studiers, in that they had paid close attention to the different kinds of concentration required for different tasks.

“If I’m studying to memorize,” my son told me, “I’m still usually chatting” — instant messaging, that is. “But it’s usually not real-time chatting. I’ll look up every once in a while and I’ll chat; I may have a movie going on in the background, but I’ll go for a movie I’ve already seen.”

He had even conducted an experiment: “So I did a time study where I calculated on average how many pages of a paper I could read when I had a movie on in the background versus when I didn’t. I found I could read at about 80 percent efficiency.” So the distraction was worth it; it meant he could go on reading for much longer stretches.

That question of how to keep yourself studying for long periods preoccupied other medical students. One said she did her best studying at the gym, usually on the elliptical machines; she taped the lectures and played them over at a fast speed while working out.

But you can’t work out all the time. “The day before a big test,” she said, “I usually do go to the gym and listen and work through one of the lectures that I might feel is more important, and then I would just go through everything.”

As an immigrant, I will always lack a certain fluency when it comes to the digital world. And learning how we learn, the overarching assignment that Dr. Cooper described, is one that we parents can’t complete for our children — no, not even the most hopelessly overinvolved parents, the ones who stay up all night putting together the seventh-grade biology poster. (You know who you are.)



The advice my older son gave me about my younger son was, “Don’t worry about it till there’s something to worry about. If he’s doing well in his classes and his homework, fine!” And that was also Dr. Cooper’s advice to parents: “If they’re doing well, permitting them to have some choice permits them to find their own style.”

Ah, but I thought to myself mournfully, I still feel that something is lost. What about the all-consuming pleasure of reading something, really reading something, with no distractions? And the creative complexity of writing, making language flow from sentence to sentence, listening only to your inner voice?

And then I reflected on my own work habits, and the ways I have adopted the customs of this new country, and I wondered: Is this the slightly suspect nostalgia of the immigrant for the lovely but already mythological terrain that she herself has left behind?

<http://www.nytimes.com/2009/10/13/health/13klas.html?ref=health>



'Whatever' Tops List of Most Annoying Words

Michael Hill, Associated Press



Oct. 8, 2009 -- So, you know, it is what it is, but Americans are totally annoyed by the use of "whatever" in conversations.

The popular slacker term of indifference was found "most annoying in conversation" by 47 percent of Americans surveyed in a Marist College poll released Wednesday.

"Whatever" easily beat out "you know," which especially grated a quarter of respondents. The other annoying contenders were "anyway" (at 7 percent), "it is what it is" (11 percent) and "at the end of the day" (2 percent).

"Whatever" -- pronounced "WHAT'-ehv-errr" when exasperated -- is an expression with staying power. Immortalized in song by Nirvana ("oh well, whatever, nevermind") in 1991, popularized by the Valley girls in "Clueless" later that decade, it is still commonly used, often by younger people.

It can be an all-purpose argument-ender or a signal of apathy. And it can really be annoying. The poll found "whatever" to be consistently disliked by Americans regardless of their race, gender, age, income or where they live.

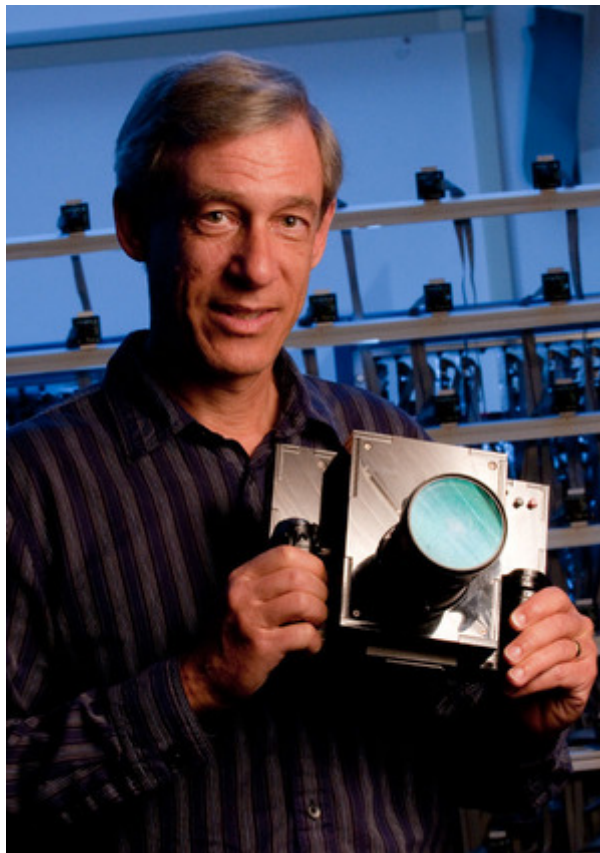
"It doesn't surprise me because 'whatever' is in a special class, probably," said Michael Adams, author of "Slang: The People's Poetry" and an associate professor of English at Indiana University. "It's a word that -- and it depends how a speaker uses it -- can suggest dismissiveness." Adams, who was not involved in the poll and is not annoyed by "whatever," points out that its use is not always negative. It also can be used in place of other, neutral phrases that have fallen out of favor, like "six of one, half dozen of the other," he said.

But the negative connotation might explain why "whatever" was judged more annoying than the ever-popular "you know," which was recently given a public workout by Caroline Kennedy during her flirtation with the New York U.S. Senate seat vacated by Hillary Rodham Clinton. "You know," Adams notes, is a way for speakers to seek assent from others. Pollsters at the Poughkeepsie, N.Y. college surveyed 938 U.S. adults by telephone Aug. 3 - Aug 6. The margin of error is 3.2 percentage points. The five choices included were chosen by people at the poll discussing what popular words and phrases might be considered especially annoying, said spokeswoman Mary Azzoli.

<http://dsc.discovery.com/news/2009/10/08/annoying-words.html>

'Frankencamera': A Giant Leap For Digital Photos?

October 11, 2009



Computer science professor Marc Levoy of Stanford shows off his prototype "Frankencamera." It allows programs to be downloaded, much like the iPhone does, and might just change the future of photography.

Linda A. Cicero/Stanford News Service

October 11, 2009

It's big. It's ugly. And it's made from recycled parts, at least for now. It's called the "Frankencamera" — and it might someday change the way you take pictures.

Computer scientists at Stanford University say the new camera works something like an iPhone: It can be altered in nearly infinite ways, depending on the applications downloaded to it.

Even the best digital camera on the market today has lots of limitations, the professor behind the prototype, Marc Levoy, tells NPR's Guy Raz.

Say you want to take a photo of your child playing with a new toy in a dark room, near a bright window. It's tough to do now because of the variations in lighting within that single frame. If Junior's face is visible and bright, the tree and the sky through the window will be bleached out. If the scene outside comes out just right, Junior will be so underexposed you won't be able to see the glee on his face.

Not so with the Frankencamera, says Levoy. For the prototype, he and his colleagues developed a program that instructs the camera to take two rapid shots if a frame has both dark and light parts. One shot



exposes correctly for the dark; one shot exposes correctly for the light. The program then merges the two images into one, taking the best parts from each.

And what if a camera could do the same thing for focus — take three shots, focusing on different things in each frame, and merge them into one crystal-clear shot?

According to Levoy, these are just a couple of examples of how programmers could change the future of photography with the Frankencamera. The key is that the camera uses a Linux operating system. All digital cameras are essentially minicomputers, says Levoy, and they can be modified *a bit* by the photographer. But the manufacturer determines what features are available. Linux is "open source," which means the camera owner can change *everything* about the electronic guts.

Photography took an enormous leap about 30 years ago, after Willard Boyle and George Smith came up with the "electronic eye" sensor that allowed cameras to ditch film and go digital. Boyle and Smith won the Nobel Prize for Physics this past week for their work. But Levoy says that digital photography has not progressed as fast as it should have since then — and that's what he's hoping to change.

Still, the Frankencamera is only a prototype at the moment. Presumably, it will become smaller and more elegant over time. But Levoy says his team is not planning to try to compete with Canon or Nikon. "Our goal is not to make a product. Our goal is to try and push traditional camera makers to incorporate more of these flexible ways of producing images in their cameras."

And, he says, their goal is to try to make 1 of every 5 of the photos you snap a keeper, rather than 1 in 100.

But why can't you just take your pictures with a standard digital camera and fix them later in Photoshop? "Well, sometimes you haven't captured everything you need to capture to make a good picture," the scientist says.

Levoy is the son, grandson and great-grandson of opticians, so he comes naturally by his interest in things visual. He imagines a future in which the camera is able to make adjustments that better mimic what the human eye is capable of.

But the Frankencamera won't necessarily turn everyone into Annie Leibovitz. "The part that we're not automating is the part that's nine inches behind the lens," Levoy says. "You still have to be a good designer of photographs."

<http://www.npr.org/templates/story/story.php?storyId=113692571&ft=1&f=1008>



Learning to juggle grows brain networks for good

- 18:00 11 October 2009 by Jessica Hamzelou



Good for the brain (Image: Alex Segre/Rex Features)

Juggling boosts the connections between different parts of the brain by tweaking the architecture of the brain's "white matter" – a finding that could lead to new therapies for people with brain injuries.

White matter describes all areas of the brain that contain mostly axons – outgrowths of nerve cells that connect different cells. It might be expected that learning a new, complex task such as juggling should strengthen these connections, but previous work looking for changes in the brains of people who had learned how to juggle had only studied increases in grey matter, which contains the nerve cells' bodies.

Now Jan Scholz and his colleagues at the University of Oxford have discovered that juggling changes white matter, too. They gave 24 young men and women training packs for juggling and had them practise for half an hour a day for six weeks. Before and after this training period, the researchers scanned the brains of the jugglers along with those of 24 people who didn't do any juggling, using a technique called diffusion tensor imaging that reveals the structure of white matter.

They found that there was no change in the brains of the non-jugglers, but the jugglers grew more white matter in a part of the parietal lobe – an area involved in connecting what we see to how we move.

The same transformation was seen in all the jugglers, regardless of how well they could perform. This suggests that it's the learning process itself that is important for brain development, not how good you are.

Learning matters

Arne May of the University Medical Centre Hamburg-Eppendorf in Germany, who led the previous work on juggling and grey matter, finds this result "fascinating". "It suggests that learning a skill is more important than exercising what you are good at already – the brain wants to be puzzled and learn something new," he says.

Like May, Scholz's group found increases in grey matter, but differences in the size and timing of the grey- and white-matter changes suggest they are independent. Nevertheless, both are probably necessary to learn how to juggle, argues Scholz.



"More white matter on its own might mean you can move more quickly, but you'd need the grey matter to make sure your hands were in the right place," he says.

Don't use it, don't lose it

The group scanned the jugglers' brains again after four weeks without juggling. They found that the new white matter had stayed put and the amount of grey matter had even increased. This could be why, when we learn a new skill, we retain some ability, no matter how long ago we last practised.

"It's like riding a bike," Scholz says. "Either you can juggle or you can't. It takes a lot of training to learn, but once it clicks, you don't forget it."

Scholz also hopes that it might be possible to develop juggling-based training programmes to help people with brain injuries, or that further study of how juggling changes the architecture of the brain may lead to the discovery of drugs that could boost this plasticity. "If we could use training or drugs to help stroke patients regenerate damaged parts of their brains, that would be fantastic," he says.

Journal reference: *Nature Neuroscience*, DOI: [10.1038/nn.2412](https://doi.org/10.1038/nn.2412)

<http://www.newscientist.com/article/dn17957-learning-to-juggle-grows-brain-networks-for-good.html?DCMP=OTC-rss&nsref=online-news>



Wayne's world: when ballet met science

Britain's foremost choreographer Wayne McGregor teams up with US scientists to discover the theory of creativity

- [Euan Ferguson](#)
- [The Observer](#), Sunday 11 October 2009



Random Dance perform Dyad 1909. Photograph: Laurent Philippe

Of all the creative processes, this is the one I don't get. I can understand, if not necessarily replicate, the way ideas get written down in narrative or poetic form: can fathom with little trouble and much enjoyment the way melody sometimes so successfully (Delius, Bill Evans) suggests a specific emotion or landscape; I even got cubism for about five minutes, then forgot how to manage that. But this: representation through dance. The results are astounding, outstanding, often shocking, often beautiful, sometimes both: but, as for the way they "represent" something: nope. Not a clue. Not a doozie.

Crucially, I'm not the only one trying to understand. Around me, in a large, dark hall at the University of California, San Diego, a team of scientists is doing the same. Earlier this year, in an unprecedented series of intensive sessions, the cognitive science department of UCSD filmed, recorded, interviewed and analysed the early creative choreography of dancers from [Wayne McGregor's](#) Random Dance group. Cognitive scientists spend their time learning how people learn, if that's not a fabulously stupid oversimplification of their alchemic process: from relatively simple stuff, such as studying the most efficient way to count a table of disparate coins, to the big stuff such as this, understanding creativity.

The process was two-way: the dancers gave their time, and let themselves be filmed, and the research scientists went back and analysed their data and then attempted to offer feedback, to tell the dancers, mainly McGregor, what they'd learned about the process of learning.

The results helped to inform the eventual product, which opens at Sadler's Wells in London this week. *Dyad 1909 (In the Spirit of Diaghilev)*, with music by Icelandic composer Olafur Arnalds, is about the [Ballet Russes](#), and Moscow and Paris, and the Shackleton expedition. It's a lot to cram into a sentence, let alone interpret through dance, and I don't know what the results will be like, other than, no doubt, energetic, brilliant and semi-impossible.

But behind the dance much of the point of *Dyad* will be the way in which it was created. For centuries, science and art have been, particularly on our campuses, at each other's throats. This is nothing less than science finally beginning to "understand" art, and artists for once welcoming dispassionate analysis rather than pretending there's some incredibly complex "creative" process that only they, never mind mere mortals, and certainly never mind scientists with pens in their pockets, could ever hope to understand. McGregor has actively courted this kind of openness and understanding, hoping in turn to learn more himself about how he and his colleagues actually do what they do, and was extremely keen to participate when first approached by the university.

He says: "I think what is vital in genuine collaboration between art and science is the notion that neither is in the service of the other," and, indeed, there's a genuine bonding and equality between him and David Kirsh, the San Diego professor in charge of the project. Each morning, for the duration of this experimental process, the two would meet over coffee and discuss what had happened the preceding day, and what the analysis may have told the scientists.

I sit in on one conversation. There is much talk (McGregor speaks as quickly, cleverly, brilliantly as he dances, but some of the talk is of autonomous choreographic agents and entity transition) that is right over my head (which struggles to function when words such as "multi-modal" are used) but the process itself is understandable, and the pair are enjoying themselves. Kirsh will ask McGregor to explain, for instance, why he chose the language he chose when asking someone to interpret, say, a skyscraper: and, in the answering, McGregor begins to question himself and the whole process of communication. And Kirsh will bounce back off him and ask again, hoping both to learn and to teach. They record these conversations: according to Kirsh, the hope eventually is for "a singular document of the process that will be available to others and analysed for years to come".

Even though it's still slightly bamboozling, soon I'm starting to understand, a little, by seeing it in practice. Up in the splendid campus of UCSD, all willows, ponds, lattes and impossibly healthy students, another rehearsal is soon under way. The cameras are set up, the dancers stretch and sit and occasionally stand to flex, and McGregor begins to talk, and something happens.

He tells tales of the times of the Ballet Russes, and the voyages around Europe, the political tensions and the social interaction. And the dancers, drawn from a variety of countries, mainly eastern Europe, who don't even have English as a first language, will ask questions, clever questions. It strikes me, for the first time, that this is surely what a huge part of modern dance is actually about: simple intelligence. Yes, the bodies go on to do amazing things, but the first stage of the process is understanding what the amazing things might purport to represent. So McGregor, occasionally striding midstage to strike a pose, or drop, or turn and hold, as a new idea comes to him, begins to talk them through ideas of skyscrapers, and of colours.

And then, fascinatingly, the creative rehearsal starts. McGregor asks his dancers to find an interpretation they feel comfortable with: and off into corners they go, and practise being skyscrapers, and being blue, while a haunting musical track plays, again and again. Only after the fourth or fifth playing, when he's satisfied that the majority have found a pose, a sequence, a balance, an interpretation they're happy with, does he ask them to come together: and this is where it really gets interesting.

Within seconds there is near-perfect interaction. One dancer has found a jerky sequence, complex but perpetual; one a more sanguine, lithe construction; one a series of stage strides – and the group perform their own improvisations and sometimes come together to mirror another's, and weave between each other, seamlessly. Already, after this very early rehearsal, you can see something taking form, and being remembered. The memory part particularly interests Kirsh: "We want to understand not just how they interpret something, and how McGregor is getting the information across to them, but how they then retain it."

Kirsh, incredibly enthusiastic about all this, is also something of a kindred soul: he agrees with me that it can be baffling at first. Are we, for instance, as an audience, expected to understand, somehow, that this



dance "represents" a colour, or a skyscraper, or is that just stupid question? He laughs. "No, I know exactly. But I don't think we are meant to, no. It's about the experience: about the energy, the skill, the exuberance, but also the fact that something has been communicated, to them, and that their bodies are now interpreting that for us. We really are learning from this. All the team are fascinated by it."

Last week, when I caught up with McGregor back on this side of the world, he told me: "It's an ongoing thing, far from finished, but already we're realising that this collaboration has proved rich enough for both sides to want to continue. I think it's going to help redefine how we "do" creativity. Already, the feedback has taught me some language tricks, and to question the finest way to rehearse a particular dance in order to get the clearest information across. David's questions have helped me define the terms I use."

McGregor, already Britain's leading contemporary choreographer, and none too shoddy a mover in his own right, will bring something doubtless memorable, by definition innovative: difficult, beautiful, celebratory. But there's an equally valid contribution going on, to my mind, in this process he's begun with the measurers, the scientists, the analysts: to see art and science unite and co-benefit so cleverly, so helpfully, so selflessly, is a thing of wonder in itself.

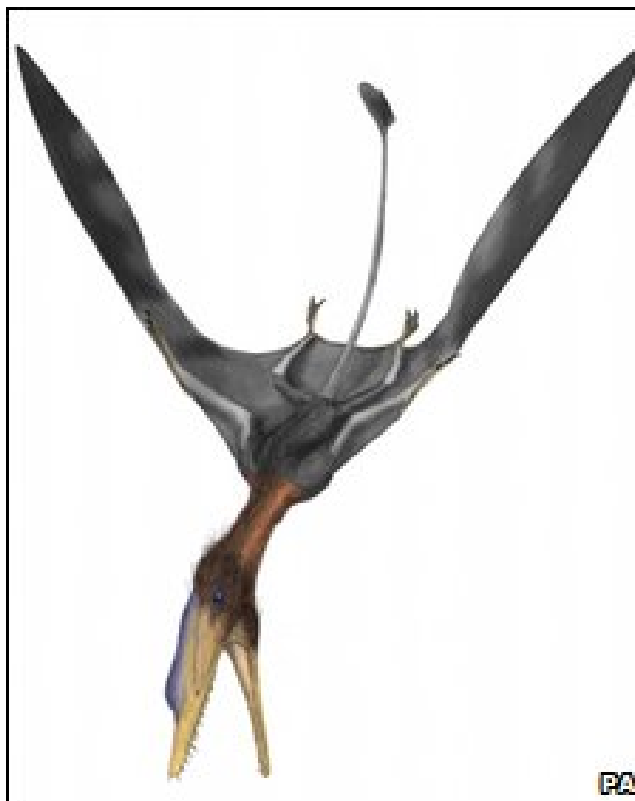
Watch McGregor and co in action at randomdance.org/r_research

<http://www.guardian.co.uk/stage/2009/oct/11/wayne-mcgregor-dyad-sadlers-wells>

New flying reptile fossils found

By Matt McGrath
BBC science reporter

Researchers in China and the UK say they have discovered the fossils of a new type of flying reptile that lived more than 160 million years ago.



The find is named *Darwinopterus*, after Charles Darwin.

Experts say it provides the first clear evidence of a controversial idea called modular evolution.

The 20 new fossils found in north-east China show similarities to both primitive and more advanced pterosaurs, or flying reptiles.

The research is published in the journal, *Proceedings of the Royal Society B*.

Missing link

Pterosaurs were flying reptiles that flourished between 65 and 220 million years ago.

Until now, scientists had known about two distinct groups of these creatures - primitive, long-tailed pterosaurs and more advanced short-tailed ones, separated by a gap in the fossil record.

But the discovery of more than 20 new fossil skeletons in north-east China sits in the gap in this evolutionary chain.



Darwinopterus is a hawk-like reptile with a head and neck just like advanced pterosaurs - but the rest of the skeleton is similar to more primitive forms.

Researchers say that this could be evidence of what they call modular evolution - where natural selection forces a whole series of traits to change rapidly rather than just one.

"*Darwinopterus* came as quite a shock to us" said Dr David Unwin, from the University of Leicester, UK.

"We had always expected a gap-filler with typically intermediate features such as a moderately elongate tail - neither long nor short.

"But the strange thing about *Darwinopterus* is that it has a head and neck just like that of advanced pterosaurs, while the rest of the skeleton, including a very long tail, is identical to that of primitive forms."

With its long jaws and rows of sharp-pointed teeth, these creatures were very well suited to catching and killing other flying species.

The fossils were found in rocks that are 160 million years old, making them 10 million years older than the first bird, *Archaeopteryx*.

Dr Unwin collaborated on the study with researchers from the Geological Institute in Beijing, China.

Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8306060.stm>

Published: 2009/10/14 04:15:02 GMT



Youth 'cannot live' without web

A survey of 16 to 24 year olds has found that 75% of them feel they "couldn't live" without the internet.



The report, published by online charity YouthNet, also found that four out of five young people used the web to look for advice.

About one third added that they felt no need to talk to a person face to face about their problems because of the resources available online.

The findings were unveiled at the Houses of Parliament on Wednesday.

Despite high-profile examples of internet security breaches, such as the recent incident of phishing email scams, 76% of the survey group thought the internet was a safe place "as long as you know what you're doing".

"Probably the middle-aged are the most vulnerable," said Open University psychologist Graham Jones.

"I think children, teenagers and people under their mid-20s have grown up with technology and they understand it deeply," he said.

Charlie McDonnell is a 19 year old video blogger on YouTube - With 200,000 subscribers and more than 20 million hits overall, he is the third most subscribed to on the site.

He started in April 2007 while "procrastinating over exam revision". He amassed around 150 viewers until he made a tongue-in-cheek film called "how to get featured on Youtube".

His mother had no interest in the internet until he got started. Now he has shown her everything and she uses his hand-me-down old kit to make her own Youtube video logs.

His use of the net illustrates how sophisticated young consumers are.

"I never really look for news, I find out about stuff that interests me from blogs. I use them as a filter to find news that I find interesting.

Twitter's not very accurate - it's one person saying they saw something on one website - but it's good for getting information straight away," he said.

Mr Jones thinks it is the parents who need to become more sophisticated.

"One of the biggest problems for children is not that they are vulnerable but that their parents don't know what they're doing," he said.

It is a point Mr McDonnell agrees with.

"It's important that parents have full understanding of the internet and its risks - younger people need parental direction," he said.

'Digital natives'

The survey, funded by the Nominet Trust - a charity that encourages the safe use of the internet - looked at how the web influences the well-being of people aged between 16 and 24.

Its author, Professor Michael Hulme of Lancaster University, names this age group "digital natives" as they have grown up in an environment rich with computer and mobile technology.

"For young people the internet is part of the fabric of their world and does not exist in isolation from the physical world," he said.

Youthnet, set up by the broadcaster Martyn Lewis in 1995, runs websites offering advice, information and volunteering opportunities to young people.

"The need for a safer, trusted [online] place has never been greater," said Fiona Dawes, Youthnet's chief executive.

"Youthnet will be taking the insights of this report to heart as we plan the future of our services."

Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/fr/-/2/hi/technology/8305731.stm>

Published: 2009/10/13 23:01:08 GMT

Parents 'doubt cot death risks'

Half of cot deaths are linked to bed-sharing but many parents are sceptical about the risk, studies have concluded.

A quarter of 500 mothers polled by the UK's Foundation for the Study of Infant Deaths (FSID) doubted that sharing a bed with a baby put them at undue risk.

But a Bristol University team's study published online in the British Medical Journal found that sharing a bed is a factor in more than 50% of cases.

Many of the deaths occurred when parent and infant slept together on a sofa.

“ We know that those at greatest risk of experiencing a cot death are very young mums, often single, and still in their teens, and this group is the most likely to reject safe sleep advice ”

Joyce Epstein of FSID

Much of this risk was linked to parents' smoking and alcohol or use of sedating drugs before bedtime.

A fifth of the cot death infants were found with a pillow and a quarter were swaddled, which may be new risk factors, say the authors.

Although cot death rates in the UK has fallen dramatically since the "Back to Sleep" campaign in the early 1990s, specific advice is still needed to help reduce these deaths even further, say the Bristol University researchers.

REDUCING THE RISK

- Place your baby on the back to sleep, not on the front or side
- Don't let your baby get too hot - no bonnets
- Sleep your baby with their feet to the foot of the cot
- Never sleep with your baby on a sofa or armchair
- Sharing a bed raises the risk, especially if you or your partner smokes, drinks or takes sedating drugs
- A dummy can reduce the risk, even if the dummy falls out while your baby is asleep

"Parents need to be advised never to put themselves in a situation where they might fall asleep with a young infant on a sofa."

And they should never sleep with an infant in any environment if they have consumed alcohol or drugs, the team warned.

But they said some parents might still want to share a bed with their baby, particularly if they needed to feed their infants many times in the night, and that this practice should not be demonised.

It could lead to increased numbers of tired parents nodding off on their sofa with their baby, they warned.

FSID's director, Joyce Epstein, said the findings were alarming.

"We know that those at greatest risk of experiencing a cot death are very young mums, often single, and still in their teens, and this group is the most likely to reject safe sleep advice."

The charity has launched a social networking website, www.bubbalicious.co.uk, aimed at supporting teenage parents.



Findings challenged

However, Rose Dodds, of the National Childbirth Trust, said the study had found that there was no increased risk of bed-sharing for babies whose parents had not drunk alcohol, taken drugs, smoked, or fallen asleep on the sofa.

She said: "It is not appropriate to tell all parents not to sleep with their babies.

"It is clear from many surveys that around half of parents sleep with their babies at some point in the first six months, and around a quarter do so routinely, so we need to help them to do this in the safest way possible.

"If we demonise the parents' bed we may be in danger of the sofa being chosen. A better approach may be to warn parents of the specific circumstances that put babies at risk."

The FSID poll findings are published in *Community Practitioner*.

Story from BBC NEWS:

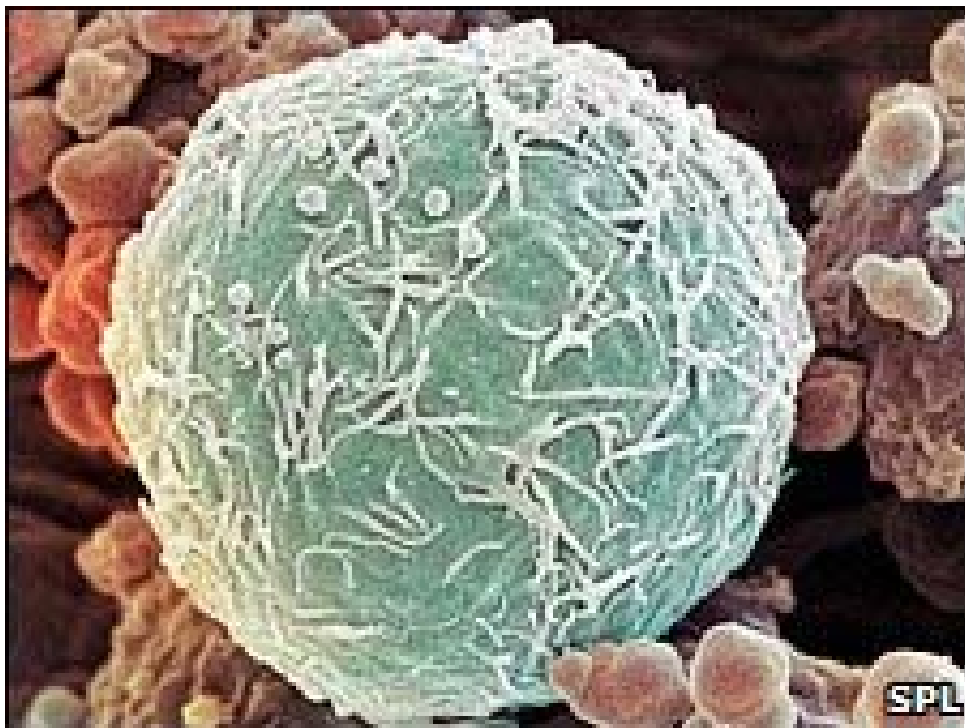
<http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8303248.stm>

Published: 2009/10/14 12:45:05 GMT



Mother can pass on cancer in womb

Scientists have proved that it is possible for a mother's cancer cells to be passed to her unborn child.



There are very rare cases where a mother and child appear to share the same cancer, but in theory the child's immune system should block the cancer.

However, an analysis by a British-led team of one such case shows the cells which caused leukaemia in the child could only have come from the mother.

The study appears in Proceedings of the National Academy of Sciences.

“ Such mother-to-offspring transfer of cancer is exceedingly rare and the chances of any pregnant woman with cancer passing it on to her child are remote ”

Professor Mel Greaves Institute of Cancer Research

Whether it is possible for a mother to "infect" her unborn child with cancer has puzzled scientists for 100 years.

In theory any cancer cells that manage to cross the placenta into the baby's bloodstream should be targeted for destruction by the child's immune system.

But there are records of 17 cases of a mother and baby appearing to share the same cancer - usually leukaemia or melanoma.

The latest study focused on a Japanese woman and her baby, who both developed leukaemia.

The researchers used an advanced genetic fingerprinting technique to prove that the leukaemia cells found in the baby had originated from the mother.

They showed that both patients' leukaemic cells carried an identical mutated cancer gene.

However, they also showed that the child had not inherited this gene from its mother - meaning it could not have developed this type of leukaemia in isolation.

No signature

Next, the researchers examined how the cancer cells could have neutralised the baby's immune system.

They found that the cancer cells lacked some DNA which played a crucial role in giving them their own specific molecular identity.

Without this telltale molecular sign, the child's immune system was unable to recognise the cells as foreign, and thus was not mobilised to attack them.

Lead researcher Professor Mel Greaves, of the Institute of Cancer Research, said: "It appears that in this and, we presume, other cases of mother-to-offspring cancer, the maternal cancer cells did cross the placenta into the developing foetus and succeeded in implanting because they were invisible to the immune system.

"We are pleased to have resolved this longstanding puzzle. But we stress that such mother-to-offspring transfer of cancer is exceedingly rare and the chances of any pregnant woman with cancer passing it on to her child are remote."

Professor Peter Johnson, chief clinician at the charity Cancer Research UK, stressed that it was extremely unusual for cancer to pass from a mother to her baby.

He said: "This is really important research as it adds to the evidence that cancers need to evade the immune system before they can grow, giving hope that by alerting a patient's immune system to a cancer we can develop new types of treatment.

"Women needing cancer treatment around the time of having a baby who are worried about this research should speak to the specialists looking after them for advice."

Dr David Grant, scientific director at Leukaemia Research, which part-funded the study, said it should help work to harness the power of the immune system to first cure and then protect patients from leukaemia.

Story from BBC NEWS:
<http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8298947.stm>

Published: 2009/10/12 23:26:49 GMT

Comfort Food: Chocolate, Water Reduce Pain Response To Heat



New research shows that eating chocolate or drinking water can blunt pain, reducing a rat's response to a hot stimulus. (Credit: iStockphoto/Jorge Gonzalez)

ScienceDaily (Oct. 14, 2009) — People often eat food to feel better, but researchers have found that eating chocolate or drinking water can blunt pain, reducing a rat's response to a hot stimulus. This natural form of pain relief may help animals in the wild avoid distraction while eating scarce food, but in modern humans with readily available food, the effect may contribute to overeating and obesity.

The study, published in the *Journal of Neuroscience* by authors Peggy Mason, PhD, professor of neurobiology, and Hayley Foo, PhD, research associate professor of neurobiology at the University of Chicago, is the first to demonstrate that this powerful painkilling effect occurs while the animals are ingesting food or liquid even in the absence of appetite.

"It's a strong, strong effect, but it's not about hunger or appetite," Mason said. "If you have all this food in front of you that's easily available to reach out and get, you're not going to stop eating, for basically almost any reason."

In the experiments, rats were given either a chocolate chip to eat or had sugar water or regular water infused directly into their mouth. As the rat swallowed the chocolate or fluid, a light-bulb beneath the cage was switched on, providing a heat stimulus that normally caused the animal to lift its paw off the floor. Mason and Foo found that rats were much slower to raise their paw while eating or drinking, compared to tests conducted while they were awake, but not eating.

Surprisingly, the researchers found no difference in the delayed paw-lift response between when the rat was eating chocolate and when it was drinking water, despite previous research indicating that only sugary substances were protective against pain.

"This really shows it has nothing to do with calories," Mason said. "Water has no calories, saccharine has no sugar, but both have the same effect as a chocolate chip. It's really shocking."

Mason and Foo then repeated the heat test as the rats were given quinine, a bitter drink that causes rats to make an expression called a gape that's akin to a child's expression of "yuck." During quinine administration, the rats reacted to heat as quickly as when not eating, suggesting that a non-pleasurable food or drink fails to trigger pain relief.

The context of ingesting was also important to whether eating or drinking blunted pain, the researchers found. When rats were made ill by a drug treatment, eating chocolate no longer delayed their response. However, drinking water still caused a reduced pain response, indicating that drinking water was considered a positive experience while ill.

By selectively inactivating a region in the brainstem called the raphe mangus – an area previously shown to blunt pain during sleep and urination – Mason and Foo were able to remove the effect of drinking water on the rat's pain response. The brainstem controls subconscious responses such as breathing and perspiration during exercise.

"You're essentially at the mercy of your brainstem, and the raphe magnus is part of that," Mason said. "It tells you, 'you're going to finish eating this, whether you like it or not,' just like you sweat while running whether you like it or not."

In the wild, Mason said, rats and other animals would not want to be distracted during the rare but important times that they were able to eat or drink. Therefore, the activation of the raphe magnus during eating or drinking would allow the rat to filter out distractions until their meal was completed. For obvious reasons, this natural pain relief would be activated when an animal is eating or drinking something pleasurable, but not when it tastes something that could be toxic or harmful.

Don Katz, an associate professor of psychology and neuroscience at Brandeis University who studies taste, said that Mason and Foo's paper brings together two systems – taste and pain – that are usually studied separately.

"They're saying the purpose of the taste system is to give the animal a cue that helps it decide what stimulus they should or shouldn't pay attention to," Katz said. "This shows there is a whole region there to enable the animal to keep eating."

Mason believes that this effect is also present in humans (studies by other labs have observed similar pain reduction in infants receiving sugar water during a booster shot), but that it has detrimental effects in modern society given our ready access to large quantities of pleasurable and fattening foods. Opening up a bag of chips could activate the brainstem such that you don't stop eating until the bag is empty, even while realizing that such behavior is bad for you.

"We've gotten a lot more overweight in last 100 to 150 years," Mason said. "We're not more hungry; the fact of the matter is that we eat more because food is readily available and we are biologically destined to eat what's readily available."

But the painkilling effect can be turned to our advantage, Mason said, perhaps as a replacement for the practice of using candy to calm children – or even adults – in the doctor's office.

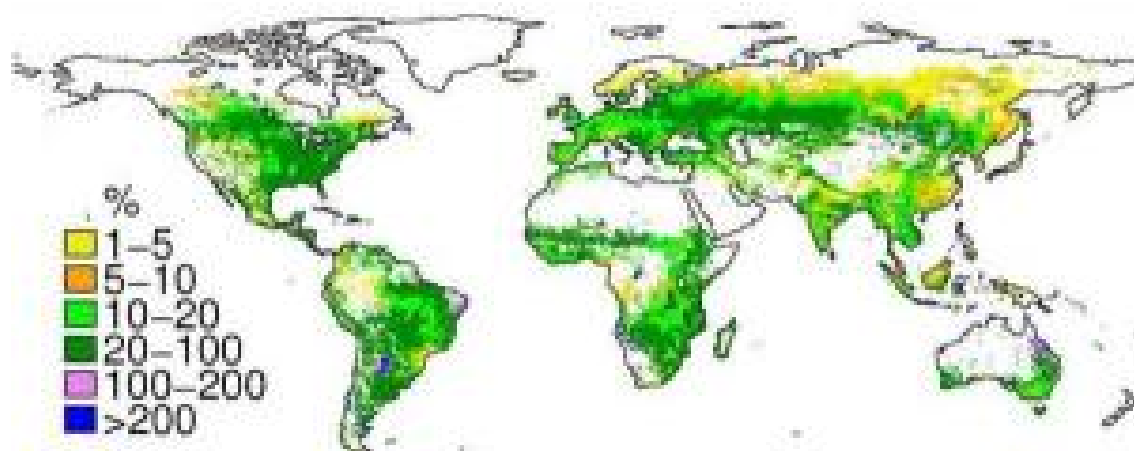
"Ingestion is a painkiller but we don't need the sugar," Mason said. "So replace the doctor's lollipop with a drink of water."

The research was funded by a grant from the National Institute on Drug Abuse and the Women's Council of the Brain Research Foundation. The paper, "Analgesia accompanying food consumption requires ingestion of hedonic foods," appears in the October 14th issue of the Journal of Neuroscience.

Adapted from materials provided by [University of Chicago Medical Center](#), via [EurekAlert!](#), a service of AAAS.

<http://www.sciencedaily.com/releases/2009/10/091013171229.htm>

Harvest And Save Water To Increase Crop Yields, Say Researchers



Percentage increase in net primary production of crops (gigatons dry matter) through the combination of harvest of 25% of runoff from cropland and of 25% reduction in soil evaporation from these areas. (Credit: PIK)

ScienceDaily (Oct. 14, 2009) — On-farm water management could increase global crop production by about one fifth, a modelling study by German and Swedish researchers indicates. However, even intensive water management on present cropland will not be sufficient to accommodate the food demands of a growing population in a warming world, the scientists report in the current edition of *Environmental Research Letters*.

“Use of water in agriculture is a key problem for the 21st century: without improvements neither the consequences of climate change will be manageable nor the demand of two or three billion additional people for food be met,” says Wolfgang Lucht of the Potsdam Institute for Climate Impact Research (PIK). “In this study we therefore investigated whether there are realistic opportunities to close the emerging gap in water supply for agriculture at least partially for many world regions. The results are quite encouraging,” adds Lucht.

Today, about 15 million square kilometres, roughly ten percent of the total land surface, is covered by cropland. An earlier study by the researchers suggested that without substantial improvements in water productivity or other measures to increase yields on present cropland, an expansion by about ten million square kilometres would be required if the world population rose to ten billion in 2050 as suggested by the IPCC’s SRES A2r scenario. The yearly consumption of freshwater for irrigated and rainfed agriculture would have to be increased by an additional 4500 cubic kilometres from currently 8800 cubic kilometres. “However, in many regions of the world that already face limits of water availability that is not an option,” says Dieter Gerten, hydrologist at PIK. “Instead, we need to think of better ways to use the water that is there.”

The research team headed by Gerten investigated how additional land and water requirements could be minimized through water management on existing cropland. The study, based on simulations with a vegetation-water model, quantifies the potentials of two water management strategies for increasing crop production: harvesting rainwater for use during dry spells and reducing soil evaporation.

In practice, a vapour shift from unproductive soil evaporation to productive plant transpiration that permits biomass growth can be attained through mulching or applying different tillage systems. Field studies show that soil evaporation can be halved this way. The researchers estimate the potential to increase global crop yield to amount to 2 to 25 percent, depending on management intensity. The highest

potentials of more than 20 percent for a moderate management regime lie mainly in semiarid regions such as the Midwestern United States, the Sahel, Southern Africa, and Central Asia.

Rainwater can be harvested by concentrating and storing runoff in ponds, or with the help of dikes or subsurface dams. The water can be redirected to crops in periods of water stress so that the risk of crop failure is reduced. In the current study, water harvesting was simulated to increase global crop yield by 4 to 31 percent, again depending on management intensity. With moderate management intensity, parts of South America and parts of Africa show large potentials of more than 20 percent for increasing crop yield.

The combination of both management strategies would result in a production increase of 7 to 53 percent. Pronounced increases can be achieved mainly in regions where present yields reach less than one tenth of what could theoretically be reached if water supply was unlimited, as in large parts of Africa. Globally, a moderate and feasible management scenario suggests that crop production can be increased by 19 percent, which is comparable with the effect of current irrigation that amounts to 17 percent.

“However, the detrimental effects of climate change could reduce global crop production by almost ten percent by 2050,” says Stefanie Rost of PIK. Even if the beneficial effects of the rising atmospheric concentration of carbon dioxide on plant growth and the moderate water management scenario were realised, the water available on current cropland would not meet the requirements of a world population of nine or ten billion.

“This evidence poses crucial questions about tradeoffs between future land and water use for irrigated and rainfed agriculture, natural ecosystems and bioenergy,” the authors state. They suggest exploring options of more efficient irrigation and expansion of irrigated agriculture, of plant breeding and genetic engineering, and of more effective trade with agricultural products from water-rich to water-poor regions.

Journal reference:

1. Stefanie Rost, Dieter Gerten, Holger Hoff, Wolfgang Lucht, Malin Falkenmark and Johan Rockström. **Global potential to increase crop production through water management in rainfed agriculture.** *Environmental Research Letters*, 2009; 4 (4): 044002 DOI: [10.1088/1748-9326/4/4/044002](https://doi.org/10.1088/1748-9326/4/4/044002)

Adapted from materials provided by [Potsdam Institute for Climate Impact Research \(PIK\)](http://www.pik-potsdam.de), via [AlphaGalileo](http://www.alpha-galileo.com).

<http://www.sciencedaily.com/releases/2009/10/091012100825.htm>

Genetic Map For Cowpea Accelerates Development Of New Varieties

Pictured left to right are UC Riverside cowpea researchers Wellington Muchero, Ndeye Diop, Raymond Fenton, Jeff Ehlers, Philip Roberts and Timothy Close in a greenhouse on the UCR campus. Cowpea plants stand behind them. (Credit: UCR Strategic Communications)



ScienceDaily (Oct. 14, 2009) — Cowpea, a protein-rich legume crop, is immensely important in many parts of the world, particularly drought-prone regions of Africa and Asia, where it plays a central role in the diet and economy of hundreds of millions of people.

Cowpea provides food that complements starchy staple crops such as corn, cassava, sorghum and millets to offer a well-rounded diet, much as beans and other grain legumes complement maize- and rice-based diets in Latin America and other places. Due to its hardy nature, cowpea plays a key role in sustaining food security for both people and their livestock.

But breeding new cowpea varieties with desirable traits, such as disease resistance, pest resistance and drought tolerance, is a time-consuming and laborious process that can take a decade from concept to release.

A challenge facing cowpea breeders, therefore, is how to accelerate the production of new and improved cowpea varieties in order to both meet the needs of a growing world population and provide the productivity gains needed by farmers to improve their economic standing.

Now a team of scientists at the University of California, Riverside has responded to this challenge by developing a high-density "consensus genetic map" of cowpea that accelerates conventional breeding severalfold and facilitates the production of new varieties of not only cowpea but also other legumes, particularly soybean and common bean (near relatives of cowpea).

To build the map, the scientists first modified and then applied advanced genetic tools developed from human genome investigations that only recently have been applied to a few major crop plants.

"The consensus map is a consolidation of six individual genetic maps of cowpea, and is far more representative of the cowpea genome than earlier maps," said team leader, Timothy Close, a professor of genetics in the Department of Botany and Plant Sciences. "We now have a reliable, powerful tool that marks a paradigm shift in crop-breeding technology."

Study results appear Oct. 13 in the online early edition of the *Proceedings of the National Academy of Sciences*.

The consensus genetic map of cowpea is a dense and detailed roadmap of its genome (a genome is a complete genetic blueprint). The map has approximately 1000 molecular markers throughout the genome. The markers, which are like signposts directing a motorist to a destination, are associated with traits desired for breeding and used to more deliberately design and assemble new superior varieties.

"All you need is a marker near a gene of interest," explained team member Philip Roberts, a professor in the Department of Nematology, who currently leads UCR's Bean/Cowpea and Dry Grain Pulses

Collaborative Research Support Program — a highly successful project, supported by the U.S. Agency for International Development, that has assisted African institutes in developing improved cowpea varieties. "With a marker-based map we can look into any trait desired in cowpea. The resolution of the map is such that we can accurately locate the position of genes that are contributing in a major way to various traits we'd like to see built into new cowpea varieties."

Close explained that cowpea is closely related to soybean at the genome level, allowing for the kind of cross referencing that would have been unfeasible without the consensus genetic map.

"A good number of genes are conserved across species," he said. "By looking at a marker on a cowpea chromosome, we can cross reference it to information on, say, the soybean genome, based on the DNA sequences of the marker. This facilitates knowledge transfer between these species, so advances made in cowpea can be translated into valuable information for soybean, and vice versa. The result is a tremendous acceleration in marker development to support the breeding process."

Cowpea, which originated in Africa, also is commonly referred to as southern pea, blackeye pea, crowder pea, lubia, niebe, coupe or frijole. In the United States, cowpea is popular in the south, where it is known as black-eyed peas and other names. California primarily grows the blackeyed cowpea type.

"It took us nearly ten years to breed 'California Blackeye No. 50,' our newest blackeye cowpea variety for California growers, using conventional breeding methods," said Jeff Ehlers, a specialist in the Department of Botany and Plant Sciences with more than 20 years of experience conducting genetic research on cowpea in California and Africa. "With the new technologies and map information now at hand this could have been done in half this time. The new consensus map will greatly expand our ability to locate valuable genes and incorporate them into new varieties."

UCR is host to a collection of more than 5,000 cowpea varieties from around the world. These genetically diverse varieties offer a treasure-trove of genes of potential value to breeders seeking to build better cowpea varieties.

UCR researchers have been providing assistance to African scientists for several decades. In the late 1970s, Anthony Hall, a professor emeritus of crop physiology in the Department of Botany and Plant Sciences, pioneered research on cowpea at UCR. His research on cowpea physiology contributed to a deeper understanding of the legume's adaptation to drought, heat and poor soils, and his efforts with several African breeders helped develop highly successful varieties in Senegal, Sudan and Ghana. He also led the effort to establish a genetic map for cowpea, published in 1997.

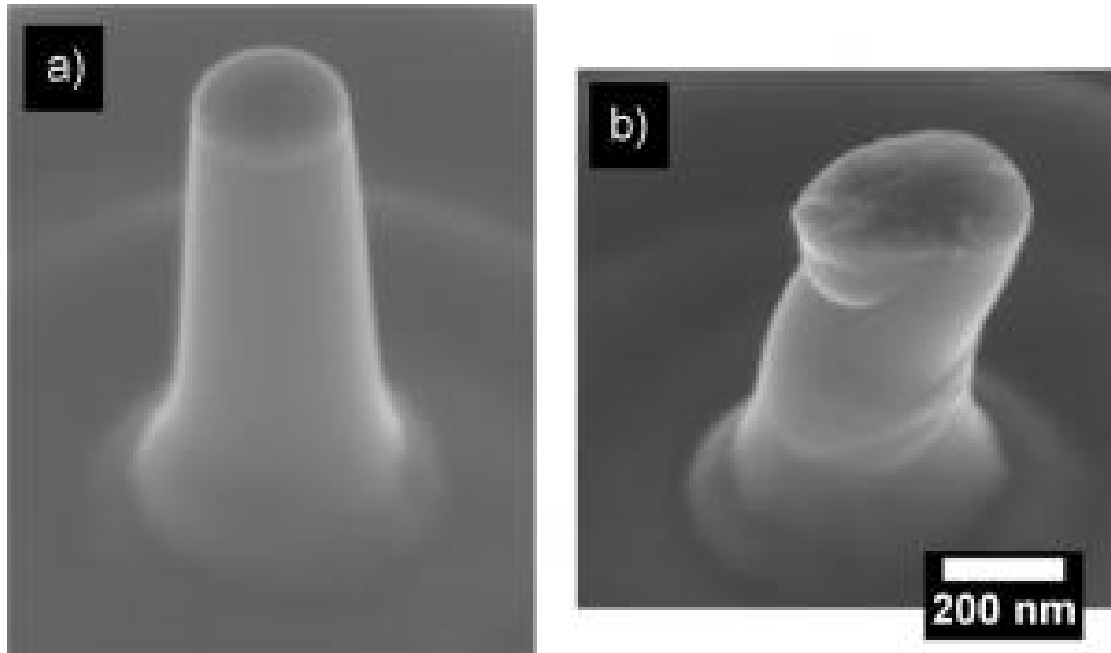
Close, Roberts and Ehlers were joined in the research by UCR's Wellington Muchero, the first author of the research paper, and Ndeye Diop, both of whom are postdoctoral researchers and hail from Africa, as well as Prasanna Bhat, Raymond Fenton, Steve Wanamaker, and Marti Pottorff. Other coauthors on the research paper are Sarah Hearne and Christian Fatokun of the International Institute of Tropical Agriculture, Nigeria, and Ndiaga Cisse of the Senegalese Institute of Agricultural Research.

The two-year research effort was funded by the Generation Challenge Program (GCP) through a grant to the GCP from the Bill and Melinda Gates Foundation, and from the U.S. Agency for International Development-funded Collaborative Research Support Program.

Adapted from materials provided by [University of California - Riverside](#), via [EurekAlert!](#), a service of AAAS.

<http://www.sciencedaily.com/releases/2009/10/091013171231.htm>

Investigating Nanopillars: Silicon Brittle? Not This Kind!



A silicon pillar with a diameter of 310 nanometers a) before loading and b) after deformation. The column has yielded to the applied force and undergone plastic deformation. (Credit: Image courtesy of Empa)

ScienceDaily (Oct. 13, 2009) — Silicon, the most important semiconductor material of all, is usually considered to be as brittle and breakable as window glass. On the nanometer scale, however, the substance exhibits very different properties, as Empa researchers have shown by creating minute silicon pillars.

If the diameters of the columns are made small enough, then under load they do not simply break off, as large pieces of silicon would, but they yield to the pressure and undergo plastic deformation, as a metal would. This discovery opens the way for completely new design techniques from a materials point of view for mechanical microsystems and in the watch industry.

Empa's founder himself, Ludwig von Tetmajer, investigated the mechanical loading of columns in his time. In the aftermath of the collapse of a railway bridge in Muenchenstein his laboratory experiments showed that Euler's bending formula is not always valid for thin rods and needed correction. "We're basically doing the same thing 127 years later on the nanometer scale, and are learning surprising things – instead of fragile silicon nanocolumns that break when loaded, we are seeing how they undergo plastic deformation like butter," explains Johann Michler, Head of Empa's Mechanics of Materials and Nanostructures laboratory in Thun.

Silicon – the most important material in the semiconductor industry

Silicon is the most commonly used raw material in the semiconductor and photovoltaic industries. It also serves as the basic building material for electronic components (like computer processors) and in many sensors and micromechanical systems, such as the cantilever arm in a scanning force microscope. In addition, more than 90 per cent of conventional solar cells are made of silicon.

But the material has its limits, for silicon is a brittle element – a wafer of silicon (the thin disc of silicon and other additives which forms the substrate for the applications mentioned above) shatters into a thousand shards under the slightest load, just like a sheet of glass. Michler and his colleagues have now

shown that this property changes on the nanometer scale. To demonstrate this physicist Fredrik Oestlund treated a silicon plate using an FIB, a Focused Ion Beam instrument which is used for the analysis and preparation of surfaces. Using a beam of gallium ions he removed ring-shaped zones of material from the plate, layer by layer, leaving only tiny pillars of silicon standing. The diameters of the pillars varied between 230 und 940 nanometers.

Load experiments with a nanoindenter

"Our pillar-bending tests are in principle the same as Tetmajer's experiments, only our pillars are about a hundred thousand times smaller," says Michler. To apply a force to the columns the scientists used a micro- and nano precision tool called a nanoindenter, where the flattened tip of a pyramid-shaped diamond tool, mounted in a scanning electron microscope, presses down along the longitudinal axis of a silicon column. The force exerted by the tip is continuously measured. «Larger» pillars developed cracks when loaded and broke into small pieces, showing the typically brittle behavior of silicon.

However, when the columns had diameters of less than 400 nanometers, no cracks developed and the structures began to suffer plastic deformation. The reason for this lies in the internal structure of the silicon – its material properties are not determined by the perfect arrangement of the atoms but by the flaws in the arrangement. If the dimensions of the column are smaller than the average distance between defects in the atomic structure of the material then the columns can easily be deformed. Oestlund and Michler, together with their research partners from the Universities of Uppsala and Minnesota, recently published these results in the journal *Advanced Functional Materials*.

Silicon with metallic properties

"Our results show that it might be possible to use silicon like a metal in mechanical applications, if the dimensions of the silicon structure are small enough," Michler speculates. Metallic materials are fault tolerant and are capable of absorbing shock loads by deforming without breaking, for example. The construction of mechanical components using brittle materials is also difficult, since they tend to fail when the strain near a defect becomes excessive. And since the precise location and size of critical defects are practically always unknown, the critical load can almost never be calculated exactly. This calculation is much simpler with a metallic material, which will simply deform under a well-defined load. This new "well-behaved" property of plastic deformation in silicon opens new opportunities for the watch industry and in semiconductor manufacturing in terms of the design of mechanical micro and nanosystems.

Adapted from materials provided by [Empa](#), via [AlphaGalileo](#).

<http://www.sciencedaily.com/releases/2009/10/091008133455.htm>

Nano Measurement In The Third Dimension

The micro probe used in the micro-nano CMM measures the form and the spacing of two reference spheres with diameters of two millimetres each. The figure shows a survey of the system and the proportions of measuring probe and measurement object in detail. (Credit: PTB)



ScienceDaily (Oct. 13, 2009) — From the motion sensor to the computer chip, in many products of daily life components are used whose functioning is based on smallest structures of the size of thousandths -- or even millionths -- of millimetres. These micro and nano structures must be manufactured and assembled with the highest precision so that in the end, the overall system will function smoothly.

Because of this, details are important. Scientists at the Physikalisch-Technische Bundesanstalt (PTB) have now developed a metrological scanning probe microscope into a micro and nano coordinate measuring instrument. This allows dimensional quantities with nanometer resolution also to be measured on three-dimensional objects in an extraordinarily large measurement range of 25 mm x 25 mm x 5 mm. The new device is already extensively being used at PTB - to a large part for calibration orders from industry and research. Often, such small dimensions can be grasped only when they are transferred to everyday life. If we assume, for example, that someone lost a cube of sugar within an area of 25 square kilometres – the new micro and nano coordinate measuring instrument would not only be able to find it, but it would also be able to determine its exact position and shape. This does not only apply to plane surfaces, but also to three-dimensional landscapes, for example if the cube of sugar were stuck to a steep wall. As increasingly, components with structures in the micro- and nanometer range are being used in industry, dimensional metrology on such structures is becoming increasingly important. To meet the increasing requirements for 3D measurements of micro and nano structures, 3D measuring probes newly developed at PTB were incorporated in a metrological scanning probe microscope based on a commercial nano-positioning system with integrated laser displacement sensors of the company SIOS Messtechnik GmbH. The new functionalities given by the measuring probe and the software extend the scanning probe microscope to a metrological micro/nano coordinate measuring machine (CMM) which also allows 3D measurements conforming to standards to be performed on micro and nano structures. International intercomparisons on step-height standards and lattice structures have shown that the measuring system is worldwide one of the most precise of its kind. For step heights, measurement uncertainties in the subnanometer range - and for measurements of the mean structure spacing on extensive lattice standards even in the range of 10 picometers - have been achieved and confirmed in comparison with optical diffraction measurements.

The new measuring instrument is available for dimensional precision measurements with nm resolution on 3D micro and nano structures such as micro gears, micro balls, hardness indenters and nano lattice standards as well as for comparisons of measures; moreover, it serves as a platform for research and development tasks. It is an important link between nano, micro and macro coordinate metrology.

Adapted from materials provided by Physikalisch-Technische Bundesanstalt (PTB).

<http://www.sciencedaily.com/releases/2009/07/090706090557.htm>

Like Humans, Monkeys Fall Into The 'Uncanny Valley'



Realistic-looking robots and computer avatars often spur negative responses in humans. Princeton University scientists showed monkeys these computer-generated images of monkeys and saw a similar response. Monkeys, they found, also are unsettled by images that are realistic but synthetic, a response known as the "uncanny valley" effect. (Credit: Photo courtesy of Shawn Steckenfinger)

ScienceDaily (Oct. 13, 2009) — Princeton University researchers have come up with a new twist on the mysterious visual phenomenon experienced by humans known as the "uncanny valley." The scientists have found that monkeys sense it too.

The uncanny valley, a phrase coined by a Japanese researcher nearly three decades ago, describes that disquieting feeling that occurs when viewers look at representations designed to be as human-like as possible -- whether computer animations or androids -- but somehow fall short.

Movie-goers may not be familiar with the term, but they understand that it is far easier to love the out-of-proportion cartoon figures in the "The Incredibles," for example, than it is to embrace the more realistic-looking characters in "The Polar Express." Viewers, to many a Hollywood director's consternation, are emotionally unsettled by images of artificial humans that look both realistic and unrealistic at the same time.

In an attempt to add to the emerging scientific literature on the subject and answer deeper questions about the evolutionary basis of communication, Princeton University researchers have found that macaque monkeys also fall into the uncanny valley, exhibiting this reaction when looking at computer-generated images of monkeys that are close but less than perfect representations.

"Increased realism does not necessarily lead to increased acceptance," said Asif Ghazanfar, an assistant professor of psychology and the Princeton Neuroscience Institute, who led the research. It is the first such finding in any animal other than human. The paper, co-written by Shawn Steckenfinger, a research specialist in the Princeton's Department of Psychology, appears in the October Oct. 12 edition of the *Proceedings of the National Academy of Sciences*.

The work, according to its authors, is significant because it indicates that there is a biological basis for the uncanny valley and supports theories that propose that the brain mechanisms underlying the uncanny valley are evolutionary adaptations. "These data demonstrate that the uncanny valley effect is not unique to humans and that evolutionary hypotheses regarding its origins are tenable," said Ghazanfar.

The uncanny valley hypothesis was introduced by the Japanese roboticist Masahiro Mori in 1970. The "valley" refers to a dip in a graph that charts a human's positive reaction in response to an image on one axis and a robot's human-likeness on another. People like to study other human faces, and they also can

enjoy scrutinizing countenances that clearly are not human, such as a doll's or a cartoon figure's. But when an image falls in between -- close to human but clearly not -- it causes a feeling of revulsion.

Experts praised the Princeton report.

"This study makes a significant contribution to existing knowledge of the uncanny valley," said Karl MacDorman, an associate professor in the School of Informatics at Indiana University, who has led important experiments in the fields of android science and computational neuroscience. "The research design is novel, the experiment is carried out with a high degree of rigor, and the results are compelling, important, newsworthy, and support the [hypothesis]."

He believes the results will be of broad interest to scientists and non-scientists, including "ethologists, animal behaviorists, cognitive psychologists of human perception, evolutionary psychologists, primate social cognitive neuroscientists, humanoid roboticists and human character animators."

In the experiments, the monkeys, which normally coo and smack their lips to engage each other, quickly avert their glances and are frightened when confronted by the close-to-real images. When asked to peer at the less close-to-real faces and real faces, however, they viewed them more often and for longer periods.

Despite the widespread acknowledgement of the uncanny valley as a valid phenomenon, there are no clear explanations for it, Ghazanfar said. One theory suggests that it is the outcome of a "disgust response" mechanism that allows humans to avoid disease. Another idea holds that the phenomenon is an indicator of humanity's highly evolved face processing abilities. Some have suggested the corpse-like appearance of some images elicits an innate fear of death. Still others have posited that the response illustrates what is perceived as a threat to human identity.

Ghazanfar said the research is likely to point him in useful directions to further explore these theories.

The research was funded by the National Science Foundation.

Adapted from materials provided by Princeton University.

<http://www.sciencedaily.com/releases/2009/10/091013123353.htm>

Hollow Spheres Made Of Metal



Hollow spheres made of ground steel, measuring just two to ten millimeters. (Credit: Copyright Fraunhofer IFAM)

ScienceDaily (Oct. 13, 2009) — Producing metallic hollow spheres is complicated: It has not yet been possible to make the small sizes required for new high-tech applications. Now for the first time researchers have manufactured ground hollow spheres measuring just two to ten millimeters.

New drive technologies combined with lighter and stronger materials will make the airplanes and automobiles of the future more fuel-efficient. But a number of technical details need to be resolved first. Magnetic ball valves are one example – for them to react extremely quickly, the balls must be as light as possible, and the same applies to rapidly moving bearings. Hollow spheres made of steel represent a solution.

Researchers at the Fraunhofer Institute for Manufacturing and Advanced Materials IFAM in Dresden working in cooperation with hollomet GmbH Dresden have created the technology for the manufacture of rapidly reacting ball valves and bearings. “In an injection valve the movement of a ball causes the valve to open and close. The lighter the ball, the quicker it moves,” explains Dr.-Ing. Hartmut Göhler, project manager at the IFAM. Until now it has only been possible to produce balls of this size as solid spheres, but a solid body is relatively heavy and therefore reacts slowly in a ball valve. “For the first time we’ve been able to produce metal hollow spheres in the required diameter of just two to ten millimeters. The hollow spheres are 40 to 70 percent lighter than solid ones.”

The process starts with polystyrene balls which are lifted up and held by an air current over a fluidized bed while a suspension consisting of metal powder and binder is sprayed onto them. When the metal layer on the balls is thick enough, heat treatment begins, in which all the organic components, the polystyrene and the binder evaporate. The residual materials are gaseous and escape through the pores in the metal layer. A fragile ball of metal remains. This is now sintered at just below melting temperature, and the metal powder granules bind together, forming a hard and cohesive shell. The sphere is now stable enough to be ground in a machine, but the pressure must not be too high as otherwise the hollow body will deform. The wall thickness can be set to between a few tenths of a millimeter and one millimeter.

Göhler sees applications for the technique wherever a low mass inertia is required. “Hollow spheres will create applications which have not been possible up to now,” Göhler states. The scientists have already produced ground spheres made of steel, other metals such as titanium and various alloys are envisaged for the future.

Adapted from materials provided by Fraunhofer-Gesellschaft.

<http://www.sciencedaily.com/releases/2009/10/091012095709.htm>

Intelligent Structural Elements: Support Frames, Adaptive Engine Hoods And More To Come



Shell structure is able to adapt to changing environmental conditions.

ScienceDaily (Oct. 13, 2009) — Weather conditions such as wind and snow loads can cause failure and collapse of supporting structures in roofs and similar constructions. Based on new hybrid intelligent construction elements (HICE), researchers at the University of Stuttgart have developed a shell structure which is able to adapt to changing environmental conditions. In a further step, the scientists will now use their knowledge to develop machines from these new structural elements which will also be able to react to their environments and adapt to given conditions.

According to experts, this development may eventually lead to a significant acceleration of entire construction processes in mechanical, electrical and control engineering.

A research group of six engineers from different fields such as civil, aerospace, mechanical and process engineering is funded by the Deutsche Forschungsgemeinschaft (German Research Foundation) with a grant of 1.858 m € assigned for the first three years of a six-year project. The research group has started to operate in June.

The structural elements (e.g. shafts, levers, tractive or surface elements) are provided with integrated sensors, actuators and control elements. Light-weight and wear-resistant materials increase their functionality. Within the course of three years, the scientists from Stuttgart hope to assemble six newly-developed HICEs (membrane shells, adaptive cover elements, tile coating elements, inflexible force transmission elements, hybrid rope elements, bearing and lever elements) into a large-scale demonstrator shell structure measuring five square metres, which will combine all of the HICEs' functionalities. The adaptive shell structure will be translucent and much lighter than conventional supporting structures. If a change in environmental factors such as wind load, wind direction or snow load occurs, the structure shall be able to dissipate strain autonomously and adaptively via levers, ties and shell elements in order to prevent failure. The demonstrator will be exhibited by the University of Stuttgart.

Portability to all engineering disciplines

In a second phase of the project, the participating researchers will try to show by means of further constructions that HICEs can be applied in all engineering disciplines. By way of example, a hybrid engine bonnet shall be developed which may be combined with state-of-the-art “active” bonnets. This could improve pedestrian safety significantly by preventing severe injuries in case of a collision with this type of bonnet: Standard active bonnets are able to report the clash via additional sensors to an electronic control device which then prompts the rear part of the bonnet to be lifted upwards via a lever structure. This creates a protective distance between the accident victim and the hard engine parts beneath the bonnet. An intelligent hybrid engine bonnet would additionally create a specific deformation of the bonnet in reaction to the parameters of the actual collision. Based on new materials, the bonnet shall be able to soften or harden relevant areas of its structure autonomously in order to prevent injuries as far as possible.

In addition, demonstrators for the application of HICEs in shaft-to-collar connections and machine enclosures will be developed.

The participating institutions are the Institutes of Mechanical Handling and Logistics, of Construction Technology and Technical Design, of Textile and Process Engineering, of Aircraft Design, of Design and Construction and of Metal Forming Technology. “Within six years, the research group will have developed an entirely new class of hybrid intelligent construction elements together with its respective constructional and computational methods. We will have reached a new level of systems integration”, says research group spokesman Prof. Karl-Heinz Wehking.

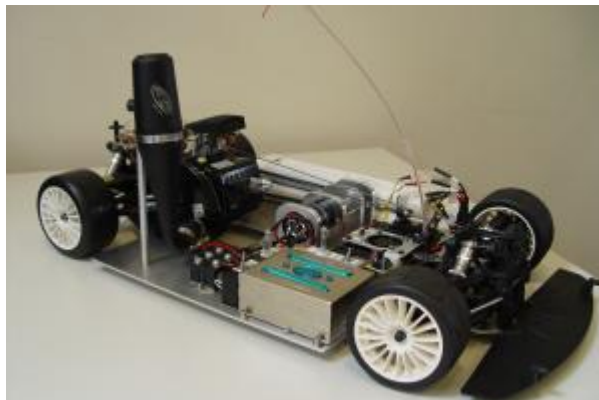
Adapted from materials provided by [University of Stuttgart](#), via [AlphaGalileo](#).

<http://www.sciencedaily.com/releases/2009/09/090902122325.htm>

Improved Redox Flow Batteries For Electric Cars

Improved redox flow batteries for electric cars. (Credit: Image courtesy of Fraunhofer-Gesellschaft)

ScienceDaily (Oct. 13, 2009) — A new type of redox flow battery presents a huge advantage for electric cars. If the rechargeable batteries are low, the discharged electrolyte fluid can simply be exchanged at the gas station for recharged fluid – as easy as refilling the petrol tank.



Electric mobility is becoming increasingly important. The German government's ambitious plan envisages one million electric cars being sold in Germany by the year 2020. Until then, however, researchers still have to overcome some hurdles, such as the question of energy storage. Lithium-ion batteries offer a possible solution, but it takes hours to charge them – time that an automobile driver doesn't have when on the road.

Researchers from the Fraunhofer Institute for Chemical Technology ICT in Pfinztal near Karlsruhe see an alternative in redox flow batteries. "These batteries are based on fluid electrolytes. They can therefore be recharged at the gas station in a few minutes – the discharged electrolyte is simply pumped out and replaced with recharged fluid," says engineer Jens Noack from ICT. "The pumped-off electrolyte can be recharged at the gas station, for example, using a wind turbine or solar plant."

The principle of redox flow batteries is not new – two fluid electrolytes containing metal ions flow through porous graphite felt electrodes, separated by a membrane which allows protons to pass through it. During this exchange of charge a current flows over the electrodes, which can be used by a battery powered device.

Until now, however, redox flow batteries have had the disadvantage of storing significantly less energy than lithium-ion batteries. The vehicles would only be able to cover about a quarter of the normal distance – around 25 kilometers – which means the driver would have to recharge the batteries four times as often. "We can now increase the mileage four or fivefold, to approximately that of lithium-ion batteries," Noack enthuses.

The researchers have already produced the prototype of a cell. Now they must assemble several cells into a battery and optimize them. This further development is being carried out with colleagues from the University of Applied Sciences, Ostphalia, in Wolfenbüttel and Braunschweig. They are testing electric drives and energy storage units on model vehicles that are only a tenth of the size of normal vehicles. The research team has already built a traditional redox flow battery into a model vehicle. A vehicle on a scale of 1:5 can be seen in action on a test rig set up at the eCarTech in Munich from 13 to 15 October. In the coming year the researchers also want to integrate the new battery, with four times greater mileage, into a model vehicle.

Adapted from materials provided by Fraunhofer-Gesellschaft.

<http://www.sciencedaily.com/releases/2009/10/091012135506.htm>

Opals Set To Shine With New Grading Technology



The Gemmological Digital Analyser (GDA) is the world's first automated device to grade opals using image analysis. (Credit: Chris Taylor)

ScienceDaily (Oct. 13, 2009) — CSIRO and a consortium of Australian Opal miners (Opal Producers Australia Limited) have unveiled the world's first automated device to grade opals using image analysis, at the 2009 National Council of Jewellery Valuers forum in Sydney.

CSIRO Mathematical and Information Sciences image analyst Leanne Bischof helped develop the Gemmological Digital Analyser (GDA).

Ms Bischof said that opals have a unique range of colour characteristics that makes them by far the most difficult gemstone to appraise.

"Qualities such as 'flash', the way an opal reflects light and colour as it is rotated, can vary with human eyesight and lighting conditions," Ms Bischof said.

"A person's judgment of an opal's colours, the brightness of those colours and the area each of them covers is a really difficult task, even for a skilled opal assessor. You really need objective image analysis and automation to assist with that."

Incorporating the expert knowledge of over 60 opal industry professionals, CSIRO designed a GDA prototype with Australian company Applied Robotics.

CSIRO then developed the complex mathematical algorithms to drive the image analysis system behind the GDA.



A small camera inside the GDA takes 871 images of the stone as it rotates on a stage which moves 360 degrees horizontally and tilts 90 degrees vertically.

High powered computers linked to the GDA analyse the images and quantify the opal's gemmological characteristics, providing a classification grade based on colour, clarity, carat, cut and character and a summary graph showing proportions of the opal's colours.

A database of information on the GDA graded opals will allow participating jewellers and industry organisations to accurately assign a dollar value to a particular grade of stone depending on the daily market price.

Director of Opal Producers Australia Limited and Lightning Ridge Opal miner Peter Sutton said the value of the Australian opal industry is estimated to be worth around \$50 million a year, according to the Australian Bureau of Statistics.

"We suspect this figure is grossly underestimated because valuations for a single stone can sometimes vary by thousands of dollars," Mr Sutton said.

The demand and trade for other Australian commodities like wheat, coal and gold have benefited from the introduction of an independent grading system, ensuring fair prices for producers and the supply of a consistent quality product to customers.

"We wanted to create an objective grading system that would improve the demand for and value of the Australian Opal industry, giving miners a fair price and consumer's confidence to trade with grade quality assurance," Mr Sutton said.

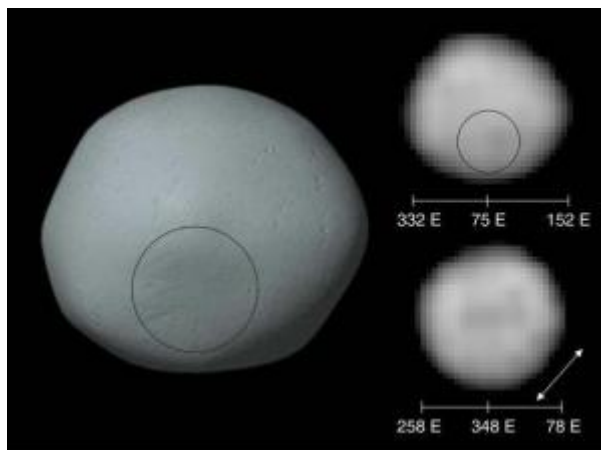
"This will be an independently-graded Australian opal product, which we will brand as Opallia."

Adapted from materials provided by [CSIRO Australia](http://www.csiro.au).

<http://www.sciencedaily.com/releases/2009/08/090831131356.htm>



Asteroid Is Actually A Protoplanet, Study Of First High-resolution Images Of Pallas Confirms



Pallas's largest crater-like feature seen in the digital model (left) and from two perspectives: appearing face-on (upper right) and edge-on along the limb (lower right). (Credit: This image is courtesy of Science/AAAS in a paper by Britney Schmidt, et al.)

ScienceDaily (Oct. 13, 2009) — Britney E. Schmidt, a UCLA doctoral student in the department of Earth and space sciences, wasn't sure what she'd glean from images of the asteroid Pallas taken by the Hubble Space Telescope. But she hoped to settle at least one burning question: Was Pallas, the second-largest asteroid, actually in that gray area between an asteroid and a small planet?

n asteroid and a small planet?

The answer, she found, was yes. Pallas, like its sister asteroids Ceres and Vesta, was that rare thing: an intact protoplanet.

"It was incredibly exciting to have this new perspective on an object that is really interesting and hadn't been observed by Hubble at high resolution," Schmidt said of the first high-resolution images of Pallas, which is believed to have been intact since its formation, most likely within a few million years of the birth of our solar system.

"We were trying to understand not only the object, but how the solar system formed," Schmidt said. "We think of these large asteroids not only as the building blocks of planets but as a chance to look at planet formation frozen in time."

The research appears Oct. 9 in the journal *Science*.

"To have the chance to use Hubble at all, and to see those images come back and understand automatically this could change what we think about this object — that was incredibly exciting to me," Schmidt said.

Pallas, which is named for the Greek goddess Pallas Athena, lies in the main asteroid belt between the orbits of Jupiter and Mars. Schmidt likens it to the size of Arizona, her home state. The massive body is unique, she said, partly because "its orbit is so much different from other asteroids. It's highly inclined."

Hubble had tried to snap pictures of the round-shaped body before but came up short. So when the space telescope took images again in September 2007, Schmidt and her colleagues had several goals.



"We wanted to learn about Pallas itself — what its shape is like, what its surface is like, does it have large impact craters, does it have significant topography," she said.

With the Hubble images, Schmidt and her colleagues were able to take new measurements of Pallas' size and shape. They were able to see that its surface has areas of dark and light, indicating that the water-rich body might have undergone an internal change in the same way planets do.

Pallas wasn't just a big rock made of hydrated silicate and ice, they found.

"That's what makes it more like a planet — the color variation and the round shape are very important as far as understanding, is this a dynamic object or has it been exactly the same since it's been formed?" Schmidt said. "We think it's probably a dynamic object."

For the first time, Schmidt and her colleagues also saw a large impact site on Pallas. They were unable to determine if it was a crater, but the depression did suggest something else important: that it could have led to Pallas' small family of asteroids orbiting in space.

"It's interesting, because there are very few large, intact asteroids left," Schmidt said. "There were probably many more. Most have been broken up completely. It's an interesting chance to almost look into the object, at the layer underneath. It's helping to unravel one of the big questions that we have about Pallas, why does it have this family?"

Schmidt's co-authors include Peter C. Thomas, a senior researcher at Cornell University; James Bauer, a researcher with the Jet Propulsion Laboratory; J.Y. Li, a postdoctoral student at the University of Maryland; Schmidt's Ph.D. adviser, UCLA professor of geophysics and space physics Christopher T. Russell; Andrew Rivkin, a researcher at Johns Hopkins University; Joel William Parker, a researcher at the Southwest Research Institute in Boulder, Colorado; Lucy McFadden, a faculty member at the University of Maryland; S. Alan Stern of the Southwest Research Institute; Max Mutchler, a researcher at the Space Telescope Sciences Institute; and Chris Radcliffe, a digital artist in Santa Monica.

"When people think of asteroids, they think of 'Star Wars' or of tiny little rocks floating through space," Schmidt said. "But some of these have been really physically dynamic. Around 5 million years after the formation of the solar system, Pallas was probably doing something kind of interesting."

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The research was funded through the Space Telescope Sciences Institute, which runs Hubble for NASA.

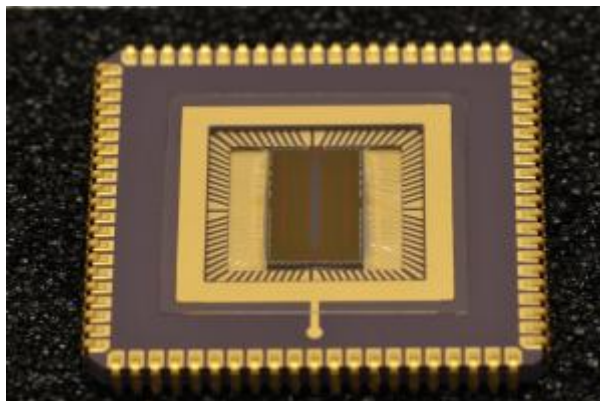
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Adapted from materials provided by [University of California - Los Angeles](http://www.ucla.edu).

<http://www.sciencedaily.com/releases/2009/10/091013110050.htm>



Color Sensors For Better Vision



Color sensors for better vision. (Credit: Image courtesy of Fraunhofer-Gesellschaft)

ScienceDaily (Oct. 13, 2009) — CMOS image sensors in special cameras – as used for driver assistance systems – mostly only provide monochrome images and have a limited sensitivity to light. Thanks to a new production process these sensors can now distinguish color and are much more sensitive to light.

The car of the future will have lots of smart assistants onboard – helping to park the car, recognize traffic signs and to warn the driver of blind spot hazards. Many driver assistance systems incorporate high-tech cameras which have to meet a wide range of requirements. They must be able to withstand high ambient temperatures and be particularly small, light and robust. What's more, they have to reliably capture all the required images and should cost as little as possible. Today, CMOS sensors are used for most in-car systems. These semiconductor chips convert light signals into electrical pulses and are installed in most digital cameras. At present, however, the sensors used for industrial and other special cameras are mostly color blind.

Now researchers at the Fraunhofer Institute for Microelectronic Circuits and Systems IMS in Duisburg are adding some color to the picture. They have developed a new process for producing CMOS image sensors which enables the chips to see color. Normally the image sensors are produced on silicon wafers using a semiconductor technique, the CMOS process. “We have integrated a color filter system in the process,” explains Prof. Dr. Holger Vogt, Deputy Director of the IMS. “In the same way as the human eye needs color-specific cone types, color filters have to be inserted in front of the sensors so that they can distinguish color.” This job is handled by polymers dyed in the primary colors red, green and blue. Each pixel on the sensor is coated with one of the three colors by a machine which coats the sensor disk with a micrometer-thick polymer layer. Using UV light and a mask which is only transparent on the desired pixels, the dye is fixed at the requisite points and the rest is then washed off. In addition, the researchers have developed special microlenses which help the sensor to capture and measure the light more efficiently. With the aid of a transparent polyimide they create a separate lens for each individual pixel, which almost doubles the light-sensitivity of the image sensor.

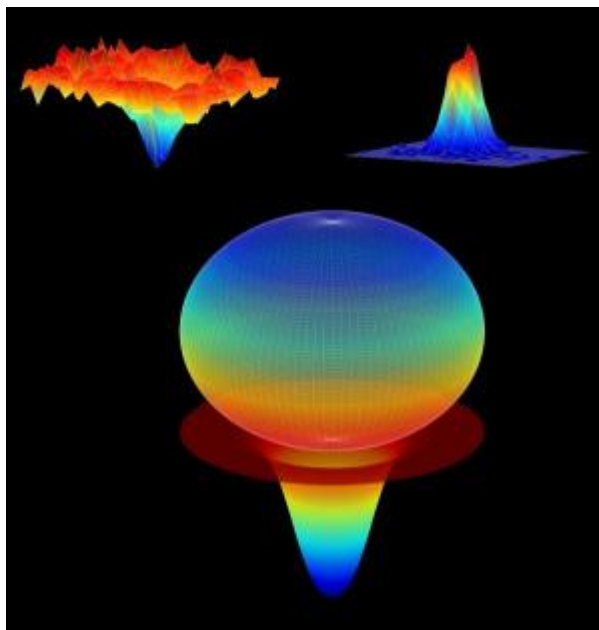
The optimized CMOS process not only makes it possible to cost-efficiently improve the performance of driver assistance systems. Endoscopes can also benefit from the new properties of CMOS image sensors. The researchers are presenting the CMOS process at the Vision trade fair from November 3 to 5 in Stuttgart.

Adapted from materials provided by [Fraunhofer-Gesellschaft](#), via [AlphaGalileo](#).

<http://www.sciencedaily.com/releases/2009/10/091005094951.htm>

Live Recordings Of Cell Communication

Researchers determine shape and size of the contact area between vesicle and membrane by measuring colour intensity from fluorescent molecules. Right: Vesicle marked by acceptor fluorescent molecules that light up when close to donor molecules (left). Middle: A plot of the same, calculated FRET. (Credit: Image courtesy of University of Copenhagen)



ScienceDaily (Oct. 13, 2009) — A new advanced method for nano-scale imaging of vesicle-fusion could add to our understanding of diseases of the nervous system and viral infections. In the long term, this could be useful in developing a cure for neurological diseases and mental disorders (e.g. schizophrenia, depression, Parkinson's disease, Alzheimer's disease).

Neurons communicate with each other with the help of nano-sized vesicles. Disruption of this communication process is responsible for many diseases and mental disorders such as depression. Nerve signals travel from one neuron to another through vesicles -- a nano-sized container loaded with neurotransmitter molecules. A vesicle fuses with the membrane surrounding a neuron, releases neurotransmitters into the surroundings that are detected by the next neuron in line. However, we still lack a more detailed understanding of how the fusion of vesicles occurs on the nano-scale. Associate Professor Dimitrios Stamou, Department of Neuroscience and Pharmacology and Nano-Science Center explains: "Contact between vesicles and membranes are an essential step in many important biological processes. We can now quantify contact areas formed between vesicles and determine the vesicle size and shape with nano-scale resolution. This helps us characterise the properties of the molecules involved in vesicle-fusion. The new method opens great new prospects for the research of neurological and infectious diseases".

Images on the nano-scale

The researchers are using a method called FRET or Fluorescence Resonance Energy Transfer. The method is well known, but what is new is the way the researchers are using it. They produce vesicles in the laboratory, which contain fluorescent donor molecules, and membranes fixed to a surface. The fixed membranes contain acceptor fluorescent molecules. Only when the two different fluorescent molecules are near to each other will light be emitted, which researchers can measure as a sign of vesicle fusion. By measuring the emitted light the researchers found new ways to determine the vesicle shape with nano-scale resolution in real-time.

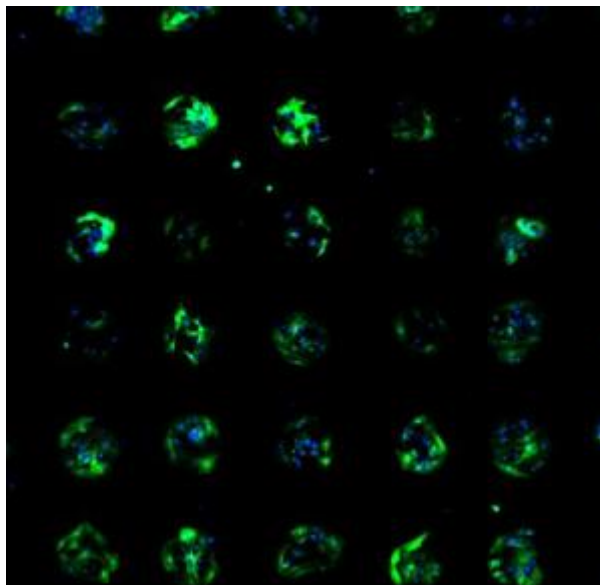
"We have lacked a method for measuring the fusion of vesicle and membrane on a nano-scale at the moment the process occurs. Until now it has only been possible to get a still image of the process with high resolution, or live images with low resolution. With the new method we can quantify the changes in vesicle shape live i.e. during fusion, and with nanoscale resolution," explains Dimitrios Stamou.

This research was recently published in *PNAS* (July 28, 2009 vol. 106 no. 30 12341-1234.)

Adapted from materials provided by [University of Copenhagen](http://www.universityofcopenhagen.com).

<http://www.sciencedaily.com/releases/2009/08/090806080345.htm>

Researchers Pave The Way For Effective Liver Treatments



UCSD researchers have developed a novel high-throughput cellular array technology that is being used to assess the complex relationships between hepatic stellate cells and components of their microenvironment. (Credit: UC San Diego)

ScienceDaily (Oct. 13, 2009) — A combination of bioengineering and medical research at the University of California, San Diego has led to a new discovery that could pave the way for more effective treatments for liver disease.

In this work, the researchers have utilized an array system that can identify the biological components that can lead to or alleviate liver disease. The technology works by controlling the range of environments surrounding star-shaped liver cells called hepatic stellate cells (HSCs). HSCs are the major cell type involved in liver fibrosis, which is the formation of scar tissue in response to liver damage. The activated stellate cell is responsible for secreting collagen that produces a fibrous scar, which can lead to cirrhosis.

Current approaches to identify the factors affecting HSC biology typically focus on each factor individually, ignoring the complex cross-talk between the many components acting on the cells. The high-throughput cellular array technology developed by UCSD researchers systematically assesses and probes the complex relationships between hepatic stellate cells and components of their microenvironment. By doing this, they found that certain proteins are critical in regulating HSC activation and that the proteins influence one another's actions on the cells. The findings were published in the September 2009 issue of *Integrative Biology*.

"We can spot hundreds of combinations of proteins in the matrix surrounding the cell such as different kinds of collagen – you can spot them individually and in combination, so you can get hundreds of combinations with several proteins," said Shu Chien, co-author of the paper and bioengineering professor and director of the Institute of Engineering Medicine at UCSD. "We used a spotting pin that's normally used for microarray DNA spotting. But we spot proteins instead of DNA on these slides.

"In one step we can look at the physical and chemical micro-environment of the cells," Chien added. "Now we can look at the optimum condition that is best for the cells to proliferate and differentiate."

The high-throughput cellular array technology used in this research was developed by Chien and his lab colleagues a few years ago mainly for stem cell research, but it has not been applied to this type of research before involving hepatic stellate cells.



"Our lab is interested in the cells that are responsible for laying down the fibrous scar in all types of chronic liver disease," said Dr. David Brenner, the dean of the UCSD School of Medicine and co-author of the paper. "In the course of 20 years, people have tried three or four matrixes to try to optimize their growth. Shu Chien mentioned this extracellular matrix array that his lab was using for stem cells, and I thought it would be an incredible opportunity to understand the effects of different matrixes in primary cell cultures.

"By looking at the array you get hundreds of different combinations of proteins and you can look at hundreds of cells at once," Brenner added. "This will give us new insights for the treatment for liver fibrosis, and it will give us the platform to test new treatments. This also allows us to do the critical experiments that will assess the ability of different drugs to work. There are really no effective therapies for liver fibrosis—there is only transplantation. Any less invasive therapy would be desirable. This is a big advance."

Chien said such medical advances are the result of the growing synergism between engineering and medicine. This study involves the dissertation work of David Brafman, who received his Ph.D. in bioengineering from UCSD under the joint advisorship of Chien and professor Karl Willert of the Department of Cellular and Molecular Medicine. Chien said the next step for this collaborative effort will be to develop a platform that allows scientists and researchers to differentiate cells into the kind they want. It's this type of work, Chien said, that gives the field of regenerative medicine a boost.

Journal reference:

1. Brafman et al. **Investigating the role of the extracellular environment in modulating hepatic stellate cell biology with arrayed combinatorial microenvironments.** *Integrative Biology*, 2009; 1 (8-9): 513 DOI: [10.1039/b912926j](https://doi.org/10.1039/b912926j)

Adapted from materials provided by [University of California - San Diego](http://www.universityofcalifornia.edu), via [EurekAlert!](http://www.eurekalert.com), a service of AAAS.

<http://www.sciencedaily.com/releases/2009/10/091009204037.htm>



Kraken Becomes First Academic Machine To Achieve Petaflop



This is the newly upgraded Kraken supercomputer, capable of a peak performance of more than one petaflop. (Credit: The University of Tennessee and Oak Ridge National Laboratory)

ScienceDaily (Oct. 13, 2009) — The National Institute for Computational Sciences' (NICS's) Cray XT5 supercomputer—Kraken—has been upgraded to become the first academic system to surpass a thousand trillion calculations a second, or one petaflop, a landmark achievement that will greatly accelerate science and place Kraken among the top five computers in the world.

Managed by the University of Tennessee (UT) for the National Science Foundation (NSF), the system came online Oct. 5 with a peak performance of 1.03 petaflops. It features more than 16,000 six-core 2.6-GHz AMD Istanbul processors with nearly 100,000 compute cores.

In addition, an upgrade to 129 terabytes of memory (the equivalent of more than 13 thousand movies on DVD) effectively doubles the size of Kraken for researchers running some of the world's most sophisticated 3-D scientific computing applications. Simulation has become a key tool for researchers in a number of fields, from climate change to materials.

"At over a petaflop of peak computing power, and the ability to routinely run full machine jobs, Kraken will dominate large-scale NSF computing in the near future," said NICS Project Director Phil Andrews. "Its unprecedented computational capability and total available memory will allow academic users to treat problems that were previously inaccessible."

For example, understanding the mechanism behind the explosion of core-collapse supernovas will reveal much about our universe (these cataclysmic events are responsible for more than half the elements in the universe). Essentially three phenomena are being simulated to explore these explosions: hydrodynamics, nuclear burning or fusion, and neutrino transport, said UT astrophysicist Bronson Messer.

At the terascale, or trillions of calculations per second, Messer and his team were forced to simulate the star in 1-D as a perfect sphere and with unrealistic fusion physics. "Now, however, we are getting closer to physical reality," said Messer. "With petascale capability, we can simulate all three phenomena simultaneously with significant realism. This brings us closer to understanding the explosion mechanism and being able to make meaningful predictions."

From the physical makeup of the universe to the causes of global warming to the roles of proteins in disease, Kraken's increased computing muscle will reach far and wide.

As the main computational resource for NICS, the new system is linked to the NSF-supported TeraGrid, a network of supercomputers across the country that is the world's largest computational platform for open scientific research.

The system and the resulting NICS organization are the result of an NSF Track 2 award of \$65 million to the University of Tennessee and its partners to provide for next-generation high-performance computing (HPC). The award was won in an open competition among HPC institutions vying to guarantee America's continued competitiveness through the next generation of supercomputers (systems greater than 10 teraflops and into the petascale).

"While reaching the petascale is a remarkable achievement in itself, the real strides will be made in the new science that petascale computing will enable," said Thomas Zacharia, NICS principal investigator, professor in electrical and computer engineering at the University of Tennessee and deputy director for science and technology at Oak Ridge National Laboratory. "Kraken is a game changer for research."

Adapted from materials provided by National Institute for Computational Sciences, via EurekAlert!, a service of AAAS.

<http://www.sciencedaily.com/releases/2009/10/091008192739.htm>

Gout chemical slows Parkinson's

The chemical urate, which is known to cause gout, appears to slow the progression of Parkinson's disease, US researchers have concluded.



The team found that a study confirmed their previous suspicions about urate, which occurs naturally in the blood.

Urate is a potent antioxidant and so counteracts oxygen-related cell damage thought to contribute to Parkinson's, they report in *Archives of Neurology*.

Trials are under way to find a safe way to raise urate levels as a therapy.

With support from the Michael J Fox Foundation, the researchers will recruit 90 recently diagnosed Parkinson's patients for treatment with a chemical which helps to produce urate - called inosine - to see if this can raise urate levels so as to slow or halt disease progression.

“ This tells us that it is possible to influence the rate of disease progression. It's a new lead to follow ”

Dr Kieran Breen of the Parkinson's Disease Society

Diets which are rich in foods like liver, seafood and dried beans and peas, as well as alcohol, can also increase blood urate levels.

But too much urate in the blood can cause gout, a painful joint disease.

Dr Michael Schwarzschild and colleague Dr Alberto Ascherio originally made the link between urate and Parkinson's when analysing data from a previous clinical trial.

Their latest work confirms their hunch that urate is protective, they say.

New lead



They looked at samples of both blood and cerebrospinal fluid - the fluid that surrounds the brain and spinal cord - and measured urate levels.

Among the 800 Parkinson's patients in the study there was a clear trend linking higher urate levels and slower disease progression.

Dr Schwarzschild, associate professor of neurology at Massachusetts General Hospital in Boston, said: "Urate is a major antioxidant and it can protect brain cells in the lab, which makes this a compelling possibility; but we don't yet know if it's urate itself or some urate-determining factor that helps people with Parkinson's."

He said people should not take the findings to mean they should eat more urate-rich foods to guard against Parkinson's.

"Because elevated urate levels have known health risks, including gout and kidney stones, urate elevation should only be attempted in the context of a closely monitored clinical trial in which potential benefits and risks are carefully balanced," he said.

Dr Kieran Breen of the Parkinson's Disease Society said more research was needed.

"This tells us that it is possible to influence the rate of disease progression. It's a new lead to follow."

He said the findings might help find a therapy and markers to help track the disease.

He added that people treated for gout should not be concerned that the treatment would inadvertently increase their risk of Parkinson's.

"There is no evidence to suggest it would," he said.

Story from BBC NEWS:
<http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8302068.stm>

Published: 2009/10/12 23:07:39 GMT

