Infoteca's E-Journal

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Deep-sea Corals May Be Oldest Living Marine Organism

Geradia (gold) coral. (Credit: NOAA Hawaiian Undersea Research Lab)

ScienceDaily (Mar. 25, 2009) — Deep-sea corals from about 400 meters off the coast of the Hawaiian Islands are much older than once believed and some may be the oldest living marine organisms known to man.

Researchers from Lawrence Livermore, Stanford University and the University of California at Santa Cruz have determined that two groups of Hawaiian deep-sea corals are far older than previously recorded.

Using the Lab's Center for Accelerator Mass Spectrometry, LLNL researchers Tom Guilderson and Stewart Fallon used radiocarbon dating to determine the ages of Geradia sp., or gold coral, and specimens of the deep-water black coral, Leiopathes sp. The longest lived in both species was 2,740 years and 4,270 years, respectively. At more than 4,000 years old, the deep-water black coral is the oldest living skeletal-accreting marine organism known.

“And to the best of our knowledge, the oldest colonial organism yet found,” Guilderson said. “Based on the carbon 14, the living polyps are only a few years old, or at least their carbon is, but they have been continuously replaced for centuries to millennia while accreting their underlying skeleton.”

The research appears in the March 23 early online edition of the *Proceedings of the National Academy of Sciences*.

Using a manned deep-sea research submersible, the team used samples that were individually collected from the Makapuu and Lanikai deep-sea coral beds off the coast of Oahu, Keahole Point deep-sea coral bed off the coast of the Big Island and Cross Seamount about 100 miles south of Oahu.

Carbon dating uses radiocarbon (carbon 14) to date the age of an object. Radiocarbon is the most widely used geochronological tool in the earth sciences for the late Quaternary (the last 50,000 years).

Earlier radiocarbon studies showed that individual gold coral colonies from the Atlantic and Pacific oceans have life spans of 1,800 to 2,740 years, but the results remain contentious with some biologists. In

particular, some have questioned whether the corals feed on re-suspended sediment (which could be old) and not on recently photosynthesized carbon that falls through the water column, or that they grew faster and then stopped growing when they reached a certain size.

To answer these questions, the group analyzed not only polyps (the living animals that make up corals) but a branch of one specimen.

The living animals had the same carbon 14 concentration as the overlying surface water. This shows that the carbon in the polyps was recently photosynthesized in the surface prior to being “eaten” by the polyps. The skeleton's carbon 14 concentration mimicked that of the overlying surface water's 'post-bomb' time series: the time since the late 1950s when the testing of nuclear weapons augmented the natural abundance of carbon 14 in the atmosphere.

The radial growth rate during the last 50 years is similar to the long-term growth rate of the 300-year branch. The radial growth rate also is consistent with that derived from larger fossil samples. The radial growth rate is similar within a rather small range of tens of microns per year for all specimens analyzed.

In the recent research, the Geradia coral was assumed to be much younger when amino acid and growth band methods were used. With radiocarbon dating, the average life span of the analyzed specimens is 970 years and ranges from about 300 years for a small branch (with a radius of 11 millimeters) to about 2,700 years (with a radius of 38 mm).

“These ages indicate a longevity that far exceeds previous estimates,” Guilderson said. “Many of the Geradia samples that we have analyzed are branches, not the largest portions of the colony and so the ages may not indicate how old the entire individual is.”

Hawaiian deep sea corals face direct threats from harvesting for jewelry and from commercial fisheries that trawl the ocean bottoms. In addition, the close relationship between deep sea corals (and the mid-water ecosystems) and ocean's surface means that they can be affected by natural and manmade changes in surface ocean conditions including ocean acidification, warming and altered stratification.

The antiquity of the coral is an additional call for action, Guilderson said.

“The extremely long life spans reinforce the need for further protection of deep-sea habitat” he said. “The research has already had an impact for activities in Hawaiian waters where a harvesting and fishing moratorium has been enacted to protect certain areas. There are similar habitats in international waters and it is hoped that the results will provide the scientific basis for agreements under the Law of the Sea, and United Nations Environment Programme.”

Journal reference:

1. E. Brendan Roark, Thomas P. Guilderson, Robert B. Dunbar, Stewart J. Fallon, and David A. Mucciarone. **Extreme longevity in proteinaceous deep-sea corals**. *Proceedings of the National Academy of Sciences,* 2009; DOI: 10.1073/pnas.0810875106

Adapted from materials provided by DOE/Lawrence Livermore National Laboratory.
http://www.sciencedaily.com/releases/2009/03/090324091209.htm

How Much Is A Year of Life Worth?

By Eben Harrell

On the wall of Sir Michael Rawlins' office in London is a cartoon of a group of men in suits cowering below a giant circular pill inscribed with the word *pharma*. Amid the supplicants strides an impervious figure from Britain's National Institute for Health and Clinical Excellence (NICE) with a puzzled look on his face. Like the man in the cartoon, NICE head Rawlins doesn't see why drug companies should deserve any deference. His organization uses hard-nosed cost-effectiveness reviews to decide which treatments Britain's National Health Service (NHS) should pay for. A new drug doesn't just have to work to impress NICE, it has to offer value for money — and if it doesn't, whether it is life-saving or not, Rawlins' group won't approve it. With skyrocketing prescription prices bloating America's health-care system, many experts are now taking a hard look at whether America should embrace NICE's controversial methods. Rawlins talked to TIME about how NICE calculates a drug's worth, what its system might mean for the U.S. market and why drug companies are running scared:

Why is NICE needed? Shouldn't you get the drugs you need when you are sick, regardless of cost?
All health-care systems are facing the problem of finite resources and almost infinite demand. And all health-care systems have implicitly if not explicitly adopted some form of cost control. In the U.S. you do it by not providing health care to some people. We are best known [for looking] at a new drug, device or diagnostic technique to see whether the increment in the cost of that treatment is worth the increment in the health gain.

How is that measured?
It's based on the cost of a measure called the "quality-adjusted life year" [QALY]. A QALY scores your health on a scale from zero to one: zero if you're dead and one if you're in perfect health. You find out as a result of a treatment where a patient would move up the scale. If you do a hip replacement, the patient might start at .5 and go up to .7, improving by .2. You can assume patients live for an average of 15 years following hip replacements. And .2 times 15 equals three quality-adjusted life years. If the hip replacement costs 10,000 GBP [about $15,000] to do, it's 10,000 divided by three, which equals 3,333 GBP [about $5,000]. That figure is the cost per QALY.

So by the cost per quality-adjusted life year, you are basically deciding how much a year of life is worth?
Yes. The most controversial area is where you place the dividing line between what is cost-effective and

what is cost-ineffective. That is the "How much is life worth?" question. And there is no real empirical research to guide you. We have looked at what other government departments do. Our Department of Transport, for instance, has a cost-per-life-saved threshold for new road schemes of about 1.5 million GBP per life, or around 30,000 GBP per life year gained. The judgment of our health economists is that somewhere in the region of 20,000-30,000 GBP per quality-adjusted life year is the [threshold], but it's not a strict limit.

That's a tough decision to make for bureaucrats, is it not?
For many difficult questions, we capture public preferences by our citizens council, a representative sample drawn from the general public. For example, we asked if should we give greater priority to children than the elderly. The group decided that a year of life was worth just as much when you are a grandparent as when you are a child. That is very culturally specific and might not apply to other countries in the world.

Why doesn't NICE take into account other factors in its cost-effectiveness review, such as lost productivity to the workforce?
The quick answer is that our statutory instruments specify that we [should not]. But if you give advantage to people who are economically active, it means you disadvantage the economically inactive — the elderly. That's something that British society would find difficult to accept.

It seems like NICE is forcing pharmaceuticals to play ball by offering special discounts to Britain. How do you manage that?
Our list price is used as a reference price in other countries, so drug companies believe that a no from NICE is damaging globally. So they set up what we call "patient-access schemes." Drug companies may either give away certain portions of treatment [such as the last few doses of a course] or reimburse the NHS for those patients who don't respond, which has the effect of reducing the price of the drug and lowering the cost per QALY — even though the reference price stays the same.

If the U.S., with its massive health-care market, did the same, could it have a transformative effect on drug costs?
I think it could. The companies won't like it in America. But yes, it could.

And you don't buy the drug companies' arguments that doing so will destroy their research-and-development budgets?
Drug development has become so expensive it's going to become unaffordable no matter what happens. A lot of the expense is a consequence of the drug-regulatory authorities, who pile on regulation after regulation, which makes getting a drug to market hugely expensive. But the expectations of investors have to be tempered as well. The 15-20% [growth] of some companies is not going to be possible in the future. A third of staff of some big pharmacy companies work in marketing, and many companies spend twice as much on marketing as R&D. That has got to go. I mean for Christ's sake, it's hopeless.

http://www.time.com/time/health/article/0,8599,1888006,00.html

Steaming hot tea linked to cancer

Drinking steaming hot tea has been linked with an increased risk of oesophageal (food tube) cancer, Iranian scientists have found.

The British Medical Journal study found that drinking black tea at temperatures of 70C or higher increased the risk.

Experts said the finding could explain the increased oesophageal cancer risk in some non-Western populations.

Adding milk, as most tea drinkers in Western countries do, cools the drink enough to eliminate the risk.

The oesophagus is the muscular tube that carries food from the throat to the stomach.

Oesophagus cancers kill more than 500,000 people worldwide each year and oesophageal squamous cell carcinoma (OSCC) is the most common type.

Tobacco and alcohol are the main factors linked to the development of oesophageal cancers in Europe and America.

But it has not been clear why other populations around the world have high rates of the disease although there has been a theory that regularly drinking very hot drinks damages the lining of the gullet.

A litre a day

Golestan Province in northern Iran has one of the highest rates of OSCC in the world, but rates of smoking and alcohol consumption are low and women are as likely to have a diagnosis as men. Tea drinking, however, is widespread.

The University of Tehran researchers studied tea drinking habits among 300 people diagnosed with OSCC and compared them with a group of 570 people from the same area.

Nearly all participants drank black tea regularly, on average drinking over a litre a day.

" **A regular habit of eating and drinking very hot foods and drinks could increase your risk of developing cancer of the oesophagus** "
Oliver Childs, Cancer Research UK

Compared with drinking warm or lukewarm tea (65C or less), drinking hot tea (65-69C) was associated with twice the risk of oesophageal cancer, and drinking very hot tea (70C or more) was associated with an eight-fold increased risk.

The speed with which people drank their tea was also important.

Drinking a cup of tea in under two minutes straight after it was poured was associated with a five-fold higher risk of cancer compared with drinking tea four or more minutes after being poured.

There was no association between the amount of tea consumed and risk of cancer.

Because the researchers had relied on study participants to say how hot their tea was, they then went on to measure the temperature of tea drunk by nearly 50,000 residents of the same area.

This ranged from under 60C to more than 70C, and reported tea drinking temperature and actual temperature was found to be similar.

Tea lovers

Writing in the BMJ, the researchers led by Professor Reza Malekzadeh, said: "Our results showed a noticeable increase in risk of oesophageal squamous cell carcinoma associated with drinking hot tea.

"A large proportion of Golestan inhabitants drink hot tea, so this habit may account for a substantial proportion of the cases of oesophageal cancer in this population."

Previous studies from the UK have reported people prefer their tea to be about 56-60C - cool enough not to be risky.

In a BMJ editorial, David Whiteman from the Queensland Institute of Medical Research in Australia said: "The mechanism through which heat promotes the development of tumours warrants further exploration and might be given renewed impetus on the basis of these findings."

Dr Whiteman advised tea-drinkers to simply wait a few minutes for their brew to cool from "scalding" to "tolerable".

Oliver Childs, a spokesman for Cancer Research UK, said: "Tea drinking is part of many cultures, and these results certainly don't point to tea itself being the problem.

"But they do provide more evidence that a regular habit of eating and drinking very hot foods and drinks could increase your risk of developing cancer of the oesophagus."

He added: "People in this region of northern Iran often drink very hot tea as part of their daily routine. We're a nation of tea lovers in the UK, but we don't tend to drink tea at such high temperatures and we usually add milk, which cools it down."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7965380.stm

Published: 2009/03/27 00:02:25 GMT

Longer schooling 'cuts dementia'

The raising of the school leaving age to 15 over 50 years ago could go some way to reducing dementia rates in the elderly, a study has suggested.

A Cambridge University team compared the mental abilities of elderly people, and found those born after the change fared better.

They say that further changes to the school leaving age could improve mental abilities and curb dementia rates more.

Experts said more information on how education affected dementia was needed.

" **It's not going to prevent what is essentially an epidemic of dementia, but it may mean it might not be quite as bad as we have predicted** "
Dr David Llewellyn, Cambridge University

Around 700,000 people in the UK currently have dementia. Experts have estimated that by 2051, the number could stand at 1.7m.

In this study, researchers compared a group of over 9,000 people aged over 65 tested in 1991 with over 5,000 over-65s tested in 2002

They were all given a standard test used to detect early signs of dementia, which involves naming as many animals as possible within a minute.

The researchers identified a small but potentially significant increase in the number of words a minute people used in the later group.

Projection

Poor cognitive function is known to be linked to developing dementia, and it is already known that dementia is less likely in people who been educated for longer.

Previous research has shown that education is beneficial because it increases the number of neural connections in the brain.

The school leaving age was set at 15 in 1947, rising to 16 in 1972. The government announced two years ago that, by 2015, teenagers would have to stay in education or training until they were 18.

Writing in the journal Aging, Neuropsychology and Cognition, the researchers say "The increase in educational levels that we observed is consistent with changes in the mandatory school leaving age in England."

Other factors including fewer heart attacks, increased prescription of drugs to reduce high blood pressure, fewer people smoking and improvements in early life nutrition are also likely to have had an effect on the cognitive abilities of the 2002 group.

SCHOOL RULES

1918 - full-time education compulsory for children aged five to 14
1947 - leaving age raised to 15
1972 - leaving age goes up to 16
2015 - teenagers will have to stay in education or training until they are 18

Dr David Llewellyn, who led the study, said: "Dementia happens when people decline cognitively to the point where it interferes with their ability to do basic things like cook.

"It tends to happen later in life, but the changes that lead to it tend to start much earlier.

"These findings are important because they affect our projection of what's likely to happen in the future.

"It's not going to prevent what is essentially an epidemic of dementia, but it may mean it might not be quite as bad as we have predicted."

Dr Llewellyn said changes to the school leaving age after the period covered in the study would should also lead to improvements in cognitive abilities, and therefore mitigate dementia rates.

And he added: "When talking about what we should do in terms of education and changes to the school leaving age, this kind of study should feed into it."

But Neil Hunt, chief executive of the Alzheimer's Society said: "Whilst we have a lot of really good evidence on healthy lifestyles and the fact that they can decrease risk of dementia, there isn't enough evidence on education and dementia to draw any conclusions.

"We know conditions such as diabetes and obesity are on the rise and that they increase people's risk of dementia - unfortunately this may have the opposite effect. "

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7968131.stm

Published: 2009/03/28 00:03:33 GMT

Wind-powered car breaks record

A British engineer from Hampshire has broken the world land speed record for a wind-powered vehicle.

Richard Jenkins reached 126.1mph (202.9km/h) in his Greenbird car on the dry plains of Ivanpah Lake in Nevada.

Mr Jenkins told the BBC that it had taken him 10 years of "hard work" to break the record and that, on the day, "things couldn't have been better".

American Bob Schumacher set the previous record of 116 mph in 1999, driving his Iron Duck vehicle.

"It's great, it's one of those things that you spend so long trying to do and when it actually happens, it's almost too easy," Mr Jenkins told the BBC.

The Greenbird is a carbon fibre composite vehicle that uses wind (and nothing else) for power. The only metalwork used is for the wing bearings and the wheel unit.

Sail away

The designers describe it as a "very high performance sailboat" but one that uses a solid wing, rather than a sail, to generate movement.

Mr Jenkins, from Lymington, spent 10 years designing the vehicle, with Greenbird the fifth vehicle he has built to try to break the record.

Due to the shape of the craft, especially at such high speeds, the wings also provide lift; a useful trait for an aircraft, but very hazardous for a car. To compensate for this, the designers have added small wings to "stick" the car to the ground, in the same way Formula 1 cars do.

"Greenbird weighs 600kg when it's standing still," said Mr Jenkins. "But at speed, the effect of the wings make her weigh just over a tonne."

Richard Jenkins spent much of his childhood sailing on the South Coast of England and from the age of 10 was designing what he calls "radical contraptions".

He has also built a wind powered craft that travels on ice, rather than land.

"Now that we've broken the record, I'm going back on to the ice craft. There's still some debate as to whether travelling on ice or land will be faster," he said

"But I think we've got some time. 126.1 mph was a good margin to beat the record and I think it will be some time before anyone else breaks it."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/technology/7968860.stm

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Reinventing America's Cities: The Time Is Now

By NICOLAI OUROUSSOFF

THE country has fallen on hard times, but those of us who love cities know we have been living in the dark ages for a while now. We know that turning things around will take more than just pouring money into shovel-ready projects, regardless of how they might boost the economy. Windmills won't do it either. We long for a bold urban vision.

With their crowded neighborhoods and web of public services, cities are not only invaluable cultural incubators; they are also vastly more efficient than suburbs. But for years they have been neglected, and in many cases forcibly harmed, by policies that favored sprawl over density and conformity over difference.

Such policies have caused many of our urban centers to devolve into generic theme parks and others, like Detroit, to decay into ghost towns. They have also sparked the rise of ecologically unsustainable gated communities and reinforced economic disparities by building walls between racial, ethnic and class groups.

Correcting this imbalance will require a radical adjustment in how we think of cities and government's role in them. At times it will mean destruction rather than repair. And it demands listening to people who have spent the last decade imagining and in many cases planning for more sustainable, livable and socially just cities.

The changes needed may seem extravagant, but they are not impossible. Many of those who see the current economic crisis as a chance to rebuild the country's infrastructure have pointed to previous major government public works projects, like Franklin D. Roosevelt's Works Projects Administration in the 1930s and 1940s and Dwight D. Eisenhower's 1956 National Interstate and Defense Highways Act, as a reminder of what this country was once capable of.

Although the W.P.A. is mostly associated with rural dams and roadways, there's hardly a city in America where it didn't leave its mark, from riverfront parks to schools and housing projects.

Eisenhower's investment in highways was equally audacious, but its effect on cities has not always been positive; in many ways the Highways Act set the stage for decades during which suburban interests trumped urban ones.

Inspired by the German autobahn, which Eisenhower saw firsthand during World War II, the program was an attempt to retool the country's immense military-industrial complex for a peacetime economy. Creating thousands of miles of intercity highways, the program fueled America's postwar car culture and suburban sprawl, in addition to changing permanently the way towns and cities have evolved.

Most notably it accelerated certain seismic cultural shifts born of the cold war and the civil rights era by creating the means by which middle-class families would flee perceived urban threats — racial friction, potential Soviet bombs — for the supposed security of the suburbs. In many cities intracity highways became dividing lines between white and black.

In New Orleans, for example, the 10 Freeway bulldozed through one of the city's most vibrant African-American communities, becoming a psychological barrier between the black middle-class Treme neighborhood and the tourist-infested French Quarter. The Santa Monica Freeway, built around the same time, walled off poor African-American areas like Crenshaw and South Central from the rest of the city to the north.

By the early 1980s, when both President Obama and I were in college, the anti-big-government, pro-privatization rhetoric of the Reagan years was catching on, and the entire notion of public spending, let alone spending on large public works projects, was becoming passé.

In many major cities this void was filled by private developers, who began refurbishing parks and old historic quarters. The result was sanitized versions of real cities organized around themed districts, convention centers and sports complexes. Meanwhile the roads, bridges and sewer systems that held these cities together were allowed to disintegrate.

At the same time Europe and Asia began to supplant America as places where visions of the future were being built. The European Union spent decades building one of the most efficient networks of high-speed trains in the world, a railway that has unified the continent while leading to the cultural revival of cities like Brussels and Lille. And environmental standards for new construction were not only encouraged, they became the law — and have been for more than a decade.

This investment in traditional large-scale infrastructure projects is increasingly being coupled with serious thinking about the future of cities themselves. The Swedish government recently began a promising competition for a design that would replace a decrepit 1930s-era bridge in the heart of Stockholm with a seamless system of locks, roadways and shops. In Madrid the government is completing a plan to bury a four-mile strip of freeway underground and cover it up with parks and new housing. And only a few weeks ago the French government concluded a nine-month study on the future of metropolitan Paris. The study, which included some of Europe's most celebrated architects, is the first phase in a plan to create a more sustainable, socially integrated model of "the post-Kyoto city."

Even China, a country where centralized planning often looks like a grotesque parody of American postwar development, is beginning to move toward more sustainable, dense urban models. The government recently announced an $88 billion plan for freight and passenger trains that will link every major urban center along the country's coast, from Beijing to the Pearl River Delta. And it is building miles of subway lines in booming cities like Shenzhen and Guangzhou.

The problem in America is not a lack of ideas. It is a tendency to equate any large-scale government construction project, no matter how thoughtful, with the most brutal urban renewal tactics of the 1950s. One result has been that pioneering projects that skillfully blend basic infrastructure with broader urban needs like housing and park space are usually killed in their infancy. Another is that we now have an archaic and grotesquely wasteful federal system in which upkeep for roads, subways, housing, public parkland and our water supply are all handled separately.

With money now available to invest again in such basic needs, I'd like to look at four cities representing a range of urban challenges and some of the plans available to address them. Though none of the plans are ideal as they stand today (and some of them represent only the germ of an idea), evaluated and addressed together as part of a coordinated effort, they could begin to form a blueprint for making our cities more efficient, sustainable and livable.

New Orleans

In the immediate aftermath of Hurricane Katrina architects and urban planners all over the country began a spirited investigation of how to make New Orleans safer and more sustainable. The nonprofit Urban Land Institute, devoted to urban issues, presented a report a few months after the storm, based purely on the city's topography, that proposed returning some of its most devastated low-lying areas to wetlands and concentrating more housing on higher ground — a plan that would, among other things, reduce the burden on the levees and canals that protect the city from storms.

At the same time local architects and preservationists began a campaign to preserve the layers of historical fabric that had been damaged by or lost in the storm, including downtown's Art Deco Charity Hospital, some early Modernist schools, New Deal-era public housing and the Ninth Ward's shotgun houses, as well as the Spanish-influenced architecture of the French Quarter.

Even some private developers seemed to understand the importance of balancing social and environmental concerns. Sean Cummings, a local developer, has proposed a master plan for a six-mile-long park on a site along the city's riverfront, currently a strip of decrepit wharfs, abandoned warehouses and parking lots.

Designed by a formidable team of architects that includes Enrique Norten, George Hargreaves, Alex Krieger and Allen Eskew, the proposal is a model of how to knit together conflicting urban realities. A matrix of public parks, outdoor markets and mid-rise residential towers is woven through the existing fabric of old warehouses. Landscaped boulevards would extend from the park into a mix of working-class and gentrified neighborhoods. What's more, concentrating more housing on high land along the river fit nicely with the Urban Land Institute's vision for a more sustainable city.

So far none of these initiatives have achieved much traction. Local communities attacked (understandably) the institute's plan as insensitive to the populations it sought to relocate. Subsequently the idea of adjusting the city's footprint in any way became politically toxic, and Mayor C. Ray Nagin quickly made it clear that the city's redevelopment would be left in the hands of private interests.

Mr. Cummings has received $30 million in federal funds for the first phase of his riverfront plan. But the money is solely for park construction, and so far the project doesn't include the subsidized housing that would prevent it from becoming an enclave for upper-middle-class whites.

Meanwhile the Department of Housing and Urban Development recently began bulldozing thousands of units of New Deal-era public housing over the objections of many local activists, while the Army Corps of Engineers is shoring up existing canals and levees as if the city were going to grow back to its original size — something no sane person believes.

Even so, the fate of New Orleans has yet to be determined. Many of the city's low-lying areas are as barren now as they were a week after the storm. And it's still possible to imagine a more sustainable, socially inclusive city, one that could serve as a model as powerful and far reaching as the American subdivisions of the 1950s. For that to happen, however, a range of government agencies would need to work together to come up with a more coordinated plan.

Los Angeles

Los Angeles has not suffered the trauma of New Orleans, but it is a city famously devoid of a functioning public transportation network and public parkland. These deficiencies will only become more glaring as the city's population continues to boom.

As far back as the 1930s Frederick Law Olmsted Jr. proposed digging up parts of the Los Angeles River's concrete bed and transforming its banks into a necklace of parks that would extend most of the 51 miles from the San Fernando Valley through downtown Los Angeles to Long Beach and provide green space for some of the city's poorest neighborhoods.

Almost 70 years later the Los Angeles City Council, prodded by a mix of local advocates and architects, revived that vision. Recognizing that the river has become both an industrial blight and an impenetrable barrier between the Latino neighborhoods of East Los Angeles and the white enclaves of downtown, the council developed a plan that would tear out part of the concrete bed and return it to its natural state, while repaving other areas in stone. At some points the sides of the riverbed would step down to allow for landscaped walkways. Parks and bike paths would be built along the banks.

So far, however, there is little money to pursue the plan. About $6 million in state grants to help develop the greenway were postponed in December. And so far the federal government has allotted only enough money for the Corps of Engineers, which oversees the river, to continue a feasibility study for concrete removal.

According to Ed P. Reyes, a member of the City Council and a major sponsor of the plan, an investment of $100 million would allow the city to complete a significant section of the plan near downtown, which would provide valuable parkland to one of the city's poorest neighborhoods and also offer the public a tangible example of the project's transformative power.

Wilshire Boulevard is another favorite cause for the architects and city planners of Los Angeles. In the early 1990s Frank Gehry and I took a drive down the city's once-great commercial spine, which stretches 16 miles from downtown Los Angeles to Santa Monica.

Mr. Gehry guided me through the range of communities that the boulevard intersects, from the Latino neighborhoods near MacArthur Park to Koreatown to the many cultural institutions that include the Wiltern Theater, the Los Angeles County Museum of Art and the Hammer Museum. The philanthropist Eli Broad is currently planning yet another museum at the corner of Wilshire and Santa Monica Boulevards in Beverly Hills.

Mr. Gehry suggested that by concentrating more public transportation and cultural institutions along this thoroughfare, Los Angeles might finally find its center, both geographically and socially.
He is not alone in this fantasy. Los Angeles has the most talented cluster of architects practicing anywhere in the United States, and at one point or another most of them have invested significant brain power in figuring out how to remake Wilshire Boulevard. Michael Maltzan has looked at how new public school construction could be connected to the public transportation network along Wilshire, a plan that not only would be cost effective but also could begin healing some of the city's deep class divisions.
There was an ideal moment, about a decade ago, when this vision might have taken hold; the county's Metropolitan Transit Authority was just then in the midst of constructing a federally financed multibillion-dollar metro system, including a line that would have run the length of Wilshire Boulevard. The Los Angeles Unified School District was building scores of new schools. And the city's rapid growth had led to a boom in new development.
Work on the metro ground to a halt several years ago after costs spiraled out of control, and when it was discovered that the district's flagship school had been built on a toxic waste site, the agency quickly scaled back its goals.
Now a new mayor, Antonio Villaraigosa, is trying to revive the idea of expanding the metro. Without an overhaul of the city's transportation network it is only a matter of time before the city breaks down, a victim of pollution and overcongestion. A citywide plan that anchored Los Angeles along two major axes — the green river and the asphalt boulevard — could save it from becoming a third world city.
The Bronx
Smaller projects too can have a powerful impact on a region's identity. In the South Bronx the nonprofit Pratt Center for Community Developmenthas been fighting to demolish parts of the Sheridan and Bruckner Expressways. The Sheridan, which forms a barrier between poor Puerto Rican and Dominican communities in the South Bronx and the Bronx River, was a particular brutal example of Robert Moses' urban renewal projects. Had it been completed, it would have torn through part of the Bronx Zoo.
When state officials unveiled a plan in 1997 to expand the expressway's entry ramps, easing truck traffic to the city's commercial food markets, the community rebelled, and Pratt began to develop a counterplan that would dismantle the expressway altogether and free up 28 acres of land. More specifically, the plan would extend local streets across the site to a new riverfront park, provide up to 1,200 units of affordable housing, create a new sewage facility and restore wetlands along the river. Commercial development could be linked to a planned commuter train station.
Not long ago the state agreed to consider the plan. But even if the plan is adopted, it is not yet clear who would pay for one of its most critical components, the housing, which in the past would have simply been turned over to private developers. What is more, the plan essentially remains a sketch; it still lacks the design elements that could bring it fully to life.
Buffalo
Perhaps the most intriguing test case for reimagining our failing cities is in Buffalo, where the federal government is pressing ahead with a plan to expand its border crossing facilities. The city was once a center of architectural experimentation, with landmarks by virtually every great American architect of the late 19th and early 20th century. Frederick Law Olmsted Sr., the father of American landscaping, created a string of elegant public parks intended for the city's factory workers.
Like other Rust Belt cities, Buffalo began its decline more than a half-century ago, a victim of failing industries and suburban flight. Large sections of Olmsted's parks and boulevards were demolished; an elevated expressway sliced through one of these parks, cutting it off from the riverfront; many of downtown's once-proud buildings were left abandoned.
Yet rather than reverse that trend, the government now seems determined to accelerate it. The Homeland Security Department is planning to expand an area at the entry to the Peace Bridge to make room for new inspection facilities and parking. That plan would require the demolition of five and a half blocks in a diverse working-class neighborhood with a rich architectural history, from late-19th-century Italianate mansions to modest two-family homes built in the 1920s.
Local preservationists argue that protecting the city's historic neighborhoods is fundamental to the city's survival. Pointing out that bridge traffic is steadily shrinking, they are pressing the government to upgrade the train system and dismantle parts of the elevated freeway to allow better access to the riverfront. Not only would they like to see Olmsted's late-19th-century vision restored; they would also like to see it joined to a more comprehensive vision for the city's future.

At this point there is no concrete plan to counter the government's, but the potential is great. The city's architectural fabric is rich. It has an active grass-roots preservation movement. And few sites better sum up the challenges of trying to save a shrinking city. I for one would love to see what a talented architect could accomplish if his imagination were given free rein over such a promising site.

Getting the projects I've described off the ground is not as impossible as it may seem. Only last week the federal Departments of Transportation and Housing and Urban Development announced the creation of an urban task force that would promote the development of sustainable communities linked to public transportation — a small but encouraging step in advancing a more integrated approach to urban growth.

In September the White House and Congress will also have a rare opportunity to rethink the antiquated transportation authorization bill, which comes up for review once every six years and funnels hundreds of billions of dollars each year into highway construction and repairs.

Given that the administration has already made sustainability a priority, that money could be redirected to other projects, like efforts that reinforce density rather than encourage urban sprawl. It could be used to replace crumbling expressways with the kind of local roads and parks that bind communities together rather than tear them apart.

I am also a fan of a National Infrastructure Bank, an idea that was first proposed by the financiers Felix Rohatyn and Everett Ehrlich.

The bank would function something like a domestic World Bank, financing large-scale undertakings like subways, airports and harbor improvements. Presumably it would be able to funnel money into the more sustainable, forward-looking projects. It could also establish a review process similar to the one created by the government's General Services Administration in the mid-1990s, which attracted some of the country's best talents to design federal courthouses and office buildings. Lavishing similar attention on bridges, pump stations, trains, public housing and schools would not only be a significant step in rebuilding a sense of civic pride; it would also prove that our society values the public infrastructure that binds us together as much as it values, say, sheltering the rich.

A half-century ago American engineering was the envy of the rest of the world. Cities like New York, Los Angeles and New Orleans were considered models for a brilliant new future. Europe, with its suffocating traditions and historical baggage, was dismissed as a decadent, aging culture.

It is no small paradox that many people in the world now see us in similar terms.

President Obama has a rare opportunity to build a new, more enlightened version of this country, one rooted in his own egalitarian ideals. It is an opportunity that may not come around again.

http://www.nytimes.com/2009/03/29/arts/design/29ouro.html?_r=1&th&emc=th

Hard Times

By EDMUND WHITE

EVERYTHING RAVAGED, EVERYTHING BURNED

By Wells Tower

238 pp. Farrar, Straus & Giroux. $24

In the nine stories in his first book, Wells Tower has invented a world of rough men and strong women. Often the men are older, battered, no longer successful, and the women have had their patience sorely tried. The husband's affair in "The Brown Coast" is discovered in a novel way — when his wife realizes that the small footprint on the front window of their car doesn't match her own. After she throws him out of the house, he retreats to his uncle's shack on a rocky, unappealing island in Florida. The narrator of "Retreat" has been through two amiable divorces and is now living on a mountain in Maine that he plans to subdivide into one-acre plots, suitable for men like himself. He thinks there are probably lots of them out there, "sad, paunchy hordes" of them,"nightly pacing carpeted apartments from Spokane to Chattanooga, frantic for escape hatches of their own."

Although the narrator and his nerdy music therapist brother have always been almost murderous rivals, when he calls to invite him for a visit ("From Stephen's end came the sound of someone doing violence to a tambourine") the invitation is accepted. But it's no surprise that everything turns out badly. Stephen's plane arrives when it's not expected; stranded in a muddy field, he's already fuming. The next day, the two brothers go hunting with a neighbor and — well, I don't want to spoil the story, but let's just say things don't turn out as expected.

In "Down Through the Valley," Jane has left the narrator for her meditation teacher, Barry, and has taken their daughter off with them to an ashram. When Jane undergoes a long "isolation" at the retreat and Barry breaks his ankle, the narrator is persuaded to drive Barry and the little girl back home. The situation that ensues is fraught — and ultimately violent — but along the way there are hilarious insights into the

feelings of two male rivals. “No belly,” the narrator reports, checking out Barry, “smooth skin, full head of hair, better-looking than me.” When Barry picks up the child to carry her to the car, the narrator sourly observes that this practiced gesture “showed he’d held her like this many times before.” Nor can the narrator stop conjuring up images of Barry the Meditation Meister in bed with compliant Jane: “You don’t want to get into thoughts about Hovering Butterflies or the Jade Stalk, or the Door of the Holy Abode, when you can remember one time, a few times actually, when you came home late under a fair amount of liquor and you got on top of your sleeping wife going, ‘Come on, Mother, can’t we poon?’ ”
If the narrators and antiheroes of Tower’s stories are half-defeated he-men, bumbling and only partly tamed, then their rivals or antagonists are self-satisfied shamans or therapists or frontier socialists. In “Leopard,” a young boy has a hateful stepfather who does nothing but make mulch and think up chores for the kid to perform. Addressing himself in the second person, the boy thinks, “As a young liar, you can generally get pretty far on the assumption that adults have more important things to worry about than catching out a kid for every little fraud he tries to pull. But your stepfather seems to have plenty of time to study and doubt everything that comes out of your mouth.”
If the intersection between hotheads and cool customers is one of the aspects of Tower’s fiction, another is class conflict. In the story called “Wild America,” a middle-class girl flirts with a louche stranger who plies her with beer, and for a moment she forgets the ordinariness of her life. But when he drives her home, her heart sinks:
“At the sight of her father, the fear went out of Jacey, and cold mortification took its place. There he stood, not yet 40, bald as an apple, and beaming out an uncomprehending fat-boy’s smile. His face, swollen with a recent sunburn, glowed against the green dark of the rosebushes at his back. He wore the cheap rubber sandals Jacey hated, and a black T-shirt airbrushed with the heads of howling wolves, whose smaller twin lay at the bottom of Jacey’s closet with the price tag still attached. Exhausted gray socks collapsed around his thick ankles, which rose to the familiar legs Jacey herself was afflicted with, bowed and trunk-like things a lifetime of exercise would never much improve. Her humiliation was sudden and solid and without thought or reason. But the wordless, exposed sensation overwhelming her was that her father wasn’t quite a person, not really, but a private part of her, a curse of pinkness and squatness and cureless vulnerability that was Jacey’s right alone to keep hidden from the world.”
I quote this passage at such length because it reveals all the tensile strength of Tower’s remarkable style. His syntax, though always easy to follow, is supple enough to wrap itself around several shades of meaning in the same sentence. His understanding of previously under-recognized feelings (in this case, the humiliation of family resemblance) is rich in detail and passionate in utterance. And his familiarity with the whole ghastly world of malls and “cute” commercial culture is serious, even plangent, certainly not merely satirical.
Every one of the stories in “Everything Ravaged, Everything Burned” is polished and distinctive. Though he’s intrigued by the painful experiences of men much older than he is, Tower can write with equal power about young women and boys; about hell-raising, skull-bashing ancient Vikings and an observant housebound old man of the 21st century, even about a cheerful, insouciant pedophile. His range is wide and his language impeccable, never strained or fussy. His grasp of human psychology is fresh and un-Freudianizing.
Ezra Pound once said that the most memorable passages are those that encapsulate kinetic movement rather than static images. He would have liked Tower’s description of a power boat as it “bullied its way through the low swells, a fat white fluke churning up behind us.” And he’d have appreciated Tower’s rendition of a broken exhaust, which sounds “like someone in a suit of armor getting dragged up the street.” Tower’s dialogue is as crisp and contemporary and offbeat as Lorrie Moore’s and his vision of America as despairing as Joy Williams’s (to cite just two of our greatest short story writers).
I once wondered why Surrealism never really caught on as a literary strategy in America. Wells Tower makes me think that nothing bizarre someone might dream up could ever be as strange as American life as we live it. The “beyond” that the Surrealists talked about so much, the au-delà, is America itself.
Edmund White’s most recent books are a novel about Stephen Crane, “Hotel de Dream,” and a short life of Rimbaud. He has just finished “City Boy,” a memoir about New York in the 1970s.

http://www.nytimes.com/2009/03/29/books/review/White-t.html?ref=books

Examining Chinese Identity

By BENJAMIN GENOCCHIO

What is meant by "Chinese" art in our age of globalization and transnational migration? To answer that question, Jerome Silbergeld, Cary Y. Liu and Dora Ching, the curators of "Outside In: Chinese x American x Contemporary Art" at the Princeton University Art Museum, have selected six artists who are all United States citizens but have some connection to China. The result is a smart, visually impressive but somewhat strange and idiosyncratic exhibition.

Four of the artists are ethnically Chinese but either live or have lived in the United States. One is an American living in China; another is an American-born Vietnamese living in Everett, Wash., who has adopted Chinese art and culture as her own. I am all for shaking up the categories of national identity and cultural affiliation, but I wonder how this group can realistically be said to exemplify contemporary Chinese art or, as the catalog puts it, "Chinese-ness."

Putting aside these issues (dealt with in more detail in the 300-page catalog), this is a handsome show that expands our understanding of Chinese art beyond the roster of experimental artists who tend to dominate art fairs and museum surveys. Here the emphasis is on artists working in what might be called traditional media, in particular ink and brush painting.

This last point is important, because for too long the American public has been given only a partial view of contemporary Chinese art. We definitely need to take into account that many artists in China continue to specialize in traditional ink and brush painting. Their art is little known or even shown outside their own country. That needs to change.

Ink painting of one kind or another dominates the first room of the show, which includes one or two examples of work by all six artists; it is a thematic grouping, though the three exhibition themes (Diversity, Stylistic Origins and Outside In) don't really help us interpret the material. Fortunately, text panels and wall labels are useful in understanding the 50 or so pieces, including paintings, drawings and sculpture.

One especially lovely work in this first room is "Bridge to Heaven" (2006) by Arnold Chang, who was born in 1954 in New York and has worked as an art dealer at auction houses and commercial galleries. These days he paints full time, producing ink-on-paper scrolls of traditional Chinese landscapes — mountains and rivers. The emphasis is on the brushwork, the DNA of Chinese ink painting.

Nearby is Liu Dan's "Bamboo Cabinet" (2002), a sweet, sensual ink painting of a Ming-period cabinet. Born in China in 1953, the artist moved to Hawaii in 1981, then to New York in 1993. His work tends to be realistic in style, though having returned to Beijing recently, he also paints imaginative landscape

scrolls in ink. Several fine examples of these are in subsequent exhibition rooms, among them "Wangchuan Villa" (2000).
Zhang Hongtu moved from China to New York in 1982. He lived for a time in New Jersey, but now lives in New York. His painting and sculptures combine references to Eastern and Western art, giving them a Chinese voice while making reference to the experience of living elsewhere. On display here is "The Bikers" (2001), two hanging scrolls depicting computer-generated imagery of urban bicycle riders superimposed on a traditional Chinese landscape painting.
Born in China in 1959, Zhi Lin traveled in 1987 on a scholarship to London, where he stayed following the massacre of pro-democracy demonstrators in Tiananmen Square in 1989. He made his way to Seattle, where he now makes figurative paintings rooted in the tradition of social protest art. Showing here are sketches and paintings from his "Five Capital Punishments in China" series (1993-2007); the elaborate means of administering capital punishment is a theme in classical Chinese art.
Rounding out the roster of artists are Michael Cherney, an American living in Beijing who makes traditional-looking Chinese hand scrolls, books and albums using photographs of Chinese landscape imagery, and Vannessa Tran, a Vietnamese-American who produces subtle oil paintings of flowers and landscape imagery. Their works are nice enough to look at, though their presence can be confusing, given that neither of them is Chinese.
Still, Mr. Cherney's photographic books have an immediate, palpable connection to place; he is one of only two artists in this show living in China. The overly scholarly curatorial thesis also seems to come alive in them: They invite consideration of a world in which cultural identity is as much a product of imagination as birth.

"Outside In: Chinese x American x Contemporary Art," Princeton University Art Museum, through June 7. Information: princetonartmuseum.org or (609) 258-3788.

http://www.nytimes.com/2009/03/29/nyregion/new-jersey/29artsnj.html?ref=design

Shedding Some Sunlight on North Fork Painters

By BENJAMIN GENOCCHIO

The artists associated with Impressionism in France left a legacy so great that we are still unraveling all its effects and influences. In addition to inventing many new modes of artistic expression, they headed out into the countryside, recording the pristine beauty as European cities were rapidly industrializing. In part, they sought to capture and preserve remnants of a vanishing world.

Not too much later in America, artists pursued a similar ambition on the North Fork and South Fork of Long Island, where with oil paints, easels and brushes hauled from city studios, they painted the sea, marshes and dunes. By the end of the 19th century, a few artists had set up colonies in the Hamptons. Several bought properties there and increasingly began to call the area home.
Although much has been written about the many artists drawn to the South Fork, especially those associated with Abstract Expressionism, comparatively little attention has been paid to the longstanding presence of artists on the North Fork. Here the art scene was quite different, as a lovely new exhibition at the Long Island Museum of American Art, History and Carriages demonstrates.
Organized in collaboration with the Southold Historical Society, "A Shared Aesthetic: Artists of Long Island's North Fork" provides a chronological overview of the many artists who came to paint and live on the North Fork of Long Island from about the mid-19th century to the present. It is by no means exhaustive, and some of the works on view do not necessarily represent each artist's very best. But combined with the scholarly catalog, it is a major contribution to the study of Long Island's art history. The catalog in particular will be of enduring significance, for it provides the first comprehensive study of North Fork artists, documenting their homes and studios and even their relationship to the community. In addition to essays by local history buffs and art historians, the catalog also contains biographies of more than 275 North Fork artists, most of them either forgotten or unknown. (Artists' biographical details sometimes vary depending on the source; the information given here comes from the catalog.)
In some ways, the show is a scaled-down version of the catalog, with works divided in the gallery according to section headings from the book's table of contents. We begin with "The Early Years," a

section including portraiture of prominent 19th-century citizens living and working on the North Fork, like Moses Conklin Cleveland of Southold, who commissioned his portrait from Orlando Hand Bears (1811-1854), who was based in Sag Harbor. There are also many charming landscapes by itinerant painter-illustrators.

Some of the most appealing works in this room are two small, little-known pencil sketches of Long Island landscapes by Alfred Rudolph Waud (1828-1891), a well-known Civil War artist whose drawings and illustrations appeared in magazines like Harper's Weekly and The New York Illustrated News. He traveled all across eastern Long Island during the 1870s, sketching outdoor scenes of Greenport and Southold, among other places. He was one of the most talented early artists to work on the North Fork.

Two other works in this section are worth mentioning, beginning with "Montauk Point" (1885), a nicely composed landscape painting by Lemuel Maynard Wiles (1826-1905), a largely self-taught painter and the father of Irving Ramsey Wiles (1861-1948), who was a prominent portrait painter; together they taught painting in and around Peconic in the summers. Benjamin Rutherfurd Fitz (1855-1891), of Peconic, painted promising landscapes in the 1880s, including "Far From the Madding Crowd" (circa 1880-84), named for the Thomas Hardy novel.

The next section, "The Coming of the Academicians," documents the many talented artists who visited, worked or moved to the North Fork and who were members of the then-prestigious National Academy of Design in New York. Among the earliest of these painters was Arthur Henry Prellwitz (1865-1940), who studied in New York before moving to Peconic, where in later years many artists congregated to live and work. He is represented here by three fine landscapes, including "The Peconic Tidal Mill" (circa 1910).

Friends and family were popular subjects among the Peconic group of painters. Edith Mitchill Prellwitz (1864-1944), the wife of Arthur Henry Prellwitz, was a gifted portraitist, though not of the caliber of Irving Ramsey Wiles, whose painting "My Mother-in-Law, Mary Lee" (1910) is the best portrait in the exhibition. Wiles also painted many landscapes, like "Still Life With Crabs," undated, and did illustrations for periodicals and magazines, but his portraits are his greatest achievement.

The final sections of the exhibition are devoted to mostly lesser-known artists, a lot of them women, who nonetheless contributed to the area's rich artistic heritage. Julia M. Wickham (1866-1952), born in Cutchogue, was one of the more talented and best known, but others like Caroline Bell (1874-1970), who lived in Mattituck, Agnes Mothersele (1898-1977) of Cutchogue and Arabella McKee (1866-1959), who lived in Peconic, painted some wonderful pictures and deserve to be better known. This show is to be applauded for bringing them to greater prominence.

"A Shared Aesthetic: Artists of Long Island's North Fork," Long Island Museum of American Art, History and Carriages, 1200 Route 25A, Stony Brook, through July 12. Information: (631) 751-0066 or longislandmuseum.org.

http://www.nytimes.com/2009/03/29/nyregion/long-island/29artsli.html?ref=design

When the Message Is the Art
By BENJAMIN GENOCCHIO

A recurrent problem with a lot of contemporary art made as a response to the environmental crisis is that it tends to lack aesthetic feeling. In its place is an earnest didacticism, which is liable to become wearisome.

So it came as a considerable relief that "And for All This, Nature Is Never Spent," at the Pelham Art Center, manages, for the most part, to sidestep this problem.
The exhibition — organized by Jo Anna Isaak, a guest curator, in collaboration with a group of Fordham University students — has an explicitly political motive: to broaden public awareness of environmental degradation. Still, it achieves that end with a selection of about 30 thoughtful, good-looking works by 10 artists from the New York region. This show has brains and beauty.
The art is often engrossing, beginning with Jesse Potts's "Narcissus: Narcissus" (2008-9), a homemade miniature plexiglass greenhouse in which the artist is growing narcissus for the duration of the show. Part science project, part oddball installation art, it dramatizes the ingredients for life on earth: light, heat and water.
Optimistically, a handful of artists celebrate nature's power of renewal — hence the exhibition title, which is taken from the writings of the 19th-century English poet and priest Gerard Manley Hopkins. Stephanie Lempert's atmospheric photographs of what at first look like pristine, beautiful landscapes are in fact depictions of reclaimed landfills around New York and Boston. The images are overlaid with text telling the story of the transformation of these once-degraded places into the healthy, living natural environments they are today.
Ms. Lempert is one of the better-known artists in the exhibition, along with Alan Sonfist, an environmental artist whose work consists of a range of activities, including collecting sticks and rocks in nature, often in remote sites, which he sometimes arranges and photographs or takes back and exhibits in the gallery. He is famous for "Time Landscape," a permanent installation of native trees at La Guardia Place and West Houston Street in Manhattan.
Showing here is "Element Selections" (1974/2009), a mixed-media installation created in 1974 but being exhibited here for the first time. For the work, the artist extracted fragments from a landscape and then arranged them casually, almost naturally on a sheet of white canvas according to their original location. Photographs show how and where the objects were found.

For Mr. Sonfist, it is the pattern of activity that counts, much more than the result. This idea has its origins in conceptual art, and for some gallerygoers it may take a little getting used to, for there is really nothing much to look at beyond the natural patterns formed by the fallen elements he collects.
At the other extreme are Mark Jones's photographs of decaying industrial structures and their impact on nature. To hammer the point home, the artist uses saturated colors to paint areas of the photographs where toxic waste or other dangerous residues in the landscape can be seen, as in "Environmental Aesthetics No. 3" (1990), showing toxic water from the vats at an abandoned paper mill in Pennsylvania.
Similarly, there is little subtlety to Christy Rupp's series "Extinct Birds Previously Consumed by Humans," life-size sculptures of the skeletons of the dodo, the great auk and other extinct birds, created primarily from chicken bones. To me these sculptures border on the obvious, aggressively banging away at a simple but tragic truth.
But these are the exception in an otherwise stimulating exhibition. Subhankar Banerjee's large-scale panoramic color photographs of Arctic wilderness in Siberia, Alaska and Canada, often showing the migratory patterns of animals and birds, are easy to like. Some are even mesmerizing, like "Caribou Migration 1" (2002), shot from the air, showing antlike trails of caribous moving across the ice.
It is possible to dismiss Mr. Banerjee's images as pretty pictures of wilderness. But they have probably done more than any other work in this show to broaden an awareness of environmental degradation, having been used by environmental groups to argue against the opening up of the Arctic National Wildlife Refuge in Alaska to oil drilling. In 2008, some of his photographs were shown at the United Nations headquarters in New York.
Mr. Banerjee's photographs can perhaps also be seen as an extension of the tradition of romantic landscape, which has played a central role in the history of American art — think of Thomas Cole, Frederic Edwin Church and Albert Bierstadt, or photographers like Carleton E. Watkins and Ansel Adams. It is an optimistic vision, even a spiritual one, in which humanity is dwarfed by the majesty of nature.

"And for All This, Nature Is Never Spent," Pelham Art Center, 155 Fifth Avenue, Pelham, through April 25. Information: (914) 738-2525 or pelhamartcenter.org.

http://www.nytimes.com/2009/03/29/nyregion/westchester/29artswe.html?ref=design

Big Bambú

By ALIX BROWNE

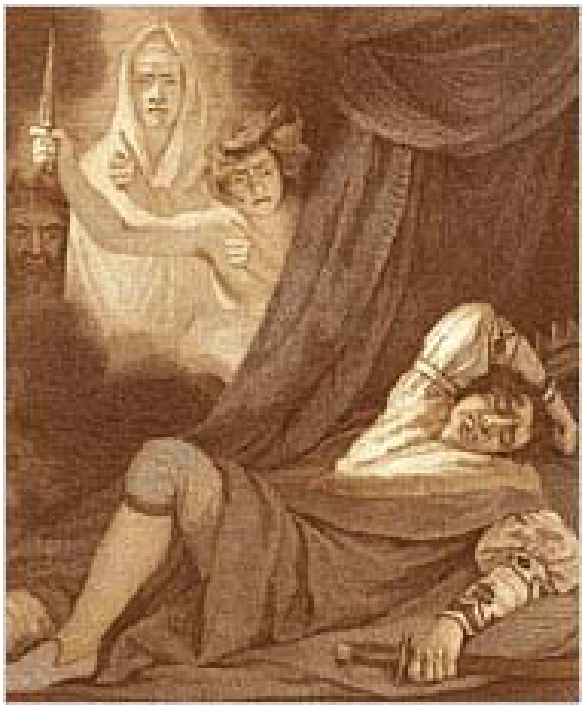
Depending on how you look at it, “Big Bambú,” a new installation by the artists Mike and Doug Starn, brings to mind a cross-section of bone viewed under a microscope or a game of pickup sticks that has been abandoned by an extremely large child. But the artists, 47-year-old identical twins and fixtures in the New York art scene since the ’80s, say that this is what their work has always been about: playing with scale and, ultimately, our perceptions of where we stand in the world.

The piece, which is made from 2,000 bamboo poles lashed together with some 16 miles of nylon rope, was assembled under the artists’ direction by a team of about a dozen rock climbers over a period of 10 weeks. Seemingly self-generating, “Big Bambú” grew from within itself, without the support of external scaffolding, making it more akin to a living organism than anything constructed by human hands. At its highest point the random matrix skims the ceiling of the nearly-50-foot factory space (the former home of the Tallix foundry, in Beacon, N.Y., known for fabricating sculptures for artists like Jeff Koons, Frank Stella and Louise Bourgeois) and coheres into an elegant arch.
“Why we need to work on this scale, I don’t know,” says Mike, adding that after overcoming their initial feeling of intimidation, the two found themselves wishing the ceilings were another 20 feet higher. The artists have even encouraged visitors to the studio to try their hands at free-climbing the piece. “It’s so much fun getting to the top,” Doug says.
The first pole was posted last September, and “Big Bambú” will be open to the public in May (Charles Renfro of Diller Scofidio & Renfro helped to design a viewing platform that will frame the piece from the second floor). Still, it remains a work in progress. Later this spring, the Starns plan to start “walking” the piece across the factory floor and back again, generating forward momentum by removing poles from the original mass and reattaching them at the front. As Mike says, “It’s always finished and it’s never finished.”

http://www.nytimes.com/2009/03/29/magazine/29Style-twins-t.html?ref=design

FOLGER SHAKESPEARE LIBRARY
Catching Some Z's in Days of Yore

By EDWARD ROTHSTEIN



WASHINGTON — In one of the displays at the Folger Shakespeare Library a 17th-century manuscript interrupts its historical chronicle of bloodthirsty battles, hewn carcasses and sundered heads with a recipe for "a dormant drink": a knockout potion. Perhaps the tale's morbidity had been affecting the anonymous author, or maybe this potion, guaranteed to instill sleep for "2-daies," just came to his mind as a perfect weapon against future enemies: you just slip 'em a Mickey.

But when this document is seen as part of the entrancing exhibition "To Sleep, Perchance to Dream," the recipe takes on broader resonance. It requires unusual ingredients like "ecittel" and "yppop," and even more exotically, "Ecim-rod doolb" and "Niarb of Senarc." The show's curators — Carole Levin, a professor of history at the University of Nebraska, Lincoln, and Garrett Sullivan, a professor of English at Pennsylvania State University — easily dispose of part of the mystery: these words are written backward.

Thus lettuce is being called for and, not surprisingly, poppies. Glass vials adjacent to the manuscript contain some ingredients, including, creepily, the dormouse blood specified, while omitting, thankfully, the brains of cranes.

The simple code might have been used more to create an aura of esoteric revelation than for any real secrecy, but the recipe reflects a way of thinking evident in many of the 17th-century volumes on display here. Sleep should not be thought of casually: it is mysterious, powerful, central, inextricably linked to the world.

Throughout the exhibition there are recipes and counsel: how to sleep (not on the "backe" for it "hurteth the braine and memorie"), when to sleep ("sleeping at noone is very dangerous"), how to ensure sleep ("take a little Camphire, and mingle it with some womans milke"), how to make beds (feathers "hath a near affinity with the Nature of Bugs") and how to control dreams (rub your temples with lapwing's blood).

If you read the open pages here, it's enough to give you insomnia. There is so much more to worry about than we moderns acknowledge, not just the incubuses and succubi who might bring on nightmares. Even the graciously helpful prescriptions can be a bit chilling. One, derived from a 1615 manual, "The Secrets of Alexis," provides a method "to see wild beasts in a dreame":

"Take the heart of an Ape, and lay it under your head when you go to bed, so that it touch your head, and you shalle see marvelous things."

Thank you, I want to respond, but I'll just read for a while.

That, though, may have been the lure that Richard Braithwaite self-mockingly invoked by calling his 1640 book on display here "a boulster lecture." It was something to be read with the head on the pillow, where its moralizing solemnity could be listened to the way the husband in the book's main illustration listens to his wife.

"This wife a wondrous racket meanes to keepe," Braithwaite writes, as she hectors her spouse in bed. "While th' Husband seemes to sleepe but does not sleepe."

"But she might full as well her Lecture smother," Braithwaite points out, "For ent'ring one Eare, it goes out at t'other."
Such dissemblance, at any rate, is not a temptation at this exhibition. There is something quite powerful here. Seventeenth-century explanations of sleep and dreams may now seem thoroughly fanciful, since they see the body's health as the result of interacting "humors," like melancholy and phlegm. But a relentless logic is at work.
On which side, for example, should a person sleep? In the handsomely designed companion sourcebook for the show, William Vaughan is cited (in 1612) explaining that after eating meat, a person should sleep on his right side until the food "be descended from the mouth of the stomack (which is on the left side)," and that then the left side is preferable "that the meate may be more easily sodden and digested in a more hot and fleshly place."
The point is that nothing is inconsequential or irrelevant. Sleep isn't an escape from the world but an extension of it (which is why it would have been helpful to have some more exploration of the sleepwear and "bedchamber" objects shown here).
As for the potions and concoctions, none are randomly composed. They attain their supposed power because their ingredients are thought to resemble in appearance, nature or quality the function they were to influence. Lettuce (ecittel), we learn, might help bring on sleep because, like sleep, it is considered both cool and moist.
In the frontispiece to Thomas Walkington's "Optick Glass of Humors" (perhaps 1631), a chart even shows how the body's humors are connected to cosmological conditions. Choler, we are told, is associated with a time of life (youth), a season (summer), an element (fire) and a heavenly body (Mars). Too much choler, which is marked by heat, is "antithetical to sleep," which is why cool, phlegmatic persons sleep more than choleric ones.
We might come to a similar conclusion about these contrasting temperaments, but we would miss the metaphysical implications that also help explain why the bedside Bible and bedtime prayer became associated with sleep rituals. Sleep was not morally inconsequential: night terrors and "Mares" (as they were called) had solemn and unsettling implications.
So dream interpretation was not a frivolous exercise. The ancestors of today's popular-psychology dream dictionaries are on display, including a contemporary variation: a touch-screen computer program called "The Dream Machine." Choose among 12 themes like Food, Nature, Animals and Money, and you are led through a directory of 17th-century dream interpretations.
Do you dream that you have kissed a dead person? A 1669 source tells us that this "signifies long life" — at least for you. Unfortunately, the playful program is only sleepily responsive.
Over all, the exhibition is compelling. Politics, too, is implicated. The era's battles between Royalists and Parliamentarians, or between Protestants and Roman Catholics, were often treated in books as taking the form of dreams, which could leave some issues of allegiance helpfully ambiguous.
You can also see here the latent sources of modernity. When a preacher, Richard Haydock, became celebrated for being able to deliver brilliant sermons while asleep, it took the rational skepticism of King James I (the same James who commissioned the stunning Bible translation that bears his name) to unmask him as a fraud in 1605.
And in a 1634 publication, putting aside metaphysics for hints of psychology, Owen Felltham argued that "Dreames are notable meanes of discovering our owne inclinations." The wise man, he wrote, "learnes to know himselfe as well by the nights blacke mantle, as the searching beames of day. In sleepe, wee have the naked and naturall thoughts of our soules."
The only frustration is that the one figure of this era who could have fully connected the night's black mantle and the searching beams of day, the mysticism of potions and the rationalism of psychology, who could both fear the dreams that may come in the sleep of death yet welcome the way sleep knits up the ravell'd sleave of care, who well knew what dreams are made on and how our little life is rounded with a sleep — that figure appears here only incidentally, though he has given both the library and the exhibition their names.
"To Sleep, Perchance to Dream" is on view through May 30 at the Folger Shakespeare Library, 201 East Capitol Street SE, Washington; (202) 544-4600; folger.edu.

http://www.nytimes.com/2009/03/28/arts/design/28libr.html?ref=design

The Reluctant Impressionist

By HOLLAND COTTER

"Poodles in Impressionism"? Now there's an exhibition theme, and one that the stretched-thin Impressionism industry may eventually have to resort to. When that time comes, all eyes will turn to Gustave Caillebotte, who painted more than a few pets of exceptional charm. You can see at least one of them, plopped down by the Seine, in the show called "Gustave Caillebotte: Impressionist Paintings From Paris to the Sea" at the Brooklyn Museum.

Thirty-some years ago the museum had a big success with a Caillebotte retrospective, which more or less introduced American audiences to an artist who was an Impressionist by association rather than by style or temperament. His three best-known pictures, "The Floor Scrapers," "Le Pont de l'Europe" and "Paris Street; Rainy Day," all urban scenes from the mid to late 1870s, have more to do with academic realism than with the scintillations of Monet.

In them the details of a hard-nosed modern world are nailed down, hard. And the particulars are social as well as optical. The bolts on a new iron railway bridge, the exact cut of a chic bourgeois coat are all accounted for. The newly rich and the perpetually poor share public space, but without an exchange of word or glance. The city itself, with its bone-white light and streets as straight and sharp as blades, is a precision-tooled machine, stripped of romantic atmosphere.

Although there are studies for these three grand paintings, and superb variations of their subjects, the pictures themselves are absent from the Brooklyn show, which has traveled from museums in Denmark and Germany, and is a more modest enterprise than the 1977 survey.

Was it worth doing, and is it worth seeing? Yes. Much of Caillebotte's output remains unfamiliar, so any exposure is valuable. Some of the pictures in the show are superb, others not, but he was a painter as interesting for his weaknesses as for his strengths. Most of the loans are from private collections rather than museums, which somehow suits the character of this very private artist, who, by the time of his death in 1894 at 45, had retreated from an art world with which he had once been intimately involved.

Caillebotte could afford to be private, because he was rich. He was born in 1848 to a haute bourgeois family in Paris, and he grew up during the years that the medieval city was being destroyed and a modern one — more sanitary, shopper friendly and police surveyable — was being built. Above all else he wanted to be modern, part of that new world.

Restlessly energetic, always seeking focus, he trained as an engineer, earned a law degree, and fought in the Franco-Prussian war. It was only in the early 1870s that he decided to become an artist. He enrolled at the École des Beaux-Arts, studied with academic gurus like Jean-Léon Gérôme, but soon left. Largely self-taught he moved back and forth between Paris and the family estate in the village of Yerres, painting what he found.

His famous floor scrapers — they reappear in an 1876 painting in the Brooklyn show — were workmen he hired to refurbish a Paris apartment as a studio. A pretty painting, from the previous year, of raindrops (or possibly insects) falling into a tree-shaded pool, was done at Yerres, as were pictures of oarsmen rowing on the nearby river.

Caillebotte depicted the figures very close up, as if he were in the boat with them. Odd angles, daringly modern, became a specialty. When he paints his mother and brother at lunch in their dusky apartment, he views them from the head of the table, where he presumably sat. In other cases he establishes an even more dominating stance by looking down from overhead. He seems to view the floor scrapers from atop a stepladder, the Yerres rowers from a standing position in the boat as they pull and sweat mere inches away.

He often saw Paris from a high balcony, though the most effective instrument of control in his urban compositions was his use of unswerving perspective. In “House Painters,” from 1877, the street zooms back in a line so ruthlessly defined and straight that it divides the scene into two separate planes of reality, one occupied by four workmen touching up a shop front, the other by a virtual ghost town in some other universe.

Caillebotte went about making such pictures in the orthodox academic way, which was also an engineer’s way, with the aid of preliminary drawings and oil sketches, a labor-intensive method that the artists who would come to be called Impressionists were leaving behind in favor of spontaneity. The Impressionists were a marginal phenomenon when Caillebotte became aware of them but a modern one, which is what he needed to know.

He visited the first Impressionist salon in 1874. When the second one took place two years later, the artists involved, including Monet, Renoir, Sisley, Cézanne and Degas, welcomed his participation.

He repaid their hospitality with patronage. He organized exhibitions for them, promoted their careers, paid their rent (Monet survived on his generosity for years) and bought their paintings, amazing things, out of the studio. He bequeathed his collection to the French government, with the stipulation that it be put on public view. Part of it became the foundation of what is now the Musée d’Orsay.

And, of course, he himself produced work, of a kind that managed to remain somewhat anomalous in any context. Possibly because he painted out of personal interest rather than professional necessity, he never felt compelled to develop a strict signature style, and moved back and forth between two kinds of realism, academic and Impressionist, old and new.

He seemed to be in a state of perpetual experimentation, with no absolute rules. He borrowed colors and moves from admired painters (Courbet, Pissarro, Monet) and tailored them to his peculiar perspectives. For a long time spontaneity was a little tricky for him, tending to translate into slap-dash haste. Instead of Monet’s deep-pile carpets of flickering strokes, he would end up with a patch of clots.

There is something candid and almost deliberate about his more maladroit episodes. It’s as if he wanted to perpetuate and re-emphasize his amateur status, and the permission it gave him to be unpredictable, imperfect, to go his own way.

You can see this variety playing out in a single painting, one that includes a pet portrait. The little dog himself is a flurry of dark stippling. Caillebotte depicts his owners, young sons of a yachting friend dressed in identical jackets and boating caps. They could be from one of the artist’s early realist paintings. The river behind them, with its shimmering reflection of boats and trees, is classic Impressionism: paint used as light.

Long before this picture was done, however, Caillebotte had backed off from the Impressionists as a group. He was distressed by the infighting; he had had a spat with Degas. He was becoming unproductive; in 1883 he painted only two pictures. He also wanted out of Paris, and spent much of his time at an estate he had bought in the village of Petit Gennevilliers a few miles away, where he developed enthusiasms that overshadowed those for art.

One was horticulture. He raised hot-house orchids and planted gardens. Suddenly he was painting dahlias and roses, up close, reproducing their bulk and texture with pigment. In some years more than half his paintings were of flowers. His great passion, though, was for sailing, and specifically for competitive

yachting, the hot sport in France at the time. And, as was his way, he went all out in his pursuit and support of it.
He traveled every summer to the Normandy coast to race. He organized and financed regattas and rewrote rule books. He designed his own boats, ones of ultra-modern sleekness that earned him national fame. Several of his wood models for hulls are in the show, which, as its title implies, makes much of this aspect of his career, though viewed purely in terms of art, it's hard to know why.
By this point painting seems to have become a secondary activity for Caillebotte, who in addition to everything else was running a large boatyard near his home and writing a book on his collection of postage stamps. His distracted attention had some welcome results. His painting really loosened up. For the first time it became truly Impressionistic.
Sometimes the effect is delightful, as in a painting, done from high on a coastal cliff, of the sea as a single wave of soft gray-blue with dotlike boats bobbing around. In other pictures, though, the same sort of casualness has a half-baked, even heavy-handed look, as if he had lost his touch or his ability to concentrate. The modernist impulse that Caillebotte had sought and fed off had become rote, a used-up style.
In the end his career as an artist — and the Brooklyn show — feels ragged and unresolved. Certainly it was short. He stopped painting in a focused way in his 30s. By the 1890s he had become a semi-recluse at Petit Gennevilliers. He died there. By that time steamships were rumbling up the Seine, shoving sailboats aside. Not long after his death his house and gardens were replaced by an auto shop, then an airplane factory.
But what's wrong with uneven and unresolved? Caillebotte's was never a clear-cut Impressionist story, or even a classic artist's story. Creatively he was a mixed breed, a product of different pedigrees. He fits into no pantheon, matches no ready profile, art historical or otherwise. Or maybe just one, that of the brilliant enthusiast, the prodigious amateur, the obsessed imperfectionist. As such, he is the perfect subject for an imperfect show.

"Gustave Caillebotte: Impressionist Paintings From Paris to the Sea" remains through July 5 at the Brooklyn Museum, 200 Eastern Parkway, at Prospect Park; (718) 638-5000, brooklynmuseum.org.

http://www.nytimes.com/2009/03/27/arts/design/27cail.html?ref=design

Recreating His World in Soot, Paper and String

By ROBERTA SMITH

James Castle was the artist of silence, grayness and folded cardboard. Silence because he was born deaf and refused to read, write, speak, sign or finger spell. Grayness because of the velvety, overcast drawings he made all his life: extravagantly tonal images of landscapes, farmyards and interiors rendered in a mixture of soot and spit applied to found paper with sticks and rags. Their muted yet solid forms in some way embodied both Castle's silent world and his loyalty to it.

And folded cardboard because of the flattened yet bulky toylike sculptures — figures, farm animals, articles of clothing and pieces of furniture — that Castle made from discarded boxes, string and paper. This detritus he gleaned from the post office and general store that his parents oversaw in their house in an Idaho farming community named Garden Valley. In his understanding of structure, moving parts and the abbreviation of familiar forms, Castle used cardboard as brilliantly as Alexander Calder used wire, but with more corners.

Castle was born in Idaho in 1899, nine years after it became a state, and died there in 1977, without ever venturing very far from the three successive farms on which his family lived. He probably never knew the meaning of the word "artist," but he must have sensed his specialness on some level. You can feel his conviction in the drawings and constructions in the two latest New York gallery shows of his extraordinary work, which has been known to the mainstream art world only since the late 1990s.

Knoedler & Company has mounted its fourth Castle show, a display of 34 of the atmospheric, intimate drawings that make Castle something like the Vuillard of the American West; the works in this show have not been previously exhibited. Ameringer Yohe Fine Art is showing drawings and constructions, including an especially imposing one of a big, black pram whose square wheels are highlighted with foil.

These substantial shows are coincidental and taken together offer compensation if (like me) you missed the lavish Castle retrospective that was mounted by the Philadelphia Museum of Art last fall and that will travel this fall to Chicago and Berkeley, Calif., with a possible final stop in New York.

Castle's artistry is implicit in his work's consistency, optimism, command of perspective and proportion, and psychological delicacy. His soot medium permitted a singular range of grays — charcoal blacks to cloudy-day silvers — as well as variously wet-dry surfaces that suggest charcoal, then ink, then ink wash, then crayon.

The constants are a fervent concentration and an affection for both the process and the subject. His many views of the farmstead of his childhood (executed largely from memory) include everything from doorknobs to open vistas, all methodically studied and recorded in a way that makes his environment feel safe and firmly grounded.

Castle not only spent most of his waking hours making art, he also fit the classic if not clichéd persona of an artist. He was touchy about the reception, display and preservation of his work. He insistently showed his drawings to visitors, wanted a positive reaction and noticed when he didn't get one.

As Castle's niece, Gerry Garrow, remarks in a documentary on view at Ameringer Yohe, the less than enthusiastic were not shown anything the next time they visited. (Directed by Jeffrey Wolf and produced by the Foundation for American Self-Taught Artists, the DVD comes with the catalog of the Philadelphia show.)

Castle's curatorial tendencies included storing much of his art in wrapped and tied bundles, putting his drawings up around the house and objecting if anyone moved them. As Ms. Garrow notes in the documentary, he liked to commandeer empty sheds or chicken coops for use in making and displaying his work. From the film you get the feeling that given more leeway, Castle might have created his own private, diminutive Marfa, à la Donald Judd.

The pride and pleasure artists take in their efforts is nowhere more evident than when Castle's depicted his own art. Once he had installed his pieces to his liking, he often made drawings of the arrangement. An especially elaborate one at Knoedler shows several drawings mounted on two sides of what appears to be a stall with books that were also his handiwork laid out on the floor.

(There are no books in either show, although they appear again in a kind of close-up rendering, also at Knoedler, of the scene in the stall. Made primarily by copying images, words and letters from other books, magazines or comics, Castle's books tend to resemble either school primers or photo albums.)

Both shows include drawings of Castle's totemic, square-headed figures, lined up on shelves or the ground and sometimes looking a bit like the denizens of "South Park." At Knoedler one drawing shows a room where repeating drawings of a mountain form a narrow frieze around the tops of the walls. In another interior image at Knoedler a cluster of drawings shares a wall with a chest of drawers and a monumental wood armchair that recurs in several works.

At Ameringer Yohe, the chair fills the entire sheet of one drawing, looming upward, like the throne of the Lincoln Memorial. Nearby an especially powerful drawing depicts constructions of Castle's sister Peggy and himself, looking a little like gods who need appeasing. Especially him: the hat suggests Al Capone; the overcoat, Yohji Yamamoto. In one especially self-referential drawing at Ameringer Yohe, Castle gives us a picture of what appears to be a drawing in progress.

Castle's interest in depicting the built environment has been frequently noted. The world he lived in was like his mediums, very much made from scratch, mostly with the materials at hand. It was also built straightforwardly from repeating units: fence posts and split rails; houses made of logs, planks or clapboard. Indoors there were wood walls, ceiling beams and wallpaper, some of it boldly checkered, and floorboards and flowered carpets, like the one in a drawing of a big front hall with a patterned carpetbag sitting front and center, at Knoedler.

Castle brought his world to order with these repeating units, and he shaped, planed and smoothed them, much as they had been in real life. They enabled him to depict the recession of space with unwavering accuracy while also flattening it, creating a marvelous push-pull tension.

It is not known if Castle was taught one-point perspective or just picked it up. But actually his compositions are so solid and accurate that it seems quite likely that he had a photographic memory. It is the perfect inborn skill for his silent, carefully shaded vision.

"James Castle Drawings: Vision and Touch" runs through April 25 at Knoedler & Company, 19 East 70th Street, Manhattan; (212) 794-0550. "James Castle" runs through April 18 at Ameringer Yohe Fine Art, 20 West 57th Street, Manhattan; (212) 445-0102.

http://www.nytimes.com/2009/03/27/arts/design/27cast.html?ref=design

'INTO THE SUNSET: PHOTOGRAPHY'S IMAGE OF THE AMERICAN WEST'
Mythic West of Dreams and Nightmares
By KEN JOHNSON

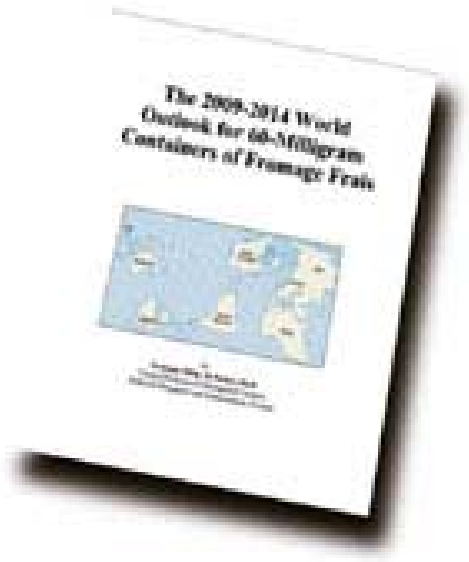
In Oregon, along Route 97 south of Klamath Falls, there once stood a billboard. Someone had painted out its words, leaving only a panoramic image of a glassy lake, dark forest and snowy mountain rising majestically under a perfect blue sky. Stephen Shore took a picture of it in 1973. Surrounded by flat, scrubby, fenced-in land with telephone poles and low mountains in the distance, beneath a sky scattered with fair-weather clouds, the billboard projected a mythic vision of the great American frontier. This was in sharp contrast to the disheartening banality of the real, modern world, of which the billboard is emblematic.

Mr. Shore's mordant photograph pretty much sums up "Into the Sunset: Photography's Image of the American West," a resonant exhibition at the Museum of Modern Art. Almost every one of the approximately 150 pictures by about 70 photographers evokes that tension between myth and reality. While loaded with compelling images, dating from 1850 to 2008, the show ultimately presents an all-too-predictably bleak view of America's realization of its Manifest Destiny.
Organized by Eva Respini, an associate curator in the museum's photography department, "Into the Sunset" is set up thematically rather than chronologically. It divides up into landscapes and images of people, with subdivisions devoted to different types of images. One group of landscapes focuses on awesome natural beauty while another documents the havoc wreaked on nature by industrial development. People in one section exemplify a pioneering spirit; elsewhere we encounter portraits of wasted human potential. Provocative and amusing conversations between images occur throughout.
Irving Penn's glamorizing 1967 studio portrait shows five ruggedly handsome Hell's Angels with two pretty girlfriends and a pair of motorcycles. Nearby, a small print made by an unknown photographer around 1892 portrays five men in bowler hats and suits. A label explains they were members of the Wild Bunch, the outlaw gang that included Butch Cassidy and the Sundance Kid. They look more like bankers than bank robbers.
Ms. Respini points out in her catalog essay that the time during which white European civilization expanded into and eventually occupied North America coincides with the invention and development of photography. This is not just incidental. The idea of the West would be informed by machine-made images.
That the medium itself can be used both for empirical documentation and visionary expression nicely mirrors the exhibition's subject: the American West is real, but it is also a set of fantasies.

Early photography pictured a new world of seemingly infinite possibility. The sense of wide openness is reflected in large-format 19th-century photographs by William Henry Jackson and Carleton Watkins in which geographical wonders are finely detailed, and certain amazing sights, like the Grand Canyon and giant redwood trees, were proved really to exist — unlike the otherworldly places and bizarre monsters that the unexplored parts of the world were thought to contain in the centuries before photography.
While photographers paved the way psychologically for transcontinental expansion in the 19th century, 20th-century modernists like Minor White and Ansel Adams helped to shape a new romantic poetry for an intensely industrialized society. The West as envisioned in their work would be a last bastion for undefiled nature and for the recuperation of the soul.
After World War II, however, that picture could no longer be sustained. It became a cliché for the tourism and real estate industries, like the billboard image in Mr. Shore's photograph. For landscape photographers of the 1960s and later the West became a place where despoiling by industry and commerce could be revealed at its most unvarnished. Robert Adams's picture of tract housing in Colorado (1970), Ed Ruscha's aerial views of parking lots (1967) and Lewis Baltz's grid of 25 pictures cataloging littering at San Quentin Point (1985) are coolly understated indictments of modern civilization.
A parallel sense of degradation animates the sections on people. Looking at the 19th-century images of explorers, pioneers and Indians, you wonder at the fortitude it must have taken for these men and women to endure and persevere as they contended with challenges few people today could imagine.
But it is hard to find much to respect in people pictured in works from the post-World War II era. The urban cowboy pausing to light a cigarette on a New York street in Robert Frank's 1954 photograph is a dude of uncertain moral fiber. The rotund husband and wife smiling vapidly at the camera while feeding their baby in a 1972 photograph by Bill Owens titled "We Are Really Happy" seem ridiculous. Three porn actors lounging between takes on a sofa in a suburban house in a 1998 picture by Larry Sultan are not exactly admirable, nor are the male street hustlers in Philip-Lorca diCorcia's noirish pictures from 1990-92.
Such photographs may evoke the West as a place of unprecedented freedom for individual expression and experimental behavior. But the people they portray look pathetic, not heroic. There are no positive role models here. Richard Prince's rope-twirling cowboy is from a cigarette ad.
Why does the exhibition project such a dim vision? Is it impossible for serious contemporary photography to see something better? Is failure and disappointment the real, unavoidable story? Or is it another myth, a paradoxically reassuring narrative to which many high-minded people now unthinkingly accede? If so, what would be the alternative? That could be an unknown worth exploring.
"Into the Sunset: Photography's Image of the American West" continues through June 8 at the Museum of Modern Art, (212) 708-9400, moma.org.

http://www.nytimes.com/2009/03/27/arts/design/27moma.html?_r=1&ref=design

Odd Prize: Judging a Book by Its Title
By SARAH LYALL



LONDON — To those outside dairy (or container) circles, a book called "The 2009-2014 World Outlook for 60-Milligram Containers of Fromage Frais" tends to provoke more questions than it resolves. Such as: Why fromage frais? And: "60-Milligram" — is that a misprint?

But the book, geared to that slender segment of the population that both cares about dairy product cartons and is happy to spend hundreds of dollars to learn more about them, has just won an actual literary award. This is the Bookseller/Diagram Prize for Oddest Book Title of the Year, sponsored by The Bookseller magazine.

It is hardly the Nobel Prize in Literature. But following well-established awards practice, Philip Stone, the magazine's charts editor and "awards administrator," released a congratulatory statement on Thursday. Sadly, it was not a ringing endorsement of the winner.

"What does the future hold for these items?" Mr. Stone asked, speaking of fromage-frais cartons. "Well, given that fromage frais normally comes in 60-gram containers, one would assume that the world outlook for 0.06-gram containers of fromage frais is pretty bleak. But I'm not willing to pay £795 to find out." (That's about $1,139.)

The work, actually a statistical report rather than a proper book, was written by Philip M. Parker, a professor of marketing at the French campus of Insead, the international business school. He uses econometric models to publish niche reports in the thousands. "This may turn out to be the highest award that report will ever win," he said in an e-mail message.

The work beat stiff competition from the four actual books on the shortlist: "Curbside Consultation of the Colon," "The Large Sieve and Its Applications," "Strip and Knit With Style" and "Techniques for Corrosion Monitoring."

Reached by telephone as he prepared to board a bus in New York, Mark Hordyszynski, the author of the losing "Strip and Knit With Style," said that the "strip" in the title means "cutting fabrics into strips." "Apparently in England, 'strip' basically has one meaning, and that means to get undressed," he said. "So I understand their point."

In an e-mail message, Dr. Brooks D. Cash, who lost for "Curbside Consultation of the Colon," part of a medical series, said that he was "honored to be in such august company." Dr. Cash, chief of gastroenterology at the National Naval Medical Center in Bethesda, Md., added, "I think being beaten by someone with that title is really cheesy."

The Diagram Prize began in 1978 as a way for Bruce Robertson, co-founder of the Diagram Group, an information and graphics company based in London, to combat his ennui at the Frankfurt Book Fair. That was a bumper year for odd titles — nominees included “100 Years of British Retail Catering” and “50 New Poodle Grooming Styles” — but the runaway winner was “Proceedings of the Second International Symposium on Nude Mice.”

Publishers are not allowed to nominate their own books, so as to prevent them from giving books willfully odd names. That is pretty much the only rule. Anyone can nominate a title, and the public is invited to vote online at thebookseller.com. The prize’s administrators try not to read the books, Mr. Stone said, because doing so might “cloud our judgment.”

In fact, no one may have read Dr. Parker’s work. His reports are printed on demand, and he said he is not sure about sales because he tracks them by genre rather than by title.

Past winners include “Versailles: The View From Sweden,” “Weeds in a Changing World” and “Reusing Old Graves.”

Books that have made the shortlist but inexplicably failed to win include “A Pictorial Book of Tongue Coatings,” “Sex After Death,” “Waterproofing Your Child” and “Cheese Problems Solved” — which, its publisher says, provides “responses to more than 200 of the most commonly asked questions about cheese,” with special emphasis on mozzarella, blue cheese and cheddar.

Authors don’t lobby for the award; it is thrust upon them, sometimes without their even knowing they were contenders.

“It came out of the blue,” said Gary Leon Hill, who won in 2005 with “People Who Don’t Know They’re Dead: How They Attach Themselves to Unsuspecting Bystanders and What to Do About It.” He added, “I was delighted by it because I’m happy to have anybody draw attention to the book.”

Last year The Bookseller held a competition for the Diagram of Diagrams, a homage of sorts to the Booker of Bookers, awarded to the best Booker Prize-winning book of all time. (Salman Rushdie’s “Midnight’s Children” won that one.) In the case of the Diagram, the uber-prize went to “Greek Rural Postmen and Their Cancellation Numbers.”

This caused some controversy. Yes, that is an odd title, but surely not odder than “How to Avoid Huge Ships,” which won the 1992 prize.

“How to Avoid Huge Ships,” in which John W. Trimmer, an old sea captain, offers shipping-lane safety tips to pleasure-boat sailors, has a select but fervent following, and on Friday evening was ranked No. 1,396,102 on Amazon.com.

One critic said on Amazon that he wished the book had included more tips on differentiating between huge and less huge ships, so readers could be sure “what size of ship they were avoiding.”

But another raved: “I never leave the house without this indispensable little book. It has literally saved my life many times while walking down Peckham High Street and Ealing Broadway.”

http://www.nytimes.com/2009/03/28/books/28contest.html?th&emc=th

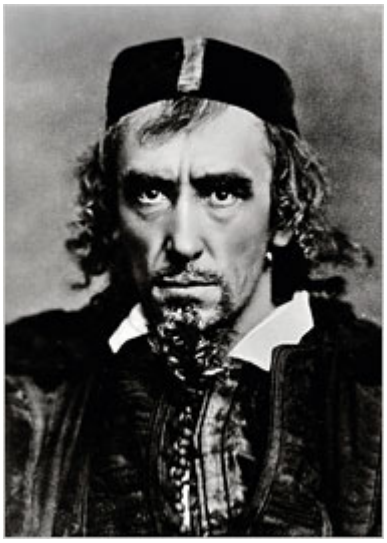
Star Power

By CHARLES McGRATH

A STRANGE EVENTFUL HISTORY

The Dramatic Lives of Ellen Terry, Henry Irving, and Their Remarkable Families

By Michael Holroyd



Illustrated. 620 pp. Farrar, Straus & Giroux. $40

The actress Ellen Terry, whom George Bernard Shaw loved from afar and wrote to compulsively, had a captivating walk-on role in Michael Holroyd's magisterial biography of Shaw. In his new book, "A Strange Eventful History," she has been promoted to leading lady and shares the stage with Henry Irving, who was her real-life co-star. They were the two greatest English-speaking actors of their age, so popular and admired that they brought to their profession a respectability it had never enjoyed before. They were befriended by prime ministers, performed in private for the queen and on one of their many trips to America dined with President Chester A. Arthur in the White House. Irving, whose ashes are buried in Westminster Abbey, was the first actor ever to be knighted. Terry's funeral, in July 1928, was a national event, so stirring that her son said to his sister in a loud stage whisper, "We must have more occasions like this."

Along with Sarah Bernhardt and Eleonora Duse, Terry and Irving were among the first actors to achieve stardom in something like the modern sense, and they also transformed entertainment in England, bringing the habit of theatergoing in general to a vast new middle-class audience. As the manager of the Lyceum, a grand West End theater, Irving sometimes seemed like a Hollywood director, a Cecil B. DeMille, waiting to happen: from composers like Arthur Sullivan he commissioned music for his productions — not just incidental tunes but full-length background scores; he spared no expense on extras or on sets; and he happily employed all the latest electric gadgetry for creating sparks and explosions. He adored flashy special effects of every kind.

Irving was an unabashed popularizer, whose greatest success came in sentimental romances and blood-and-thunder melodramas, and had no use at all for highbrow contemporary playwrights like Ibsen or Shaw. He loved Shakespeare but believed that Shakespeare's plays had to be made "actable," so he cut "Hamlet" by about 40 percent and "Macbeth" by 20. No Lady Macduff and her children, no murder of Banquo! "King Lear" also got whacked, as he omitted "all superfluous horrors" (like the blinding of Gloucester), but on the other hand, Irving, in the title role, added so many extra grunts and groans to the part that the play ran 30 minutes longer than expected.

But Irving was also an innovator, whose influence can still be felt. For example, he was one of the first actors to make Shylock sympathetic (giving him Tennyson's voice, incidentally); at the Lyceum, Holroyd says, he introduced numbered seats, free programs and the custom of lowering the houselights as the curtain went up. He was a manic researcher and also a perfectionist and a despot, except when it came to Terry, whom he recognized as a genius of another sort, the sun to his moon.

She was a natural, who grew up in what became a theatrical dynasty. (Terry's sister Kate, John Gielgud's grandmother, was for a while even more famous, and four of their siblings also appeared onstage.) The Terry parents were traveling players not unlike the Crummleses in "Nicholas Nickleby," and just as much a prodigy as that novel's "Infant Phenomenon," Ellen made her London debut at the age of 9 as Mamillius in "The Winter's Tale." The Rev. Charles Dodgson, a k a Lewis Carroll, was sitting in the audience and became an obsessive, lifelong fan. She had a voice that was half whisper, half sigh, and she spoke Shakespeare's lines, her son later said, with such naturalness that it was as if they were something

she had heard just that morning. She had a moonwalking trick of moving her leg slightly backward before putting down her foot, so that she seemed to float across the stage.

Her legendary beauty is not immediately apparent in the most famous photograph of Terry, taken by Julia Margaret Cameron in Tennyson's bathroom, where she seems moody and withdrawn. But she is sweet and dreamy in some well-known paintings by the Pre-Raphaelite G. F. Watts, who was very briefly her husband, and her glamour, self-possession and sexuality light up the famous Sargent portrait of her as Lady Macbeth. She was the "it" girl of her time, gleeful and spontaneous, sliding down banisters backstage and once, just for fun, grabbing hold of some scenery being hoisted to the flies and rising with it perilously high over the stage. Irving, on the other hand, was anguished and deliberate; his idea of recreation was going to the police courts so he could study the expressions of the accused — in much the same way that Bernhardt used to visit morgues, so she could study the corpses.

There have been several excellent books about Irving and Terry individually, including Terry's own charming, if highly unreliable, memoir, "The Story of My Life." What Holroyd adds to the picture is an extended dual focus, as well as lively and entertaining writing — among contemporary biographers he is almost without peer as a stylist — and an unparalleled knowledge of the period. (Who but Holroyd, for example, would know about Irving's travails in finding a suitable Rozinante for a one-acter about Don Quixote? The first horse he cast was so moribund it had to be carted off to the knacker's. The second was flatulent and so well fed that signs of emaciation had to be hand-painted on its flanks.) Holroyd also expands his examination to the next generation, to Irving's and Terry's offspring, explaining in a prefatory note his belief that "the configurations of family life today still echo and reflect the concealed lives of a hundred years or more ago." In fact, the extended Irving and Terry families were unusually dysfunctional even by today's standards, and their example seems not so much representative as cautionary — a warning about the dangers of celebrity and neglectful parenting, and a reminder that talent isn't always hereditary.

In 1869, Irving, who was as isolated and withdrawn as Terry was warm and flirtatious, married Florence O'Callaghan, of whom it was said that she read only one book but read it often: Burke's Peerage. They had two children, Henry and Laurence, and after the marriage broke up, Florence, snobbish and embittered, tried to poison them against their father and especially against Terry (whom she called "the wench"). But much to her annoyance, her sons were unable to resist the glamour of their father's world, and though he did little to help or encourage them (Terry was more nurturing and supportive), both took up their father's trade. Neither was hugely gifted. Laurence, the younger, had such an unpromising beginning onstage that he shot himself in despair, though he went on to be modestly successful as an actor and playwright. Henry, probably more able, was locked in the past and became a pale imitation of his father, playing Irving's old roles and trying to keep his company going. He even took over his father's last mistress, a bizarre creature known as Mrs. Aria, whom today we would call a professional groupie.

Terry married Watts in 1864, when she was 16 and he was 46. He was one of those Victorians, like Ruskin and Matthew Arnold, whom Lytton Strachey called a "glass case" specimen, so rarefied and neurasthenic that he was virtually sexless. ("He couldn't do very much," his second wife reported, "but he liked to fumble about.") Watts was looking less for a wife, really, than for a permanent, live-in model, and Terry proved too high-spirited and intractable for the job. The marriage was essentially over in 10 months, and a few years later she ran away with a widower architect and stage designer named Edward William Godwin.

They had two children, Edward and Edith, who, smarting under the stigma of Victorian illegitimacy, eventually took the name Craig (after the Ailsa Craig, the giant rock off the coast of Ayrshire in Scotland). Both of them, too, went into the family business. Edward, or Edward Gordon Craig, as he was known, became a writer, an artist and a radical, groundbreaking stage designer, some of whose theories and innovations are still in vogue. Oddly — or perhaps inevitably — Gordon Craig, who as a youth had complained bitterly about being illegitimate and having no father figure in his life, turned into a ruthless womanizer who left behind him a trail of at least 12 children (most born out of wedlock), none of whom he paid much attention to or supported. His many girlfriends included Olga Knipper (Chekhov's widow), Isadora Duncan and just about every secretary he ever hired. (He liked them to take dictation with their clothes off.) The one who probably mattered most to him was Duncan, but she burned too intensely for Craig, and after their breakup he contrived never to see her, not even after the tragic death of their child, - Deirdre.

Gordon Craig, himself the subject of several books, is an immensely important figure, part genius, part fraud — always a combustible combination. In a way he left a greater or longer-lasting stamp on the

theater than his mother did. But readers of "A Strange Eventful History" may weary a little of all the attention he is paid here, and may even come to resent, as his sister did, that Terry preferred him, the prodigal, to Edith, who spent much of her life caring for her mother while Gordon was traipsing around Europe running up debts.

Edith, or Edy, as she was known, looked like her mother but lacked her magnetism and un-self-conscious ease. She nevertheless became a theatrical jack-of-all-trades: a decent actor, a first-rate costume designer and an ingenious director, who was the center of a circle of lesbians, feminists and suffragists. Among her admirers were the composer Ethel Smyth, Virginia Woolf and Vita Sackville-West, and one of the key figures was a fascinating character named Christabel Marshall, who restyled herself Christopher St. John. (It was catching: another member of the group, Clare Atwood, became Tony.) In part what held them all together was Terry, now retired, demanding and a little dotty but still possessed of immense charm.

From what people said about her, from her book and her many letters, we can infer a lot about Terry's personal appeal, and even something of her style as an actress. Though she was a hard worker, she made it look effortless. She was one of those actors who are loved less for their ability to take on another persona than simply for being themselves. Even as Ophelia or Portia or Juliet, she was always Ellen Terry, and when she occasionally played parts that were all wrong for her, or forgot her lines sometimes, no one minded. Her critics complained that she was so brisk and sunny that deep, sustained emotion was beyond her, but very few people cared about that either.

Irving was an altogether stranger case. If Terry was a character out of Dickens, he was from a Thomas Hardy novel — a complete self-invention. He was born John Brodribb, to Cornish parents who hoped he would become a minister. He stammered, was scrawny, had a herky-jerky way of walking, and yet, stage-struck, he determined to become an actor. He rose at 5 every morning and swam in the Thames to build up his physique. He took elocution lessons and classes in sword fighting, and traveled for years with stock companies all over Britain, gradually learning his trade. Everything about him was a little extreme. He cultivated odd accents and, scorning greasepaint, made himself up with watercolors, so that in photographs he sometimes seems Kabuki-like. Unlike Terry, he made acting look hard — you were supposed to notice how effortful it was — and by our standards he was doubtless a ham. Even Terry admitted, "Henry was always attracted by fustian." Henry James thought Irving was vulgar and affected. Shaw, partly out of rivalry for Terry's affection, became a merciless critic and in an obituary wrote that Irving was "interested in nothing but himself; and the self in which he was interested was an imaginary self in an imaginary world."

Except for Terry, Irving paid little attention to other actors. He was a one-man show, and his self-involvement only grew with time. Though their respective families denied that he and Terry had a sexual relationship, they were clearly lovers until, like all the men in her life, he drifted away. He wanted admiration, not collaboration. And yet, whatever the nature of his talent, it had tremendous appeal: proud and aloof, he somehow turned his limitations into assets. He did a lot of tricks with his voice and with his rigid physique. Even Shaw could not help writing of Irving's performance as Iachimo in "Cymbeline," "It was no vulgar bagful of 'points,' but a true impersonation, unbroken in its life current from end to end."

More even than Terry, he was the symbol of what it meant to be an actor, and from his overwhelming success and popularity we can perhaps conclude that theater then was a little different from what we're used to. The point wasn't to be true to life but to improve on it — to make it grander, stranger, more of a spectacle.

As the title suggests, Holroyd frames his book almost like a melodrama, and it unspools with great narrative energy. Almost too much: there are times when he seems more interested in storytelling than in explaining why the story is important. Physically, "A Strange Eventful History" is an exceptionally handsome volume, with pages of color photographs and many of Gordon Craig's original woodcuts, but the text is speckled with dangling constructions ("After seven years of wandering abroad, England appeared ready to receive him"), and often dispenses with the customary practice of setting off non-restrictive phrases and clauses with commas. Terry might not have cared, but Irving, so obsessive and controlling, would have had a fit.

Charles McGrath, formerly the editor of the Book Review, is a writer at large for The Times.

http://www.nytimes.com/2009/03/29/books/review/McGrath-t.html?ref=books

Get Smart

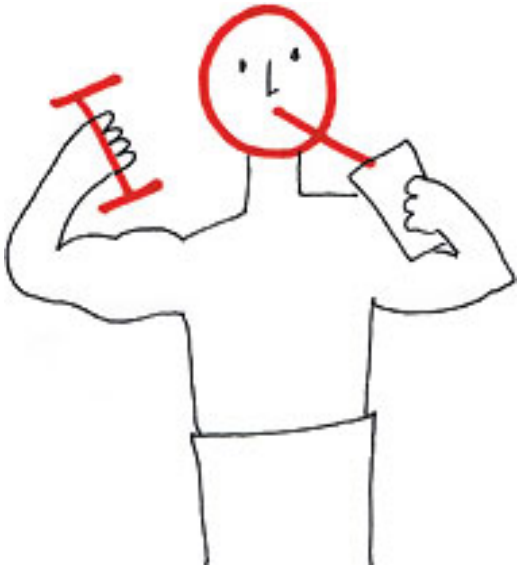
By JIM HOLT

INTELLIGENCE AND HOW TO GET IT

Why Schools and Culture Count

By Richard E. Nisbett

304 pp. W. W. Norton & Company. $26.95



Success in life depends on intelligence, which is measured by I.Q. tests. Intelligence is mostly a matter of heredity, as we know from studies of identical twins reared apart. Since I.Q. differences between individuals are mainly genetic, the same must be true for I.Q. differences between groups. So the I.Q. ranking of racial/ethnic groups — Ashkenazi Jews on top, followed by East Asians, whites in general, and then blacks — is fixed by nature, not culture. Social programs that seek to raise I.Q. are bound to be futile. Cognitive inequalities, being written in the genes, are here to stay, and so are the social inequalities that arise from them.

What I have just summarized, with only a hint of caricature, is the hereditarian view of intelligence. This is the view endorsed, for instance, by Richard J. Herrnstein and Charles Murray in "The Bell Curve" (1994), and by Arthur R. Jensen in "The g Factor" (1998). Although hereditarianism has been widely denounced as racism wrapped in pseudoscience, these books drew on a large body of research and were carefully reasoned. Critics often found it easier to impugn the authors' motives than to refute their conclusions.

Richard E. Nisbett, a prominent cognitive psychologist who teaches at the University of Michigan, doesn't shirk the hard work. In "Intelligence and How to Get It," he offers a meticulous and eye-opening critique of hereditarianism. True to its self-helplike title, the book does contain a few tips on how to boost your child's I.Q. — like exercising during pregnancy (mothers who work out tend to have bigger babies who grow up smarter, possibly because of greater brain size). But its real value lies in Nisbett's forceful marshaling of the evidence, much of it recent, favoring what he calls "the new environmentalism," which stresses the importance of nonhereditary factors in determining I.Q. So fascinating is this evidence — drawn from neuroscience and genetics, as well as from studies of educational interventions and parenting styles — that the author's slightly academic prose style can be forgiven.

Intellectually, the I.Q. debate is a treacherous one. Concepts like heritability are so tricky that even experts stumble into fallacy. Moreover, the relevant data come mostly come from "natural experiments," which can harbor subtle biases. When the evidence is ambiguous, it is all the easier for ideology to influence one's scientific judgment. Liberals hope that social policy can redress life's unfairness. Conservatives hold that natural inequality must be accepted as inevitable. When each side wants to believe certain scientific conclusions for extra-scientific reasons, skepticism is the better part of rigor.

Nisbett himself proceeds with due caution. He grants that I.Q. tests — which gauge both "fluid" intelligence (abstract reasoning skills) and "crystallized" intelligence (knowledge) — measure something real. They also measure something important: even within the same family, higher-I.Q. children go on to make more money than their less-bright siblings.

However, Nisbett bridles at the hereditarian claim that I.Q. is 75 to 85 percent heritable; the real figure, he thinks, is less than 50 percent. Estimates come from comparing the I.Q.'s of blood relatives — identical twins, fraternal twins, siblings — growing up in different adoptive families. But there is a snare here. As Nisbett observes, "adoptive families, like Tolstoy's happy families, are all alike." Not only are they more

affluent than average, they also tend to give children lots of cognitive stimulation. Thus data from them yield erroneously high estimates of I.Q. heritability. (Think: if we all grew up in exactly the same environment, I.Q. differences would appear to be 100 percent genetic.) This underscores an important point: there is no fixed value for heritability. The notion makes sense only relative to a population. Heritability of I.Q. is higher for upper-class families than for lower-class families, because lower-class families provide a wider range of cognitive environments, from terrible to pretty good.

Even if genes play some role in determining I.Q. differences within a population, which Nisbett grants, that implies nothing about average differences between populations. The classic example is corn seed planted on two plots of land, one with rich soil and the other with poor soil. Within each plot, differences in the height of the corn plants are completely genetic. Yet the average difference between the two plots is entirely environmental.

Could the same logic explain the disparity in average I.Q. between Americans of European and of African descent? Nisbett thinks so. The racial I.Q. gap, he argues, is "purely environmental." For one thing, it's been shrinking: over the last 30 years, the measured I.Q. difference between black and white 12-year-olds has dropped from 15 points to 9.5 points. Among his more direct evidence, Nisbett cites impressive studies in population genetics. African-Americans have on average about 20 percent European genes, largely as a legacy of slavery. But the proportion of European genes ranges widely among individuals, from near zero to more than 80 percent. If the racial gap is mostly genetic, then blacks with more European genes ought to have higher I.Q.'s on average. In fact, they don't.

Nisbett is similarly skeptical that genetics could account for the intellectual prowess of Ashkenazi Jews, whose average I.Q. measures somewhere between 110 and 115. As for the alleged I.Q. superiority of East Asians over American whites, that turns out to be an artifact of sloppy comparisons; when I.Q. tests are properly normed, Americans actually score slightly higher than East Asians.

If I.Q. differences are indeed largely environmental, what might help eliminate group disparities? The most dramatic results come from adoption. When poor children are adopted by upper-middle-class families, they show an I.Q. gain of 12 to 16 points. Upper-class parents talk to their children more than working-class parents do. And there are subtler differences. In poorer black families, for example, children are rarely asked "known-answer questions" — that is, questions where the parents already know the right answer. ("What color is the elephant, Billy?") Consequently, as Nisbett observes, the children are nonplussed by such questions at school. ("If the teacher doesn't know this, then I sure don't.")

The challenge is to find educational programs that are as effective as adoption in raising I.Q. So far, Nisbett observes, almost all school-age interventions have yielded disappointing results. But some intensive early-childhood interventions have produced enduring I.Q. gains, at a cost of around $15,000 per child per year. Yet, by the author's reckoning, it would cost less than $100 billion a year to extend such programs to the neediest third of America's preschoolers. The gain to society would be incalculable.

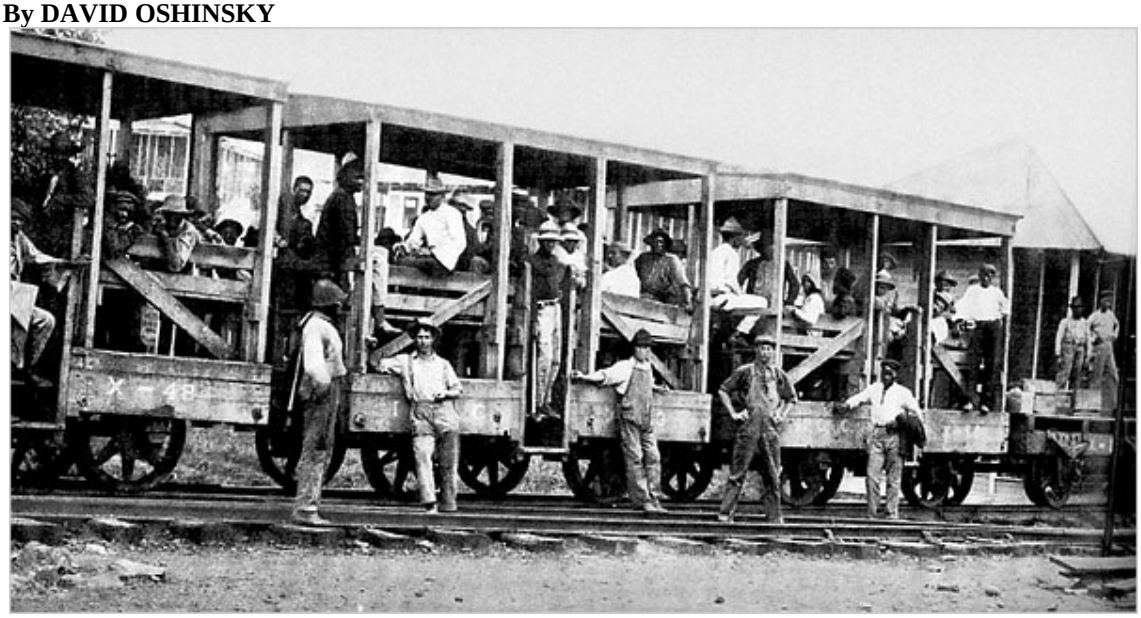
Still, there are limits even to Nisbett's optimism. Social policy can get rid of ethnic I.Q. gaps, he thinks, but "the social-class gap" in I.Q. "is never going to be closed." I would frame the matter a little differently. Even if I.Q. inequality is inevitable, it may eventually become irrelevant. Over the last century, for reasons that aren't entirely clear, I.Q. scores around the world have been rising by three points a decade. Some of this rise, Nisbett argues, represents a real gain in intelligence. But beyond a certain threshold — an I.Q. of 115, say — there is no correlation between intelligence and creativity or genius. As more of us are propelled above this threshold — and, if Nisbett is right, nearly all of us can be — the role of intelligence in determining success will come to be infinitesimal by comparison with such "moral" traits as conscientiousness and perseverance. Then we can start arguing about whether those are genetic.

Jim Holt is the author of "Stop Me if You've Heard This: A History and Philosophy of Jokes." He is working on a book about the puzzle of existence

http://www.nytimes.com/2009/03/29/books/review/Holt-t.html?ref=books

They Dug It

By DAVID OSHINSKY



THE CANAL BUILDERS

Making America's Empire at the Panama Canal

By Julie Greene Illustrated. 475 pp. The Penguin Press. $30

While running for the Republican presidential nomination in 1976, Ronald Reagan stumbled onto an issue that energized his upstart campaign. In stop after stop, he recalled, people expressed "utter disbelief" that an American president — the Republican incumbent, Gerald R. Ford — would even think of relinquishing control over the Panama Canal. Knowing next to nothing about its history, but quite a lot about the politics of flag-waving, Reagan quickly turned the canal into a symbol of American resolve in an increasingly dangerous and disrespectful world. "We bought it, we paid for it, it's ours," he told the cheering crowds, and "we are going to keep it."

What was so special about the Canal Zone? Why this allegiance to a distant spot of land, 10 miles wide and 50 miles long, that many Americans would have trouble finding on a map? The answer lies in the mythology that has surrounded the canal since its opening, in 1914. America had not only pulled off one of the greatest engineering feats in history, it had succeeded where France had failed. It was our technology, our science and our leadership that had carried the day. Even better, we had shared the blessings of this modern marvel with the entire world, once again showing our selfless intent. What clearer example could there be of America's distinctiveness, its ability to shape the future, to get big things done?

Many historians of the canal accept this line of thinking. Their works have centered on the genius of American planners like George Washington Goethals, seeing the decisions they made, and the obstacles they overcame, as signs of a superior national character. Whether eradicating deadly diseases like yellow fever, constructing the massive locks and gates that raised and lowered the ships, or disposing of millions of tons of rubble produced by the dynamite and steam shovels that leveled entire mountains, these planners faced down every problem thrown their way, finishing the project ahead of schedule and well under budget. "I think often about why the French failed at Panama and why we succeeded," the historian David McCullough said a few years ago. "One of the reasons . . . is that we were gifted, we were attuned to adaptation, to doing what works, whereas they were trained to do everything in a certain way. We have a gift for improvisation."

"The Canal Builders," by Julie Greene, a history professor at the University of Maryland, takes a very different approach. Less interested in the now fabled engineering feats of the project, she instead

emphasizes the human dimension — the daily lives of the thousands of workers and family members who journeyed to the Canal Zone from all parts of the world seeking adventure, better wages or simply a fresh start. Who were they? What jobs did they do? Where did they live? What did they eat? How were they governed? Her answers provide a fascinating look at those who actually built the canal between 1904 and 1914, a largely forgotten population of 60,000 brought to life in a remarkably creative way.

Workers from the Caribbean, especially Jamaica and Barbados, constituted the bulk of the unskilled labor force, doing the dirty, dangerous jobs that whites wouldn't do. Recruited by company agents, paid far more than they could ever earn at home, these men were used up and replaced like the junked parts of a machine. In one of the many personal histories employed by Greene, a West Indian named Constantine Parkinson wrote that "people get kill and injure almost every day and all the bosses want is to get the canal build." Indeed, so many of them died in landslides and explosions that a special envelope was used to alert their families back home. A woman from Barbados remembered the sight of a local mother with a black-bordered envelope in her hand: "That meant her son had died in Panama."

While thousands of other workers came from Europe and Asia, the best jobs almost always went to white Americans. Because word had spread in the United States about the perils of Panama, hefty incentives were required. A skilled American worker in the Canal Zone — an accountant, a steam-shovel operator or a locomotive engineer — could make as much as $200 a month, a staggering sum in that era, paid in American gold currency. (Most nonwhites and non-Americans were "silver workers," paid in Panamanian silver.) White Americans received six weeks of vacation each year. Wives received free passage to Panama, and married couples were given prime living quarters. American officials believed that women and children would help stabilize the region by cutting down on drinking, prostitution and crime.

Life beyond the Canal Zone teemed with immigrant peddlers and lonely workers flush with cash. A tourist in Panama City described a street scene in which a cart, "loaded with English tea biscuit, drawn by an old American Army mule, driven by a Hindu wearing a turban, drove up in front of a Chinese shop." Across the street was "an Italian lace shop run by a Jew." But white Americans lived a world apart from this clamor. The Canal Zone gave them all the comforts of home, resembling a modern-day gated community, with schools, churches, servants, ball fields, libraries and Y.M.C.A.'s. Neighborhoods were segregated by race and class. Labor unions were frowned upon. A well-organized police force kept order. As Speaker of the House Joseph Cannon, who led a touring group of congressmen, put it, "We're just as comfortable here as in Illinois."

At its best, "The Canal Builders" presents a telling portrait of exploitation, privilege and insularity, backed by a mountain of fresh research. But it veers toward predictability in its epilogue, which sees the canal project as both a launching pad for America's global dominance (a well-worn historical theme) and a precursor of the suffering that plagues our current world economy. "Strategies devised during the canal construction project have reached across the decades to the current day," Greene concludes. "We can see them in the increasing importance of transnational migrant labor and the rapid flow of capital around the globe, in the persistent notion that citizens deserve certain rights that are denied to aliens, and in the sentimental and idealistic ways Americans sometimes approach the exercise of U.S. power around the world."

But Greene never considers the possibility that the canal project was merely a reflection of powerful forces already in place, and not some grand design for the future. As a result, she doesn't question whether conditions for West Indian canal workers were any more dangerous than those for immigrant laborers in, say, a Pittsburgh steel mill or a Chicago meatpacking plant. Or whether these West Indians were afforded fewer rights than immigrant workers in Europe, Asia or other parts of the Americas. The differences, I suspect, were extremely small. The canal project represented the best — and worst — of the spreading industrial revolution, circa 1910, with a strong dose of American bravado mixed in.

The real strength of "The Canal Builders" lies not in floating big theories, but in recreating forgotten lives. It is history from the bottom up, and it speaks for 60,000 anonymous people who helped build what President Theodore Roosevelt grandiosely called "the greatest work of the kind ever attempted." That should be more than enough.

David Oshinsky holds the Jack S. Blanton chair in history at the University of Texas and is a distinguished scholar in residence at New York University.

http://www.nytimes.com/2009/03/29/books/review/Oshinsky-t.html?ref=books

Justice of the Peace

By ADAM LEBOR

MADAME PROSECUTOR

Confrontations With Humanity's Worst Criminals and the Culture of Impunity:A Memoir

By Carla Del Pontewith Chuck Sudetic

434 pp. Other Press. $25.95

Cynics argue that because the United Nations was unable to stop the carnage in the former Yugoslavia and Rwanda, it set up war crimes tribunals instead, as a kind of humanitarian consolation prize.
What the diplomats did not expect was Carla Del Ponte's determination to bring the perpetrators to justice and to end the culture of impunity. As the attorney general of Switzerland, she had fought against the muro di gomma, the wall of rubber, that deflected her attempts to stop Mafia money-laundering.
"Madame Prosecutor" is her account of battling the muro di gomma across the Balkans, Rwanda and Western capitals.
It is a relentless, sometimes (understandably) angry book, and an important insider's account of the quest for international justice. Each of its 13 chapter titles begins with the word "Confronting": "Confronting Kosovo," "Confronting Rwanda's Genocide," even "Confronting the Tribunal Bureaucracy," the heading for a chapter in which she accuses some of her own officials of obstruction and incompetence.
Del Ponte's determination to make the Rwanda and Yugoslavia tribunals functioning instruments of international criminal justice caused consternation. She was a wild card, disrupting diplomacy's finely calibrated responses. Yet she succeeded, at least in part. Slobodan Milosevic, the former president of Serbia, was arrested on charges of genocide and died in his cell at the United Nations detention center in The Hague in 2006. Radovan Karadzic, the former Bosnian Serb leader, is detained there now and is preparing his defense against charges of genocide.
Del Ponte wrote "Madame Prosecutor" with Chuck Sudetic, who covered the Yugoslav wars for The New York Times from 1990 to 1995. Sudetic, a fine reporter and an elegant writer, is the author of "Blood and Vengeance," one of the best books on the former Yugoslavia. "Madame Prosecutor" is less evocative but is clearly written and generally well paced, although occasionally the depth of detail, as Del Ponte outlines yet another meeting with obstructive Serbian or Croatian officials, slows down the narrative.

The book's microfocus on her political battles also means it lacks sufficient geopolitical context. Del Ponte had a ringside seat at one of the most momentous shifts in international diplomacy in recent history: the setting up of new legal instruments to bring dictators and war criminals to justice. There are occasional insider snippets, as when, in March 2001, Kofi Annan, then the secretary general of the United Nations, wrote to Del Ponte admonishing her for calling for economic aid to Yugoslavia to be made conditional on better cooperation with the tribunal. However, the reader is left wishing that Del Ponte were as indiscreet about her dealings with the superpowers as she is, for example, about her relations with her own officials.

Only a tiny fraction of Yugoslav war criminals have been indicted. By the time Del Ponte left her post, at the end of 2007, the tribunal had issued 161 indictments, mostly concentrating on senior figures. Local courts are now expected to take up the burden. Some of the horrors chronicled make for grim reading, and one incident in particular haunts long after the book has been closed.

In February 2007, a protected prosecution witness gave evidence at the trial of seven senior Bosnian Serb army officers, charged with the massacre of up to 8,000 Muslim men and boys at Srebrenica in 1995. The witness had been a driver, delivering food and drink to the executioners as they lined up their victims and sprayed them with gunfire.

And then, suddenly, the shooting stopped. A very young boy emerged from the heap of bodies, covered in blood and mangled flesh. He began walking toward the gunmen, crying for his "Babo" (father). The soldiers lowered their weapons. The commanding officer ordered them to shoot the boy, but they refused, telling him to do it himself. The witness intervened on behalf of the boy: "All of a sudden he took me by the hand. . . . I don't want any one of you to experience that, . . . the grip, the grip of him on my hand, and I was amazed at his strength." He took the boy to his van and put some music on, while the gunmen returned to their work.

Later in February 2007, another witness testified at the Srebrenica trial. It was the boy (now a young man) who had crawled out from the pile of corpses.

The Yugoslav tribunal is scheduled to close down by the end of 2011. Meanwhile, in January, the International Criminal Court in The Hague began its first trial, that of Thomas Lubanga, a former Congolese warlord. Survivors of Congo's horrors have already taken the witness stand. For this, too, Carla Del Ponte deserves considerable credit.

Adam LeBor is the author of " 'Complicity With Evil': The United Nations in the Age of Modern Genocide."

http://www.nytimes.com/2009/03/29/books/review/LeBor-t.html?ref=books

Other People's Airs

By KAUI HART HEMMINGS

SPOILED

Stories

By Caitlin Macy

220 pp. Random House. $24

With a title like "Spoiled," I expected Caitlin Macy's first story collection to be about Park Avenue princesses caught in a glamorous panic of wealthy-people problems (status, sex scandals, where to summer) and using wealthy-people medication (gossip, Barneys, Grey Goose with a twist of Valium) to keep their despair as recessed as the lighting in their nurseries.
I expected, in other words, to meet older versions of the characters from "The Fundamentals of Play," Macy's fine 2000 novel about New York 20-somethings in a glamorous panic of . . . see above.
I wouldn't have minded. Wealth, class, the surfeit and cattiness of the overindulged — a writer like Macy could create beguiling chokers with these gems. But from the first paragraph I knew I was in different territory. These nine stories are less concerned with the fabulous than with something altogether more demanding and substantial.
The characters grumbling through this book aren't as spoiled as they'd like. The settings aren't Upper East Side penthouses facing the park. They're in the same buildings, perhaps, but as the begrudging narrator of one story notes, "in interior rooms that open onto shaftways." That character, a young mother, gives a comically in-depth analysis of her difficult friend, Christie. Vexed by Christie's naked social-climbing — and feeling herself above trivial matters like money and excess — the narrator dissolves their friendship, determined "to burn the fat from my life." By the end, however, she's perfectly willing to regain the weight when she learns Christie can do her a life-changing (and status-changing) favor.
Many of these stories are about women studying other women from an amused distance. Yet thanks to Macy's knack for detail and clarity, the stories never feel distant. Instead, they're fraught and immediate. One character's fixation on a girl and her nanny leads to an ill-conceived and ultimately selfish act of charity. Another character, Trish, steals a coat from her stylish, irreverent housekeeper, hoping to knock her confidence down a peg to a level more suitable for a servant.
A few stories (like the one about the coat) rely too heavily on symbolism — the events lining up too neatly, the toughened voice leading to an ending that feels manufactured and bereft. Yet while the action can seem contrived or mundane, the writing itself is always rousing. Trish's fantasy of a cleaning lady is of somebody "heavy and saturnine, with an air of the Old World." She imagines she'll "indulge the

woman, with unexpected bonuses and thoughtful gestures: 'Do you want this Vogue? I was going to throw it out.' "

These characters aren't so much spoiled as offensively naïve and sheltered. Yet there's a catch: Their routines, language, obsessions and complications are often (and intentionally) recognizable as our own. Macy seems to be broadening the definition of who's spoiled, warmly including most of her readers.

This is how Macy's characters speak to their children: "Do we hurt people's bodies in this family? Look at my face, Miles — is that something we do?"

Funny, absurd, familiar. If you chant "ohm" at the end of an exercise class, you're implicated. If you're drinking a soy latte while reading, say, The New York Times Book Review, you've been tagged.

There's a thrill and a shame in this recognition, in judging others' pretensions only to realize, as Macy's characters do, that you share them.

These stories often ring the same note, it's true, and the women in them are sometimes hard to distinguish. But taken individually, they are exquisite character studies: urbane, assured and filthy rich in smart observations.

Kaui Hart Hemmings is the author of a story collection, "House of Thieves," and a novel, "The Descendants."

http://www.nytimes.com/2009/03/29/books/review/Hemmings-t.html?ref=books

In Berlin, Authors Find Their Voice

By NICHOLAS KULISH

ON one of those long December nights in Berlin that make the days feel like no more than mere intermissions, the steady drizzle and slippery cobblestones should have kept anyone even entertaining the notion of stepping outside into such misery at home under a blanket. Yet there they were, a crowd of young people in sneakers and hoodies, over 100 strong to watch the group known as Chaussee der Enthusiasten, or Avenue of the Enthusiasts, give their weekly reading from their latest works.Some of the pieces were carefully crafted vignettes, others handwritten, free-associating riffs on the day's headlines, daredevil feats of literature without a net. Two of the young men, Jochen Schmidt and Stephan Zeisig, bantered on stage like an East Berlin version of "A Prairie Home Companion," concluding every sentence with "wahr?" which means "true," and is the capstone of most thoughts expressed in Berliner dialect and a challenge rather than a question, you know?

They talked about trying to seem "oppositionell" when they were just coming of age in the days before the Wall fell, not out of conviction but because they had heard that female Stasi agents slept with regime opponents to get at their secrets. The crowd laughed.
"Oh, come on," heckled a fellow writer and Enthusiast, Kirsten Fuchs, as she waited for her turn. "Last week you were talking about having a crush on your Pioneer leader," referring to East Germany's indoctrinating version of a scout leader. The crowd howled. The reading continued.
Just another night out in Berlin.
With its history as the capital of the Third Reich and time as the divided symbol of the cold war, Berlin may not be known for happy stories, but it is known in Germany for a certain rueful humor, sharpened by tragedy, suffering and the unforgiving environment itself. Foreigners most often stumble into this attitude through "Cabaret," the musical expression of Christopher Isherwood's "Berlin Stories," his prose tribute to the capital in the dying days of the Weimar Republic.
Wit and wordplay are a native sport, and locals turn out in force at readings big and small, from the stately Literaturhaus in Charlottenburg in the west to the bare concrete and benches at the RAW-tempel — where the Chaussee der Enthusiasten reading took place — in the former railyard where the former Reichsbahn used to fix up its trains in Friedrichshain in the former east.
Across the ocean, the word has been out for more than a little while about the cavernous spaces available in Berlin for a seemingly ceremonial fee — even by the standards of crisis-chastened New York and London. Those low rents famously have allowed industrial artists to find studios for their massive sculptures, and bands to lease rehearsal spaces for their practice sessions.
Applied on the minute scale, that means ultracheap nooks for the aspiring authors who need room only for a laptop (or, in advanced cases of the writing bug, an antique typewriter) and a precarious stack of books.
There are cheaper places in the world, though one has to go much farther east nowadays than Warsaw to find them, but none that also have the breadth of cultural offering. Whether that's the KW Institute for

Contemporary Art or the Berlinale film festival, Daniel Barenboim conducting "Fidelio" at the Berlin State Opera or the peaked black roof of Bertolt Brecht's Berliner Ensemble looming over the Spree River and would-be playwrights alike, there is culture and tradition.

It is that history as much or more than the economics that appeals to writers. Berlin wears its old wounds plainly, like a dueling scar in an Otto Dix portrait. In this capital city, the government left the scrawling of Soviet soldiers on the walls of the Reichstag as a chastening reminder to legislators of the country's darkest hour and how it ended up there.

"Berlin openly tells stories and heavily breathes history on every street corner," said Thomas Pletzinger, whom I got to know a decade ago when he was a young publishing assistant in New York. Last year, his first novel, "Bestattung eines Hundes," or "Burial of a Dog," received wide critical praise in Germany; it will be published in the United States in fall 2010.

Mr. Pletzinger described himself as growing up "in a small, bombed-out yet nowadays seemingly history-free city in Western Germany that conceals all traces of history with ugly '60s architecture and shopping centers." Berlin, the bustling metropolis of Alfred Döblin's "Berlin Alexanderplatz," was always his goal as a youth in his hometown of Hagen, not far from Dortmund. Now at work on a novel set in Berlin, Prague and New York between 1925 and 2005, he said that this is the place he has to write it.

More and more, the city is expanding on its historic role as an incubator of books. Award winners and anonymous scribblers, locals and expatriates, everyone in Berlin has a book in him and everyone with a book in him seems to have roosted in Berlin.

The teeming masses of authors are supported by a superstructure of foundations and grants and ubiquitous antiquariat (used-book stores) seemingly on every corner, not to mention the noble cultural villas, like the Literarisches Colloquium Berlin and the American Academy in Berlin, both on the same lovely lake — the Wannsee — near where the poet Heinrich von Kleist killed himself in 1811 after first shooting the incurably ill Henriette Vogel.

Seven young writers, including Mr. Pletzinger, rented a space in the former eastern part of the city to challenge the notion that their profession is, by necessity, a solitary one. They opened a storefront where they can work side by side, calling it Adler & Söhne Literaturproduktion, a kind of highbrow sweatshop for the stitching together of sentences.

The area around Helmholtzplatz in the northern end of Prenzlauer Berg is known for its bars and cafes, where the music and the conversation carry on deep into the night. But on a rainy evening this past July, it was instead a little storefront on a nearby side street where the guests spilled onto the sidewalk, ignoring the weather and drinking and talking into the morning hours.

Writers from Poland and Mexico, New York and London, and every corner of Germany were celebrating the opening of Adler & Söhne. Sasa Stanisic, a co-founder who is originally from Bosnia and is the author of "How the Soldier Repairs the Gramophone," a novel in German set during the conflict in Bosnia, was among them. He held forth in English about a recent trip to Iowa, where he was a fellow at the International Writing Program at the University of Iowa. Nearby, plans were being laid to rendezvous at the upcoming Frankfurt Book Fair. A tryst or two began in the backroom.

Most intriguing was the story making the rounds that this humble location had once housed the tobacco shop where the iconic East German avant-garde dramatist Heiner Müller used to buy his cigarettes. The possibility that the nicotine that powered the writing of "Hamletmachine" was procured in that very space seemed, for some, far more intoxicating than the beer.

WRITTEN WORD SPOKEN HERE

Here is where to find information about readings and writers' groups in Berlin:

Adler & Söhne Literaturproduktion: Senefelderstrasse 31; www.adlerundsoehne.com.

American Academy in Berlin: Am Sandwerder 17-19; 49-30-804-830; www.americanacademy.de.

Chausee der Enthusiasten (www.enthusiasten.de) at RAW-tempel: Revaler Strasse 99; 49-30-292-4695; www.raw-tempel.de.

Literaturhaus Berlin: Fasanenstrasse 23; 49-30-887-2860; www.literaturhaus-berlin.de.

Literarisches Colloquium Berlin: Am Sandwerder 5; 49-30-816-9960; www.lcb.de.

http://travel.nytimes.com/2009/03/29/travel/29culture.html?ref=books

An Arctic Circle of Friends

By SCOTT BORGERSON and CAITLYN ANTRIM

THE North Pole is under siege by global warming. The sea ice there has lost half its thickness in the past six years, and all signs point to further rapid melting. By 2013, the entire Arctic could be devoid of ice in summer, and the region is likely to experience an influx of shipping, fishing and tourism. Russia planted its flag in the North Pole's ocean floor two years ago, and other northern nations find themselves under mounting pressure to lay claim to huge swaths of the seabed. Before the land grab goes too far, the nations most involved should turn the northernmost part of the Arctic into a great park — a marine preserve that protects the polar environment and serves as a center for peaceful, international scientific research.The Arctic's pristine waters are a leading indicator, and an important regulator, of global climate health. They are the beginning and the end of the so-called great ocean conveyor, the mighty current that connects all the world's oceans. And they are home to a vibrant ecosystem that supports whales, polar bears and terns.Driving much of the new interest in the Arctic, however, are the stores of oil and gas that lie beneath the water — amounting to an estimated 22 percent of the earth's remaining supplies. The largest deposits, however, are likely to be found in the shallower parts of the continental shelf, within the surrounding countries' existing economic zones. Any fields found at greater depths, within the boundaries of the proposed park, would be prohibitively expensive to exploit for at least decades to come. For sovereignty claims, North Pole oil is a red herring. The Convention on the Law of the Sea, the international treaty that sets the rules for ownership of ocean resources, recognizes that Canada, Denmark, Norway and Russia, the four countries neighboring the Arctic Ocean, may be entitled to extend their seabed boundaries — and even sets a deadline for doing so. (Because the United States has not joined the Convention, it cannot make a claim to the extended continental shelf.) But it leaves it to those countries to resolve overlapping claims among themselves. Disputes over jurisdiction stand to slow the process of setting up a system for protecting the Arctic and could also poison international relations elsewhere. The creation of an international park would head off both problems.One approach would be for the states and international organizations most involved in the Arctic to designate everything above 88 degrees latitude north — a circle with a 120-nautical-mile radius — as a marine park. This would be consistent with an idea presented in 1987 by Mikhail Gorbachev of the Soviet Union to create an Arctic "zone of peace." And it has precedent in the 1959 treaty that created an international zone for scientific research in Antarctica, and that has governed that continent so well ever since. Like Antarctica, the park could be managed by an international cooperative, including not only Canada, Denmark and Russia but also the United States, China, Finland, Germany, Japan, Norway, Sweden and any other countries that engage in Arctic research. Canada, Denmark and Russia would benefit from such an initiative because each would avoid the kind of legal conflict and jurisdictional uncertainty that could discourage private investment in the surrounding areas. And the sovereignty extensions that have already been approved by the Continental Shelf Commission, a body established by parties to the Convention on the Law of the Sea, could be put into effect without delay. All three countries could also use the new scientific research to help them better manage their Arctic resources. And the park would not interfere with any nation's freedom of navigation.

It might seem presumptuous for Americans to suggest that our northern neighbors forgo ownership of even a small part of the Arctic seabed. Admiral Robert Peary may have planted the American flag at the North Pole 100 years ago, but we have no territorial stake in the Lomonosov Ridge, the submarine link between Eurasia and North America that is the source of the competing claims. We do, however, have a vested interest in the peaceful development of the Arctic as a region. As citizens of a shared earth, we also have a stake in the greater good that can come from exploring the depths of the fastest warming part of the planet. American leadership on a polar park would send a clear message that we are attuned to the climate crisis.

Scott Borgerson is the visiting fellow for ocean governance at the Council on Foreign Relations. Caitlyn Antrim is the executive director of the Rule of Law Committee for the Oceans.

http://www.nytimes.com/2009/03/28/opinion/28borgerson.html?th&emc=th

Thyroid disorders 'misdiagnosed'

People with suspected thyroid disorders are being mistreated and misinformed, experts have warned.

British Thyroid Association doctors say some people are being given the wrong tests and the wrong treatment.

NHS doctors abide by expert guidelines - but the BTA says the problem comes when patients go outside the NHS.

Around 3% of the UK population has an underactive thyroid, which should be diagnosed with a blood test and treated with a synthetic hormone.

" **It can be confusing for patients** "
Professor Peter Trainer, Society for Endocrinology

An under-active thyroid, or hypothyroidism, develops when the thyroid gland produces too little thyroxine, and it is becoming more prevalent because of the ageing population.

Symptoms can include being very tired, feeling the cold, having difficulties with memory or concentration, weight gain and fertility problems.

These are symptoms that can mimic other conditions, and experts warn an incorrect diagnosis could mean some patients could suffer harmful effects from excess thyroid hormones, while other serious conditions may go undiagnosed.

The Royal College of Physicians (RCP) recently set out guidance for how hypothyroidism should be diagnosed and treated in the UK.

It says the only accurate way to diagnose a thyroid disorder is via a blood test which measures hormone levels, and the only scientifically proven way of treating the condition is by topping up a patient's natural thyroxine levels with a synthetic form of the hormone.

But the BTA warns that information on the web and in the media about alternative ways of diagnosing and treating the condition are leading people to turn to alternative methods of diagnosis and treatments.

It says urine tests, saliva tests and measuring body temperature are not reliable ways of diagnosing the condition.

Confusion

Dr Amit Allahabadia, the secretary of the BTA who wrote the editorial, said: "This is potentially an enormous problem, given that in any one year, one in four people in the United Kingdom have their thyroid function checked.

He added: "I think it is essentially doctors who are outside the NHS [who] may be misdiagnosing the condition.

"Patients may go to see them when they think they have an under-active thyroid, or when tests have shown they have normal hormone levels but they still feel ill."

Dr Allahabadia said he believed a "significant minority" of patients were affected, either directly through misdiagnosis or mistreatment or because they were being confused by inaccurate information.

Professor Peter Trainer, who chairs the clinical committee of the Society for Endocrinology which represents the specialists who treat thyroid disorders, said: "Our sympathy has to lie with the patient because there is potentially misleading information available on the web.

"It can be confusing for patients, and it can be difficult for GPs when they are confronted with that information, which is why the RCP guidance was published."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7965417.stm

Published: 2009/03/27 00:02:08 GMT

Medical scan sensitivity boosted

A technique using the fuel which powers the space shuttle could make a form of medical scan much more sensitive.

The University of York developers say it has the potential to help doctors make a faster and more accurate diagnosis for many medical conditions.

It may also increase the range of conditions that can be studied using magnetic resonance imaging, they say.

Writing in Science, they describe how they boosted MRI sensitivity by manipulating the fuel parahydrogen.

" **Our method has the potential to help doctors make faster and more accurate diagnoses in a wide range of medical conditions** "
Professor Gary Green, University of York

The technique increased the sensitivity of the scans by 1,000 times, and hugely speeded up the process of taking a scan, potentially reducing the cost of the procedure too.

It would take the standard method 100 hours to obtain the same amount of information the new technique generates in one second.

The technique works by interacting parahydrogen with a specially designed molecular field to create molecules that can be very easily detected by MRI scans.

Carbon molecules

Standard MRI scanners usually work by measuring information from hydrogen atoms found in the water and fat contained in the body's tissues.

But the new technique can also measure data from the carbon-based molecules that are the building blocks of the tissues themselves.

Lead researcher Professor Gary Green said: "Our method has the potential to help doctors make faster and more accurate diagnoses in a wide range of medical conditions.

"The technique could ultimately replace current clinical imaging technologies that depend on the use of radioactive substances or heavy metals, which themselves create health concerns."

Professor Ian Greer, dean of the Hull York Medical School, said: "This technological advance has the potential to revolutionise the accessibility and application of high quality medical imaging to patients.

"It will bring significant to benefits to diagnosis and treatment in virtually all areas of medicine and surgery, ranging from cancer diagnosis to orthopaedics and trauma."

Professor Derek Jones, an expert in MRI at Cardiff University, described the work as a "significant and exciting advance".

He said the York team's work meant that MRI could potentially be used to detect a larger range of molecules in the body, and in much smaller concentrations than previously possible.

"It shows great promise for expanding the applications of MRI in clinical and clinico-research settings, improving diagnosis and understanding of pathophysiology of a wide range of diseases."

Dr Martin Graves, an expert on MRI at the University of Cambridge, said the York technique was in competition with other potential ways to boost the sensitivity of MRI, including a technique called dynamic nuclear polarisation.

He said both methods offered the potential for MRI to produce images to rival those produced by PET scanning - without the need to subject the patient to a dose of radiation.

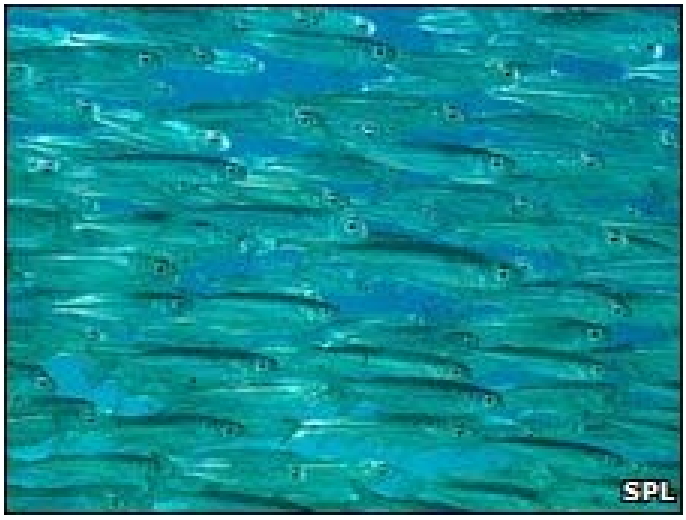
"It is very early days, but MRI has suffered from sensitivity issues, and new approaches which might allow us to probe the body's metabolism more deeply are potentially an exciting development."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7965364.stm

Published: 2009/03/27 00:02:31 GMT

Millions of fish shoal in seconds

Researchers in the US have recorded the point at which hundreds of millions of herring coalesce into a vast shoal.



The team used equipment, which they also invented, that uses sound waves to remotely monitor movement of the fish.

They found that, when the herring numbers reach a tipping point, or "critical threshold", this triggers a chain reaction whereby the shoal forms within seconds.

The findings are reported in the journal Science.

Herring form shoals to migrate during the autumn spawning season.

The shoal moves in a "highly organised fashion" and hundreds of millions of herring travel together to shallower waters to spawn.

The very ordered movement of the fish has reinforced an earlier theory that very large groups of migrating animals - swarms or shoals - act as one.

Fibre optic ocean

The technology the researchers used is called Ocean Acoustic Waveguide Remote Sensing.

This produces an image of the whole shoal by bouncing sound waves off the bodies of the fish.

With this equipment, measurements could be taken at such a high speed that the team was able to create a moving image of the forming shoal.

Using sound waves to monitor animals in the darkness of the ocean is not new.

But traditionally, a single survey vessel sends high-frequency sound beams into the ocean - taking a snapshot of a relatively small area.

The new system uses much lower frequency sound that can travel much farther.

" **The fish form a shoal covering tens of kilometres within tens of minutes** "
Nicholas Makris MIT

"It's like using the ocean as a fibre optic cable," explained Nicholas Makris, the Massachusetts Institute of Technology (MIT) professor who led the research.

"The low frequency beams stay trapped in the water column and can cover a 100km area in a minute and a half."

This, says Professor Makris, is a vast improvement over conventional techniques, which Makris compared to "watching one pixel on a movie screen" while the new technology allows you to "see the entire movie".

'Cities of fish'

The herring's initial movement seems to be triggered by the reduction in light as the sun sets.

"When the light fades, it's safer for the fish to move away from the seabed," says Professor Makris.

"Once they have a certain number of other fish in their sphere of perception, they suddenly come together - forming a shoal covering tens of kilometres within tens of minutes."

The herring gather in such huge numbers, and under cover of darkness, for "synchronised spawning". This helps protect them from predators.

The ordered movement of the shoal means the fish can reach their spawning ground more quickly and more safely.

"This is truly a commute," says Professor Makris. "And there are truly cities of fish down there."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/7966335.stm

Published: 2009/03/26 18:01:38 GMT

Mars domes may be 'mud volcanoes'

By Paul Rincon
Science reporter, BBC News, The Woodlands, Texas

Scientists say the possible discovery of mud volcanoes on Mars could boost the search for the planet's past life.

If life ever existed on Mars, the evidence could be buried deep below the surface, where it may be warm enough for water to remain in a liquid state.

Mud volcanoes could transport rocks from depths of several kilometres up to the surface, where robotic explorers could reach them.

Details were presented at the Lunar and Planetary Science Conference in Texas.

Using images taken by Nasa's Mars Odyssey spacecraft, Carlton Allen and Dorothy Oehler of Nasa's Johnson Space Center in Houston identified dozens of mounds in the northern plains of Mars which they say bear a striking resemblance to mud volcanoes.

Infrared data also show the domes cool more quickly at night than the surrounding rock, as one might expect if they were made of sediment.

Together with David Baker from Brown University, the researchers used instruments on Nasa's Mars Reconnaissance Orbiter (MRO) to observe several of these structures in a northern region known as Acidalia Planitia.

Data from the MRO's Crism experiment indicate that the material in the domes is more oxidised than the rock of the surrounding plains. This might suggest the presence of iron oxides, which form in the presence of liquid water.

They also took pictures of the structures with the HiRise camera on MRO; the images show the bright domes standing out against the dark basaltic rock of the surrounding plains.

Dr Allen told BBC News the structures resembled smooth cones with "no breaks", which visibly feathered out towards the margins. The observations, he said, were consistent with material that is "smooth, soft and easily eroded".

Gas vents

On Earth, the largest concentration of mud volcanoes is in Azerbaijan and the adjacent Caspian Sea. But they have been found at more than 40 sites on land and at more than 20 locations beneath the sea.

They are formed when pressurised gas and liquid from as much as several kilometres down, breach the surface. They belch out slurries of fluid, mud and rocks, as well as gases such as methane.

"In Azerbaijan, there is so much methane coming out that they can catch fire," said Dr Allen.

This raises the possibility that mud volcanoes could contribute to the methane observed in the Martian atmosphere.

Methane should last for only a short time in the atmosphere until it is destroyed by sunlight, so its continued presence means it is being replenished by some unknown process.

Dr Allen said the area with the mud volcanoes has not been well surveyed for atmospheric methane.

He said the team had found no evidence that the domes could be active today, as most show clear evidence of erosion. But he suggested they could have formed in the last 10 million years.

Other researchers caution that other processes such as the retreat of glaciers can form similar mound structures.

But they suggest that, if life does exist deep beneath the Martian surface, mud volcanoes could be one of the best ways to get at the evidence.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/7966437.stm

Published: 2009/03/26 17:09:36 GMT

Brain quirk could help explain financial crisis

- 11:29 24 March 2009 by **Ewen Callaway**

Why did almost no-one question the financial activity that caused the credit crunch? (Image: Caroline Purser/Photograher's Choice/Getty)

With hindsight, the causes of the current global financial meltdown seem obvious, even predictable. Now, brain imaging offers one explanation for why so few investors challenged foolhardy fiscal advice.

Our brains raise few objections when presented with seemingly expert guidance, new research suggests.

"Most average people have this tendency to turn off their own capacity for making judgments when an expert comes into the picture," says Gregory Berns, a neuroeconomist at Emory University in Atlanta.

Risk circuits

Berns' team presented 24 young volunteers with a simple choice: accept a sure payment or bet on a riskier, yet higher-paying lottery.

When weighing this decision, volunteers activated brain circuits known to calculate risk and reward. In line with previous research, the team noticed more brain activation in these dopamine-delivering areas when the expected reward was higher.

"When advice is not there, when people are making these judgments on their own, you can make clear correlations with expected value in the lottery and areas associated with the dopamine system," he says.

To see how subjects respond to financial advice, the team told volunteers that Charles Noussair, an economics professor at Emory who advises the US Federal Reserve, would offer his opinion on whether they should accept the easy money or take a chance.

Acting blindly

In reality, a computer program told volunteers to accept the sure thing if it added up to about 20% or more of the lottery sweepstake.

Volunteers usually took this advice blindly, brain scans suggest. Correlations between increased potential reward and brain activity disappeared when volunteers received the advice.

"That suggests that the normal mechanisms people use to evaluate risk and reward are not being used when you have an expert telling you what to do," Berns says.

"I think this explains a lot, if not everything, about the current market situation," he adds, urging people to take expert advice – fiscal, medical or otherwise – more shrewdly. "In my opinion, decision-making shouldn't be handed over to anyone, expert or otherwise."

Journal reference: *PLoS-ONE* (DOI: 10.1371/journal.pone.0004957)

http://www.newscientist.com/article/dn16826-brain-quirk-could-help-explain-financial-crisis.html?DCMP=OTC-rss&nsref=online-news

Déjà vu: Where fact meets fantasy

- 25 March 2009 by **Helen Phillips**
- Magazine issue 2701. **Subscribe** and get 4 free issues.

The feeling that history is repeating itself is one of the weirdest sensations a healthy human can have (Image: Mark Pennington)

Enlarge image

1 more image

Mr P, an 80-year-old Polish émigré and former engineer, knew he had memory problems, but it was his wife who described it as a permanent sense of déjà vu. He refused to watch TV or read a newspaper, as he claimed to have seen everything before. When he went out walking he said the same birds sang in the same trees and the same cars drove past at the same time every day. His doctor said he should see a memory specialist, but Mr P refused. He was convinced that he had already been.

Déjà vu can happen to anyone, and anyone who has had it will recognise the description immediately. It is more than just a sense that you have seen or done something before; it is a startling, inappropriate and often disturbing sense that history is repeating, and impossibly so. You can't place where the earlier encounter happened, and it can feel like a premonition or a dream. Subjective, strange and fleeting, not to mention tainted by paranormal explanations, the phenomenon has been a difficult and unpopular one to study.

Now that is changing, spurred in part by Mr P and a handful of people who, like him, have dementia and experience continuous déjà vu, and also by the discovery that there is a group of people with epilepsy who have déjà vu-like auras before a seizure. They are making it possible for researchers to catch the process in action, bringing hope that the secrets of this strange and disturbing phenomenon could finally be unlocked. Surprisingly, not only is déjà vu proving an interesting window on the peculiar ways that our memory works, it is also providing a few clues about how we tell the difference

between what is real, imagined, dreamed and remembered - one of the true mysteries of consciousness.

Speculations about past lives or telepathy aside, the first biological explanations of déjà vu were based on ideas that two sensory signals in the brain - perhaps one from each eye or each hemisphere of the brain - for some reason move out of sync, so that people have the experience of reliving the same event. "Mental diplopia", as it was called, is intuitively appealing but the evidence is stacked against it. Information from the two eyes mixes very early in visual processing, long before we perceive a scene. What's more, déjà vu - rather ironically as the term means "already seen" - can occur in blind people, according to Chris Moulin, a psychologist at the University of Leeds, UK, (*Brain and Cognition*, vol 62, p 264). Then there are the cases of people who have had their two cortical hemispheres surgically separated in an attempt to relieve intractable epilepsy. If the mental diplopia idea were correct you might expect them to have permanent déjà vu, yet there are no reports of this happening.

A second intuitive explanation is some sort of distortion in time perception. Somehow, incoming signals must get misinterpreted and labelled with an inappropriate time stamp, making the experience seem old as well as current. If the brain's memory system is like a tape recorder, it is as if the recording head has got muddled with the playback head. It is an interesting analogy, but it does not appear to have any anatomical basis in the brain.

Now another theory is gaining credibility. Perhaps déjà vu feels like reliving a past experience because we actually are - at least to some extent. Psychologist Anne Cleary of Colorado State University in Fort Collins came to this idea via an interest in memory problems. Keen to explain instances such as when something seems to be on the tip of the tongue, or when we recognise a face but can't place it, she started looking for parallels with déjà vu. "One particular theory of déjà vu is that it may be a memory process," she says. "Features of a new situation may be familiar from some prior situation."

Her first experiments seem to support this. In one, she was able to induce familiarity for images of celebrity faces or well-known places, even if the viewer couldn't place the image, simply by first presenting subjects with lists of their names. In another study volunteers reported familiarity with words that sounded similar to ones presented in an earlier list. Nevertheless, Cleary acknowledges that this can't be the whole story. "Déjà vu is unique in that it is not just another instance of familiarity, it actually feels wrong," she says.How to account for this? One possibility is that déjà vu is based on a memory fragment that comes from something more subtle, such as similarity between the configuration or layout of two scenes. Say you are in the living room of a friend's new house with the eerie feeling that you have been there before, yet knowing you can't possibly. It could be just that the arrangement of furniture is similar to what you have seen before, suggests Cleary, so the sense of familiarity feels misplaced.

To test the idea, her team produced a large range of images showing scenes such as a bar, a bowling alley, landscapes or rooms from a house. Volunteers saw a subset of these, then they were tested on a new set, half of which were entirely novel and the other half resembling scenes from the first set in structure and configuration but not content. Not only did the similar layouts produce familiarity without recall, subjects also reported a sense of the inexplicable, having been told that all the scenes were different.Although the familiarity idea appeals to many, Moulin, for one, is not convinced. His scepticism stems from a study of a person with epilepsy that he conducted with Akira O'Connor, now at Washington University in St Louis, Missouri. This 39-year-old man's auras of déjà vu were long-lasting enough to conduct experiments during them. The researchers reasoned that if familiarity is at the root of déjà vu, they should be able to stop the experience in its tracks by distracting the man's attention away from whatever scene he was looking at. However, when he looked away or focused on something different, his déjà vu did not dissipate, and would follow his line of vision and his hearing, suggesting that real familiarity is not the key. The fact that an epilepsy aura can cause déjà vu at all

suggests that it is erroneous activity in a particular part of the brain that leads to misplaced feelings of familiarity, suggests Moulin.

Hypnotic dissociation

But how? Moulin and O'Connor think déjà vu is the consequence of a dissociation between familiarity and recall. We know that we can have a sense of familiarity for a face or name without actually remembering where we know it from. Using hypnosis, O'Connor and Moulin have been able to create a more mysterious sense of familiarity that leads people to draw parallels with déjà vu. One group of people was given a puzzle to solve. Then, while under hypnosis, they were told they would be given the puzzle again, but would not recall it. Another group did not do the puzzle but were told under hypnosis that they would be given it later and that they would experience feelings of familiarity but not understand why. Both situations produced a sense of eerie familiarity, which some people likened to déjà vu. Moulin and O'Connor hope that their ability to induce a déjà vu-like state in the lab will help them probe the phenomenon. They also believe these experiments support the idea that familiarity and recall are dissociable, and that you can have a sense of familiarity without actually having any prior experience of something.Studies of the brain also support the idea that separate circuits mediate recollection and familiarity, according to John Aggleton and Malcolm Brown of Cardiff University, UK, who recently reviewed brain imaging and animal studies (*Trends in Cognitive Sciences*, vol 10, p 455). They point out that different parts of the medial temporal lobe, at the side of the brain, are responsible for different aspects of memory recall (see illustration). The curved tube-like hippocampus, which runs through the centre of the lobe, mediates recollection, particularly of autobiographical memories. Meanwhile, the studies show that the surrounding parahippocampus, particularly the perirhinal cortex, may provide the feelings of familiarity.

This fits well with the evidence from brain scans of Mr P and others like him, who show huge degeneration of neurons in the medial temporal lobe, and the fact that it is epilepsy originating in the medial temporal lobe that leads to déjà vu auras.It is possible that both Moulin and Cleary are correct. The perirhinal cortex may store information about spatial relationships, rather than time, place and sequence of events, and so normal familiarity feelings could come largely from layout and configuration, backing Cleary's findings. Indeed, there may be many ways to produce false familiarity, according to psychologist Alan Brown of Southern Methodist University in Dallas, Texas, author of *The déjà vu experience* (Psychology press, 2004). His own experiments indicate some other possibilities. For example, he has induced the feeling by distracting volunteers while they saw a glimpse of a scene and then moments later giving them a good look. "If you take a brief glance when distracted, and look at the same scene again afterwards, it can feel like you've seen it before but much earlier," says Brown. He has also induced it by showing people images of things they had forgotten. "Just as a stomach ache can hurt the same way but be caused by lots of different processes, it could be the same way with déjà vu," he says.

The real problem with explaining déjà vu, however, is not how we can get familiarity without recognition, but why it feels so disturbing. "We'd get it all the time if it were just familiarity with real experiences," says Ed Wild from the Institute of Neurology in London. He suggests that mood and emotion are also important contributors to the sensation of déjà vu. We need the right combination of signals, not just the layout of a scene but how we feel at the time, to believe something is familiar when really it is not.

A matter of degree

Moulin agrees it may be matter of degree. The regions thought to mediate recall, familiarity and emotions are all extremely closely linked. A small amount of stimulation could produce a mild sense of familiarity, while a stronger stimulus could spread into neighbouring emotion regions producing a more disturbing feeling, or even the striking sense of doom or premonition some people report with déjà vu.

Cognitive neuroscientist Stefan Köhler from the University of Western Ontario in London, Canada, believes the role of emotion is even more central in generating the sense of weirdness that accompanies déjà vu. He recently had the chance to image the brain of a person cured of epilepsy with déjà vu auras by removal of a large tumour that was triggering the seizures. The excised areas consisted of parts of the hippocampus and perirhinal cortex, but also included the amygdala. It suggests that this region, which is known to be heavily tied up with emotion, was also involved in creating the déjà vu. Köhler speculates that without the appropriate emotional arousal, perhaps the brain cannot recognise a person or place we have encountered before as truly familiar. On the other hand, inappropriate emotional arousal may make us believe something is familiar when actually it is not.

The final element of déjà vu, a sense that it feels impossible, probably comes from the reasoning parts of our brain. According to Köhler, when our rational knowledge tells us one thing, but our emotional instincts tell us another, it can feel very wrong. This final element is missing in people with dementia, including Mr P, who accept their experiences as perfectly normal. Köhler suspects this may be because neurodegeneration in these individuals has caused a disconnection between the temporal lobes, which are generating sensations, and the frontal lobes which are continuously interpreting them.Our brains are looking for associations all the time. Déjà vu is interesting, says Kohler, because it points to a brain mechanism that helps you interpret what you are doing. When you are having a memory, you have the sensation of recollection. It feels like having a memory, and doesn't feel like daydreaming or current reality. "Déjà vu is a fault in a kind of cognitive process that is going on in the background all the time. When it goes wrong, it's very striking," says Moulin. At the extreme, patients with permanent déjà vu - dubbed déjà vecu, for already experienced - actually make up stories to make sense of it (*New Scientist*, 7 October 2006, p 32).

While déjà vu is starting to divulge some of its secrets, there is still a long way to go before we understand how we actually decide what is real, imagined, dreamed or experienced, and how these various tags lead to such different conscious experiences. One anecdotal finding that came to light while working on this article is that people who think a lot about déjà vu are more prone to it. I had déjà vu about reading about déjà vu, and researchers have had déjà vu about having déjà vu. It certainly retains mystery enough to justify further study. After all, says Wild, "déjà vu is one of weirdest brain experiences that normal people have".

Stranger and stranger yet

About 10 per cent of people claim never to have experienced déjà vu, while some individuals report having it regularly.

Children first get it at around age 8 or 9, suggesting that a degree of cognitive maturity is required.

Déjà vu happens less as you get older and more when you are tired, anxious or stressed.

It is particularly prevalent in people with certain conditions known to produce problems in time perception, such as schizophrenia and epilepsy.

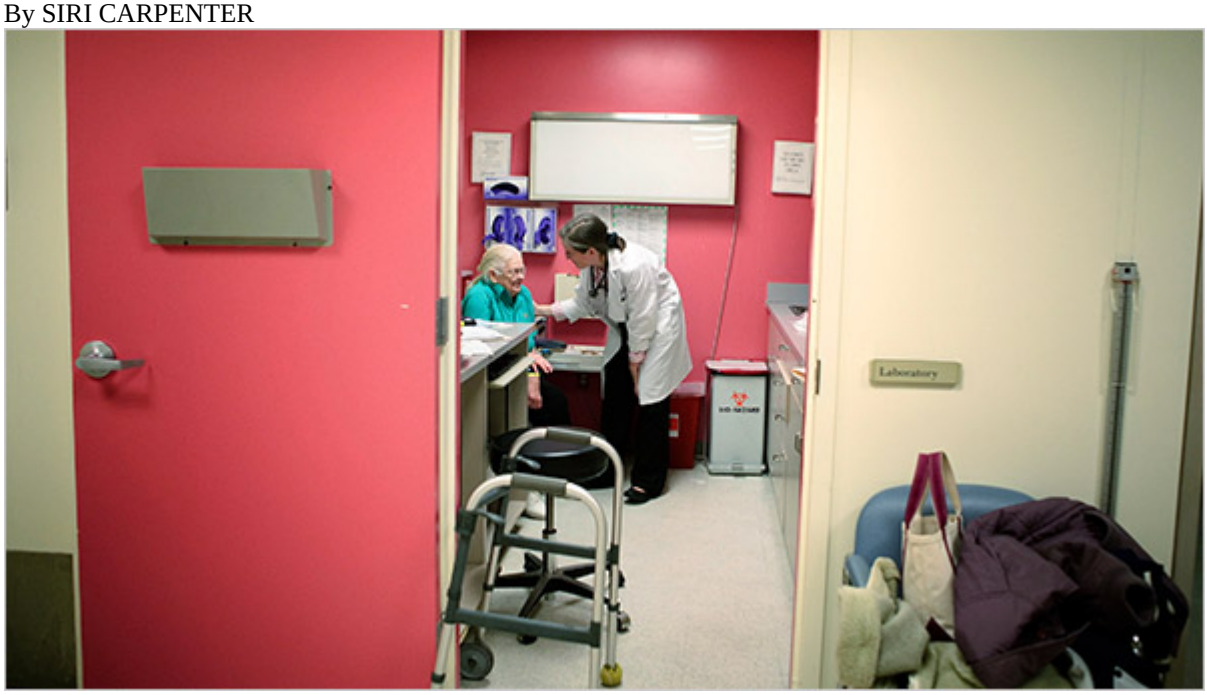
Although there is no gene for déjà vu, it is possible that certain versions of genes associated with epilepsy make some of us more prone to it.

Just reading this article could give you déjà vu.

http://www.newscientist.com/article/mg20127011.400-deja-vu-where-fact-meets-fantasy.html?full=true

Treating an Illness Is One Thing. What About a Patient With Many?

By SIRI CARPENTER



Mazie Piccolo has so many health problems it's hard to keep track. Congestive heart failure makes her short of breath and causes her legs to swell. An abnormal heart rhythm raises her risk for stroke. Arthritis in her knees makes it hard for her to get around, and she can no longer drive.

Mrs. Piccolo, 84, of Rosedale, Md., also has osteoporosis, and she has fallen several times in the past few years, once breaking her pelvis. On top of all these medical ailments and others — high cholesterol, high blood pressure, gastric reflux — she has a history of depression, and it is sometimes hard for her to care for her husband, who is even frailer than she is.

Strictly by the book, Mrs. Piccolo should be taking 13 different medications — an expensive, confusing cocktail that has proved too much for her to manage. Other medications that might be advisable cause intolerable side effects, and the more drugs she takes, the greater the risk of dangerous drug interactions.

What is striking about her predicament is not how rare it is, but how common. Two-thirds of people over age 65, and almost three-quarters of people over 80, have multiple chronic health conditions, and 68 percent of Medicare spending goes to people who have five or more chronic diseases.

As a group, patients like Mrs. Piccolo fare poorly by any measure. They linger in hospitals longer, experience more serious preventable health complications and die younger than patients with less complex medical profiles.

Yet people with multiple health problems — a condition known as multimorbidity — are largely overlooked both in medical research and in the nation's clinics and hospitals. The default position is to treat complicated patients as collections of malfunctioning body parts rather than as whole human beings.

"Very often, there is nobody looking at the big picture or recognizing that what is best for the disease may not be best for the patient," said Dr. Mary E. Tinetti, a geriatrician at the Yale School of Medicine.

And treating one disease in isolation, she added, can make another disease worse. In controlling diabetes, for example, doctors often seek to reduce levels of a blood-sugar marker called hemoglobin A1C. "But we know that for some people with complicated diseases, that's not always the best move," Dr. Tinetti said.

Mrs. Piccolo is being treated by Dr. Cynthia M. Boyd, a Johns Hopkins University geriatrician whose research focuses on patients with multiple chronic conditions.

"Doing right by patients like this is tremendously challenging," Dr. Boyd said. "Would she get the most benefit from lowering her blood pressure or cholesterol level, or from being treated for her osteoporosis, or from taking warfarin for stroke prevention? Or is it more important to treat her depression so she can manage her overall health better, or to try to improve her ability to physically get around?"

The medical file for Fred Powledge, 74, is four inches thick, with more than a dozen current diagnoses, including diabetes, gout, chronic obstructive pulmonary disease, compressed vertebrae, three replacement joints, two replacement eye lenses and arthritis.

Mr. Powledge, a Maryland writer, takes almost a dozen pills a day, as ordered by six physicians.

"Good luck and a lot of sleuthing on my part have given me doctors whom I trust and who are mostly aware of interactions among the drugs they prescribe," he said in an e-mail message. "But what's missing is someone who can look at the big picture and see my health as a whole.

"That falls to me alone, with the help of my very wise wife and frequent visits to reliable Web sites," he continued. "As our population ages, we need some kind of overseer to juggle all the diagnoses and prescriptions and look for conflicts and duplications. This would also help to counteract the notion in many people's minds that the doctor knows best — because often the doctor doesn't."

In a medical system geared toward individual organs and diseases, there is no champion for patients with multiple illnesses — no National Institute on Multimorbidity, no charity Race for the Multimorbidity Cure, no celebrity pressuring Capitol Hill for more research.

And because studies involving uncomplicated populations are cheapest and easiest to interpret, patients with multiple diseases are routinely shut out of drug trials. A 2007 study found that 81 percent of the randomized trials published in the most prestigious medical journals excluded patients because of coexisting medical problems.

"We often don't know what the real safety or efficacy is for patients with multiple illnesses," said Dr. W. Douglas Weaver, president of the American College of Cardiology.

Pharmaceutical companies are required to study how well particular drugs and medical devices work in the real world, after they've gotten government approval. In theory, such post-marketing studies should shed light on how best to treat patients who have complex medical problems. But the studies tend to include only a small fraction of patients receiving treatment, Dr. Weaver said.

Comprehensive data registries that track all patients at a given hospital or clinic are more promising, he said. But he added that unless the federal government stepped in to support such registries and pay doctors for participating, they might not be sustainable.

Because so little research includes complicated patients, physicians have little scientific evidence on which to base their care. In a 2005 study, Dr. Boyd and colleagues analyzed influential, evidence-based clinical practice guidelines used to treat nine of the most common chronic diseases, among them osteoporosis, arthritis, Type 2 diabetes and high cholesterol.

Fewer than half the guidelines specifically addressed patients with multiple illnesses, and most were limited to patients with only one coexisting disease or a small number of closely related diseases. “We’re so far away from having perfect evidence about how to help patients with complex health problems,” Dr. Boyd said.

Lacking solid guidance, doctors make their best guesses about whether a particular guideline is applicable to the patient, said Gerard F. Anderson, a professor of health policy and management at the Bloomberg School of Public Health at Johns Hopkins. And “their best guesses,” he went on, “vary all over the map.”

Time pressures intensify the doctors’ predicament. A typical 15-minute appointment leaves too little time to weigh the risks and benefits of a complex treatment plan, much less to fully consider the patient’s preferences and priorities.

“We don’t actually know how to weigh evidence across diseases,” said Dr. Boyd, of Johns Hopkins, “and we also don’t know the best ways of communicating to patients what we do and don’t know.”

Quality-improvement measures, which tie doctors’ compensation to how closely they follow evidence-based practice guidelines, further complicate matters, and some worry that they provide a financial incentive for physicians to sacrifice individualized decision-making.

“Doctors know that it’s not right for someone to be on 15, 18, 20 medications,” said Dr. Tinetti, the Yale geriatrician. “But they’re being told that that’s what’s necessary in order to treat each of the diseases that the patients in front of them have.”

Changing that will require a major investment in research, guidelines and quality measures that include the kinds of complicated cases doctors see every day.

“I think everyone realizes that we need to figure out how to integrate care for our elderly patients with multiple chronic conditions,” said Dr. Ardis D. Hoven, an internist in Lexington, Ky., who is a trustee of the American Medical Association. “But we’ve got a long way to go. We’re just now beginning to verbalize this.”

http://www.nytimes.com/2009/03/31/health/31sick.html?_r=1&nl=8hlth&emc=hltha1

Comforter and Comforted in an Unfolding Mystery

By NELL BURGER KIRST

I never really got to know the young woman. I met her during my third-year psychiatry rotation, when our team was consulted for concerns about depression.

Privacy rules won't allow me to use her name (where possible, I've gotten consent from the others involved in this story). She was terminally ill, sick not just with the disease but with all the complications of its treatment, and confined to bed in the intensive care unit.

By the time I met her she could barely speak. Her face was a vacant yellow moon, and her sparse, colorless hair sprawled tangled and sweat-soaked across her pillow.

What I did come to know of her was through her boyfriend, Josh. They had been together since middle school and had stayed together even as the rest of her life fell apart.

When her strained relationship with her parents became impossible and they were no longer in her life, Josh remained her confidant and closest friend. When she learned she was seriously ill, she and Josh filled out the paperwork required to give him her durable power of attorney.

So it was that he sat by her bed day after day, occasionally rising from his post there to perform the rudimentary maintenance that she no longer could: wiping the tears from her eyes and clearing the caked secretions around her mouth.

In her medical chart, he is referred to not as her "boyfriend," but as "family" or even simply as "Josh," and his presence in her record traces much of the agonizing march of her illness.

As she takes a turn for the worse: "Josh feels that [the patient] is still fighting and would like to proceed with treatment."

As organ systems begin failing: "Family will readdress code status tomorrow."

And finally, as supportive medical care is withdrawn: “Josh understands that [she] is dying and states that he is struggling to imagine a future without her.”

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Five months later, in the dead of winter, a 25-year-old man named David was changing a flat tire on the side of the road when he was struck by a van. He landed in the I.C.U. on a ventilator, with multiple fractures. I had landed there just several days earlier in my capacity as a medical student, and I would follow him as my patient for the next several weeks.

He soon became medically stable enough to move to a general hospital floor, but he had significant behavioral problems that required a sitter to stay with him around the clock. He routinely removed his feeding tube, refused to work with therapists, would not use a bedpan. He was frustrating and difficult to work with, and he was sabotaging his own recovery.

One morning I spoke with his nurse about his progress. His feeding tube had been in place for 30 hours straight. He had begun to cooperate in physical therapy, and he was using the bedpan without complaints.

David’s mother emerged into the hallway to confirm his improvement. It seemed to her to have a lot to do with the sitter who had been assigned to him for the past couple of days.

The sitter, she said, was extremely patient. He was supportive and enthusiastic, listening to David’s stories and sharing stories of his own. He was someone David could relate to, a perfect fit for him. I nodded, encouraged, and walked into the room.

There was David, sitting up in his hospital bed, animated and joking with his sitter. The thick, tedious air that had occupied David’s room effervesced and became light, and it happened so quickly I could not catch my breath.

His sitter was Josh.

It turned out he had taken a job with the hospital after his girlfriend’s death. His story, I realized, was a kind of love story, and in some way it evoked all of our stories, whether we are doctor or patient, comforter or comforted, healer or healed. Josh reaffirmed for me what we medical professionals know but all too easily forget: the human story is not a series of illnesses and treatments that we manage, but is an unfolding mystery — a process with which we ourselves are in ongoing communion, as both witnesses and full as participants.

There, settling into our place in the story, we can see it in its wholeness and let it make us whole. We take part in its healing as it unfolds, and we are healed by its unfolding.

Nell Burger Kirst is a fourth-year medical student.

http://www.nytimes.com/2009/03/31/health/31case.html?nl=8hlth&emc=hltha1

Benefits of Mammogram Under Debate in Britain

By RONI CARYN RABIN

The conventional wisdom about breast cancer screening is coming under sharp attack in Britain, and health officials there are taking notice.

They have promised to rewrite informational fliers about mammography after advocates and experts complained in a letter to The Times of London that none of the handouts "comes close to telling the truth" — overstating the benefits of screening and leaving out critical information about the harms.

What women are not told, the letter said, is that for every woman whose life is saved by breast cancer screening, up to 10 healthy women are given diagnoses — and, often, surgery — for a cancer that is so slow-growing it would never have threatened a woman's life.

"The culture is just that mammography is such a very sensible thing to do, so you chug along and have it done," said one of the signers, Hazel Thornton, in a telephone interview.

Mrs. Thornton, 75, said she became disenchanted with routine screening more than 15 years ago, after a mammogram identified ductal carcinoma in situ, a noninvasive breast cancer that often does not progress. She had a lumpectomy, but was offered such a confusing array of treatment options that she realized doctors knew little about how aggressively to treat this kind of cancer.

"You don't know about all the uncertainty until you're one of the unlucky ones, and it happens to you," she said.

The idea that mammography may do more harm than good may be alien to many American women. The prevention message has emphasized that screening protects women from breast cancer, and one survey of 479 women found that only 7 percent were aware that some cancers grow so slowly that even without treatment they will not affect a woman's health.

A 2006 analysis by the Nordic Cochrane Center collaborative, an independent research and information center based in Copenhagen, found that for every 2,000 women age 50 to 70 who are screened for 10 years, one woman will be saved from dying of breast cancer, while 10 will have their lives disrupted unnecessarily by overtreatment. The figures were cited in the letter to The Times.

Julietta Patnick, the director of cancer screening programs for the British National Health Service, said the patient handout was being revised and added that information about overdiagnosis might be added.

But in a telephone interview, she dismissed the Cochrane figures as inaccurate. British studies, she said, show that the ratio of lives saved to lives unnecessarily disrupted is more like one to one.

“We know, from statistics, that there are cancers diagnosed through screening that wouldn’t otherwise have been diagnosed — because the woman dies of something else first, because she might get run over by a bus, or she might have a heart attack, or she might live to 90 and it would just sit there, and she wouldn’t have died of breast cancer,” Ms. Patnick said.

But the problem is, “You don’t know who that woman is,” she continued. “You just know that statistically, she exists.”

Experts agree that under a microscope, slow-growing cancers look no different from more aggressive ones, so it is impossible to know which ones can be left untouched.

The author of the Cochrane analysis, Dr. Peter C. Gotzsche, another signer of the British letter, has written an alternative version of a patient handout for women considering mammography. It starts off by saying, “It may be reasonable to attend breast cancer screening with mammography, but it may also be reasonable not to attend.”

Women in the United States are screened much more rigorously than women in Britain, with annual mammography starting at 40. British women start at 50, and get a mammogram once every three years.

Dr. Ned Calonge, chairman of the United States Preventive Services Task Force, says mammography has been oversold to American women.

“The expectation of women is that ‘If I get screened, I won’t get breast cancer,’ ” he said. “I hear that women will say: ‘How can I have breast cancer? I always get my mammogram.’ ”

In fact, Dr. Calonge went on, early detection may not make a difference in survival for many women.

“Some women would have the same outcomes, whether the cancer is detected clinically or by mammography,” he said. “And there are women whose cancer is so aggressive we cannot detect it early enough to make a difference in mortality.”

An expert panel that reviewed the evidence on annual mammography for the task force in 2002 downgraded the recommendation for annual screens to “recommended” from “strongly recommended.” That review raised some of the same concerns mentioned by the critics in Britain: the high incidence of false-positive scares that cause anxiety yet turn out to be nothing serious, and the potential overtreatment of ductal carcinoma in situ and other “indolent” cancers. The panel also expressed concern about the potential for harm from exposure to radiation during the scans.

Mammography is more effective in older women. But even among women 50 and over, the panel concluded, only one death would be prevented after 14 years of observing more than 800 women who had undergone screening.

"That's a hefty number of women" who must be screened to derive a benefit, Dr. Calonge said.

Similarly, studies about prostate screening for men concluded this month that the P.S.A. blood tests save few lives while leading to unnecessary treatment with potentially serious complications.

Despite the task force's reservations, most medical societies endorse annual mammography, as does the American Cancer Society. Robert Smith, director of cancer screening for the society, says he believes overdiagnosis is minimal at best, and only 10 percent of invasive cancers found through mammography are harmless and will never be life-threatening.

"I think this is another example of, 'Here is something your doctor knows and isn't telling you,' " Dr. Smith said. "This is a debate between people who see the glass half full or the glass half empty."

"Breast cancer screening is a good part of a preventive health care plan," he continued. "It's not perfect."

Ultimately, women have to make their own decision about whether to be screened, said Dr. Lisa M. Schwartz, an associate professor at Dartmouth Medical School, who is co-author of "Know Your Chances" (University of California, 2008), a book about how to interpret health statistics and risk.

"You're not crazy if you don't get screened, and you're not crazy if you do get screened," said Dr. Schwartz, who also signed the letter to The Times. "People can make their own decision, and we don't need to coerce people into doing this.

"There is a real trade-off of benefits and harms. Women should know that. There's no question on one count: if you get screened, it's more likely you'll have a diagnosis of breast cancer."

http://www.nytimes.com/2009/03/31/health/31mamm.html?nl=8hlth&emc=hltha1

School Water Fountains to Prevent Obesity

George Ruhe for The New York Times Could this be the answer to childhood obesity?

Adding school water fountains, distributing water bottles in classrooms and teaching kids about the health benefits of water can lower a child's risk for becoming overweight, a new study shows.

The findings, published in today's Pediatrics, are based on a unique intervention in 32 German grade schools. In the study, about 3,000 second and third graders were weighed and quizzed about their beverage consumption. In some of the schools, water fountains were added and children were given personal water bottles they could fill at the beginning of the school day. Teachers were also given lesson plans that included health messages about the benefits of water consumption.

At the beginning of the study, there were no statistical differences in the prevalence of overweight kids in the different groups. By the end of the school year, however, children in the schools where water drinking was encouraged were 30 percent less likely to be overweight.

Why the water intervention influenced weight risk among the schoolchildren isn't entirely clear. Overall, the study didn't show statistically meaningful differences in body mass index scores or overall consumption of sugary beverages. However, juice consumption did appear to drop slightly in the water group. Because kids are still growing, the goal is not to help them lose weight but to slow weight gain. The data suggest that the water intervention most likely benefited kids on the borderline of weight problems by preventing them from progressing into the overweight group.

It may be that water consumption slightly reduced the amount of calories kids were consuming from beverages, or it could be that kids who drink extra water eat slightly less food. The study authors noted that the number of students studied was slightly lower than the planned 3,600, which could have undermined their ability to detect an effect. Although water consumption from fountains was measured, overall beverage consumption was determined based on self-reports by students and parents. Small changes in drinking habits are unlikely to be detected using these methods.

Another limit is the fact that daily food consumption wasn't measured, so it's not known whether drinking more water influenced a child's eating habits.

http://well.blogs.nytimes.com/2009/03/30/school-water-fountains-to-prevent-obesity/

Reshaping the Heart Is No Help

By DENISE GRADY

An operation that once looked promising to treat heart failure has turned out not to help patients, doctors are reporting. The operation, ventricular reconstruction, reshapes the heart's main pumping chamber in the hopes of making it work better. For about 20 years, surgeons have been performing it on some patients with heart failure who are already undergoing bypass surgery to treat blocked coronary arteries.

About five million Americans have heart failure, and it contributes to 287,000 deaths a year. Causes include damage from heart attacks, blocked coronary arteries, diseased heart valves, high blood pressure and diabetes. As a result, the heart becomes enlarged, scarred, misshapen and too weak to pump enough blood. Patients can become short of breath and have trouble walking. Doctors had hoped that reconstruction, by restoring the heart's natural shape and size, would help people feel better and survive longer.

But it does not, according to a major study in which 1,000 people were randomly assigned to have either reconstruction as well as bypass surgery, or bypass alone. Researchers then tracked the patients for a median of 48 months to see how many died or wound up in the hospital again. They also looked at symptoms and ability to exercise.

There were no differences between the two groups. Death and rehospitalization rates were the same, and symptoms improved equally in both groups. But the patients who had the reconstruction spent more time on the operating table and in the hospital.

Some surgeons say patients with severe scars on the heart, who were not studied, may benefit from the surgery.

But performing the operation routinely "cannot be justified," wrote Dr. Howard J. Eisen, in an editorial published online Friday in The New England Journal of Medicine. Dr. Eisen, who did not take part in the study, is a cardiologist at the Drexel University medical school in Philadelphia. An article about the study was also published in the journal, and the findings were presented on Sunday at a conference in Orlando, Fla.

http://www.nytimes.com/2009/03/31/health/31heart.html?nl=8hlth&emc=hltha2

Afflictions of the Brain, Cured or Not

By ABIGAIL ZUGER, M.D.

Brain Surgeon
A Doctor's Inspiring Encounters with Mortality and Miracles. By Keith Black, M.D., with Arnold Mann. Wellness Central. 212 pages. $25.99.

The Body Broken
A Memoir. By Lynne Greenberg. Random House. 220 pages. $25.

There are two sides to every disease story — a lot more if you count the patient and the doctor, the patient's relatives and the doctor's relatives, the nurses, the therapists and the insurer. What a shame that the only time we ever get to hear all of them is in court. Otherwise, it is pretty much all monologue out there in the literature of health lost and regained, with all the usual problems of perspective and turf.

Someday, perhaps, a multi-author volume will do justice to the whole elephant. In the meantime we are left with makeshift composites, like the dialogue provided by two new books on the triumphs and failures of neurosurgery.

This is the realm of bad headaches — headaches that thrive on ibuprofen and just get worse, headaches that may eventually bring patients to doctors like Keith Black, scans in hand. A neurosurgeon at Cedars-Sinai in Los Angeles, Dr. Black is one of a few dozen in the country specializing in brain tumor surgery (most neurosurgeons work on the brain's blood vessels, or in the spinal cord). Among the patients he recalls in his fascinating, if somewhat stilted, memoir are a hip-hop artist with a benign tumor destroying her hearing and balance, a California pastor with nodules of melanoma in the brain, and a Hong Kong tycoon with a glioblastoma multiforme — the most feared of all brain tumors — extending its tentacles through the right temporal lobe.

No music is allowed in Dr. Black's operating room. It requires superhuman patience and concentration to peer into a microscope for hours, peeling apart gauzy layers of tissue to remove all these invaders. He likens the work to that of a cat burglar, his aim to get in and out of the brain without leaving a trace. One false move and the patient may never see, hear, smell again — or may never wake up at all.

Out of the operating room, with a concentration no less intense, Dr. Black does a lot of mental bargaining. In exchange for torturous surgery — one unlucky man is essentially cut in half to remove a tumor — patients with malignancies may get months to years of remission, while those with benign tumors may be fixed forever.

But how much grisly recuperation is fair payment for how much subsequent health? When should Dr. Black stand back and let nature take its course? Despite all the shades of gray, he has to make a decision in each instance, and so his world is an orderly progression of decision, action and result. And if there is the constant background thrum of other people's bad headaches, it is a chorus he has learned by now to accept.

For Lynne Greenberg, a Brooklyn Heights resident, mother of two and scholar of 17th-century English literature, the headache is the only thing, really, the metronome by which she has lived out the last three years. It struck in 2006 while she was sitting in a London library making her way through a stack of ancient documents: "Any movement or physical activity at all sent shock waves through the center of my head." It has never gone away.

More than two decades ago, when Ms. Greenberg was 19, a car accident catapulted her over an embankment to a 30-foot fall. She broke her neck but miraculously escaped all neurologic injury, and after a few months of neck immobilization she was declared cured.

After the headache appeared, a series of scans showed that Ms. Greenberg's old fracture had rebroken — or perhaps it had never healed at all. Was this the cause of the headache? Was it a coincidental finding? Did she need emergency surgery to stabilize her spine? Or was she a neurotic narcotic-seeking depressive reaping secondary gain from her alleged pain? Every doctor rendered a different opinion, leaving her increasingly frantic, confused, in a tangle of medications and pain.

Ms. Greenberg nails whole portions of the health care elephant in her compulsively readable book: the doctor shopping, the postop misery, the unhappy effects of chronic illness on marriage and small children, the looking-glass world of detox and rehab. The chorus in this book — other than the array of doctors, some good and some bad — are the poets Ms. Greenberg lives among, most prominently the blind John Milton, whose "Paradise Lost" chronicled a similarly cataclysmic fall.

Literate, fraught and unsettling, Ms. Greenberg's book has no resolution — none of the easy wrap-up Dr. Black offers us. He cured the hip-hop artist and put the pastor into a miraculously long-term remission; the Hong Kong tycoon fought a good fight but ultimately succumbed. Dr. Black's own story wraps up happily as well: an African-American kid from segregated Alabama, he was a science prodigy whose parents refused to limit his horizons, and he has soared high.

But it is Ms. Greenberg's epic journey through a gray landscape of pain, with a few rest stops along the way but no resolution in sight, that forms the more memorable narrative.

http://www.nytimes.com/2009/03/31/health/31book.html?nl=8hlth&emc=hltha8

Statin cuts risk of blood clots

A cholesterol-lowering statin drug can significantly cut the risk of potentially fatal blood clots, US research suggests.

In trials rosuvastatin cut the risk of venous thromboembolism (VTE) in healthy people by 43%.

Forms of VTE include deep vein thrombosis (DVT) and pulmonary embolism, the most common cause of preventable death in hospital patients.

The study appears in the New England Journal of Medicine.

VENOUS THROMBOEMBOLISM

Deep vein thrombosis: An early form of VTE in which blood clots develop in the legs or pelvis

Pulmonary embolism: Part of a clot breaks off and lodges in the arteries that supply the lungs. People who face prolonged periods of immobility at increased risk

More than 25,000 people a year die in Britain after developing fatal blood clots.

It is estimated that 52% of hospital patients in the UK are at risk of developing DVT.

However, the MPs' report published in November 2007 said that less than half are made aware of the risks, and only a third will be risk assessed by a healthcare professional.

DVT has also been associated with long-haul air travel, where passengers have limited opportunity to move around.

The latest, long-term study, presented at an American College of Cardiology conference, was based on 17,802 healthy men and women.

Statins have already been shown to reduce the risk of heart attack and stroke.

Rosuvastatin, manufactured by AstraZeneca and marketed as Crestor, is just one type of the drug. Other brands were not tested in the current trial.

No bleeding

Lead researcher Dr Paul Ridker, of Brigham and Women's Hospital, said: "The clinical bottom line here is simple, in addition to reducing risks of heart attack and stroke, we now have hard evidence that aggressive statin therapy reduces life-threatening blood clots in the veins."

Dr Ridker added that statin therapy carried no risk of excess bleeding - a side effect associated with alternative blood-thinning treatments such as warfarin.

Professor Peter Weissberg, medical director of the British Heart Foundation, welcomed the study.

He said: "Further clinical trials are now needed to see if patients at high risk of a DVT are protected by statins.

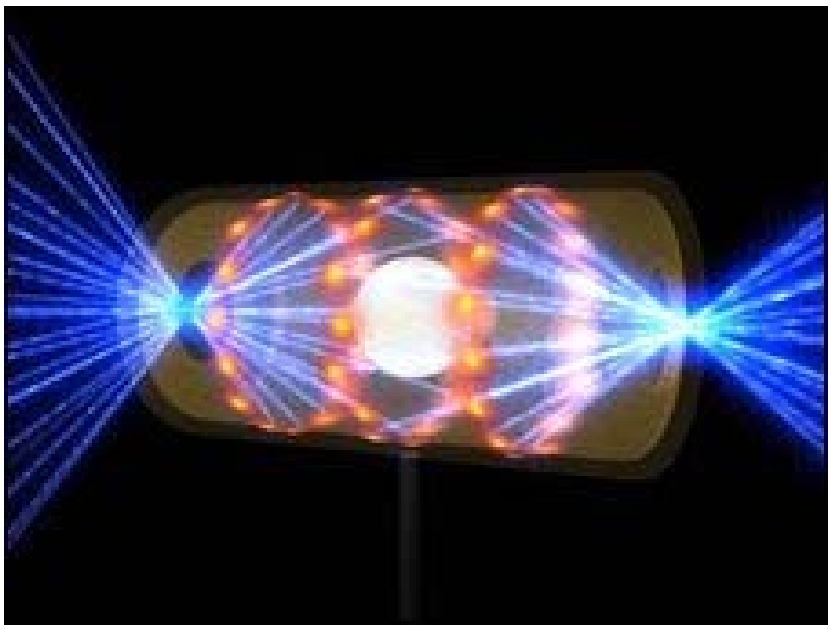
"If they are, the findings could lead to such patients being prescribed statins to protect them in the future."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7971414.stm

Published: 2009/03/30 09:10:01 GMT

Giant laser experiment powers up

The US has finished constructing a huge physics experiment aimed at recreating conditions at the heart of our Sun.



The US National Ignition Facility is designed to demonstrate the feasibility of nuclear fusion, a process that could offer abundant clean energy.

The lab will kick-start the reaction by focusing 192 giant laser beams on a tiny pellet of hydrogen fuel.

To work, it must show that more energy can be extracted from the process than is required to initiate it.

Professor Mike Dunne, who leads a European venture that is also pursuing nuclear fusion with lasers, told BBC News that if NIF was successful, it would be a "seismic event".

"It would mark the transition for laser fusion from 'physics' to 'engineering reality'," he said.

The California-based NIF is the largest experimental science facility in the US and contains the world's most powerful laser. It has taken 12 years to build.

"This is a major milestone," said Dr Ed Moses, director of the facility.

"We are well on our way to achieving what we set out to do - controlled, sustained nuclear fusion and energy gain for the first time ever in a laboratory setting."

'**Building blocks**'

Experiments will begin in June 2009, with the first significant results expected between 2010 and 2012.

HOW TO MAKE A STAR ON EARTH

A pea-sized spherical capsule is filled with fusion fuel
This comprises a 150-microgram mix of deuterium and tritium
The NIF laser set-up pulses for 20 billionths of a second
For that time, it generates about 500 trillion watts
That's equivalent to five million million 100-watt light bulbs
All the laser power is focused on to the capsule's surface
The fuel is compressed to a density 100 times that of lead
It is heated to more than 100 million degrees Celsius
Under these extreme conditions, fusion is initiated

"We have an incredible amount to do and an incredible amount to learn," added Dr Moses.

Fusion is looked on as the "holy grail" of energy sources because of its potential to supply almost limitless clean energy.

But the challenge of creating a practical fusion reactor has eluded scientists for decades. Now, however, they believe they are nearing their goal.

"We are now very close to the culmination of 50 years' effort," explained Professor Dunne.

There are currently several experimental facilities around the world aimed at demonstrating the building blocks of nuclear fusion.

In this process, two heavier forms of hydrogen, known as deuterium and tritium, are fused together to form helium.

Deuterium is commonly found in seawater, whilst tritium can be prepared from lithium, a relatively common element found in soil.

When these isotopes are combined at high temperatures, a small amount of mass is lost and a colossal amount of energy is released.

Energy gain

Fusion naturally occurs at the centre of stars where huge gravitational pressure allows the process to happen at temperatures of about 10 million Celsius.

At the much lower pressures on Earth, temperatures to produce fusion need to be much higher - above 100 million Celsius.

NIF will focus on a process known as inertially confined fusion, in which these extreme temperatures are achieved using ultra powerful lasers.

"When all NIF lasers are fired at full energy, they will deliver 1.8 megajoules of ultraviolet energy to the target," explained Dr Moses.

NIF's beams are intended to deliver more than 60 times the energy of any previous laser system. When fired, the pulse will last just a few nanoseconds (billionths of a second) but it will impart 500 trillion watts of power - more than the peak electrical generating power of the entire United States.

This intense energy will be focused on a ball-bearing-sized pellet of fuel, ablating the surface and compressing the remaining material inwards.

"This process will create temperatures of 100 million degrees and pressures billions of times greater than Earth's atmospheric pressure, forcing the hydrogen nuclei to fuse and release many times more energy than the laser energy required to spark the reaction," said Dr Moses.

This "energy gain", as it is known, is key. If it works, NIF will release 10 to 100 times more energy than the amount pumped into the lasers to kick-start the reaction.

Other experiments have shown that ignition is possible, but so far none has been able to demonstrate a net energy gain.

"The world is looking to NIF to provide a clear, unequivocal demonstration that lasers can initiate fusion energy gain," said Professor Dunne.

"This would lay the fundamental physics question to rest, allowing the community to focus on harnessing this energy."

Twin track

Although NIF is only at the beginning of its experimental life, scientists are already planning its successor, a European project known as Hiper (High Power Laser Energy Research).

"The technology of NIF allows the laser to fire every few hours," explained Professor Dunne, director of Hiper.

"This is right for the demonstration of the physics 'proof of principle', but does not meet the requirement of a laser fusion power plant, which needs to operate a few times per second."

Hiper aims to lay the foundations of this continuous fusion cycle by showing it can ignite a steady stream of fuel pellets.

"This means a fundamentally different laser technology, a new approach to fuel pellet production, and a suite for robotic handling capability," said Professor Dunne.

In October 2008, Hiper received approximately 13m euros of funding to carry out a feasibility study. It also has access to European hardware and capability worth a further 50m euros.

If all goes well, engineers will begin to build the Hiper facility towards the end of the next decade, bringing the vision of a commercial fusion reactor one step closer to reality.

At approximately the same time, scientists will also get their hands on another mammoth fusion experiment, the International Thermonuclear Experimental Reactor (Iter), currently being built in Cadarache, France.

Iter will attempt to initiate fusion using a different method, known as magnetic confinement, in which a super-heated volume of gas is constrained by magnetic fields in a doughnut-shaped vessel known as a tokamak.

"We are entering a period when much of the technology development is common to both approaches," said Professor Dunne.

"We believe that the two-track approach is essential given the scale of the problem, and the predicted impact on society."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/7972865.stm

Published: 2009/03/31 00:23:45 GMT

Evolution study focuses on snail

By Sarah Mukherjee
Environment correspondent, BBC News

Members of the public across Europe are being asked to look in their gardens or local green spaces for banded snails as part of a UK-led evolutionary study.

The Open University says its Evolution MegaLab will be one of the largest evolutionary studies ever undertaken.

Scientists believe the research could show how the creatures have evolved in the past 40 years to reflect changes in temperature and their predators.

The six-month study, starting in April, will ask people to submit data online.

'Ideal organism'

Professor Jonathan Silvertown, from the OU, said: "I was thinking about Darwin year and how we could help people get an idea of what Darwin was talking about.

"The banded snail has been studied for 60 or more years, so it's an ideal organism to use. It's something that's very common, we know what the genetics are and it's safe to handle."

Professor Silvertown said there were two main evolutionary drivers that affect where yellow and brown banded snails are found.

The first is climate - darker-shelled snails tend to be further north, and scientists believe this is because dark shells get warmer quicker than lighter ones.

Darker-shelled snails could also be active for longer - which would make a difference to how much they could eat and how many offspring they could have.

The second evolutionary driver is predation by thrushes.

The birds hunt by sight and they find it more difficult to find yellow-striped shells around grass and brown shells against brown leaves - so yellow-shelled snails have been more common in grassland and darker ones in areas with brownish background environments.

'Genuine study'

"We think [the snails] have changed in the last 40 or 50 years," said Professor Silvertown.

"Firstly, the climate has warmed up, so we think the distribution of colours has probably changed.

"Secondly, thrushes have become far less common in the last 30 years or so - so snail colouring in different habitats might be less important."

This is what the Evolution MegaLab, which will run from April to October, will be trying to discover.

"There's a lot of historical data on the website," said Professor Silvertown.

"We have data from the past on 8,000 or so snail populations, so if you submit your data on the website, it will automatically make a comparison telling you whether there's been any change in your area."

Professor Silvertown said this was a genuine scientific study and not just a public relations exercise.

It has been funded in part by the Royal Society and the British Council, and he and his team are hoping that a major report will be published on the data collected at the beginning of next year.

He also points out that this could be an invaluable tool for researchers of the future who will be able to look at this project and compare any further evolutionary changes.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/7971200.stm

Published: 2009/03/30 00:15:56 GMT

Polypill 'could become a reality'

A cheap five-in-one pill can guard against heart attacks and stroke, research suggests.

The concept of a polypill for everyone over 55 to cut heart disease by up to 80% was mooted over five years ago, but slow progress has been made since.

Now a trial in India shows such a pill has the desired effects and is safe and well-tolerated by those who take it.

Although The Lancet study is proof of concept, experts still question the ethics of a pill for lifestyle issues.

" **There is a danger that lifestyle factors could be overlooked in favour of 'popping a pill'** "
Mike Rich of UK charity the Blood Pressure Association

Critics say the problems of high blood pressure and cholesterol should be tackled with diet and exercise rather than by popping a pill.

The polypill used in the latest study combines five active pharmacological ingredients widely available separately - aspirin, a statin to lower cholesterol and three blood pressure-lowering drugs - as well as folic acid.

Does what it says on the tin

Trials on 2,053 healthy individuals free of cardiovascular disease, but with a risk factor such as high blood pressure or a long-term smoker, showed combining the drugs into one tablet delivered a similar effect to each drug separately.

Reductions were seen in both blood pressure and cholesterol without any major side effects.

WHAT'S IN IT?
Aspirin to thin the blood
A statin drug to lower cholesterol
Three blood pressure-lowering drugs: ACE inhibitor Diuretic Beta-blocker
Folic acid to reduce the level of homocysteine in the blood which is another risk factor for heart disease

The researchers believe that the combined action of all the components in their "Polycap" capsule made by Cadila Pharmaceuticals, could potentially halve strokes and heart attacks in average, middle-aged people.

On a global scale, this would save tens of millions of lives.

The study, led by Dr Salim Yusuf, from McMaster University in Ontario, Canada, took in people at 50 centres across India.

A spokeswoman for the British Heart Foundation said: "The results suggest that the polypill has the potential to reduce the incidence of cardiovascular disease.

" **The polypill does exactly what it should, but no more** "
UK researcher Professor Simon Thom

"We now need further research to examine whether the polypill actually reduces mortality."

A UK team led by Professor Simon Thom of Imperial College London is hoping to do just this.

They have been testing a four-in-one polypill called the Red Heart Pill, with the backing of the Wellcome Trust and the British Heart Foundation, which could cost as little as 15 euros per person per year.

Professor Thom said it would be at least five years before there was enough data to convince drug regulators to approve a polypill.

"Mounting evidence shows the polypill does exactly what it should, but no more, whereas exercise has wide reaching effects on health and wellbeing. So a polypill is an addition rather than a replacement for lifestyle interventions."

Mike Rich of UK charity the Blood Pressure Association said: "This study further stimulates the debate over whether a 'magic bullet' is the answer to the prevention of heart disease and strokes.

"Eating healthily and taking regular exercise are proven ways to lower high blood pressure - and have many other health benefits too - and there is a danger that these lifestyle factors could be overlooked in favour of 'popping a pill'."

Joanne Murphy of The Stroke Association said: "By combining these medications in one pill, it will make it easier for people to take their medication. However, it is important that more research and investigation is done into this pill to ensure its safety."

One GP, Dr Sarah Jarvis, said the pill should not be viewed as an alternative to improving lifestyles through diet and exercise.

"What we need to bear in mind is that this may well cut the likelihood of dying of heart disease dramatically. Fantastic. But it's not going to stop you getting arthritis, it's not going to stop you get lung disease," she said.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7971456.stm

Published: 2009/03/31 06:39:29 GMT

Video games 'can improve vision'

Playing action video games can boost an aspect of adult vision previously thought to be fixed, a US study shows.

Researchers found playing the games improved the ability to notice even very small changes in shades of grey against a uniform background.

"Contrast sensitivity" is important in situations such as driving at night, or in conditions of poor visibility.

The Nature Neuroscience study raises the possibility of using a video game training regime to improve vision.

Contrast sensitivity is often one of the first aspects of vision to be affected by ageing.

" **There is some evidence that the visual system can learn** "
John Sloper Moorfields Eye Hospital

It can also be affected by conditions such as amblyopia, known as "lazy eye".

Improving contrast sensitivity usually requires physical changes in eye optics, through eye surgery, glasses or contact lenses.

A team from the University of Rochester studied expert video game players playing games involving aiming and shooting at virtual targets.

They found that they had better contrast sensitivity when compared with players who played non-action video games.

These results were not because people with better contrast sensitivity were more likely to be action video game players - giving non-video game players intensive daily practice in video game playing improved this group's performance on tests of contrast sensitivity.

Crucially, the improvements in this study were sustained for months or even years in some cases, suggesting that time spent in front of a computer screen is not necessarily harmful for vision, as has sometimes been suggested.

Unpredictable events

Lead researcher Dr Daphne Bavelier said it was likely that several aspects of playing video games combined to produce the beneficial effect.

The games immersed players in an environment where they had to be constantly ready to react to unpredictable events, and where visual information had to be responded to instantly in very precise physical ways.

In addition, the mere fact that the games were stimulating and rewarding should not be overlooked.

Dr Bavelier hopes to make use of the discovery to develop new ways to treat amblyopia.

The hope is that by using video games researchers can encourage the two eyes to work together, and restore the stereo vision which is lacking in people with a lazy eye.

Professor Gary Rubin, of the University College London Institute of Ophthalmology, said he was surprised by the findings.

He said other work had shown that it was possible to train people to improve some aspects of their vision - for instance, to widen the visual field.

But he said: "Contrast sensitivity is a very basic visual function, and usually they are more difficult to alter in adulthood.

"This is a small study, showing a small effect, but it was carefully done, and merits further investigation."

John Sloper, a consultant at Moorfields Eye Hospital in London, said other researchers were also examining the potential for using video games to treat amblyopia.

He said: "There is some evidence that the visual system can learn."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7967381.stm

Published: 2009/03/29 23:01:32 GMT

Google's Book Settlement Is a Ripoff for Authors

Why allow a single publisher to throw out a functioning copyright system?

By LYNN CHU

To get through the 385 pages of mind-numbing legalese of the Google settlement, it might be better to be Nino Scalia, Bob Bork or David Boies. Preferably all three at once. Absent brain enhancement surgery, understanding this monstrosity by May 5, 2009, is going to be rough.

That's the date by which every author and publisher in America is supposed to decide whether to "opt in," "opt out," or simply "ignore" a vast compulsory licensing scheme for the benefit of Google. Most, about 88%, are expected to "ignore." That's because they know their online display rights have value, and the last thing they want is to be herded like sheep into a giant contract commitment.

After Google began digitizing the University of Michigan library in 2004, the Authors Guild, the Association of American Publishers and a handful of authors and publishers filed a class-action lawsuit for copyright infringement. Last November, those "class representatives" reached an out-of-court settlement with Google that would, if approved by the federal court, permit Google to post out-of-print books for reading, sales, institutional licensing, ad sales, and other publishing exploitations, by Google, online. The settlement gives the class-action attorneys $30 million; a new, quasi-judicial bureaucracy called the Book Rights Registry $35 million (more on this later); and $45 million for owners infringed up to now -- about $60 a title. It remains subject to a final fairness hearing, slated for June 11.

No one elected these "class representatives" to represent America's tens of thousands of authors and publishers to convey their digital rights to Google. Nor are the interests of this so-called class identical. There is nothing more individual in the world than a book, an author, a publisher, and the value of a contract. The aging baby boomers now flacking the settlement don't seem to understand that PDF scanning (how Google and everyone else digitizes books) isn't rocket science; it's cheap and easy. Books will be digitized without Google. But the Google settlement sets in amber today's overhyped role of the Internet, ruled by that great and magnificent Oz -- Google.

Sound like hyperbole? Consider this: Under the settlement, every rights-owner in America is supposed to hand over all their private contract data, on every edition of every work they ever wrote -- and every excerpt permission ever granted to others -- at the peril of losing the money Google will be making on their backs. This is a massive burden on everyone in the book industry, making us all, in effect, Google's data-entry slaves. Indeed, in most cases such information about every permission ever granted is unlocatable. It opens a Pandora's box of disputes and mistaken claims about who actually owns what.

Google's erstwhile adversaries are paid off with the aforementioned Book Rights Registry (BRR), which will compete with the U.S. Copyright Office and the federal courts. The BRR expects to read everyone's contracts to say who is owed what of Google's revenues -- net again of all its costs, which are sure to be huge. Our entire dynamic system of individual contract enforcement over time and changing individual proclivities is thus to be exchanged for a forced, immediate squabble over rights, and static databasing, right now, of determinations made by Google.

The Internet was supposed to eliminate middlemen, not pack multiple layers on. The BRR is in fact merely Google's contract negotiation and claims department. As in Hollywood, the settlement deal turns book authors into fully subordinated, last-in-line net residuaries. This reverses the economics of books.

Book publishers today are entitled to a share of the publishing partnership because they shoulder -- not lay off on authors -- all the costs of editing and publication and marketing. The author's net profit share, generally half, in books, is for his creation. The author's share rises against the publisher when the

publisher's costs are lower, as in digital. If the author shoulders still more of those costs and burdens, the publisher's share should be reduced again. That doesn't happen with Google.

We already have a good system. It's called the system of private property and free contract, designed for dispersed, autonomous individuals -- not command-and-control centers. The U.S. Constitution grants authors small monopolies in their own copyrights. Author market power is talent-based and individual, not collective. This class action seeks to wipe all this out -- just for Google. But U.S. law does not grant any single publisher monopoly power to herd all of us into its list.

For private gain, the Google parties now seek to destroy the health in the system that individual bargaining preserves. Disputes will be fixed in arbitration with no access to federal courts which have often shown mercy to authors. Arbitrators will be "you sign it you eat it" line-parsing bureaucrats.

Say goodbye to your rights, forever, authors, if this mess goes through.

Ms. Chu is a principal at Writers Representatives LLC.

http://online.wsj.com/article/SB123819841868261921.html

Rage Against the Art Gene

Darwin revolutionized our understanding of mankind's origins. Now scientists think they can apply his theories to the source of our creativity without it sounding like a lot of monkey business.

Jeremy McCarter
NEWSWEEK
From the magazine issue dated Apr 6, 2009

The notion that the origin of the arts— crowning glory of the species, realm of such sublime masterworks as "Hamlet," Beethoven's Ninth and the "Mona Lisa"—can be traced to the living and mating routines of our subliterate nomad ancestors sounds like some kind of joke. In fact, it was treated as a joke by Stephen Colbert a few weeks ago, when he invited Denis Dutton, the author of a new book about creativity and evolution, on to "The Colbert Report." Dutton was explaining why our love of string quartets and Jane Austen began hundreds of thousands of years ago in the Pleistocene epoch when Colbert cut in: "How many cavemen were reading 'Emma'?"

Colbert being Colbert, the objection was pretty obnoxious. (Moments earlier, he'd begun the interview by asking Dutton to stipulate that "evolution is a fraud.") But his comically overstated question helps pinpoint one of the more fascinating debates within Darwinism in this, the 200th anniversary year of Charles Darwin's birth. Since "The Origin of Species" appeared in 1859, scientists have succeeded in explaining more and more aspects of the natural world as products of evolution by natural selection, the process by which some features, because they enhance survival and reproduction, become more prevalent over the generations. Their progress has led scholars to poke around in the human mind itself. Researchers such as Steven Pinker and Daniel Dennett have tried to explain the way we think and act in modern society in terms of faculties that helped our ancestors survive on the East African savannas of prehistory—a form of analysis that often sounds, as Colbert's question suggests, kind of preposterous.

Dutton is not the first person to extend the tools of evolutionary psychology (which is what this field of inquiry is called) to humanity's obsession with making and enjoying art. But in "The Art Instinct," he uses a synthesis of existing approaches to propose a new "Darwinian esthetics" —a way of thinking about culture that's informed by natural history. As a professor of the philosophy of art (at the University of Canterbury, New Zealand) and the editor of Arts & Letters Daily, the go-to site for the world's procrastinating intellectuals, he represents an important conduit between the frequently combative fields of science and the humanities. Quite apart from its timeliness for Darwin's bicentennial, the book deserves a look because it's the latest in a long, long line of attempts to bring art and science together in a way that doesn't leave one—or both—with a black eye.

A Darwinian understanding of culture begins with the observation that the arts appear in every human society and yield intense delight. When evolutionary psychologists detect those qualities, bells start ringing. Universal appearance of a behavior sometimes leads scientists to infer that it evolved before our ancestors' diaspora from Africa 60,000 years ago (e.g., walking upright). And intense pleasure is often how our genes encourage some advantageous behavior (e.g., a taste for sweet or fatty food helped our ancestors get enough calories). But where an upright gait and a varied diet had obvious survival advantages for our nomad forebears, it's far from clear that the same went for something as energy-consuming and apparently useless as the arts.

Dutton sees evolution generating an art instinct in two ways. First, creative capacities would have helped our ancestors to survive in the hostile conditions of the Pleistocene, the epoch beginning 1.8 million years ago, during which *Homo sapiens* evolved in Africa. An ability to invent and absorb stories, for instance, would have helped early humans work out "what if" scenarios without risking their lives, pass along survival tips and build capacities for understanding other people around the campfire. The best storytellers and best listeners would have had slightly greater odds of survival, giving future generations a higher percentage of good storytellers and listeners, and so on.

Second, on those long, dull savanna nights after the day's hunting and/or gathering was done, a big vocabulary and a creative streak would have improved a man's chances of wooing a lover (and thereby passing on his genes to a child)—just as an amusing woman would have been more likely to entice the guy to stay (thereby boosting the child's odds of survival). According to this view, which Dutton derives from the psychologist Geoffrey Miller, evolution turns the brain into "a gaudy, overpowered Pleistocene home-entertainment system" for winning and keeping lovers.

Over the thousands of generations of our prehistory, then, the pressure from these two processes (natural selection and sexual selection, in evolutionary terms) would have led to what Dutton calls the survival "not just of the physically strongest but of the cleverest, wittiest and wisest." By the dawn of civilization 10,000 years ago, our ancestors' brains would have been hard-wired to collaborate and use tools, as well as to create and enjoy art. Thus our tastes are not blank slates filled in entirely by our societies (as various continental philosophers would have it): they are shaped in part by the distant ancestors whom we unwittingly take with us every time we go to the museum, the playhouse and the concert hall. All in all, it's a lovely vision. I just wish somebody could convince me that it's true.

Because, really, who knows? In his lucid and authoritative new book, "Why Evolution Is True," Jerry A. Coyne, a biologist from the University of Chicago, decries the "scientific parlor game" of trying to find Darwinian explanations for every form of behavior. Human life in the Pleistocene is so remote that even when researchers add the knowledge gained from observing hunter-gatherer tribes active today to the fossil record, the resulting picture of our ancestors' ways is hopelessly blurry. "The fact is," said Coyne when I called to talk to him about the arts, "you cannot give me a human behavior for which I can't make up a story about why it's adaptive."

The complaint isn't unique to Dutton's book—it's the standard retort whenever evolutionary psychology thinks it has discovered another string tugging at the marionette of modern Homo sapiens. But the arts turn out to be especially problematic for evolutionary psychology. For one thing, there are large fields of artistic endeavor that even Dutton acknowledges lie outside Darwin's reach. In music, the way that key modulations affect the mind "spontaneously, pleasurably, effortlessly," he writes, is a "mystery of evolution." The traits that distinguish masterpieces from the general run of creative work prove similarly puzzling. The tie between evolution and qualities like complexity and purpose "is murky at best, but it is real and it is worth meditating on"—an unconvincing remark that sounds like a congressman forming a commission when he knows better than to take real action.

When the book departs from theory to consider actual art and actual human beings, the strain of yoking evolution to creativity grows even more visible. According to Dutton, moderns and postmoderns are wrong to think that people can be taught to enjoy any kind of art, no matter how ugly or obscure it might be. Our human nature ensures "not only that some things in the arts will be difficult to appreciate but that appreciation of them may be impossible."

That proposition sounds reasonable (if banal) when he's discussing the paucity of art based on smell. But Schönberg? "The general failure of his contratonality to catch on with the musical public is evidence that it is not just another conventional musical schema for the blank slate that is the human mind," writes Dutton. Really? Schönberg may not be a Mozart-class rock star, but plenty of people do enjoy his music—enough that orchestras seem determined to keep playing it. Are the 2,500 people who have declared themselves Schönberg fans on Facebook committing some kind of crime against esthetic nature?

Dutton would say he wasn't making an absolute statement, only pointing out a general tendency. But here is exactly the trouble with evolutionary psychology, a flaw that the arts make uniquely plain. Much of evolutionary psychology deals with universals. It works backward from some shared trait to puzzle out an underlying cause and help us to understand ourselves better. But when a human activity doesn't lend itself to universals, evolutionary psychology begins to sound dubious. And no field of human endeavor has less to do with universals than the arts. Those 2,500 Schönberg fans are doing something gloriously human: acting on a ferociously individual, unrelentingly subjective enthusiasm for something weird.

All this, I realize, sounds like the romantic nonsense of a culture writer whose field is being encroached upon by the guys in lab coats. I'll cop to the romantic part, but not to the nonsense. After all, evolutionary psychology has received its sharpest criticism from no less a Darwinian than Stephen Jay Gould. Until his death in 2002, he stood as one of the great champions and evangelists of science, as well as one of the most exacting critics of its tendency to overreach. He was also my teacher. When I tried to pinpoint why Dutton's book left me unsatisfied, his lessons kept coming to mind.

According to Gould, life's history needs to be understood not just as the result of natural forces explicable by science, but also of contingency: strange, unplanned events that change the course of everything that follows. (If not for a freak asteroid impact 65 million years ago, Gould used to say, mammals might still be small, furry creatures scurrying around a dinosaur-centric world.) No outcome of life's history struck him as more contingent—or, consequently, more wonderful—than the human mind, a tangle of "mental machinery jury-rigged in the immensity of evolution." He called higher mental functions like the arts "spandrels," an architectural term for the triangular space formed when two arches meet at right angles. Though their rich decoration can make them appear to be the point of a particular design (in the domes of some medieval churches, for instance), they're really an inadvertent byproduct of how arches work. The arts, likewise, may be one of the many adaptively useless byproducts of a complex brain that evolved to perform other tasks.

This doesn't mean that the sciences of the mind have nothing to tell us about our wildly contingent brains, only that in fields like ethics and the humanities, evolutionary psychology doesn't answer the questions that matter most. In an example cited by Gould, the really pressing question isn't what makes composers compose, it's what made Handel a composing genius; not why people listen to orchestral music, but what complex bundle of reasons makes an individual listener (Gould himself) swoon over Handel's Old Testament oratorios.

Dutton is no philistine; he expresses a genuine reverence for great art throughout his book, and he may very well be right that there's an instinctive nudge behind our impulse to sculpt and sing and draw. But something rings false in the overriding impression created by evolutionary esthetics: that a mental trait is ennobled when we supply it with Darwinian roots. Gould, the self-described "naturalist by profession, and a humanist at heart," knew the opposite to be true.

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Harvard encourages dusting off the classics

Says esoteric courses enrich learning

By Tracy Jan, Globe Staff | March 30, 2009

When Harvard was founded nearly four centuries ago, all students read and spoke Latin. They had to: Lectures were delivered primarily in the ancient tongue, and the classics was pretty much all they could study.

Today, the number of students conversant in Cicero and Plato has dwindled, with only 42 - less than 1 percent of Harvard's 6,640 undergraduates - choosing classics as a major. Then there's Sanskrit and Indian studies, which has three students, and astronomy and astrophysics, with five starry-eyed souls.

Although most students may deem the undersubscribed subjects impractical, the bastion of liberal arts education has in recent years begun promoting learning for learning's sake as a worthy and enriching pursuit. Rather than viewing a major solely as a stepping-stone to a career, the university is pushing students to broaden their interests and explore more esoteric topics.

Professors and students in those subjects insist that studying even the most obscure disciplines can lead to jobs in a variety of fields, from academia to finance.

"It's amusing when you tell people you're in a concentration and they say, 'I didn't even know we had that here,' " said Daniel Handlin, an astronomy and astrophysics major who wants to be an astronaut. "People can imagine the classics existing, but a lot of people just don't even think of astronomy at all."

To entice students to explore such subjects, Harvard has more than tripled the number of small freshman seminars taught by star professors. Among the 132 diverse classes: "The Beasts of Antiquity and their Natural History."

Harvard has also delayed the deadline for declaring a major from the end of freshman year to the middle of sophomore year, to give students more time to sample different disciplines. And the university has begun allowing students to declare a minor, encouraging them to venture in some depth beyond their main academic interest. A minor requires four to six courses in a department.

"We recognize that we are unlikely to be a popular concentration, but we are hopeful that we will be a popular secondary field," said Jay Harris, dean of undergraduate education and a Jewish studies professor in the Near Eastern languages and civilization department, which only has 13 majors. "The hope is we will get more people into say, the classics or Islamic studies or whatever it may be."

Whether Harvard can sell Latin and Byzantine Greek as marketable undergraduate degrees remains to be seen. More than 700 students major - or concentrate, in Harvard parlance - in economics each year, making it the most popular field, followed by government, with nearly 500 students.

"For students, there's an increasing need to think of one's education as economically viable and productive and useful," said Anne Monius, a South Asian religions professor.

That leaves students like Brian Kennedy, one of 16 majoring in folklore and mythology, having to defend his interest in Old Irish and Celtic mythology.

"The big question is, 'What are you going to do with that?' " he said. He plans to go to law school.

Harvard hopes to bring more of its undergraduates back to the university's liberal arts roots. President Drew Faust, a Civil War historian, has said that education in the humanities prepares students to challenge the status quo.

"That kind of critical thinking and questioning is something we should encourage and instill more fully than we do," Faust said in a recent interview about the value of a liberal arts education when jobs are becoming hard to come by.

While most students think of government and economics as more practical majors, leading to careers in politics and business, said classics major Veronica Koven-Matasy, "Classics is something you just want to do for its own sake."

Koven-Matasy, president of the Harvard Classical Club, began studying Latin in seventh grade at Boston Latin School and wants to teach. Many other classics majors, though, go on to become investment bankers, doctors, and lawyers, said Mark Schiefsky, director of undergraduate studies in classics.

The classics department, where enrollment has hovered between 40 and 50 in the last eight years, is drawing up plans to preserve, perhaps even brighten, its future. Professors agreed this month to make the language-intensive field more accessible by introducing a classical civilization focus that requires four instead of eight language courses. Princeton and Yale have already taken similar steps.

Starting next year, Harvard also plans to do away with a rigorous six-hour comprehensive classics exam for seniors majoring in the subject."We had such Draconian requirements that really did date from another era," said Schiefsky, who pushed for the changes, the first overhaul of the department's requirements in about 40 years.

At Yale, where just 17 students are majoring in classics, the department offers unusual courses like "Food and Diet in Greco-Roman Antiquity" to draw undergraduates. Princeton has introduced "turbo" language courses that cram a year of Greek and Latin into one semester. The move has attracted students who are impatient to read and translate Homer without wading through an entire year of fundamental language instruction, said Denis Feeney, chairman of the classics department there.

Princeton has also embraced a decadelong university-wide effort to encourage students to be more adventurous in their choice of majors. That has lead to growth in interest in several small departments, including classics, where the number of majors has risen from 21 to 37 over the last 10 years."We're really thrilled, but we still want more students," Feeney said. "We're empire builders here in the classics."

At Harvard, other small departments are considering introducing new focuses to make themselves more attractive to students. The university has discussed expanding Sanskrit and Indian studies to a more broad-based South Asian Studies. And the Near Eastern languages and civilizations department would like to beef up its offerings in the contemporary Middle East. But their ambitions may be stymied by Harvard's budget crisis.Meanwhile, students in less sought-after majors relish their fortune. They have easy access to professors, many opportunities for independent research, and enroll in small - and at times, private - classes.

Rachel Carpentier, the only junior majoring in Sanskrit and Indian studies, has been the sole student in her Tamil language class for the past two years."I basically get private tutoring three times a week," said Carpentier, who is also majoring in music. "It's really quite remarkable how much attention my professors are willing to pay to me."

Tracy Jan can be reached at tjan@globe.com. ■

http://www.boston.com/news/education/higher/articles/2009/03/30/harvard_encourages_dusting_off_the_classics/?page=full

At MIT's AgeLab growing old is the new frontier

Researchers seek to understand the needs of the aging

By Hiawatha Bray, Globe Staff | March 23, 2009

In a laboratory at the Massachusetts Institute of Technology, there's a suit of clothing that can make anyone feel ready for Social Security.

It's called the Age Gain Now Empathy System, or AGNES, a navy-blue jumpsuit laced with braces and elastic bands and topped with a white MIT hard hat. Exercise physiologist Rozanne Puleo helped a team of mechanical engineers develop AGNES. The goal: To teach engineers in their 20s and 30s how to design products that are easy for people in their 70s to use.

"There hasn't been one person who's put on this suit who hasn't said, 'Wow, I didn't know opening a package could be this difficult,' " Puleo said. "You can be somewhat empathetic, but you really never understand."

At MIT's AgeLab, understanding the needs of aging people has been a full-time job for nearly 10 years. Founder Joseph Coughlin created the lab to help businesses tailor products and services to the world's older folks. "It's about designing the lifestyle of the future," said Coughlin, a dapper 47-year-old who picked up a penchant for bow ties in his teens, while working as an aide to the late US Senator Daniel Patrick Moynihan.

Coughlin's vision of the future is nothing like the youth-obsessed fantasies of TV and movies. In reality, tomorrow belongs to the old. The United Nations reported in 2007 that people above 60 are the fastest-growing age group on earth. There are 700 million of them now, and there will be 2 billion by mid-century. In the United States alone, people over 65 made up 12 percent of the population in 2006, but the

number will rise to 20 percent by 2030. As a result, Coughlin said, "Our grandparents, and ourselves as we age, are folks who are defining the future of lifestyle."

Yet making products specifically for old people can be commercial suicide. "If you design for the old," said Coughlin, "the young won't use it and the old will run away." But features that benefit older consumers, like more readable labels or packages that are easier to open, are helpful to younger customers as well. Coughlin foresees a future full of products that quietly incorporate his lab's research, making them more useful to people of any age.

Coughlin spent more than a decade at consulting firm EG&G, where he specialized in transportation issues and became interested in the needs of aging drivers. Armed with a doctorate in public policy from Boston University, Coughlin joined MIT's School of Engineering in 1997.

"Public policy is about engineering institutions," said Coughlin, and he believes our institutions need a major overhaul to cope with an aging population. He launched the AgeLab in late 1999. Since then, a host of businesses - insurance companies, food producers, carmakers - have invested millions in the lab's research.

The most visible of these investments is a red Volkswagen Beetle that sits in a second-floor laboratory. "Miss Daisy," as Coughlin calls it, might be the world's most expensive Beetle, even though it doesn't have a motor. Instead, the engine compartment, like the rest of the car, is crammed with digital electronics - about $1 million worth.

A computer generated roadway is projected on a wall in front of Miss Daisy, and aging drivers are recruited for simulated test drives. Electrodes measure their breathing and heart rate; cameras mounted on the dashboard track eye movements. It's a bid to figure out how old people respond to diverse driving situations, and whether carmakers can help by improving the design of their vehicles. AgeLab research inspired BMW to redesign the controls in some of its high-end sedans.

Down in the parking lot, another AgeLab car is fully functional. A black Volvo SUV lets drivers conduct vision and reaction tests in the real world. They'd better drive carefully; Coughlin said the Volvo, with all its computers, radar sensors, and video cameras, cost $1.5 million to assemble.

In another corner of the lab is a mockup of a supermarket self-scanning device that attaches to the user's shopping cart. Supermarkets like Stop & Shop already use such devices, but the AgeLab is working on a version that would read medical data from a "smart card" carried by an elderly shopper. If customers scanned an item that was bad for their health, the scanner would issue a gentle warning and suggest safer alternatives. The scanner would erase the user's medical data after checkout, to protect privacy.

But some of the AgeLab's corporate allies aren't interested in creating new and improved gadgets. "It isn't the technology, it's focusing on the business and marketing opportunities to address an aging population," said Vicki Shepard, senior vice president of Healthways Inc., a Nashville firm that provides telephone and Internet support for people with chronic illnesses.

Armed with survey data from hundreds of elderly volunteers recruited by the AgeLab, Healthways has redesigned its website and written materials, to make them more usable by older patients. The company and the lab have also teamed up with pollsters at the Gallup Organization on a 25-year study of the health of seniors. The survey, which began last year, places 1,000 phone calls per day to seniors, then studies the results for clues on how to intervene before small health problems become crises.

AgeLab research is also helping families with funeral arrangements. Everest Funeral Package LLC in Houston, which provides online funeral planning and price negotiation, worked closely with the AgeLab in designing its services. "They helped us shape the model of our business," said Everest president Mark Duffey.

Instead of focusing on the elderly, the AgeLab's funeral research led Everest to concentrate on their baby boomer children. AgeLab researchers found that the oldest daughter of the family is most likely in charge of parents' funeral arrangements. "She wants to be able to make consumer decisions like she makes for everything else," said Duffey, "and the funeral industry doesn't let you do that." That's because most funeral homes don't provide an easy way to compare prices and services.

So AgeLab helped Everest create a unique database by telephoning thousands of funeral homes nationwide, and publishing their prices and services on the company's website. "It's that data that empowers the consumer to be able to make very sound choices," Duffey said.

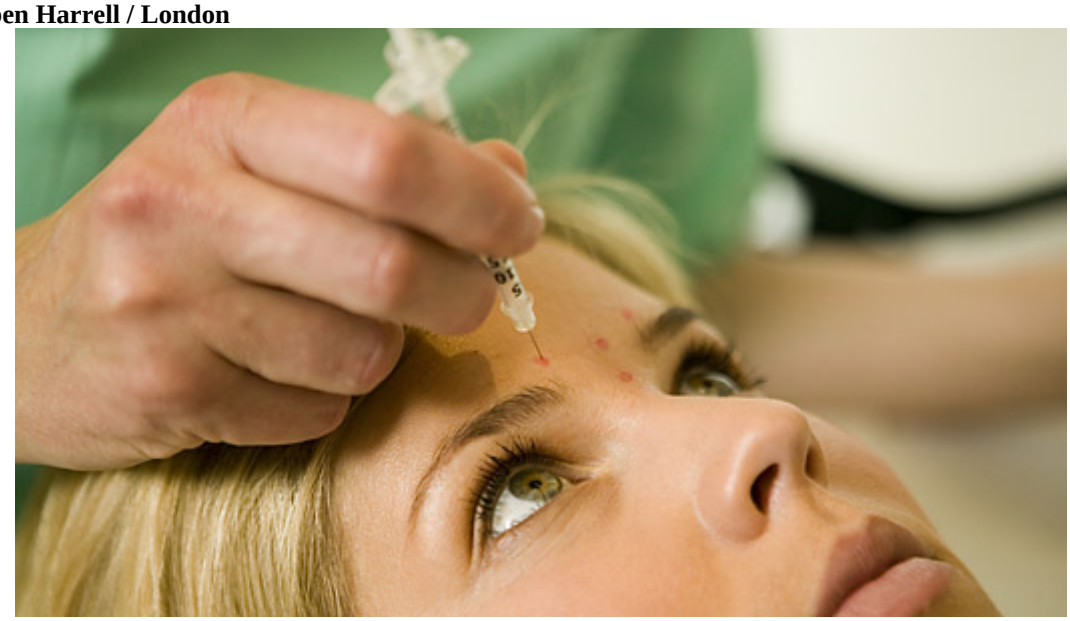
Still, AgeLab is mainly focused on the living, particularly the millions of baby boomers who soon won't need an AGNES suit to feel old. Today, Florida is the oldest US state, with 17 percent of its citizens over 65, but "the United States, in 20 years, is going to be a nation of Floridas," Coughlin said. "It's a personal issue, with profound public challenges associated with it."

Hiawatha Bray can be reached at bray@globe.com. ■

*www.boston.com/business/technology/articles/2009/03/23/**at_mits_agelab_growing_old_is_the_new_frontier**/*

Wipe Away That Frown: Botox Makes You Happier

By Eben Harrell / London



Botox may not only provide a nonsurgical facelift, it may also lift your spirits, new research suggests.

By paralyzing the facial muscles used for frowning, Botulinum Toxin A — or Botox — prevents people from physically displaying expressions of negative emotion. Building on previous research that suggests facial expressions not only reflect but influence mood levels, the new study hypothesizes that Botox may lighten people's moods by literally wiping the frowns off their faces. (Read "The Year in Medicine 2008: From A to Z.")

The study, published in the March issue of *The Journal of Cosmetic Dermatology*, followed 25 cosmetic patients, 12 of whom received injections of Botulinum Toxin A, or similar neurotoxins, while the others had fillers, peels or other cosmetic treatments for wrinkles. (Watch a TIME video on botox.)

Two weeks after the treatments, the patients filled out a Hospital Anxiety and Depression test — a self-screening questionnaire for depression and anxiety. They also rated the success of their treatments.

"The Botox patients scored much lower on measures of depression, anxiety and irritability," explains Michael Lewis, a psychology professor at the University of Cardiff and lead author of the study. "Crucially, there was no significant difference in how much their treatment made them feel attractive from those who had other treatments, suggesting that [the mood boost] wasn't just down to a boost in self-confidence." (See pictures of facial yoga.)

In 2006, Dr. Eric Finzi, a cosmetic surgeon in Maryland, injected Botox into frown lines around the mouth or in the forehead furrows of 10 clinically depressed women. The treatment was found to eliminate depression symptoms in nine of them and reduced symptoms in the tenth woman. At the time, Finzi explained the results using the "facial feedback hypothesis" — a feedback loop in which people frown back at a depressed person, further deepening that person's sense of isolation. He suggested that if a depressed person can't frown because of Botox treatment, then others won't frown back at them, thereby breaking the loop. (See the top 10 medical breakthroughs of 2008.)

But Lewis says he favors the theory that facial muscles influence brain activity directly and points to earlier research that suggests such a neurological link. For example, studies have shown that subjects find

comedy routines significantly funnier when they hold a pen between their teeth like a dog holding a bone, a pose that stimulates the muscles used for smiling. Similarly, subjects laugh less when holding a pen between their lips, a pose that mimics frowning.

Such studies are part of a growing trend in counseling and therapy that focuses on behavioral change — a new approach summed up by the Alcoholics Anonymous slogan, "Fake it 'til you make it" — rather than the stern "talk therapy" of the Freudian era. Cognitive behavioral therapy, for example, teaches patients to alter the physiological feedback cycles of certain conditions, from slowing their breathing during panic attacks to cutting the hangdog look during periods of depression. Other popular forms of therapy may draw directly from a facial feedback loop: laughter therapy, for example, seeks to harness the salubrious effects of engaging the smiling muscles, as well as releasing endorphins.

While the cosmetic industry did not fund Lewis' study, it will likely get a boost from his new Botox research. The industry has already shown interest in promoting Botox as a mood enhancer: "I have noted frequently that my patients who receive Botox seem happier," Joel Schlessinger, then President-elect of the American Society of Cosmetic Dermatology and Aesthetic Surgery and President of LovelySkin.com, said as early as 2006. And Botox has already proven to be somewhat of a wonder drug in its wide application: studies have shown it to be an effective treatment for enlarged prostates, migraines, excessive sweating, writer's cramp, and even some forms of cancer. (See pictures of cancer survivors and read their inspirational stories.)

But Lewis warns that his and Finzi's studies both examined small sample groups, so, he says, it would be premature to consider Botox injections — at around $400 each — purely on the basis of their potential for mood enhancement. "The problem is that Botox paralyzes muscles used for communication — even if it is negative communication — so it's difficult to predict the full consequences," he says. "But certainly the research suggests possible treatments." And that, at least, could be something to smile about.

http://www.time.com/time/health/article/0,8599,1888623,00.html

Poetry Readership at 16-Year Low; Is Verse Dying?

In January, the National Endowment for the Arts released a report titled "Reading on the Rise," announcing that the number of American adults reading fiction had increased for the first time since the NEA began tracking reading habits in 1982. According to the report, 50.2 percent of adults had read a work of fiction in the previous year, compared with just 46.7 percent in 2002. The results were greeted with a mixture of excitement and caution by education experts. Some saw them as the long-awaited reversal of the trend toward a dumber, TV-obsessed United States; others, more wary, called them a statistical blip. Almost as an afterthought, the report also noted that the number of adults reading poetry had continued to decline, bringing poetry's readership to its lowest point in at least 16 years.

The dismal poetry findings stand in sharp contrast not only to the rise in general fiction reading, but also to the efforts of the country's many poetry-advocacy organizations, which for the past dozen years have been creating programs to attract larger audiences. These programs are at least in part a response to the growing sense that poetry is being forgotten in the U.S. They include National Poetry Month (April); readings, lectures and contests held across the country; initiatives to get poems into mainstream publications such as newspapers; and various efforts to boost poetry's presence online (poets.org, the Web site of the Academy of American Poets, even launched a mobile version optimized for use on the iPhone). Yet according to the NEA report, in 2008, just 8.3 percent of adults had read any poetry in the preceding 12 months. That figure was 12.1 percent in 2002, and in 1992, it was 17.1 percent, meaning the number of people reading poetry has decreased by approximately half over the past 16 years.

Sunil Iyengar, the NEA's director of the Office of Research and Analysis, says the agency can't answer with certainty why fewer adults are reading poetry. He and others believed the opposite would be true, largely because of poetry's expansion onto the Internet. "In fact," he says, "part of our surmise as to why fiction reading rates seem to be up might be due to greater opportunities through online reading. But we don't know why with poetry that's not the case."

Dana Gioia, who was chairman of the NEA when the new report was released but has since stepped down, credits the rise in fiction reading to a number of things, including more reading online; initiatives like the NEA's "Big Read," which began in 2006 and seeks to have whole communities read a literary work together; the efforts of educators; and the success of series such as the Harry Potter books and Stephenie Meyer's "Twilight." He also mentions Oprah's Book Club as a catalyst.

Poetry, for all its merits, has no program or volume to rival the current popularity of Oprah and Harry Potter, but even so, the decline of its already modest following is noteworthy. Some critics and readers claim that most poetry today is too cloistered and inaccessible, or that it is just plain bad. Yet a telephone survey conducted in 2005 by the National Opinion Research Center on behalf of the Poetry Foundation found that only 2 percent of respondents said they didn't read poetry because it was "too hard." And Donald Hall, a former U.S. poet laureate, points out that most poetry in any age is bad, and that hasn't kept people from reading in the past.

There might be other factors at work. According to the NORC survey, which included about 1,000 adults who read for pleasure primarily in English, people who don't like poetry-and therefore don't read it-are typically those who haven't been exposed to much of it. "Their in-school experiences were fairly limited, and most of them first read classic poetry, poetry which may be less accessible and which may seem less relevant to teenagers than might contemporary poetry," the report concluded. "It seems likely that people's perceptions of poetry are the greatest barriers to participation."

Exposing more people to poetry is exactly what advocates have been trying to do, and evidence suggests they've done quite well. National Poetry Month, for instance, which began in 1996, has become a fixture in thousands of schools and is celebrated in communities all over the country. Poets.org had more than 10 million visits last year, up from about 4.5 million in 2001, and Poetry magazine, one of the form's oldest and most venerable outlets in the U.S., has seen its circulation triple to 30,000 since 2003.

Perhaps the most successful, and forward-looking, program of the past few years has been Poetry Out

Loud, a recitation competition for high-school students that is often compared to the Scripps National Spelling Bee. It was created by the NEA and the Poetry Foundation, and in 2006, its first year as a national contest, about 40,000 students participated. This year, nearly 300,000 students are taking part, reciting both contemporary and classical poetry. Stephen Young, the Poetry Foundation's program director, says the event was devised as a more lively way of engaging a young audience. "I think the timing seemed good because, in the years that memorizing and reciting of poetry had gone off the pedagogical map, the slam movement and hip-hop poetry and performance poetry had hit the scene," he says. "We conceived of Poetry Out Loud as another approach to teaching poetry, but perhaps more pleasurable than [how] poetry was taught when I was a high-school student."
Attracting young readers who haven't yet formed an impression of poetry has been a particular focus of the foundation. The recent successes of poetry advocates on that front are generally not reflected in the NEA numbers, which looked only at the reading habits of those 18 and older. Anne Halsey, the Poetry Foundation's media director, says the group is confident that its efforts will eventually become more broadly evident. "We're a young organization," she says. "We're taking the long view of this."

Still, despite the anecdotal evidence that interest in poetry is on the rise, at least among some parts of the public, the NEA numbers are difficult to discount. The report is based on "The Survey of Public Participation in the Arts," conducted in partnership with the U.S. Census Bureau. The survey's sample was more than 18,000 adults, which the report points out is "roughly 20 times the size of the average media poll," and it was balanced by the Census Bureau to "reflect the present U.S. population." It is by far the largest recent study on reading in the U.S.

Even if readership is down, not everyone is concerned. In fact, popularity is itself a fraught subject in the poetry community. In an address to the Association of Writers & Writing Programs this February, the president of the Poetry Foundation, John Barr, described how the popular poet writing for the common reader essentially disappeared with the advent of Modernism. The 19th-century model of poets publishing in mainstream venues such as newspapers was replaced by the 20th-century model, in which the increasing fragmentation and difficulty of poetry required specialists to discern it, moving it into the college classroom. Today, to call a poem "accessible" is practically an insult, and promotional events like National Poetry Month are derided by many poetry diehards as the reduction of a complex and often deeply private art form to a public spectacle.

A few years after the launch of National Poetry Month, poet Charles Bernstein wrote in a caustic essay that April is now when "poets are symbolically dragged into the public square in order to be humiliated with the claim that their product has not achieved sufficient market penetration." He added that "National Poetry Month is about making poetry safe for readers by promoting examples of the art form at its most bland and its most morally 'positive'."Barr, who presides over an organization that tries to represent poets-even those who say they don't need or want publicity-while broadening their readership, says it's "not necessarily a bad thing" if fewer people read poetry. The goal is to find each poem "its largest intended audience," he says. Tree Swenson, executive director of the Academy of American Poets, says, "Because of the nature of poetry, it's not just 'more people, more people, more people,' but deeper engagement and more kinds of poetry and moving people along to interest in poetry that might be more challenging."

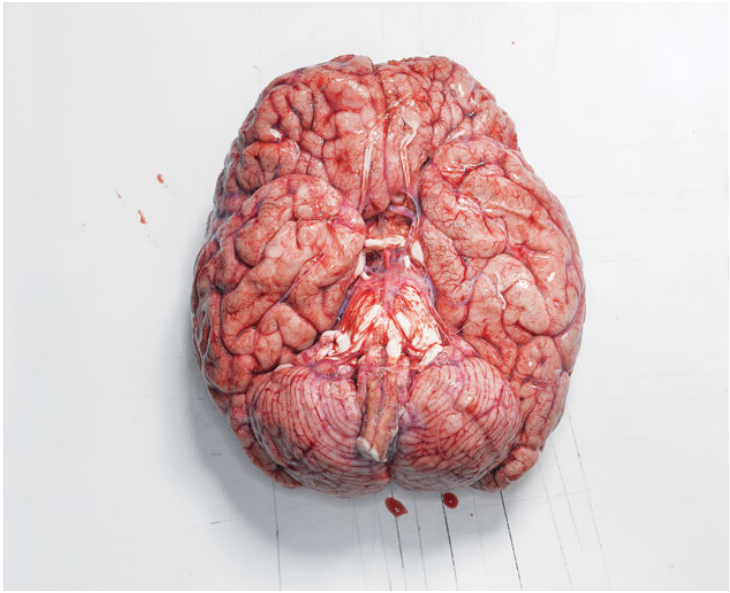
Of course, poetry has been supposedly dying now for several generations. In 1934, Edmund Wilson published an essay called "Is Verse a Dying Technique?" Fifty-four years later, Joseph Epstein chimed in with "Who Killed Poetry?" and former NEA chairman Gioia gained fame with a 1991 piece titled "Can Poetry Matter?" In answering their titular questions, all three to some degree concluded that poetry's concentration in the hands of specialists and the halls of academia was bad for the art form's health. Former poet laureate Hall, who published an essay called "Death to the Death of Poetry" in 1989, has heard it all before. "I'm 80 years old," he says. "[For] 60 years I've been reading about poetry losing its audience."

Despite what national surveys may suggest, and despite rumors of its demise, poetry seems likely to persist, in one form or another.

http://mobile.newsweek.com/detail.jsp?key=45010&rc=cu&p=0&all=1

Scientists Map the Brain, Gene by Gene

By Jonah Lehrer ✉03.28.09



The human brain is surprisingly bloody. I've worked in neuroscience labs, and I'm used to seeing brains that are stored in glass jars filled with formaldehyde, the preserved tissue a lifeless gray. But this brain—removed from a warm body just a few hours ago—looks bruised, its folds stained purple. Blood drips from the severed stem, forming puddles on the stainless steel table.

I'm in the dissection room of the Allen Institute for Brain Science in Seattle, and the scientist next to me is in a hurry: His specimen—this fragile cortex—is falling apart. Dying, the gray matter turns acidic and begins to eat away at itself; nucleic acids unravel, cell membranes dissolve. He takes a thin, sterilized knife and slices into the tissue with disconcerting ease. I'm reminded of Jell-O and guillotines and the meat counter at the supermarket. He saws repeatedly until the brain is reduced to a series of thin slabs, which are then photographed and rushed to a freezer. All that remains is a pool of blood, like the scene of a crime.

Behind all the gore there's a profound purpose: The scientists here are mapping the brain. And while conventional brain maps describe distinct anatomical areas, like the frontal lobes and the hippocampus—many of which were first outlined in the 19th century—the Allen Brain Atlas seeks to describe the cortex at the level of specific genes and individual neurons. Slices of tissue containing billions of brain cells will be analyzed to see which snippets of DNA are turned on in each cell.

If the institute succeeds, its maps will help scientists decipher the function of the thousands of genes that help produce the human brain. (Although the Human Genome Project was completed more than five years ago, scientists still have little idea which genes are used to make the brain, let alone where in the brain they are expressed.) For the first time, it will be possible to understand how such a complex object is assembled from a basic four-letter code.

"The maps of the brain we currently have are like those antique maps people used to draw of the New World," says Allan Jones, chief scientific officer at the Allen Institute. "We can see the crude outlines of the structure, but we have no idea what's happening on the inside." Jones is in charge of making sure the atlas gets finished. He wears starched button-up shirts and crisply pleated khakis, and he looks like the kind of guy who has a drawer full of bow ties. "Studying the brain now is like trying to navigate a vast

city without any driving instructions," he says. "You don't know where you are, and you have no idea how to find what you're looking for."

Author Jonah Lehrer spoke at San Francisco's Commonwealth Club on February 19, 2009 about the black box of the human mind.

When the project is completed in 2012, at an expected cost of $55 million, its data sets will list the roughly 20,000 genes that, switched on in the exact right place at the exact right time, give rise to this self-aware tangle of neurons. And because the vast majority of mental illnesses and disorders, from schizophrenia to autism, have a significant genetic component, scientists at the institute hope that the atlas will eventually lead to new methods of diagnosis and more effective medical treatments. To map the brain is to map its afflictions.

This enterprise is unique in one other respect: scale. "People ask me why we didn't start with a more modest goal, like trying to map some small brain area," Jones says. "The point of doing the whole brain, though, is that it allows us to really develop theories about how the brain works. Sometimes, the only way to make sense of a complex system is to be systematic."

To achieve this, the Allen Institute reimagined the scientific process. There was no grand hypothesis, or even a semblance of theory. The researchers just wanted the data, and, given the amount needed, it quickly became apparent that the work couldn't be done by hand. So, shortly after the institute was founded in 2003, Jones and his team started thinking about how to industrialize the experimental process. While modern science remains, for the most part, a field of artisans—scientists performing their own experiments at their own benches—the atlas required a high-throughput model, in which everything would be done on an efficient assembly line. Thanks to a team of new laboratory robots, what would have taken a thousand technicians several years can now be accomplished in less than 20 months.

The institute can produce more than a terabyte of data per day. (In comparison, the 3 billion base pairs in the human genome can fit in a text file that's only 3 gigabytes.) And the project is just getting started.

In March 2002, Paul Allen—cofounder of Microsoft and 41st-richest person in the world—brought together a dozen neuroscientists for a three-day meeting aboard his 300-foot yacht, Tatoosh, which was anchored in Nassau, Bahamas. At the time, Allen's philanthropic work consisted of an eclectic (some say frivolous) set of endeavors. There was the Experience Music Project in Seattle, a rock-and-roll museum designed by Frank Gehry; the Allen Telescope Array, 350 radio telescopes dedicated to deep-space observation and the search for extraterrestrial life; and SpaceShipOne, the first privately funded plane developed to put a human in space. But Allen was eager to start something new: a project involving neuroscience. He was excited by the sheer uncharted mystery of the mind—one of the last, great scientific frontiers—hoping a single large-scale endeavor could transform the field.

"I first got interested in the brain through computers," Allen says. "There's a long history of artificial intelligence programs that try to mimic what the brain is doing, but they've all fallen short. Here's this incredible computer, a really astonishing piece of engineering, and we have no idea how it works."

Over several days, Allen asked the neuroscientists to imagine a way to move their field forward dramatically. "I wanted them to think big," he says. "Like the Human Genome Project, only for the brain." Some advocated focusing on a single disease, like Alzheimer's. Others argued for more investment in brain imaging technology. But a consensus emerged that what neuroscience most needed was a map, a vast atlas of gene expression that would reconcile the field's disparate experimental approaches. It's not that scientists don't know a lot about the brain—it's that they have no idea how it all fits together.

Today, you can measure the electrical activity of individual neurons, which involves plunging a microelectrode into the tissue and hoping to find an interesting cell. You can image the brain in an fMRI machine and isolate the areas that are active during certain types of mental activity. Or you can use the tools of molecular biology and study specific kinase enzymes, synaptic proteins, or RNA splices.

The problem with this multiplicity of techniques is that they fail to explain how the brain's essential elements—the wet stuff, the genetic text, the electric loom of cells—conspire to create a sentient piece of matter. Allen decided that what neuroscience needed was a tool to help get beyond these obsolete boundaries. "It became apparent to me that there were lots of scientists studying their own little area of brain, pursuing these very specific questions," he says. "But I wanted to develop something that would focus on making these crosscutting connections, so that everybody in the field could benefit."

Say, for instance, someone is investigating the anatomy of autism. The scientist has done an fMRI study that reveals abnormalities in a cortical area in autistic subjects—a bit of brain is not functioning properly—and this might help explain the symptoms of the disease. But now what? The problem has been isolated, but at a very abstract level. The research has hit a dead end.

Meanwhile, another scientist is looking at autism from a very different perspective, conducting large-scale genetic studies that identify a few of the fragments of DNA associated with the disease. (Autism is one of the most heritable psychiatric disorders.) The problem with these efforts is that they often highlight obscure genes that haven't been studied. Nobody knows what these genes do, or whether they're even expressed in the brain. As a result, the research stalls and it remains completely unclear how this genetic defect might lead to the particular problems seen in the fMRIs.

But now imagine that this scientist has access to the Allen atlas. By looking at the map, he should be able to quickly see whether any of the genes known to be associated with autism—several have already been identified—are expressed in the brain areas that appear abnormal in the fMRI scans. This means that the disease can be pinpointed at a very precise level, reduced to a few dysfunctional circuits expressing the wrong set of genes. "That's what having a huge database lets you do," Allen says. "It becomes a tool that will really accelerate the pace of research." Such a map can also help neuroscientists better target their genetic searches. Instead of looking at every gene expressed in the brain—according to the institute's research, that may include nearly 80 percent of the human genome—they can focus only on those that are present in the relevant brain areas.

Then there's the mystery of the developing brain. How does something so complex manage to build itself? The Allen Institute is also measuring genetic expression in the mouse brain, from embryo to adult, to explore how the orchestra of genes is switched on and off in different areas during development. Which snippets of DNA transform the hippocampus into a center of long-term memory? Which make the amygdala a warehouse of fear and anxiety? "One of the things I've come to appreciate about the brain is the importance of location," Allen says. "It's not just a set of interchangeable parts that you can swap in and out. These brain areas are all so distinct, and for reasons we can finally begin to understand."

There's something ironic about Allen, cofounder of a software empire, funding an exhaustive atlas of our neural hardware. (He established the institute with a donation of $100 million.) For decades, many cognitive scientists insisted that the physical brain was largely irrelevant to the study of the mind. It didn't matter whether the human operating system was running on a real cortex or a set of silicon microchips—the software was everything. Given Allen's background—this was the man who helped develop MS-DOS 1.0, after all—he might have been expected to ally with the software crowd in the belief that the 1s and 0s were more important than the anatomical details. Instead, Allen decided that our operating system could run only on one very particular kind of computer. "There are so many intricacies to our brain that won't be understood unless we start to look at the system as a whole," he says. "All these different details don't operate in isolation. But how do they work together to create such a powerful machine?"

The cavernous and antiseptic main lab on the second floor of the Allen Institute is dominated by five big black boxes, each the size of a Smart Car. These are robots, specially constructed by lab-automation company Tecan. At the center of each is a glass window, through which all the action can be observed: A metal arm equipped with a series of long plastic pipettes moves endlessly back and forth, squirting a variety of liquids onto slices of brain. The accompanying mechanical noises—a comforting chorus of squeaks, clanks, and beeps—sound like the androids from WALL-E. At the moment, each robot is processing 192 brain slices per day, allowing the lab to analyze nearly a thousand every 24 hours. (Other

bots perform more specialized tasks, like delicately adding glass covers to the tissue samples.) They work through the night, continuing to do science while their human counterparts sleep.

Before a single brain was dissected, back when the atlas was still purely hypothetical, Allan Jones realized that the most difficult challenges wouldn't be scientific. All the necessary tools were available, and there were no theoretical obstacles. Instead, Jones worried about the seemingly infinite amount of data required. "There really was no model for this type of project," he says. "There was no earlier map that we were trying to improve or update. And the reason there wasn't another map was because it didn't seem possible."

What the institute needed was someone who could translate its epic ambition into an efficient production process, in which thousands of brain slices would be collected and assessed *every day*. This led Jones to hire Paul Wohnoutka, a former Boeing engineer with decades of experience managing complex manufacturing systems. ("I thought a commercial airliner was the most challenging thing I'd help build," he says. "I was wrong.") Wohnoutka has an earnest Midwestern demeanor; his speech quickens with excitement when he starts describing the details of his assembly line, like the colored barcodes used to classify microscope slides. His first priority was to standardize everything so that each slice was put through the exact same process, which he detailed in thick binders filled with instructions. "Scientists are used to working by themselves, so they can get pretty suspicious when you start talking about industrialization," Wohnoutka says. "But all we're really doing here is applying some basic principles that manufacturing companies learned decades ago. It only seems strange because we're making science, not widgets."

In biology, most experiments are done in small batches by postdocs and grad students. That would never work here. Just consider the technical difficulty of mapping the entire brain: Each organ must be cut into thin slices that are measured in microns. These slices—several thousand per brain—are then immersed in a concentrated RNA solution to probe for a specific gene. The basic idea is that the RNA will bind to its complement in the brain cells. (This is made possible by the interwoven nature of the double helix, with one strand automatically attaching to the other.) The tissue is then washed with a series of antibodies and chemicals that attach to the RNA, causing the molecule to become visible. In the Allen Brain Atlas protocol, the cells containing the RNA are stained a washed-out violet, the color of spilled wine, with higher levels of gene expression leading to darker shades. This experimental method is known as in situ hybridization, and it has been a staple of bench science for nearly 40 years. But doing it on this scale is utterly without precedent, possible only because the institute perfected its high-throughput protocol.

There are no robots on the first floor of the Allen Institute. Instead, it's dominated by a surprisingly antiquated piece of furniture. It looks, at first glance, like the card catalog for a vast library—large cabinets with hundreds of small, meticulously labeled drawers. Opening one triggers a clattering of glass, the shifting of microscope slides. Each slide is blank except for what appears to be a greasy fingerprint in the center. Not until it's held up to the light does the content become clear: The smudge is actually a sagittal slice of mouse brain.

These slides—there are more than 250,000—provided the raw data for the mouse brain atlas, the first neural map constructed by the institute. While the mouse atlas is sometimes described as a mere precursor to the human version—a way to perfect the protocols and show that the robots were ready—it's actually been an invaluable resource for gaining insight into the human brain. After all, natural selection is an inveterate tinkerer, and every animal brain is made out of the same basic shopping list of used biological parts. "It might be disconcerting for some people to think about how much our brain has in common with the brains of rodents," Jones says, "but that's just how it is."

Traditional methods would have taken decades, but by using assembly-line robots and new protocols, the Allen Institute expects to finish the human brain atlas in four years.

The mice were exquisitely standardized: Only 56-day-old males of the C57BL/6J strain were used. To keep track of all the samples, the glass slides were labeled with unique barcodes identifying where in the brain they came from and which genes they were being tested for. When scientists want to check a specific slide, they simply whip out a handheld barcode reader and all the relevant information instantly appears on a computer screen. If it weren't for this data-management system, designed by Wohnoutka, the institute would be utterly overwhelmed by its own experimental results. "The barcodes are just our version of the lab notebook," Wohnoutka says. "When you have a million-plus samples, you simply can't write stuff out by hand."

Once the *in situ* hybridization protocols were tweaked for the Tecan robots, the gene mapping was relatively straightforward. The mouse atlas project soon became a matter of efficient repetition, as the factory floor churned out more than 1,000 slices of mouse brain every 24 hours.

But the flood of data exceeded the ability of scientists to analyze it. Glass slides started to gather in neglected piles; there were too many mouse brains and not enough microscopes to study them. "We quickly realized that you can't industrialize just one part of the system," Jones says. "You have to industrialize everything, or else you'll be stuck with all this information that you can't understand."

So the next challenge was finding a way to digitally photograph every slide. Given the output of the lab, it was obvious that robotic microscopes would be required. Unfortunately, no such technology existed, which meant that the institute had to build its own. The researchers rigged 10 Leica 600B microscopes with glass-slide loaders, barcode readers, and small computers running image-analysis software. The machines are mesmerizing to watch—the lenses constantly zoom in and out like metal eyes. Every two seconds, a new snapshot of a stained brain slice enters the atlas. To date, these microscopes have taken more than 85 million photographs.

The data then travels downstairs to the massive computer room, where rows of hard drives and CPUs are stacked in metal racks connected by thick tangles of black wires, like nerve fibers. Two 20-ton air conditioners make the space sound like a wind tunnel. (When the AC briefly failed last year, the room went from 68 to 92 degrees Fahrenheit in less than 20 minutes.) Once an image enters the cluster, an algorithm quantifies billions of individual neurons and translates them into a statistical "heat map" of gene expression. This is the heart of the project, the part that turns the data into something that actually looks like an atlas.

Michael Hawrylycz, director of informatics at the institute, helped design the software. Although colleagues often tease Hawrylycz for being absentminded and messy—the day I met him, he was wearing his T-shirt inside out and his office was a labyrinth of piles—his innovations have allowed the atlas project to classify and categorize the astonishing amount of data. "I make sure scientists can find what they're looking for," he said, before trying in vain to find a scientific paper that was lost somewhere on his desk.

At first, Hawrylycz and others assumed that the most common search would be anatomical—in other words, that scientists would use the atlas to see which genes were expressed in a particular brain area, like the hippocampus. However, the unexpected complexity of the brain meant that such broad searches returned way too much information; the old boundaries were suddenly useless.

This led Hawrylycz and his team to invent a new set of search tools. First, they divided the mouse brain into 53,000 voxels, or microscopic cubes. This enabled scientists to quickly figure out the most important genes in that bit of brain, since they could see which were most highly expressed. They could also compare the gene expression patterns of various voxels to one another. Do you want to know what other brain area most resembles a particular circuit of layer-5 neurons in the left cerebral cortex? Just click on the circuit and a colorful map is superimposed on the mouse brain. The dark red areas represent voxels that are similar, while navy blue signifies an area expressing a very different set of genes. (Imagine if Google Maps let you compare any street in Seattle with every other street in every other city in the world for thousands of variables and you can begin to understand the power of such a tool.) "We call it an

'unbiased' spatial search, because it allows you to look past these old anatomical maps and pull out all sorts of unexpected correlations," Hawrylycz says. "The goal is to let people make their own maps."

This means that once the human atlas is complete, a scientist studying autism or Alzheimer's or human intelligence will be able to quickly generate a snapshot of the brain that reflects the specific genes they're interested in.

In January 2007, after four years of high-throughput experiments and painstaking programming (and a cost of $45 million), the institute published a *Nature* paper describing the methods and results of the mouse atlas. (When the project was completed on time and under budget, the British medical journal *The Lancet* compared Allen's venture with his former Microsoft partner's plan to cure malaria: The headline read "PAUL ALLEN 1, BILL GATES 0.") The entire database was made available for free online at brain-map.org.

"The atlas has become an essential tool for the field very quickly," says Susumu Tonegawa, a Nobel laureate and professor of neuroscience at MIT. He relies on the maps when creating "knockout" strains of mice—rodents that are missing a specific set of neural genes. "These are animals that at first appear normal," Tonegawa says, "but when you look closer you notice that they have deficits in learning and memory depending on what you have interfered with." By determining where each of these deleted genes is expressed in the mouse atlas, Tonegawa can quickly identify the circuit of cells he erased, which shows him exactly which parts of the brain were affected by the genetic mutation. "I can see what is broken," he says, "and that lets me understand how it works."

One unexpected—even disheartening—aspect of the Allen Institute's effort is that although its scientists have barely begun their work, early data sets have already demonstrated that the flesh in our head is far more complicated than anyone previously imagined.

The brain might look homogenous to the naked eye, but it's actually filled with an array of cell types, each of which expresses a distinct set of genes depending on its precise location. Consider the neocortex, the so-called CPU of the brain: Scientists assumed for decades that most cortical circuits were essentially the same—the brain was supposed to rely on a standard set of microchips, like a typical supercomputer. But the atlas has revealed a startling genetic diversity; different slabs of cortex are defined by entirely different sets of genes. The supercomputer analogy needs to be permanently retired.

Or look at the hippocampus, the crescent-shaped center of long-term memory. Until recently, this small fold of tissue in the middle of the brain was depicted as neatly divided into four distinct areas. But data from the atlas has rendered the old maps not only obsolete but flat-out misleading. Even a single hippocampal area can actually be subdivided into at least nine discrete regions, each with its own genetic makeup.

Scientists at the institute are just starting to grapple with the seemingly infinite regress of the brain, in which every new level of detail reveals yet another level. "You can't help but be intimidated by the complexity of it all," Jones says. "Just when you think you're getting a handle on it, you realize that you haven't even scratched the surface." This is the bleak part of working at the Allen Institute: What you mostly discover is that the mind remains an immense mystery. We don't even know what we don't know.

But Jones and others aren't ready to surrender. They remain excited by the idea of working on the frontier of science, by the possibility that their maps will allow others to make sense of this still inscrutable landscape. In other words, they are waiting for the future, for some scientist to invent an elegant theory that explains their enigmatic data. Jones likes to compare the current state of neuroscience to 19th-century chemistry. At the time, chemists were strict empiricists; they set substances on fire and then recorded the colors visible in the flames. Different chemicals produced different spectrums of light, but nobody could make sense of the spectrums. The data seemed completely random. But then, with the discovery of quantum mechanics, scientists were finally able to explain the colored light—the unique rainbows were

actually side effects of subatomic structure. Such is the faith of scientists: Nature must always make sense.

But what if neuroscience isn't like chemistry? The brain, after all, is a byproduct of evolution, an accumulation of genetic accidents. The data that looks so arbitrary might actually *be* arbitrary. If that's the case, having a precise atlas of the brain won't lead to a unified theory—because such a thing can't exist.

Occasionally this doubt seeps into conversations about the atlas, as the scientists wonder aloud whether these 3 pounds of tissue can ever be understood. "The brain is just details on top of details on top of details," Hawrylycz says. "You sometimes find yourself asking questions that don't have answers, like 'Do we really need so many different combinatorial patterns of genes?' Well, it doesn't matter if we *need* to be this way. It's the way we are. The brain doesn't care about making our job easy."

There are also several unresolved technical problems. For example, the human brain is 2,000 times larger than the mouse brain, which means that even the industrialized protocols of the Allen Institute can't generate *all* the necessary amounts of data. The scientists are forced to augment the refined maps of in situ hybridization with cruder techniques, which provide a measurement of gene expression in particular brain areas but not at the cellular level."The problem with this data," one researcher told me, "is that it's like grinding up the paint on a Monet canvas and then thinking you understand the painting." The scientists are stuck in a paradox: When they zoom in and map the brain at a cellular level, they struggle to make sense of what they see. But when they zoom out, they lose the necessary resolution. "We're still trying to find that sweet spot," Jones says. "What's the most useful way to describe the details of the brain? That's what we need to figure out."

And then there are the theoretical questions. Although the scientists are determined to create a universal map of the brain—a generic guide to its gene expression—such an abstraction doesn't actually exist. There is no single human brain, just as there is no single human genome. As a result, the scientists must determine what sort of brains should be included in the atlas. (These issues are especially important given the limited supply of available human specimens. While thousands of nearly identical mice were used to create the mouse atlas, its human counterpart will be based on fewer than 15 highly distinct individuals.) When I was at the institute, the scientists were struggling to define what it meant to be "normal." Is it normal to smoke cigarettes? Is it normal *not* to drink alcohol? What about a cortex of someone who has taken antidepressants? Or spent years in psychoanalysis? Or committed a violent felony? Is anybody normal? How do you standardize the individual?

Although the human atlas is years from completion, a theme is beginning to emerge: Every brain is profoundly unique, a landscape of cells that has never existed before and never will again. The same gene that will be highly expressed in some subjects will be completely absent in others. Important drug targets, like serotonin receptors, will exist in a disparate set of brain areas depending on the individual. This variation is even visible at a gross anatomical level—different people have differently shaped cortices, with different boundaries between anatomical regions. (This is why, for instance, neurosurgeons have to painstakingly probe the cortex during surgery.) If the human atlas is like Google Maps, then every mind is its own city."It can seem like there's an infinite number of variables to consider when you look at the human brain," says Elaine Shen, a manager at the institute. "We're making a genetic map, but what if the map isn't detailed enough? Or what if each brain is so different in expression patterns that we can't make sense of it?" She and her colleagues are convinced, however, that the only way to solve these unknowns is to look at the data, to break the brain apart and try to measure everything. "Once all the data is out there, someone else is going to connect the dots," Jones says. "All we want to do is make that scientific leap possible."

Jonah Lehrer(jonah.lehrer@gmail.com) *is the author of* How We Decide and Proust Was a Neuroscientist.

http://www.wired.com/medtech/health/magazine/17-04/ff_brainatlas

Climate changes Europe's borders – and the world's

- 10:32 27 March 2009 by **Michael Marshall**
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The Matterhorn (left) sits right on the Swiss-Italian border (Image: Eye Ubiquitous/Rex Features)
Italy and Switzerland are planning to redraw their shared alpine border, as global warming is melting the glaciers that originally guided the line. Although peaceful, the move raises fears of future conflicts over shifting borders and resources.

Glaciers and ice fields around the world are melting as temperatures rise, with Europe's high mountains particularly hard hit.

The original proposal to move the Swiss-Italian border comes from Franco Narducci, a member of Italy's centre-left opposition party.

The Italian parliament must approve a new law before the change can happen, whereas Switzerland does not need to go through this process. The final border will be agreed by a commission of experts from Switzerland's Federal Office of Topography and Italy's Military Geographic Institute.

"I think it's fantastic that these two countries are talking about adjusting their borders," says Mark Zeitoun of the University of East Anglia, UK, an expert on international resource management and conflict. "Elsewhere in the world you see a much more nationalistic attitude."

Border wars

The proposal would move the border by up to 100 metres in several regions, including the area surrounding the famous Matterhorn mountain, which will remain straddling the border.

Border communities would be unaffected by the border changes, as the area in question is more than 4000 metres above sea level, and uninhabited. However, other areas of glacial melting and geographic change could prove more contentious.

"Climate change has the potential to lead to large conflicts, particularly where water resources are concerned," says Nick Robson of the South Asian Strategic Stability Institute (see *Is this the beginning of water wars?*).

Melting resource

One such flashpoint for future conflict is the disputed region of Kashmir, the bulk of which is divided between India and Pakistan. This mountainous region has been bitterly fought over since partition in 1947.

Pakistan's major rivers, including the Indus, start life as meltwater from glaciers in Indian-controlled parts of the region. As these glaciers melt and recede with the changing climate, they are likely to cause severe flooding, followed by drought when meltwater is no longer sufficient to feed the rivers.

Pakistan this week accused India of withholding water from the Chenab, a river flowing from the Himalayas into both countries.

Pakistan's president Asif Ali Zardari warned that the water crisis in Pakistan is directly linked to relations with India. "Resolution could prevent an environmental catastrophe in South Asia," he said, "but failure to do so could fuel the fires of discontent that lead to extremism and terrorism."

James Lee of American University, Washington DC, an expert on the relationship between climate, geography and conflict, agrees. "I think it's a very good bet that the Kashmir glaciers will get caught up in the India/Pakistan dispute."

Zeitoun plays down the potential for more serious problems. "The link between climate change and conflict is pretty tenuous," he says.

States suffering water shortages due to climate change could import food rather than growing their own, reducing international tensions, he says, though the shortages would still cause suffering for subsistence farmers.

Polar hotspot

Lee thinks that the polar north will be the first flashpoint. The retreating ice sheets are starting to allow access for shipping vessels and oil drilling, and countries including the US, Canada and Russia have all made claims there.

"Most of the countries making claims in the Arctic are NATO members, so you would expect them to be able to resolve their disputes peacefully," he says, "but Russia is a wild card."

At the other side of the world, Chile and Argentina have a long-running dispute over ownership of the South Patagonian ice fields, which led to a crisis in 1978 and could flare up again as the ice melts.

"The border isn't clearly demarcated," says Lee. However, he thinks that any conflict there is a long way off, and would only become a serious possibility once the Antarctic Treaty runs out in 2048.

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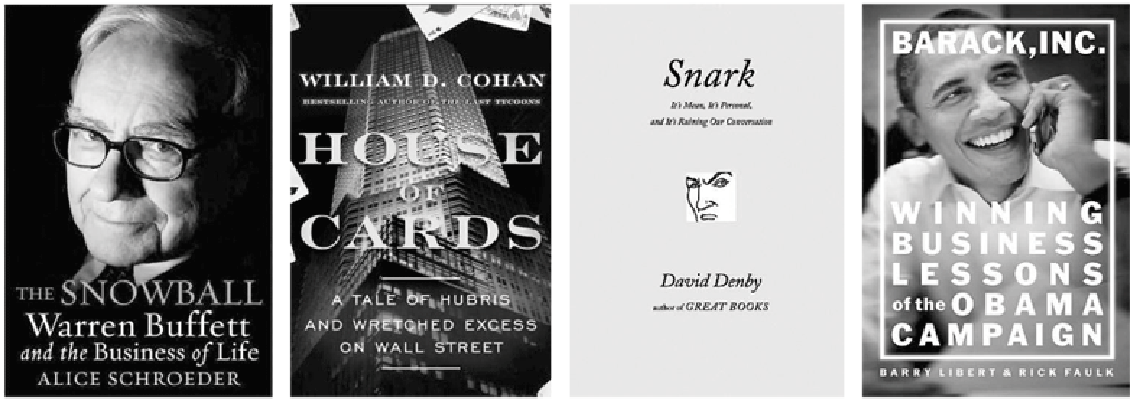
You've Read the Headlines. Now, Quick, Read the Book.

By MOTOKO RICH

From Manuscript to Hardcover



11 MONTHS
Published September 2008

4 MONTHS
Published March 2009

3.5 MONTHS
Published January 2009

2 MONTHS
Published January 2009
E-book in December 2008

For those who want instant information, there is no shortage of outlets, from cable news to Twitter posts. For the long view, it was said, try a book.

But as the metabolism of the culture has sped up in the digital age, pockets of the publishing industry are prodding themselves out of their Paleolithic ways and joining the rush, with more books on current events coming out faster than ever before.

For generations the publishing industry has worked on a fairly standard schedule, taking nine months to a year after an author delivered a manuscript to put finished books in stores. Now, enabled in part by e-book technology and fueled by a convergence of spectacularly dramatic news events, publishers are hitting the fast-forward button.

In December the FT Press released an e-book edition of "Barack, Inc: Winning Business Lessons of the Obama Campaign" a month after the authors delivered a manuscript. Last month Free Press, a unit of Simon & Schuster, published an e-book version of "Dumb Money: How Our Greatest Financial Minds Bankrupted the Nation" just three weeks after Daniel Gross, a writer for Newsweek magazine, completed the book.

And as the financial crisis was deepening last March, George Soros submitted a manuscript to the publisher PublicAffairs. Ten days later the e-book of "The New Paradigm for Financial Markets" went on sale.

"People can't wait a year to get timely information on critical subjects," said Amy Neidlinger, associate publisher of FT Press. "Especially today it's dated 10 minutes after you've just received the first installation."

Of course many publishers and authors suggest that taking time to produce a reflective work is what books are about, and that they should not succumb to the pressures of the 24-hour news cycle.

"You have to believe in the long arm of history," said the author Andrew Meier, who agreed to sell a book to Random House to chronicle four generations of the Morgenthau family just weeks before Robert M. Morgenthau, the Manhattan district attorney, announced he would retire at the end of the year. Mr. Meier said the book, "The House of Morgenthau," probably would not come out earlier than 2011, despite the potential value of releasing it closer to Mr. Morgenthau's departure.

Publishers have released so-called instant books for decades, focusing on political campaigns, sports events and true crime. Most of Bob Woodward's books are released on a tight schedule; his publisher, Simon & Schuster, calls it "extreme publishing."

But the unprecedented pileup of historic news is motivating a broader industry speedup. Hoping to capture the public interest while it is still ripe — and to beat out competition — publishers are rushing out a cavalcade of books tied to the election of the first African-American president, a spiraling economic crisis and eye-popping financial scandals.

For the fastest path to market Martha K. Levin, publisher of Free Press, said the e-book model allowed publishers to take more risks, because printing and distribution costs are so low. "Dumb Money," Ms. Levin said, has sold "a couple thousand" in e-book form. While such a number would probably disappoint for a print book, Ms. Levin said she was pleased with its performance. The publisher will issue a paperback edition next month.

Other publishers, while not releasing early e-books, are nevertheless speeding up print editions. With "Snark," a long essay by David Denby, the movie critic for The New Yorker, Simon & Schuster took just three months to go from manuscript to hardcover copies.

"It's fun to do a very short polemic that jumps into the conversation as it's being had," said Priscilla Painton, editor in chief of Simon & Schuster. "I didn't see the reason to drag it out forever."

Industry insiders say more publishers should expedite their processes to keep pace with the modern media age.

Even books of high quality, if they "come out so late that they're either obsolete or redundant, are going to lose out," said Todd Shuster, a literary agent.

For now the quick-turnaround books represent only about 5 percent of all titles, said Kathryn Popoff, vice president for the trade division at Borders Books. But she added that there were more now than ever before, in part, "because of the news cycle."

Many publishers maintain that books are not meant to chase headlines. "What we need to do on the book side is to do the most thorough, the best and most contextualized" work, said Ann Godoff, president and publisher of the Penguin Press.

She noted that she was waiting until 2010 to publish a book by Nouriel Roubini, the New York University economist whose prognostications have kept him in the news lately, and Stephen Mihm, a historian at the University of Georgia.

Booksellers say that the closer books hew to the news, the shorter the shelf life. "They peak, and they are over," said Antoinette Ercolano, vice president of trade book buying at Barnes & Noble. "If the consumer feels they aren't getting anything new, it's not going to work."

Only a book that "has instant media appeal" is worth doing quickly, said Jamie Raab, publisher of Grand Central Publishing, a unit of Hachette Book Group. Most books, she and others in the industry said, require time for the publisher to edit and market the book, line up blurbs or secure reviews in magazines with long lead times.

Last August Chelsea Green Publishing, a small house in Vermont, courted controversy when it first offered "Obama's Challenge" — a portrait and prescription for Barack Obama by Robert Kuttner — exclusively through Amazon's print-on-demand service so that it would be available at the time of the Democratic National Convention.

Other booksellers threatened to boycott the title. Barnes & Noble reduced its initial order.

Margo Baldwin, president of Chelsea Green, said it was worth the industry storm. "If Obama had lost, the book would have been dead," she said. "So we felt like we had to get it out as fast as we possibly could."

The current economic downturn prompted Robert T. Kiyosaki, the best-selling author of "Rich Dad Poor Dad," to write a book that he is posting chapter by chapter online at conspiracyoftherich.com, where readers can see his work free.

The final book, "Conspiracy of the Rich: The 8 New Rules of Money," will be published in paperback by Grand Central in September.

Mr. Kiyosaki is integrating up-to-the-minute information as he writes. On March 18 he inserted the news that the Federal Reserve was buying $1 trillion in treasury bonds and mortgage securities into a chapter titled "Are You Prepared for the Coming Depression?"

"If this book had gone through the normal publishing procedures," Mr. Kiyosaki said, "it wouldn't be worth writing."

http://www.nytimes.com/2009/03/30/books/30quic.html?th&emc=th

Mice And Humans Should Have More In Common In Clinical Trials

Purdue researcher Joseph Garner found that traditional testing methods in mice increase errors in lab results. His study suggests researchers vary the environmental conditions for mice during tests to lessen the possibility of false positives. (Credit: Purdue Marketing and Media photo/Mark Simons)

ScienceDaily (Mar. 31, 2009) — Just as no two humans are the same, a Purdue University scientist has shown treating mice more as individuals in laboratory testing cuts down on erroneous results and could significantly reduce the cost of drug development.

Mice have long been used as test subjects for treatments and drugs before those products are approved for human testing. But new research shows that the customary practice of standardizing mice by trying to limit environmental variation in laboratories actually increases the chance of getting an incorrect result.

The study, done by Joseph Garner, a Purdue assistant professor of animal sciences, and professor Hanno Würbel of the Justus-Liebig University of Giessen in Germany, was published in the early online edition of *Nature Methods* on Monday (March 30). It suggests scientists should change their methods and test mice in deliberately varying environmental conditions. Garner said that will decrease the number of false positive test results and eliminate further costly testing of drugs or treatments destined to fail.

"In lab animals, we have this bizarre idea that we can control everything that happens," Garner said. "But we would never be able to do that with humans, and we wouldn't want to. You want to know if a drug is going to work in all people, so you test it on a wide range of different people. We should do the same thing with mice."

Garner said human testing uses a broad range of subjects, giving scientists an idea of how a drug or treatment might affect different types of people. But scientists often use mice that are basically genetically identical and try to limit internal and external environmental factors such as stress, diet and age to eliminate variables affecting the outcome.

Garner said there is no practical way to ensure that all environmental conditions are the same with mice, however, because they respond to cues humans cannot detect. For example, a researcher's odor in one lab might cause more stress for a mouse than another researcher's odor in a second lab with different mice, giving different results. But scientists, unaware of the odor difference, may believe a treatment worked when the mice were actually responding to an environmental cue, giving a false positive.

The study used three different strains of mice from previously published data and compared their behavioral characteristics against each other. The observations were done in three different labs, two different types of cages and at three different times to make 18 different replicates of the same

experiment. Traditional testing theories say the results should have been the same in all those experiments.

Once the results were compared, however, the researchers found many false positives, or instances when one strain appeared to act differently from another when it actually should not.

"There were nearly 10 times more false positives than we would expect by chance," Garner said. "There had to be a gremlin causing these false positives."

The researchers suspected the problem was in the traditional lab experiment design. So they reevaluated the data, picking a mouse of each strain from each environment - similar to matching pairs in human clinical trials - and found only the same number of false positives as would be expected by chance.

When mouse testing creates a false positive, leading a researcher to believe a drug has worked, the drug could be sent to further animal testing and human clinical trials at a cost of millions of dollars. Drugs that fail in clinical trials cannot be marketed, and the money is wasted. To recoup those losses, drug companies must increase the costs of marketable drugs.

"Drugs aren't expensive because they're costly to make," Garner said. "They're expensive because the company has to recoup the costs of the other drugs that have failed in human clinical trials. Numbers are hard to estimate, but for every drug that reaches the marketplace, well over 100 have been abandoned at some point in their development."

Garner said giving mice varying environments also could be better for the animals because fewer could be used. Weeding out an unsuccessful drug would eliminate an unnecessary second round of animal testing.

"The really exciting message is that we have shown how the false positives in early drug discovery can be drastically reduced without costing anything more than a change in experimental design," Garner said. "These are positive results for pharmaceutical research, patients and for mice."

Garner and Würbel, along with Würbel's doctoral student Helene Richter, received research funding from the German Research Foundation. Their research will now focus on which environmental factors have the most impact on results.

Journal reference:

1. S Helene Richter, Joseph P Garner & Hanno Würbel. **Environmental standardization: cure or cause of poor reproducibility in animal experiments?** *Nature Methods*, 2009; DOI: 10.1038/nmeth.1312

Adapted from materials provided by Purdue University.

http://www.sciencedaily.com/releases/2009/03/090330142422.htm

Slow-growing TB Bacteria Point The Way To New Drug Development

Under a magnification of 15549x, this colorized scanning electron micrograph (SEM) shows a number of Mycobacterium tuberculosis bacteria. (Credit: CDC/Janice Carr)

ScienceDaily (Mar. 31, 2009) — The discovery of a large number of slow-growing *Mycobacterium tuberculosis* bacteria, which cause tuberculosis (TB), in the lungs of TB patients could be an important step forward in the design of new anti-TB drugs.

Until now it was thought that *M. tuberculosis* bacteria in the lungs of TB patients were rapidly multiplying. However recent research by Dr Simon Waddell and colleagues from St George's University of London and the University of Leicester, using gene chips to look at how TB bacteria behave in different environments, revealed that the tuberculosis bacteria in the sputum (phlegm coughed from the lungs) of TB patients resemble bacteria that are growing very slowly or hardly at all.

This has caused concern, as slowly growing bacteria are non-responsive to treatment with isoniazid, one of the main antibiotics used to treat TB. This may be the reason why it takes six months to treat pulmonary TB successfully, whereas most bacterial infections are treated in days. This prolonged treatment often leads people to stop taking their medicines early or only to take them intermittently, which can cause relapses and the emergence of antibiotic resistance.

"Our observations imply that either a large number of the infecting bacteria in the lungs are not multiplying rapidly as previously suggested; or the bacteria are adapting by not growing when they are coughed from the lungs into the air," said Dr Waddell, presenting his findings at the Society for General Microbiology meeting at Harrogate March 30.

"We need to find out how bacteria respond during infection and after drug treatment to understand how bacteria become tolerant to antibiotics. This will provide alternative opportunities for the development of better drugs that the world desperately needs to combat the growing health threat of TB."

Tuberculosis kills around 1.7 million people each year, equating to 4,500 deaths a day, or someone dying of TB every 19 seconds. Approximately one third of the world's population are infected with tuberculosis bacteria (~2 billion people), of which around one in ten will develop active disease.

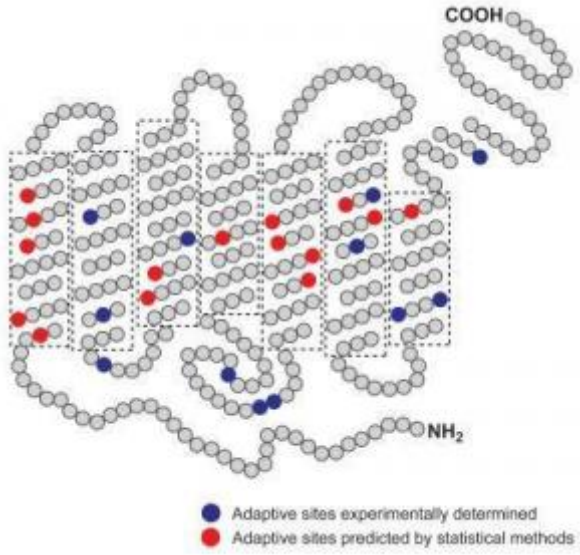
Current antibiotic treatment for M. tuberculosis involves a minimum of 3 drugs over a 6-month period (isoniazid, rifampicin and pyrazinamide for 2 months, followed by isoniazid and rifampicin for a further 4 months). Multidrug-resistant TB (MDR-TB), resistant to two front line drugs, and extensively-drug resistant TB (XDR-TB), resistant to at least two front line drugs and two others, have recently become major clinical problems.

It is estimated by the WHO (World Health Organisation) that there are around 500,000 new cases of MDR-TB per year, and 40,000 new cases of XDR-TB. The need for new drugs to treat TB is greater now than ever.

Adapted from materials provided by Society for General Microbiology, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/03/090329205447.htm

Hundreds Of Natural-selection Studies Could Be Wrong, Study Demonstrates



The image depicts the structure of the bovine rhodopsin protein. The blue circles represent amino acid sites that have undergone natural selection as determined through experiments, while the red circles represent amino acid sites that have undergone natural selection as determined through statistical analyses. (Credit: Masafumi Nozawa, Penn State (Adapted from Yokoyama et al. 2008 PNAS))

ScienceDaily (Mar. 31, 2009) — Scientists at Penn State and the National Institute of Genetics in Japan have demonstrated that several statistical methods commonly used by biologists to detect natural selection at the molecular level tend to produce incorrect results.

"Our finding means that hundreds of published studies on natural selection may have drawn incorrect conclusions," said Masatoshi Nei, Penn State Evan Pugh Professor of Biology and the team's leader. The team's results will be published in the Online Early Edition of the journal *Proceedings of the National Academy of Science*s during the week ending Friday 3 April 2009 and also in the journal's print edition at a later date.

Nei said that many scientists who examine human evolution have used faulty statistical methods in their studies and, as a result, their conclusions could be wrong. For example, in one published study the scientists used a statistical method to demonstrate pervasive natural selection during human evolution. "This group documented adaptive evolution in many genes expressed in the brain, thyroid, and placenta, which are assumed to be important for human evolution," said Masafumi Nozawa, a postdoctoral fellow at Penn State and one of the paper's authors. "But if the statistical method that they used is not reliable, then their results also might not be reliable," added Nei. "Of course, we would never say that natural selection is not happening, but we are saying that these statistical methods can lead scientists to make erroneous inferences," he said.

The team examined the branch-site method and several types of site-prediction methods commonly used for statistical analyses of natural selection at the molecular level. The branch-site method enables scientists to determine whether or not natural selection has occurred within a particular gene, and the site-prediction method allows scientists to predict the exact location on a gene in which natural selection has occurred.

"Both of these methods are very popular among biologists because they appear to give valuable results about which genes have undergone natural selection," said Nei. "But neither of the methods seems to give an accurate picture of what's really going on."

Nei said that for many years he has suspected that the statistical methods were faulty. "The methods assume that when natural selection occurs the number of nucleotide substitutions that lead to changes in amino acids is significantly higher than the number of nucleotide substitutions that do not result in amino acid changes," he said. "But this assumption may be wrong. Actually, the majority of amino acid substitutions do not lead to functional changes, and the adaptive change of a protein often occurs by a rare amino acid substitution. For this reason, statistical methods may give erroneous conclusions." Nei also believes that the methods are inaccurate when the number of nucleotide substitutions observed is small.

To demonstrate the faultiness of the statistical methods, Nei's team compiled data collected by their Emory University colleague, Shozo Yokoyama, on the genes that control the abilities of fish to see light at different water depths and on the genes that control color vision in a variety of animals. The team used these data to compare statistically predicted sites of natural selection with experimentally determined sites. They found that the statistical methods rarely predicted the actual sites of natural selection, which had been identified by Yokoyama through experiments. "In some cases, statistical method completely failed to identify the true sites where natural selection occurred," said Nei. "This particular exercise demonstrated the difficulty with which statistical methods are able to detect natural selection."

To demonstrate how small sample sizes can lead to incorrect results, the team used computer simulations to examine the evolution of genes in three primates: humans, chimpanzees, and macaques. The scientists mimicked the procedures used by the authors of a 2007 paper, which applied the branch-site method to 14,000 orthologous genes -- genes that are genealogically identical among different species -- and which found that the method predicted selection in 32 of the genes. Nei and his team also studied selection using Fisher's exact test, but this test did not detect any selection. "The results indicate that the number of nucleotide substitutions that occurred were too small to detect any selection; therefore, all of the 32 cases obtained by the branch-site method must be false positives," said Nozawa.

"These statistical methods have led many scientists to believe that natural selection acted on many more genes in humans than it did in chimpanzees, and they conclude that this is the reason why humans have developed large brains and other morphological differences," said Nei. "But I believe that these scientists are wrong. The number of genes that have undergone selection should be nearly the same in humans and chimps. The differences that make us human are more likely due to mutations that were favorable to us in the particular environment into which we moved, and these mutations then accumulated through time."

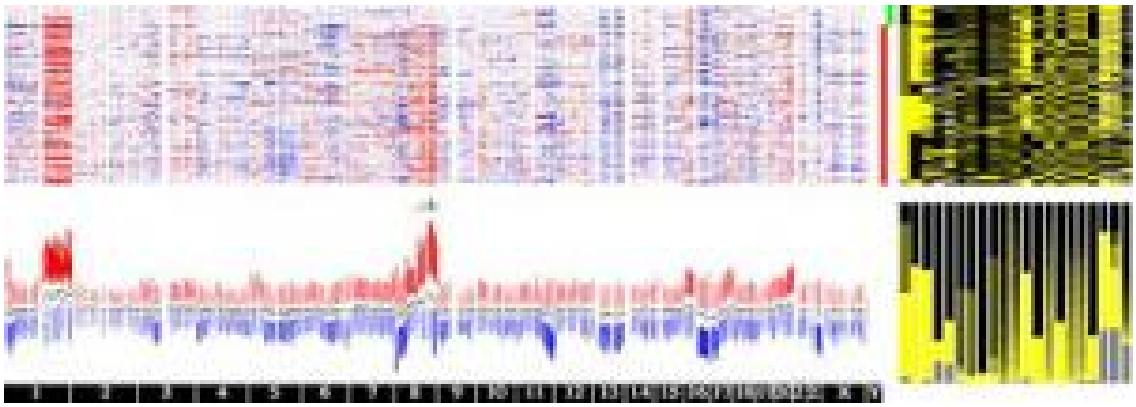
Nei said that to obtain a more realistic picture of natural selection, biologists should pair experimental data with their statistical data whenever possible. Scientists usually do not use experimental data because such experiments can be difficult to conduct and because they are very time-consuming.

A third author on the study is Yoshiyuki Suzuki, a researcher at the National Institute of Genetics in Japan. This research was supported by the National Institutes of Health.

Adapted from materials provided by Penn State.

http://www.sciencedaily.com/releases/2009/03/090330200821.htm

Cancer Genomics Browser Gives Cancer Researchers A Powerful New Tool



The UCSC Cancer Genomics Browser uses "heatmaps" as a visual representation to display genomic and clinical data side by side. (Credit: Image courtesy of University of California - Santa Cruz)

ScienceDaily (Mar. 31, 2009) — A Cancer Genomics Browser developed by researchers at the University of California, Santa Cruz, provides a new way to visualize and analyze data from studies aimed at improving cancer treatment by unraveling the complex genetic roots of the disease.

The browser consists of a suite of web-based tools designed to help researchers find patterns in the huge amounts of clinical and genomic data being gathered in large-scale cancer studies. Medical researchers hope to identify genetic signatures and other "biomarkers" in cancer cells that can be used to predict how individual patients will respond to different therapies throughout the course of their treatment.

A paper describing the Cancer Genomics Browser has been published in the April issue of Nature Methods by a team based at the Jack Baskin School of Engineering at UCSC. Coauthor David Haussler, professor of biomolecular engineering, said development of the browser was driven by the needs of cancer researchers, who are now using powerful technologies for genome analysis and DNA sequencing in their efforts to understand cancer at the molecular level.

"Each of these tests gives millions of measurements, and the result is a bad case of data overload," Haussler said. "We've built the cancer browser so that researchers can upload their data and use a variety of software tools to visualize and interpret their results."

To get a user's perspective on the browser as it took shape, Haussler's team worked closely with Dr. Laura Esserman, professor of surgery and radiology at UC San Francisco, and Marc Lenburg, associate professor of pathology and laboratory medicine at Boston University School of Medicine. Esserman and Lenburg, both coauthors of the paper, are involved in the I-SPY Trial, a multi-institutional collaboration aimed at identifying biomarkers to predict the most effective therapies for patients with advanced breast cancer.

"What is amazing about the browser is that it allows us to combine complex molecular data and clinical observations, and provides insights into how we can truly improve treatment and outcomes," said Esserman, director of the Carol Franc Buck Breast Care Center and associate director of the Breast Oncology Program at the Helen Diller Family Comprehensive Cancer Center at UCSF.

Cancer genomics involves searching for all of the genes and mutations that contribute to the development of a cancer cell and its progression from a localized cancer to metastatic disease that spreads throughout the body. A genome is an organism's complete set of DNA, and researchers are now able to analyze the alterations that occur throughout the genome of a patient's cancer cells. Recent advances, such as microarray technology and high-throughput DNA sequencing, have made it possible to characterize tumor samples in exquisite detail.

"You can run a microarray chip that analyzes a million points in the genome and can tell you about changes in the DNA, as well as inherited variations that make a person more or less susceptible to cancer," Haussler said.

Many different types of genomic changes can have clinical significance, including insertions, deletions, and other changes in the DNA sequence, such as changes in the number of copies of a gene. Moreover, microarrays and high-throughput methods for measuring proteins make it possible to see how these genomic alterations interfere with the cell's normal workings.

"The Cancer Genomics Browser is fantastic in that it helps users display many different dimensions of clinical and molecular data simultaneously," Lenburg said. "For example, for a given set of tumor biopsies, it is possible to see which regions of the genome are abnormal, how much of every gene is being expressed, how active various signaling pathways are--all organized by, say, how well each patient responded to a particular drug. As a result, the process of identifying possible connections is really easy."

The browser was developed by a team of scientists at UCSC's Center for Biomolecular Science and Engineering (CBSE), an interdisciplinary center housed in the Baskin School of Engineering and directed by Haussler. Ting Wang, a Helen Hay Whitney postdoctoral fellow, came up with the initial design of the browser and coordinated the team's efforts. The first three authors of the paper--postdoctoral researcher Jingchun Zhu and graduate students Zachary Sanborn and Stephen Benz--did much of the work involved in building the browser, with help from CBSE research scientist James Kent and others.

The public browser site (http://genome-cancer.ucsc.edu) hosts a growing body of publicly available cancer genomic data, and the browser is also being used on confidential, prepublication data by several groups involved in clinical trials and cancer genomics research, Wang said.

The Cancer Genomics Browser is a natural extension of the UCSC Genome Browser, a widely used platform for accessing and visualizing genomic data. Created by Kent as a tool for exploring the human genome, the UCSC Genome Browser now averages one million page requests every week. It displays data and annotations in linear tracks that parallel the DNA sequences of the dozens of genomes in the browser.

But this type of display doesn't work well with clinical data from large numbers of patients. And clinical databases don't handle genomic data very well. The Cancer Genomics Browser is able to integrate these different types of data into a single interactive display.

"Large clinical trials that include detailed molecular profiling of patient samples generate a really big mountain of data. Actually, it is more like several big mountains of data," Lenburg said. "The browser creates a way of organizing all this data, and all these different types of data, into a single unified picture."

The Cancer Genomics Browser represents data as "heatmaps," in which colors represent the values of key variables. Genomic and clinical data are displayed side by side, and researchers can group and sort the data on the basis of any feature of interest, such as age, gender, response to therapy, estrogen-receptor status of breast cancers, and so on. Because humans excel at visual pattern recognition, correlations in the data tend to jump out as the user manipulates the browser display.

"The ideas behind it are simple, but the result is a pretty powerful tool. It makes it a lot easier to see patterns in the data," Wang said.

Standard statistical tools are integrated into the browser so that users can perform quantitative analyses. The browser's developers hope to improve these capabilities in the future. "Now that we have the platform, we want to incorporate state-of-the-art algorithms to get the most out of the data," Wang said.

In developing the browser, the researchers used prepublication datasets from the I-SPY Trial (Investigation of Serial Studies to Predict Your Therapeutic Response with Imaging and Molecular Analysis) and The Cancer Genome Atlas (TCGA). The I-SPY study is funded by the National Cancer Institute (NCI) and includes nine cancer centers nationwide. TCGA is a large-scale collaborative effort by NCI and the National Human Genome Research Institute to systematically characterize the genomic changes that occur in cancer. The UCSC team is also working with a related worldwide effort, the International Cancer Genome Consortium.

The coauthors of the Nature Methods paper include UCSC researchers Christopher Szeto, Fan Hsu, Robert Kuhn, Donna Karolchik, and John Archie, in addition to Zhu, Sanborn, Benz, Lenburg, Esserman, Kent, Haussler, and Wang. Funding for this project was provided by the I-SPY consortium, the TCGA consortium, the California Institute for Quantitative Biosciences (QB3), and the National Institutes of Health. Haussler is a Howard Hughes Medical Institute investigator.

Adapted from materials provided by University of California - Santa Cruz.

http://www.sciencedaily.com/releases/2009/03/090330142425.htm

Statistical Road Safety Illuminated By Mathematics Of Eighteenth Century Minister

ScienceDaily (Mar. 31, 2009) — What possible connection could there be between an eighteenth century British Presbyterian minister and preventing road traffic accidents in Hartford, Connecticut? Everything, according to a report in the *International Journal of Intelligent Systems Technologies and Applications.*

Thomas Bayes (1702-1761) was not only a church minister but also the mathematician who formulated a probability theorem that can be used to solve problems that stymie conventional statistics. The crux of his theorem can be stated as follows: "The probability of any event is the ratio between the value at which an expectation depending on the happening of the event ought to be computed, and the value of the thing expected upon its happening."

This inverse probability, which hinges not only on the concept of "heads-or-tails", but on expectations has been used previously to develop powerful email spam filters, to improve medical diagnostics, and most recently to improve road safety in Hartford.

Clara Fang at the Department of Civil Engineering, University of Hartford, and colleagues Joseph Rimiller and Najib Habesch of Urban Engineers, Inc, also in Hartford, explain how Hartford was the first US city to develop and implement a comprehensive citywide traffic calming masterplan. Included in the plan were the building of mini-roundabouts, curb extensions, speed tables, parking chicanes, bicycle lanes and the implementation of "road diets" in which excess lanes were eliminated from particular streets.

The team has now analyzed the before and after crash data for the traffic calming devices to determine which were most effective in reducing accidents.

Rather than using conventional data analysis to look at the before and after statistics, the team used an empirical Bayesian method. This allowed them to predict the expected crash rate at specific sites around the city assuming that no safety and traffic-calming measures had been put in place. Study site crash rates with and without treatment for the same time period were compared. They then also compared this with a conventional analysis to weed out any analytical biases.

Their analysis revealed that all implemented safety features led to fewer crashes, but also that the higher the "before" crash rate and the greater the traffic demands, the greater the reduction. In other words, those sites that had few crashes before, also had few crashes after. However, there were significant reductions in crash rates on three streets, Franklin, Main and Wethersfield, which the team explains was due significantly to the reduction in speed on these roads achieved by putting them on a road diet.

"Speeds at the study sites were reduced by up to six miles per hour, with an average reduction of three to four miles per hour," the team explains, "The road diets also prevented aggressive drivers from passing more prudent drivers, thus, eliminating one potential source of conflict."It would seem that a seventeenth century clergyman has plenty to say about solving a twenty-first century problem.

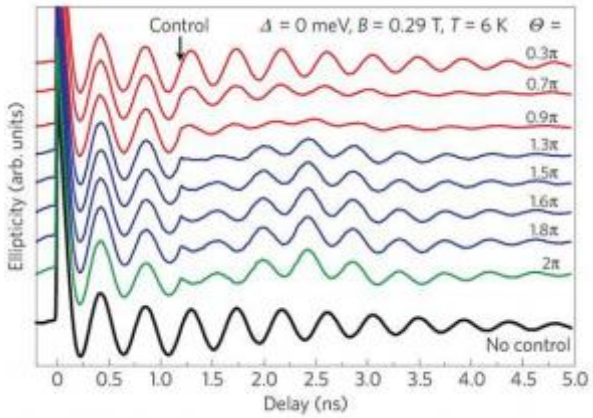
Journal reference:

1. . **A simplified Empirical Bayesian method to safety evaluation of traffic calming treatment for urban road systems**. *Int. J. Intelligent Systems Technologies and Applications*, 2009, 6, 349-363

Adapted from materials provided by Inderscience Publishers, via EurekAlert!, a service of AAAS.

çhttp://www.sciencedaily.com/releases/2009/03/090327092904.htm

New Step Towards Quantum Computers



The diagrams show how the spin "wavers" (oscillation shown at top) in relation to time following an alignment laser pulse. One oscillation period corresponds to one complete "waver" rotation. As anticipated, the strength (amplitude) of all red curves decreases with time. After 1.2 nanoseconds (ns) a laser control pulse is irradiated to suddenly change the alignment of the spin, indicated by the phase of blue and finally green curves: It is precisely the counter-phase to the black curve at the bottom, recorded without control pulse. Moreover this waver builds up in the counter-phase at 2.4 ns, so that the signal is particularly high here, significantly facilitating readout. (Credit: Image courtesy of Ruhr-Universitaet-Bochum)

ScienceDaily (Mar. 30, 2009) — The intrinsic rotation of electrons – the "spin" – is a promising property for future electronics devices. If use as an information carrier were possible, the processing power of electronic components would suddenly increase to a multiple of the present capacity.

In cooperation with colleagues from Dortmund, St. Petersburg and Washington, Ruhr-Universität Bochum physicists have now succeeded in aligning electron spin, bringing it to a controlled "waver" and reading it out. The electron spin can also be realigned as required at any time using optical pulses.

"This is the first, important step toward addressing these "quantum bits", which will form an integral part of data transfer systems and processors in the future," said Prof. Andreas Wieck. The researchers have published their report in *Nature Physics*.

Complex Calculations in Minimum Space

Modern electronics is based on electrical charges: If a memory cell (bit) has an electrical charge, it represents a logical "1"; if no charge is present, this is a logical "0".

However, electrons have more than just a charge – they spin like a top around their own axis, producing a magnetic field, similar to the earth. This spin can be accelerated or decelerated by applying an external magnetic field. The "top" begins to waver and its axis tips to virtually any desired angle.

If these manifold possibilities were used as information carriers, it would be possible to store a great deal more information than just "0" and "1" with an electron. Moreover adjacent electrons could be moved into various configurations, because they exert forces on one another in the same manner as two magnets on a bulletin board. This phenomenon would provide a significantly more complex base for data storage and processing. Even a small quantity of these so-call quantum bits (qubits), would allow extremely complex calculations, for which millions of bits are required today.

Confinement of Spins in Indium-Arsenic Islands

Naturally, one single electron has only a very small measurable effect. For this reason, individual electron measurements can only be performed with great difficulty using highly sensitive instruments. This is why the international research team has specialized in confining nearly one million electrons each in virtually identical indium-arsenic islands ("quantum dots") and totaling their effect. These "ensemble" measurements provide signals which are stronger by a magnitude of six, making them very sturdy and allowing them to be recorded easily.

"Contrary to the preconceptions of many international competitors, all associated electron spins exhibit precisely the same behavior, and the microscopic effects can therefore be measured very easily," stated Wieck.

Optical Switching of Quantum Dots

In their study, the physicists were not only successful in aligning the electron spin; they also managed to rotate it optically using a laser pulse in any desired direction at any time and read this direction out with a further laser pulse. This is the first important step towards "addressing" and influencing qubits.

"The interesting factor here is that these electrons are enclosed in solid bodies, so we no longer need complex high vacuum equipment and light occlusion on all sides to keep them permanently in a module as in quantum optics," stressed Prof. Wieck. In Bochum, the extremely high vacuum is required only once during production of the quantum dot; after that the semiconductor system is sealed against air ingress, has a long service life and is just as reliable as all transistors and memory cells already in use today.

Journal reference:

1. A. Greilich, Sophia E. Economou, S. Spatzek, D. R. Yakovlev, D. Reuter, A. D. Wieck, T. L. Reinecke, M. Bayer. **Ultrafast optical rotations of electron spins in quantum dots**. *Nature Physics*, 2009; DOI: 10.1038/nphys1226

Adapted from materials provided by Ruhr-Universitaet-Bochum, via AlphaGalileo.

http://www.sciencedaily.com/releases/2009/03/090329205547.htm

Glass You Can Build With: Metallic Glass That's Stronger And Lasts Longer

Cracks propagate through metallic glass by following shear bands, which in this micrograph look like wrinkles in cloth. The featureless blobs in the picture are a second, crystalline phase of the metal, but if these barriers are not properly spaced to halt crack propagation, the metal can fail disastrously. (Credit: Image courtesy of DOE/Lawrence Berkeley National Laboratory)

ScienceDaily (Mar. 30, 2009) — The normal structure of metals is crystalline. Glass, on the other hand, is amorphous. But it's possible to make amorphous forms of metal, metallic glasses, which can be remarkably strong, having many properties equal to or better than their crystalline metal cousins. The catch is that bulk metallic glasses are highly susceptible to fatigue, a severe problem for their use as structural materials.

Now researchers at the U.S. Department of Energy's Lawrence Berkeley National Laboratory and the University of California at Berkeley, working with colleagues at the California Institute of Technology, have solved the fundamental problem of poor fatigue resistance in bulk metallic glasses. The results are metallic glass alloys that are not only stronger than high-strength steel and aluminum alloys but more resistant to fatigue as well.

Bulk metallic glasses

For a decade or so it has been possible to make metallic glasses in bulk – just like regular crystalline metals – by using a number of tricks: rapidly cooling the liquid metal, for example, and mixing together several elements with different crystalline structures – "which because they don't know how to crystallize, delays the crystallization and allows you to create an amorphous structure," as Robert Ritchie of Berkeley Lab's Materials Sciences Division explains.

The excitement that greeted the ability to make metallic glasses in bulk has not been followed up by widespread technological use, however. These alloys were first employed for lightweight, springy gold clubs, but to date there have been few, if any, important structural applications – in the aerospace industry, for example, as was initially hoped.

"One reason for this is that properties associated with cracking or fracture – such as fracture toughness or fatigue resistance – in these bulk metallic glass have often been quite poor," says Maximilien Launey, a postdoctoral research fellow working with Ritchie at Berkeley Lab.

"Without good toughness, these alloys have found few applications structurally," says Ritchie, who is also a professor in UC Berkeley's Department of Materials Science and Engineering. "Moreover, their fatigue resistance is also quite poor, with fatigue limits sometimes as low as one tenth or so that of most crystalline metallic alloys."

Since fatigue is the most widespread mechanism of degradation in metallic structures, low fatigue resistance has impeded the adoption of metallic glasses as structural materials.

“While it has been often thought the fatigue limit was the cyclic stress needed to initiate a crack in a material, there are always small cracks present,” Ritchie says. “The fatigue limit is actually the cyclic stress needed to get such a small crack propagating.”

In crystalline materials there are many barriers to crack propagation, including grain boundaries, inclusions, and other microstructural obstacles. Says Ritchie, “The fatigue limit is the stress needed to get cracks past such barriers.” But metallic glasses have no crystalline structure, so no such barriers exist.

“If a crack is present, there’s nothing to stop it from propagating,” says Ritchie. “In metallic glasses, dominant shear bands can form and extend throughout the material; under tensile stress, this can lead to premature catastrophic failures at very small strains — a particular problem in metallic glasses.”

Stopping runaway cracks

Ritchie and Launey worked with colleagues Douglas Hofmann and William Johnson at Caltech to find a solution. Johnson’s group at Cal Tech had developed a metallic glass alloy named DH3, made from five elements – roughly a third zirconium, a third titanium, and the remainder niobium, copper, and beryllium. In bulk samples of DH3 the researchers induced a second phase of the metal, which took the form of narrow pathways of crystalline metal permeating the metallic glass in dendritic (treelike) patterns; its growth was carefully controlled by processing a partially molten liquid-solid mixture.

The resulting dendritic phase acts as a local arrest point to any crack that begins to propagate in the glass.“The process of blocking these shear bands is important not just for fatigue but for toughness as well,” Launey says. “The approach of using a second phase has been tried before, but hasn’t always been very successful. What this study shows is that it is their separation that is critical; the spacing of these arrest points has to be small enough to arrest any crack before it becomes large enough to cause catastrophic failure.”

The goal is to match the mechanical and microstructural scales of the material: the microstructural scale is the space of the dendritic branches, while the mechanical scale is the length of a crack that breaks the material.“So it is important that any shear band or crack is arrested before it makes it that far,” Ritchie says. “We do that by having a finer distribution of these second phases” – with dimensions determined by a simple formula – “and as a result we got far superior fatigue resistance.”So good, in fact, that toughness, ductility, and fatigue resistance – all intimately related properties – of the DH3 alloy improved to the point that the bulk metallic glass was not only stronger than many structural metal alloys but had a fatigue limit more than 30 percent higher than ultra-high-strength steel and aluminum-lithium alloys.

“The important point here is that these design strategies can be universally applied to any other metallic glass systems,” Launey says. “As a result, we feel the fatigue problem in metallic glasses can be solved.”

Journal reference:

1. Maximilien E. Launey, Douglas C. Hofmann, William L. Johnson, and Robert O. Ritchie. **Solution to the problem of the poor cyclic fatigue resistance of bulk metallic glasses**. *Proceedings of the National Academy of Sciences*, 2009; DOI: 10.1073/pnas.0900740106

Adapted from materials provided by DOE/Lawrence Berkeley National Laboratory.

http://www.sciencedaily.com/releases/2009/03/090324091211.htm

Month Of Conception Linked To Birth Defects In United States

New research suggests that birth defect rates in the United States may be highest for women conceiving in the spring and summer. (Credit: iStockphoto/Amanda Rohde)

ScienceDaily (Mar. 30, 2009) — A study published in the April 2009 issue of the medical journal *Acta Pædiatrica* is the first to report that birth defect rates in the United States were highest for women conceiving in the spring and summer.

The researchers also found that this period of increase risk correlated with increased levels of pesticides in surface water across the United States.

Studying all 30.1 million births which occurred in the U.S. between 1996 and 2002, the researchers found a strong association between the increased number of birth defects in children of women whose last menstrual period occurred in April, May, June or July and elevated levels of nitrates, atrazine and other pesticides in surface water during the same months. While many of these chemicals, including the herbicide atrazine which is banned in European countries but permitted in the U.S., are suspected to be harmful to the developing embryo, this is the first study to link their increased seasonal concentration in surface water with the peak in birth defects in infants conceived in the same months.

The correlation between the month of last menstrual period and higher rates of birth defects was statistically significant for half of the 22 categories of birth defects reported in a Centers for Disease Control database from 1996 to 2002 including spina bifida, cleft lip, clubfoot and Down's syndrome.

"Elevated concentrations of pesticides and other agrochemicals in surface water during April through July coincided with significantly higher risk of birth defects in live births conceived by women whose last menstrual period began in the same months. While our study didn't prove a cause and effect link, the fact that birth defects and pesticides in surface water peak during the same four months makes us suspect that the two are related," said Paul Winchester, M.D., Indiana University School of Medicine professor of clinical pediatrics, the first author of the study.

"Birth defects, which affect about 3 out of 100 newborns in the U.S., are one of the leading causes of infant death. What we are most excited about is that if our suspicions are right and pesticides are contributing to birth defect risk, we can reverse or modify the factors that are causing these lifelong and often very serious medical problems," said Dr. Winchester, a Riley Hospital for Children neonatalogist.

Birth defects are known to be associated with risk factors such as alcohol, smoking, diabetes or advanced age. However, the researchers found that even mothers who didn't report these risk factors had higher overall birth defect rates for babies conceived from April to July.

The study relies on findings by U.S. Geological Survey, the U.S. Environmental Protection Agency and other agencies on the seasonal variations in nitrates, atrazine and other pesticides in the surface water.

"These observations by Dr. Winchester are extremely important, as they raise the question for the first time regarding the potential adverse effect of these commonly used chemicals on pregnancy outcome – the health and well-being of our children," said James Lemons, M.D., Hugh McK. Landon Professor of Pediatrics at the IU School of Medicine. Dr. Lemons is director of the section of neonatal-perinatal medicine at Riley Hospital.

Co-authors of this study, which was funded by the Division of Neonatalogy of the Department of Pediatrics of the IU School of Medicine, were Jordan Huskins, B.A., a fourth year I.U. School of Medicine student, and Jun Ying, Ph.D. of the University of Cincinnati.

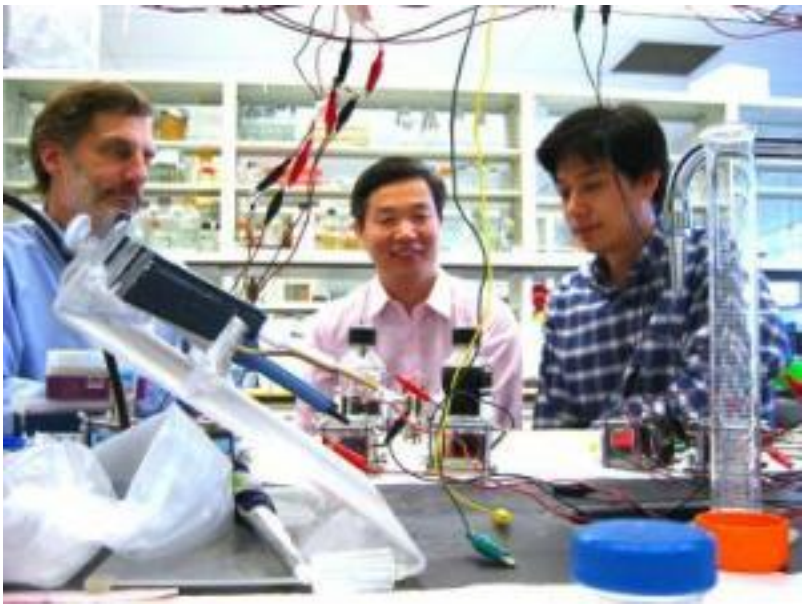
Journal reference:

1. Paul D Winchester, Jordan Huskins, Jun Ying. **Agrichemicals in surface water and birth defects in the United States**. *Acta Paediatrica*, 2009; 98 (4): 664 DOI: 10.1111/j.1651-2227.2008.01207.x

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

http://www.sciencedaily.com/releases/2009/03/090330130235.htm

New Portable Energy Source Utilizes Microbes To Turn Electricity Directly To Methane



This photo shows Bruce E. Logan, Shaoan Cheng and Defeng Xing with a microbial cell that produces methane directly from electricity. (Credit: Bruce Logan's Lab, Penn State)

ScienceDaily (Mar. 30, 2009) — A tiny microbe can take electricity and directly convert carbon dioxide and water to methane, producing a portable energy source with a potentially neutral carbon footprint, according to a team of Penn State engineers.

"We were studying making hydrogen in microbial electrolysis cells and we kept getting all this methane," said Bruce E. Logan, Kappe Professor of Environmental Engineering, Penn State. "We may now understand why."

Methanogenic microorganisms do produce methane in marshes and dumps, but scientists thought that the organisms turned hydrogen or organic materials, such as acetate, into methane. However, the researchers found, while trying to produce hydrogen in microbial electrolysis cells, that their cells produced much more methane than expected.

"All the methane generation going on in nature that we have assumed is going through hydrogen may not be," said Logan. "We actually find very little hydrogen in the gas phase in nature. Perhaps where we assumed hydrogen is being made, it is not."

Microbial electrolysis cells do require an electrical voltage to be added to the voltage that is produced by bacteria using organic materials to produce current that evolves into hydrogen. The researchers found that the Archaea, using about the same electrical input, could use the current to convert carbon dioxide and water to methane without any organic material, bacteria or hydrogen usually found in microbial electrolysis cells.

"We have a microbe that is self perpetuating that can accept electrons directly, and use them to create methane," said Logan.

Logan, working with Shaoan Cheng, senior research associate; Defeng Xing, post doctoral researcher, and Douglas F. Call, graduate student, environmental engineering, confirmed that the microscopic organisms produced the methane. The researchers created a two-chambered cell with an anode immersed in water on one side of the chamber and a cathode in water, inorganic nutrients and carbon dioxide on the

other side of the chamber. They applied a voltage, but recorded only a minute current. The researchers then coated the cathode with the biofilm of Archaea and not only did current flow in the circuit, but the cell produced methane.

"The only way to get current at the voltage we used was if the microbes were directly accepting electrons," said Logan. He notes that the electrochemical reaction takes place without any precious metal catalysts and at a lower energy level than converting carbon dioxide to methane using conventional, non-biological methods.

The cells are about 80 percent efficient in converting electricity to methane and because they use carbon dioxide as feed stock, would be carbon neutral if the electricity comes from a non-carbon source such as solar or wind power.

"The process does not sequester carbon, but it does turn carbon dioxide into fuel," said Logan. "If the methane is burned and carbon dioxide captured, then the process can be carbon neutral."

Logan suggests the method for off peak capture of renewable energy in a portable fuel. Methane is preferred over hydrogen because a large portion of the U.S. infrastructure is already set up to easily transport and deliver methane.

These findings are reported in this week's issue of *Environmental Science and Technology.* The National Science Foundation and Air Products and Chemicals, Inc. supported this project.

Journal reference:

1. Shaoan Cheng, Defeng Xing, Douglas F. Call and Bruce E. Logan. **Direct Biological Conversion of Electrical Current into Methane by Electromethanogenesis**. *Environ. Sci. Technol.*, 2009 [link]

Adapted from materials provided by Penn State.

http://www.sciencedaily.com/releases/2009/03/090330111257.htm

Simple Finger Device May Help Predict Heart Attacks

ScienceDaily (Mar. 30, 2009) — Results of a Mayo Clinic study show that a simple, noninvasive finger sensor test is "highly predictive" of a major cardiac event, such as a heart attack or stroke, for people who are considered at low or moderate risk, according to researchers.

The noninvasive finger test device, called the EndoPAT by Itamar Medical, measures the health of endothelial cells by measuring blood flow. Endothelial cells line the blood vessels and regulate normal blood flow. Research has shown that if the cells don't function properly - a condition called endothelial dysfunction - it can set the stage for atherosclerosis (hardening of the arteries) and lead to major cardiovascular health problems. Previously, there was no simple test for endothelium function, says Amir Lerman, M.D., a cardiologist at Mayo Clinic and the senior author of the study.

Forty-nine percent of patients whose EndoPAT test indicated poor endothelial function had a cardiac event during the seven-year study. Researchers at Mayo Clinic and Tufts-New England Medical Center in Boston used the device to test 270 patients between the ages of 42 and 66 and followed their progress from August 1999 to August 2007. These patients already knew that they had low-to-medium risk of experiencing a major heart event, based on their Framingham Risk Score. The score is the commonly used risk predictor and was developed from the Framingham Heart Study, a longitudinal study of heart disease.

Some of their risk factors included high blood pressure, high cholesterol, obesity and a family history of heart disease, Dr. Lerman says. "The results of the study may help identify a discriminating tool beyond the Framingham Risk Score," he says. "And the results of these individual tests may help physicians change a patient's medications or recommend other therapies, so they don't have a heart attack or stroke later on."

The test may be used in an individualized medicine model of risk assessment of the patients, Dr. Lerman says.

EndoPAT, which received U.S. Food and Drug Administration approval in 2003, consists of digital recording equipment and two finger probes that look like large thimbles. For the test, which takes 15 minutes, probes are placed on each index finger and hooked up to a small machine to measure blood flow. A standard blood pressure cuff is placed on one arm; the arm without the cuff is the control. A reading of the fingers' blood flow rate begins, and then the blood pressure cuff on one arm is inflated for a few minutes and then deflated, allowing for three timed readings.

The role of the inflated blood pressure cuff is to occlude and then release blood flow to assess reactive hyperemia (RH), the normal blood flow response that occurs when occlusion is released. In the study, 49 percent of the patients who went on to have a cardiac event had a low RH score.

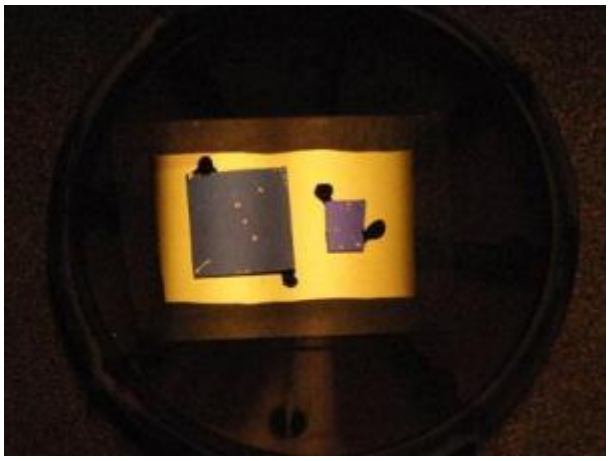
A low RH signal - indicating a lower blood flow response - is consistent with endothelial dysfunction and potentially impaired vascular health that may lead to or serve as a marker for future events, Dr. Lerman says.

The study will be presented March 31, 2009 at the American College of Cardiology Annual Scientific Session in Orlando (0917-7).

Adapted from materials provided by Mayo Clinic.

http://www.sciencedaily.com/releases/2009/03/090326134026.htm

New Material Could Lead To Faster Chips: Graphene May Solve Communications Speed Limit



The graphene microchip. (Credit: Photo / Donna Coveney)

ScienceDaily (Mar. 30, 2009) — New research findings at MIT could lead to microchips that operate at much higher speeds than is possible with today's standard silicon chips, leading to cell phones and other communications systems that can transmit data much faster.

The key to the superfast chips is the use of a material called graphene, a form of pure carbon that was first identified in 2004. Researchers at other institutions have already used the one-atom-thick layer of carbon atoms to make prototype transistors and other simple devices, but the latest MIT results could open up a range of new applications.

The MIT researchers built an experimental graphene chip known as a frequency multiplier, meaning it is capable of taking an incoming electrical signal of a certain frequency — for example, the clock speed that determines how fast a computer chip can carry out its computations — and producing an output signal that is a multiple of that frequency. In this case, the MIT graphene chip can double the frequency of an electromagnetic signal.

Frequency multipliers are widely used in radio communications and other applications. But existing systems require multiple components, produce "noisy" signals that require filtering and consume large power, whereas the new graphene system has just a single transistor and produces, in a highly efficient manner, a clean output that needs no filtering.

The findings are being reported in a paper in the May issue of Electron Device Letters and were also reported last week at the American Physical Society meeting by Tomás Palacios, assistant professor in MIT's Department of Electrical Engineering and Computer Science and a core member of the Microsystems Technology Laboratories. The work was done by Palacios along with EECS Assistant Professor Jing Kong and two of their students, Han Wang and Daniel Nezich.

"In electronics, we're always trying to increase the frequency," Palacios says, in order to make "faster and faster computers" and cellphones that can send data at higher rates, for example. "It's very difficult to generate high frequencies above 4 or 5 gigahertz," he says, but the new graphene technology could lead to practical systems in the 500 to 1,000 gigahertz range.

"Researchers have been trying to find uses for this material since its discovery in 2004," he says. "I believe this application will have tremendous implications in high-frequency communications and electronics." By running several of the frequency-doubling chips in series, it should be possible to attain frequencies many times higher than are now feasible.

While the work is still at the laboratory stage, Palacios says, because it is mostly based on relatively standard chip processing technology he thinks developing it to a stage that could become a commercial product "may take a year of work, maximum two." This project is currently being partially funded by the MIT Institute for Soldier Nanotechnology and by the Interconnect Focus Center program, and it has already attracted the interest of "many other offices in the federal government and major chip-making companies," according to Palacios.

Graphene is related to the better-known buckyballs and carbon nanotubes, which also are made of one-atom-thick sheets of carbon. But in those materials, the carbon sheets are rolled up in the form of a tube or a ball. While physicists had long speculated that flat sheets of the material should be theoretically possible, some had doubted that it could ever remain stable in the real world.

"In physics today, graphene is, arguably, the most exciting topic," Palacios says. It is the strongest material ever discovered, and also has a number of unsurpassed electrical properties, such as "mobility" — the ease with which electrons can start moving in the material, key to use in electronics — which is 100 times that of silicon, the standard material of computer chips.

One key factor in enabling widespread use of graphene will be perfecting methods for making the material in sufficient quantity. The material was first identified, and most of the early work was based on, using "sticky tape technology," Palacios explains. That involves taking a block of graphite, pressing a piece of sticky tape against it, peeling it off and then applying the tape to a wafer of silicon or other material.

But Kong has been developing a method for growing entire wafers of graphene directly, which could make the material practical for electronics. Kong and Palacios' groups are currently working to transfer the frequency multipliers to these new graphene wafers.

"Graphene will play a key role in future of electronics," Palacios says. "We just need to identify the right devices to take full advantage of its outstanding properties. Frequency multipliers could be one of these devices."

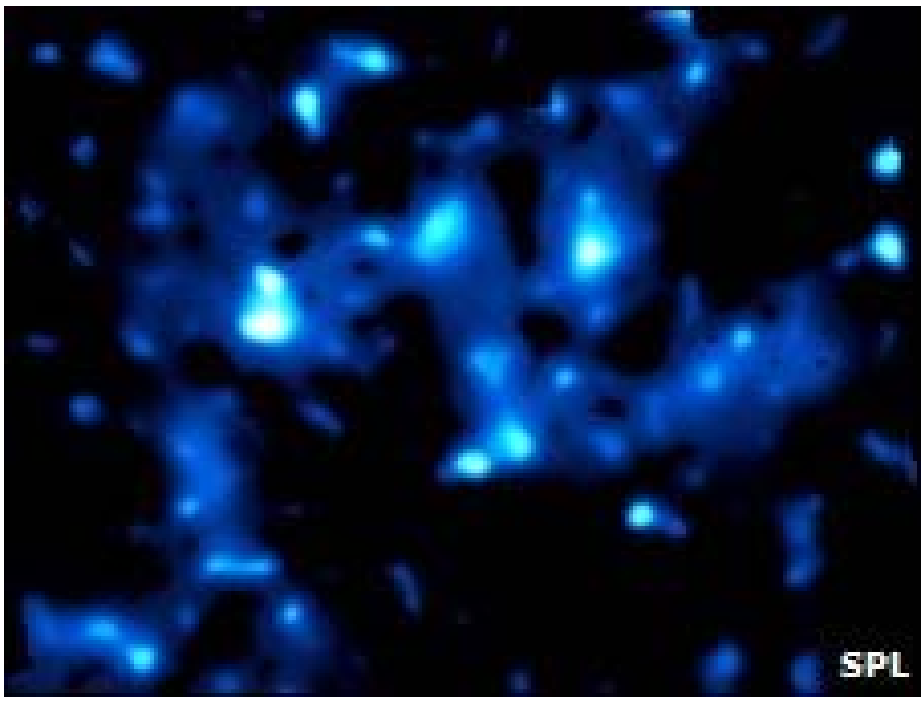
Adapted from materials provided by Massachusetts Institute of Technology.

http://www.sciencedaily.com/releases/2009/03/090324081443.htm

Signals could be from dark matter

By Victoria Gill
Science reporter, BBC News

Scientists have detected particles that may come from invisible "dark matter".



This is thought to make up 23% of the Universe, but can only be detected through its effects on "normal" matter.

Writing in the journal Nature, scientists relate how a satellite-borne instrument found an unexplained source of positrons in space.

But the researchers say their mysterious signal must be further investigated before they will know if they have "discovered dark matter".

The space-based experiment, known as Pamela, was launched in June 2006, and carries instruments designed to investigate dark matter particles.

" **Many leading theoreticians think this signal must come from dark matter** "
Piergiorgio Picozza

It detected an "excess" of positrons in an area where the scientists expected to see far fewer.

The instrument that recorded this signal was measuring the ratio of positrons - the anti-particles of electrons that have a positive rather than a negative charge - to electrons.

It found a relatively high ratio of positrons within a "high energy level".

"The ratio [of positrons to electrons] should decrease with increasing energy," said Piergiorgio Picozza, a professor at the University of Rome Tor Vergata, Italy, and one of the authors of the research.

"But we found that, at one particular energy range, it increases, and that's not what we expected."

Spinning stars

"Since we know a lot about the background sources of positrons and electrons, we know what fraction we would expect to see at this particular energy level," explained Nigel Smith, who carries out research into dark matter at the UK's Rutherford Appleton Laboratory but was not involved in this research.

THE PAMELA MISSION
Pamela stands for: Payload for Antimatter Matter Exploration and Light-nuclei Astrophysics
The satellite carries instruments to identify particles and anti-particles
It is expected to orbit the Earth for a minimum of three years

"It's like light; when you see different colours, you're looking at photons - light particles - with different energies."

However, there could be another explanation for the positrons. They may come from pulsars - rapidly rotating, super-dense, dead stars that release lots of energy into the cosmos.

Nasa's Fermi Gamma-ray Space Telescope, which was launched in June 2008, is already taking measurements from pulsars and should produce data that could clarify the mysterious signal.

Professor Smith thinks pulsars provide the most likely explanation.

"It's the simplest solution," he said. "I think everyone will be waiting for the Fermi data to come in."

Professor Picozza agrees that pulsars offer a plausible, if less exciting, origin.

"Many leading theoreticians think this signal must come from dark matter," he continued.

"But I don't think this data alone is enough to claim that discovery. What we have found is another primary source of positrons."

He believes that the particles thought to constitute dark matter could be reproduced in the Large Hadron Collider (LHC) in Switzerland.

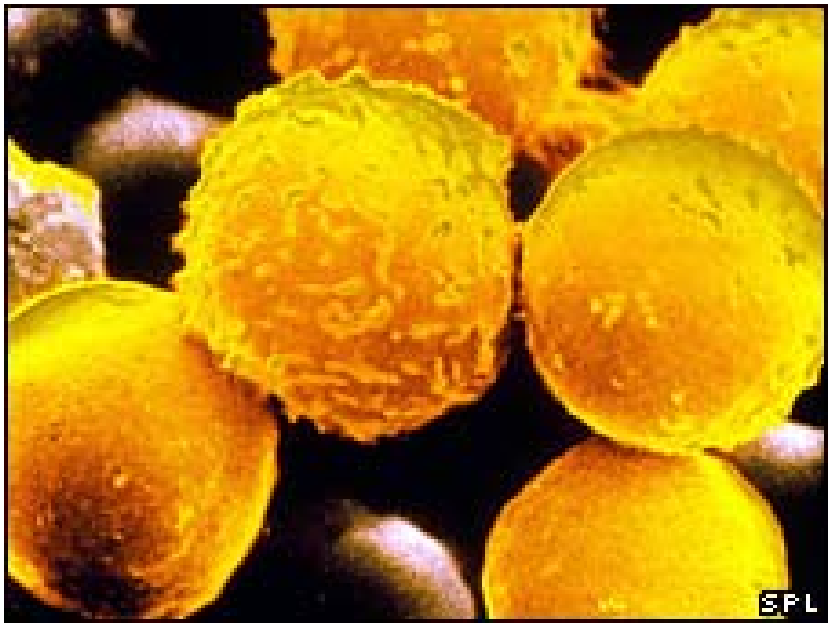
If, he said, this new signal does not match the data collected from pulsars, and if experiments in the LHC back-up the dark matter theoreticians, "then we could then say we have discovered dark matter".

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/7977102.stm

Published: 2009/04/01 17:47:39 GMT

How infection may spark leukaemia

Scientists have shown how common infections might trigger childhood leukaemia.



They have identified a molecule, TGF, produced by the body in response to infection that stimulates development of the disease.

It triggers multiplication of pre-cancerous stem cells at the expense of healthy counterparts.

The Institute of Cancer Research study appears in the Journal of Clinical Investigation.

" **While infection is clearly only one factor in triggering progression, this study greatly increases the strength of evidence for its role in the commonest form of childhood leukaemia** "
Dr Shabih Syed Leukaemia Research

Leukaemia occurs when large numbers of white blood cells take over the bone marrow, leaving the body unable to produce enough normal blood cells.

The researchers had already identified a genetic mutation - a fusion of two genes - occurring in the womb that creates pre-leukaemic cells.

These cells then grow in the bone marrow, effectively acting as a silent time bomb that can stay in the body for up to 15 years.

Evidence suggests the mutation may be present in as many as one in 100 newborn babies, but only about one in 100 of these children then go on to develop leukaemia.

This suggests that the cells will only complete the transformation to fully-fledged cancer cells if they exposed to an independent trigger.

The latest study suggests production of TGF in response to an infection could be that trigger.

Because the molecule hugely increases the rate at which the pre-leukaemic cells multiply, this significantly raises the the chance that some will become even further damaged in a way that results in the child developing leukaemia.

Preventative measures

Researcher Professor Mel Greaves said: "Identifying this step means we can determine how an unusual immune response to infection may trigger the development of the full leukaemia and eventually perhaps develop preventative measures such as a vaccine."

Dr Shabih Syed, scientific director at the charity Leukaemia Research, said: "Before this study, there had been only circumstantial evidence to implicate infections in the progression from a child carrying pre-leukaemic cells to actually having leukaemia.

"There was no evidence of the mechanism by which this might happen.

"While infection is clearly only one factor in triggering progression, this study greatly increases the strength of evidence for its role in the commonest form of childhood leukaemia."

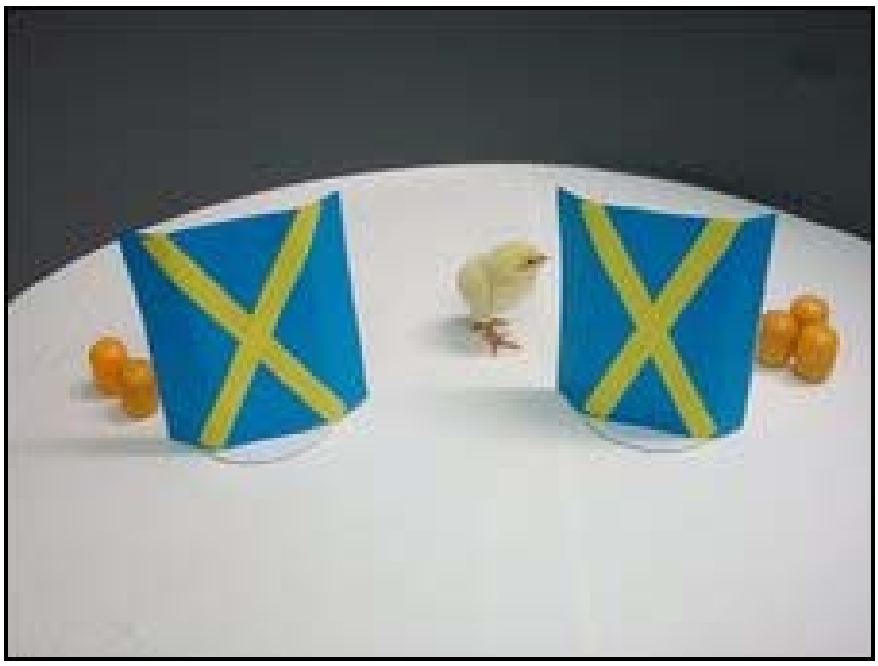
Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7973678.stm

Published: 2009/04/01 07:03:39 GMT

Baby chicks do basic arithmetic

By Victoria Gill
Science reporter, BBC News

Baby birds can do arithmetic, say researchers in Italy.



Scientists from the universities of Padova and Trento demonstrated chicks' ability to add and subtract objects as they were moved behind two screens.

Lucia Regolin, an author of the study said the animals "performed basic arithmetic" to work out which screen concealed the larger group of objects.

The findings are reported in the journal Proceedings of the Royal Society B.

Chicks always try to stay close to objects they are reared with - just as they stay close to and follow their mother as soon as they hatch. This instant recognition is known as "imprinting".

"We had already found that the chicks have a tendency to approach a group containing more of these familiar objects," explained Professor Regolin, who studies animal behaviour at the University of Padova.

She and her team were able to test the birds' numerical skills as they followed the objects - which, in this instance, were small plastic balls.

"We used the little plastic containers you get inside Kinder eggs and suspended them from fishing line," Professor Regolin told BBC News. "We made these balls 'disappear' by moving them behind the screens one at a time."

Counting chickens

In each of the mini maths tests, a chick watched from a clear-fronted holding box while one of the researchers slowly moved the balls behind the screens - three behind one screen and two behind the other.

The front door of the box was then opened, releasing the chick into the tiny arena, so it could walk around and select a screen to look behind.

" **They chose correctly - adding up the numbers based on groups of objects they couldn't see at that moment** "
Lucia Regolin University of Padova

"The chicks still approached the larger of the two groups first, even though they had to rely on memory to work out which screen to choose," said Professor Regolin.

Swapping the objects from one screen to another didn't fool the maths-performing chicks.

"In a further experiment, once we had hidden the balls behind each screen, we transferred some of them from one to the other," Professor Regolin explained.

The birds, she said, were able to "count" the balls that were moved to work out which screen hid the larger set at the end of the transfer.

"They still chose correctly - adding up the numbers based on groups of objects they couldn't see at that moment."

It is already known that many non-human primates and monkeys can count, and even domestic dogs have been found to be capable of simple additions.

But this is the first time the ability has been seen in such young animals, and with no prior training.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/7975260.stm

Published: 2009/04/01 09:03:54 GMT

Thin speaker offers 'crisp sound'

Anyone who has struggled to understand speaker announcements at train stations will be heartened by work initially done at Warwick University in the UK.

Engineers claim their new ultra-thin speakers, as well as looking good and being easy to conceal, will also deliver clearer, crisper sound. The loudspeakers could replace public address systems in passenger terminals and shopping centres.

They could also be used as speaking posters to deliver adverts. The system, dubbed flat, flexible loudspeaker (FFL), started life as a piece of tin foil and some baking paper.

These materials were first used to produce sound by Warwick University professor Dr Duncan Billson.

It provided proof of concept and since then the system has developed into a complex set of flexible laminates made up of different conducting and insulating polymers.

Traditional speakers work by converting an electric signal into sound. What makes the FFL different from existing speakers is that when stimulated by an electrical signal it moves air as a bulk mass rather than from a point source.

This means sound is more evenly distributed around a room without the blasting effect of traditional systems. Steve Couchman, the chief executive of Warwick Audio Technology, the spin-off firm created to sell the speakers, said: "We believe this is a truly innovative technology. Its size and flexibility means it can be used in all sorts of areas where space is at a premium."

The speakers could be concealed inside ceiling tiles in the home, printed with a design and hung on the wall like a picture or even wrapped around a lampshade.

He said the firm had had interest in the speakers from audio-visual companies for use in digital signage.

Car manufacturers are also interested in the speakers because they allow sound to be directed which means, for example, music could be heard in the back of the car but not the front.

But the design could make the speakers particularly useful for PA systems, said Mr Couchman.

"The sound produced by FFLs can be directed straight at its intended audience. The sound, volume and quality does not deteriorate as it does in conventional speakers which means that public announcements in passenger terminals could be clearer, crisper and easier to hear."

The firm hopes to launch its first commercial product later this year.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/technology/7976991.stm

Published: 2009/04/01 13:42:43 GMT

Stem cell 'deafness cure' closer

Stem cells that could be used to restore hearing have been successfully created, scientists have said.

A Sheffield University team took stem cells from embryos and converted them into cells that behave like sensory hair cells in the human inner ear.

Their discovery could ultimately help those who have lost hair cells through noise damage and some people born with inherited hearing problems.

But any cure is still some years away, experts told the journal Stem Cell.

The Sheffield team is now working on the next stage of the research to check if the cells can restore hearing.

" **This research is incredibly promising and opens up exciting possibilities** "
Dr Ralph Holme, RNID

Currently, hair cell damage is irreversible and causes hearing problems in some 10% of people worldwide.

Embryonic stem cells could change this because they have the unique ability to become any kind of human cell.

Not only could they be used to replace the lost hair cells, but also any damaged nerve cells along which the signals generated by the hair cells are transmitted to the brain.

But the use of stem cells is controversial - opponents object on the grounds that it is unethical to destroy embryos in the name of science.

Lead researcher Dr Marcelo Rivolta, said: "The potential of stem cells is very exciting. We have now an experimental system to study genes and drugs in a human context.

"Moreover, these cells would help us to develop the technologies needed to deliver them into damaged tissues, such as the cochlea, in order to restore the different cell types.

" **Is this the ultimate upgrade for the iPod generation?** "
Professor David McAlpine Ear Institute

"This should facilitate the development of a stem cell treatment for deafness."

Dr Ralph Holme, director of biomedical research at RNID, said: "Stem cell therapy for hearing loss is still some years away but this research is incredibly promising and opens up exciting possibilities by bringing us closer to restoring hearing in the future."

Vivienne Michael of Deafness Research UK said: "This study highlights the importance of stem cell research.

"In addition to the future potential for restoring hearing with stem cell therapy, the recent research success means that we may now have better ways to test the efficacy and toxicity of new drugs on auditory cells."

Professor David McAlpine, director of the Ear Institute, University College London, said: "Is this the ultimate upgrade for the iPod generation?

"The possibility of regenerating the sensory cells of the inner ear, so easily damaged by exposure to loud sound, has just moved a step closer.

"If scientists can find out ways to deliver new cells to the inner ear, and wire them up correctly, then "plug and play" hearing could be the future."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7974795.stm

Published: 2009/04/01 23:58:30 GMT

Sisters 'make people happy'

Sisters spread happiness while brothers breed distress, experts believe.

Researchers quizzed 571 people aged 17 to 25 about their lives and found those who grew up with sisters were more likely to be happy and balanced.

The University of Ulster said having daughters made a family more open and willing to discuss feelings.

They said the influence of girls was particularly important after distressing family events such as marital break-ups.

The findings are due to be presented at the British Psychological Society in Brighton on Thursday.

During the study, participants filled in psychological questionnaires which researchers used to assess a range of issues, including whether they had a positive outlook and any mental health problems.

" **Emotional expression is fundamental to good psychological health and having sisters promotes this in families** "
Professor Tony Cassidy, lead researcher

Lead researcher Professor Tony Cassidy said: "Sisters appear to encourage more open communication and cohesion in families.

"However, brothers seemed to have the alternative effect.

"Emotional expression is fundamental to good psychological health and having sisters promotes this in families." He said many of the participants had been brought up in families where parents had split and the impact of sisters was even more marked in these circumstances.

"I think these findings could be used by people offering support to families and children during distressing times. HAVE YOUR SAY I have a sister and am neither happy or balanced Richard Hill, Birmingham "We may have to think carefully about the way we deal with families with lots of boys."

Geri Burnikell, co-ordinator of the charity Support Line, which offers counselling to young people and families, said: "This is very interesting and certainly chimes with our experiences.

"Boys tend to internalise problems and in families where there are lots of sons, I can see that can cause problems. "I think the most important thing in these circumstances is to give people someone independent to talk to outside the immediate family unit."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7977454.stm

Published: 2009/04/02 00:03:33 GMT

How song, dance and movies bailed us out of the Depression
Popular culture provided the optimism and energy that helped the country get moving. We may need that again.
By Morris Dickstein

April 1, 2009

Many were surprised that the final stimulus legislation signed by President Obama preserved a $50-million increase in arts funding that had been the subject of a heated battle in Congress. Though it amounted to only a tiny fraction of the measure's total cost, it had become the target of conservatives, many of whom consider the arts frivolous, elitist and, frankly, left-wing. They showed their disdain in February when they pushed for -- and passed -- a Senate amendment ruling out stimulus funds for museums, arts centers and theaters.

That shortsighted decision was reversed at the last moment, after supporters made a good case that the arts are often the linchpin of downtown neighborhoods, creating jobs and providing many other economic benefits: stimulating business, promoting urban renewal and attracting tourists.

But was that really the point? Is that really why we need the arts? These days, it seems that every discussion of the economic situation includes the obligatory comparison to the prolonged crisis of the 1930s, yet what the Depression and the New Deal actually showed is that the value of the arts goes well beyond job creation and economic stimulus.

Studies of the 1930s have shown how the economic meltdown was accompanied by psychological depression: loss of morale, a sense of despair, grave fears for the future. Going to the movies or listening to the radio could not solve these problems, but they could ease them in the same way that President Franklin D. Roosevelt's intimate fireside chats boosted morale and restored confidence.

The most durable cliche about the arts in the 1930s is that despite the surge of social consciousness among writers, photographers and painters (some of it supported by federal dollars), the arts offered Depression audiences little more than fluffy escapism, which was just what they needed.

But that's not the whole story. It's certainly a paradox that dire economic times produced such a fizzy, buoyant popular culture. From the warring couples of screwball comedy and the magical dancing of Fred Astaire and Ginger Rogers to the sophisticated music and lyrics of Cole Porter, Rodgers and Hart, and the Gershwins, the '30s generated mass entertainment legendary for its wit, elegance and style. This culture had its roots in the devil-may-care world of the 1920s, but it took on new meaning as the Depression deepened.

The engine of the arts in the '30s was not escapism, as we sometimes imagine, but speed, energy and movement at a time of economic stagnation and social malaise. When Warner Bros. -- which avoided bankruptcy with its lively and topical gangster films, backstage musicals and Depression melodramas -- promised a "New Deal in Entertainment," it was offering the cultural equivalent of the New Deal, a psychological stimulus package that might energize a shaken public.

With his roots in the ethnic slums, the gangster was a dynamic figure who somehow mastered his own fate even as he trampled on other people's lives. Busby Berkeley's showgirls were at the center of glittering fables of success and failure, wondrous changes in fortunes that resonated for '30s audiences. Against all odds, the performers came together into a working community; so did the stricken victims in topical melodramas right up through "The Grapes of Wrath," who discovered that they were helpless on their own but had a chance if they banded together and helped one another.

If we look at the arts as a life-giving form of social therapy, many other fads and fashions of the 1930s fall into place. The thrust of the culture, like the aims of the New Deal, was to get the country moving again. At cross-purposes in conversation, Astaire and Rogers seem perfectly ill-matched. Endlessly

bickering with each other, they can agree on nothing. But once they dance, a swirling poetry of movement takes over.

The public also loved comedies about the very rich. Everyone could feel superior to their silliness, the weightlessness of their lives, yet live vicariously through their energy, irresponsibility and freedom, the snap of their delicious dialogue. Meanwhile, musical standards created a seductive dreamland, somewhere "over the rainbow," a better world where cloudy skies and rainy days somehow promised "pennies from heaven."

The propulsive swing music of the big bands, produced by performers and band leaders such as Duke Ellington, Artie Shaw and Benny Goodman, brought jazz to a mass audience for the first time -- jazz to dance to, not simply to listen to. It filled the airwaves, ballrooms, nightclubs, even concert halls.

The visual equivalent of swing music was Art Deco. Gifted designers such as Raymond Loewy, Donald Deskey, Walter Dorwin Teague and Norman Bel Geddes stimulated consumption by putting a fluid sense of movement into everything from locomotives to table radios, projecting the consumer into a streamlined future otherwise hard to imagine. This culminated in the design of the 1939 New York World's Fair, with its flowing crowds and futuristic visions of "The World of Tomorrow."

Today's economic and cultural climate is still a long way from the Depression, which was already in its fourth year when FDR kicked off the New Deal. A quarter of the workforce was unemployed. The stock market had crashed, and the banking system had failed. Yet there are eerie resemblances, especially in the crisis of confidence that froze credit markets and blasted consumer spending almost overnight in mid-September of last year.

There is little sign so far of how the arts will respond to the damage done to our confidence and morale this time around. But moviegoing has already increased by almost 16% this year. We know from the 1930s that the stimulating effect of art and entertainment comes not only in the jobs produced but in the emotional links with the public that absorbs this work and takes it to heart.

The arts can be a lifeline as well as a pleasant diversion, a source of optimism and energy as well as peerless insight, especially when so many people are stymied or perplexed by the unexpected changes in their world. As our troubles worsen, as stress morphs into anxiety and depression, we may desperately need the mixture of the real and the fantastic, the sober and the silly, that only the arts can bring us.

Morris Dickstein teaches literature and film at the CUNY Graduate Center in New York. His new book, "Dancing in the Dark: A Cultural History of the Great Depression," will be published in September.

http://www.latimes.com/news/opinion/commentary/la-oe-dickstein1-2009apr01,0,7168938.story

Study: Treatment for HIV Should Start Earlier

By Alice Park

There's a mantra in AIDS treatment that every physician in the field knows by heart: When it comes to HIV, hit early and hit hard.

The idea, first put forth by leading AIDS researcher Dr. David Ho of the Aaron Diamond AIDS Research Center more than a decade go, is to blitz the virus in its first days of infecting a new human host, before it can establish a beachhead and launch a full-scale AIDS attack. And so far, the strategy seems to be working. Early treatment of newly infected patients has significantly reduced the death rate from AIDS in regions of the world where antiretroviral therapies (ART) are readily available. (Read about the surge in HIV/AIDS in Washington, D.C.)

The problem is that nobody, including the experts, knows how early is early enough. And now the largest study to date attempting to answer that question suggests that initiating anti-HIV therapy far earlier than current guidelines recommend could save more lives. The findings are setting off a lively debate in the AIDS community about whether those guidelines should be changed — and how soon.

Dr. Mari Kitahata, at the University of Washington, reports in the *New England Journal of Medicine* that HIV-positive patients enrolled in a nine-year study reduced their risk of dying as much as 94% by the trial's end if they began ART earlier, compared with patients who deferred treatment. "Our study adds to the weight of evidence accumulating that the balance between the potential benefit in survival of initiating therapy earlier outweighs the potential deleterious effects," says Kitahata, referring to concerns over the drugs' toxicity and possible long-term side effects.

Kitahata studied more than 17,000 HIV-positive patients who were being treated by physicians from 22 different research groups in 60 cities in North America between 1996 and 2005. She and her team essentially conducted two trials. In one, the scientists looked at patients who chose to initiate ART when their level of CD4 cells — infection-fighting immune cells that HIV uses to replicate and then systematically destroys — ranged between 351 and 500 cells per cubic mm of blood. These patients were compared with those who decided to defer therapy until their counts dipped below 350 cells per cubic mm, the level at which current guidelines recommend starting drug treatment.

In the second study, Kitahata's team looked at patients who chose to start ART when their CD4 count was 500 or above and compared them with patients who decided to defer treatment until their CD4 counts

dropped below 500 cells. (In a normal, healthy adult, CD4 levels range from 600 to 1,200.) In both studies, the patients deferring treatment were more likely to have died by the 2005 end of the study than were their earlier-treated cohorts. HIV-positive patients beginning therapy at CD4 levels between 351 and 500 cells were 69% more likely to be alive at the end of the nine-year study, while those initiating drug treatment at CD4 counts of 500 or more were 94% more likely to have survived.

"I have a particularly strong view about this," says Ho about the early treatment of HIV, "so these results are what I would expect. You have a virus that is churning away actively, constantly destroying important immune cells, so how can it be good to let that go on unchecked by delaying therapy?" </P

Ho is not the only expert impressed with the results. "This is a very good study that at least suggests strongly that there is a benefit to starting treatment early," says Dr. Anthony Fauci, director of the National Institute on Allergy and Infectious Diseases. But is it enough to change the current guidelines for when HIV-positive patients should start ART? "That is a question of debate now in the scientific and public-health community," he says.

In fact, when the potent ART combination therapy first emerged in the mid-1990s, government health officials recommended that anyone with a CD4 count of 500 cells or lower receive treatment. But in response to growing concerns over HIV's increasing ability to become resistant to the drugs, as well as worries over the drugs' toxicity and patients' inconsistent compliance with their regimen, the guidelines dropped to 200 before eventually settling at 350 cells — much further along in the progression of the disease.

None of these guidelines have been supported by the gold standard of medical evidence, the randomized controlled trial. And as convincing and as large as the current study is, Fauci notes that it too lacks this scientific imprimatur. In Kitahata's study, researchers followed patients as they and their doctors made their own decisions about when they would begin drug therapy. Those who chose to start early — before their CD4 counts reached 350 cells or 500 cells, for instance — may have simply been more health-conscious overall and therefore less likely to die, which could have confounded the study's results. Only a randomized and controlled trial in which patients are arbitrarily assigned either to initiate or defer therapy could determine any real benefit of early treatment.

Still, Fauci acknowledges that the sheer size of Kitahata's study gives its findings some weight. She presented the preliminary data to a government panel on HIV-treatment guidelines in February, and the results have since gotten HIV experts talking about whether waiting to begin treatment until the current threshold of 350 cells is reached is too late to improve HIV patients' survival.

Answering that question won't be easy. While there are clear benefits to starting anti-HIV medicines early in the progression of the disease, the drugs are not without side effects. Some studies have noted increased risk of certain cancers as well as toxic effects to the brain and other organs over the long term. "The real critical issue that everyone is struggling with is, What about the potential long-term deleterious effects of ART that might override the beneficial effects?" says Fauci.

While the medications currently prescribed are already much safer in the short term than the ones commonly used during the study period, their long-term effects on health are still unknown, since they simply haven't been circulating long enough for any damaging side effects to have surfaced. But, Ho notes, "I always felt the side effects of HIV are greater than the side effects of the drugs." After all, he says, "the side effect of unchecked HIV is death."

http://www.time.com/time/health/article/0,8599,1889251,00.html

Museum Is to Show the Human Side of a Cartoon Titan

By BROOKS BARNES

LOS ANGELES — The heirs of Walt Disney, angered by negative portrayals of him over the years, are preparing to unveil their response: a $112 million museum focused on his happy home life and artistic achievements.

The Walt Disney Family Museum, to be run by the former deputy director of the Harvard University Art Museums, Richard Benefield, will open in October in San Francisco. On Wednesday the institution will introduce its exhibition plans and holdings, which range from personal items (home movies never shown before) to "Steamboat Willie" animation cels.

"It all started with a nasty book and my frustration with how reporters all around the world picked it up," said Diane Disney Miller in an interview. Mrs. Miller, Disney's sole surviving child, was referring to "Walt Disney: Hollywood's Dark Prince," a 1994 biography by Marc Eliot that depicted him as a bigot. Mrs. Miller, 75, said she was also dismayed by "Walt Disney: The Triumph of the American Imagination," a 2006 biography by Neal Gabler that included an unflattering look at his marriage. Unlike Mr. Eliot's book, which has been dismissed by some historians, Mr. Gabler's work benefited from full cooperation with the family and the Walt Disney Company.

Speaking of the company, Mrs. Miller hasn't been especially thrilled with aspects of its stewardship, either. "They try, but there is nobody there anymore who actually knew him," she said. Disney the man, she frets, has gotten lost as his empire pushes its brand across the globe.

"My kids have literally encountered people who didn't know that my father was a person," said Mrs. Miller, who has seven children with her husband, Ronald. "They think he's just some kind of corporate logo."

Thus the museum. Financed by the family's foundation and the sale of bonds, it aims to refocus attention on the man behind the myth by telling his life story, from humble beginnings in rural Missouri to a stint driving an ambulance in World War I to his fascination with utopian ideas. The work, of course, is also there, including an exhibit on the making of "Snow White and the Seven Dwarfs," Hollywood's first feature-length animated film, including the actual Academy Awards it received, a full-size Oscar and seven tiny ones.

"I'm really glad the family is doing this," said Steven D. Lavine, president of the California Institute of the Arts, of which Walt Disney and his brother, Roy, were co-founders. "People who want to take pot shots at pop culture often focus on him, and the depth and profundity of his work can really get missed as a result."

The museum will be located in three historic buildings in the Presidio of San Francisco, picked for its proximity to Mrs. Miller's home and because it would stand out, far from the corporate headquarters in Southern California. Exhibits will be organized in chronological order and feature 215 video monitors. There will also be a 120-seat screening space, a store and a cafe.

Because of its relatively constricted size, the museum will admit a maximum of 60 people every 15 minutes. That allows for an annual attendance of 517,000, though Mr. Benefield said he was aiming for 350,000. Tickets will be timed, so drop-ins may not be immediately accommodated.

Museums designed to burnish reputations rarely succeed, except in the minds of the organizers. Often sneered at as vanity projects, they typically steer so clear of anything controversial or unflattering that the public grows suspicious of the positive parts of the story.

Mr. Benefield said he had a blunt conversation with Mrs. Miller and her son Walt before taking the job. "There has to be academic integrity and scholarship of the highest order, or I really don't want to be involved," he recalled telling Mrs. Miller.

"I told her there are things that you might not want to hear about your father, but we don't want to ignore them," Mr. Benefield continued. "Putting out the whole story will be very meaningful. It will debunk some of these wild myths, like that he was frozen when he died. Totally untrue."

(Disney, who died in 1966 at 65 from complications from lung cancer, was cremated; his burial site is in the Forest Lawn cemetery in Glendale, Calif.)

So the museum will include, for example, a video about Disney's friendly testimony before the House Un-American Activities Committee in 1947 and will pay attention to the bitter animators' strike against him in 1941.

Starting the museum has been difficult. Disney did not decorate his home with animation art, so the vast majority of his work is owned by the company. Mrs. Miller had to buy what she could and is relying on lent material as well. The company is sending scores of items, including a rare multiplane camera that was developed to create a three-dimensional effect for "Snow White."

Further complicating matters, Disney owns its founder's name and image. "We have to run most everything by the company to make sure it's happy with it," Mr. Benefield said.

Disney executives declined to comment. They are probably puzzled by Mrs. Miller's concerns, given the attention the company gives her father. Disney releases DVDs called "Walt Disney Treasures" that feature his television appearances and operates a museum-style attraction about his life at Walt Disney World. The company recently issued collectible figurines in his likeness and runs a fan club and magazine dedicated to him; part of its California Adventure Park is being rebuilt to reflect Disney's early days in the state.

The company has thrived by controlling its characters, whether Mickey Mouse or Walt Disney himself. But Mrs. Miller may set the bar when it comes to being protective. Mr. Benefield recalled that, upon his hiring, her son Walt said, "Anything my mother wants, she gets."

http://www.nytimes.com/2009/04/01/movies/01disn.html?ref=design

'BRAZZA IN CONGO'
Casting a Sliver of Light on the Heart of Darkness

By EDWARD ROTHSTEIN

There are many treacherous paths leading toward history's realms of darkness, but when it comes to routes hacked out by imperialist powers in the Congo, we really do seem near darkness's heart. First arrived the explorers, whose readiness to confront disease and starvation, crashing rapids and warring tribes, can seem on the edge of madness. Signs of what was to unfold can be sensed in glints of cruel grandiosity or punishments meted out to mutinous native servants.

And then came others, possessing weaponry and a sophisticated support before which tribes in dense jungles had no recourse: European concessionaires and feckless traders, brutish exploiters and enslavers. During the 20 years after 1890 millions of Africans met their deaths through the acts of these imperial adventurers.
The consequences of these deeds were so great, Western reflection so intense, and blame, defensiveness and guilt so widespread that we have settled into a familiar formula for understanding what happened. Imperialism is widely seen as the original sin of the modern West, whose ramifications can still be felt in the aftershocks of warfare and corruption that continue to plague so much of the African continent.
There is, though, much more that needs to be understood about this history beyond this sweeping formula, and while the new exhibition at New York University's Casa Italiana Zerilli-Marimò, "Brazza in Congo: A Life and Legacy," does not alter the fundamental premises, the show's three rooms, in which photographs, chronologies, maps and text are modestly displayed, shed so much novel light for an American visitor that the past seems open to even further inspection. It is a counterhistory, a celebration of an explorer scarcely known in the United States, an Italian-born, French-educated aristocrat, Pietro Savorgnan di Brazza.
In 1875, at the age of 23, he sold one of his family's estates, obtained a contribution from his sister's dowry, and set off on an expedition into equatorial Africa, just a few years after the Welsh explorer Henry Stanley had discovered the whereabouts of Dr. Livingstone there, on the shores of what is now Lake Tanganyika.
And Brazza, in this loving tribute, is the counterexplorer, the very opposite of Stanley. "In the 1880s," the exhibition tells us, "there were two paths for the heart of Africa: Pietro di Brazza's and Henry M. Stanley's. Alas, today Stanley's path of violence, raw greed and power has triumphed and become the modus operandi of governments in the Congo region."
Stanley, the show argues, was the militant conqueror, Brazza the empathetic visitor; Stanley, the "breaker of stones," Brazza, the pacifist. Stanley was the agent for the imperialist project of King Leopold II of Belgium, who used the Congo to enrich his coffers; Brazza, the bearer of the French tricolor, heralding protection, liberty and equality for the natives of this benighted land, "rejecting the racism of his age."
Stanley's pursuits led to the brutal oppression of a Belgian colony that developed into the nation called Congo; Brazza's efforts led to the French colony (now the Congo Republic) whose capital was called, in tribute, Brazzaville. The city became the capital of Free France during the Second World War, where Charles de Gaulle set up residence.
And in magnificent photographs from the 1880s by Nadar (whose celebrity subjects also included Hugo, Proust and Rodin), Brazza appears here not as a conqueror of untamed climes, but as a sensitive celebrant

of the exotic. He is intense, introspective, bearded, willowy, dark-eyed, wrapped in the alien garments of another world. In one photograph he is posed with frayed cloth trousers, disarrayed shirt, a walking stick and a casually draped kaffiyeh, looking more like a desert wanderer from Arabia than one who has braved the heat of jungles. Parisian women swore their devotion; soap and cigarettes bore his name.

If the exhibition seems at times more a homage than an appraisal, that is partly because its creators, Idanna Pucci and her husband, Terence Ward, mean it so. As Ms. Pucci's new book, "Brazza in Congo" (Umbrage), explains, that trailblazer is her ancestor: his niece was her grandmother. Ms. Pucci has also prepared another show, "Brazza: A Symbol for Humanity," opening on Tuesday at the National Arts Club. In that show an enormous work by the Poto-Poto painters from Brazzaville will be displayed celebrating the amicable meeting of Brazza and Makoko Iloo I, king of the Batéké, the region's largest population group. The treaty from that meeting became the foundation for a French colony, and embodies, the exhibition suggests, an ideal of cultural interaction.

The painting is also part of another battle for her ancestor's reputation that Ms. Pucci details in her book. In it she suggests that the current government of the Congo Republic may have engaged in fraud and worse to move the graves of Brazza and his family from Algiers and house them in an enormous white marble mausoleum in Brazzaville, thus conferring legitimacy on what Ms. Pucci considers a corrupt regime and violating the ideals Brazza represented.

In the Casa Italiana show Brazza becomes the embodiment of a countercultural counterhistory, reflecting an idea of what might have been had his methods been followed then — as they should, Ms. Pucci argues, be implemented now.

In a way, though, this image of Brazza is as schematic a romance as the one of Stanley-esque villainy it is meant to counterpoise. We have very little sense of Brazza as a human being, either from the book or the exhibition. Instead he takes on saintly characteristics. Yet we know that he traveled with multiple French flags to stake national claims; that when he met Stanley in Africa, he did not reveal that he had any ability to claim land for France; and that he hid other aspects of his enterprise. And for a supposed pacifist he knew enough to keep an outpost stocked with Winchester rifles.

"I do not travel in African countries like a warrior," he once said, but he certainly knew how to think like one. There is a faux naïf quality to some of his pronouncements as when, in one village, he sees skulls hanging on a tree outside the hut he has been given but claims surprise "because the only cannibals that have threatened me thus far are mosquitoes, flies and wasps."

Meanwhile we should know that this is more than a two-player tragedy in which explorers confront each other over a pastoral landscape; cannibals feasted on the spoils of war, and the Arab slave trade played a central role. Tim Jeal's recent biography, "Stanley," shows just how complicated that man also was, how often Stanley's sympathies and sense of justice were in play, and how skewed his reputation became.

Stanley's image suffered partly because of efforts by Brazza and other critics to fuel European rivalries and partly because these drastically different characters — Brazza an aristocratic populist, Stanley an ambitious and abandoned workhouse child — had drastically different ideologies. The path to the heart of darkness is far more intricate than it first seems.

But Brazza was a charismatic figure of unusual powers, and his proclamations show a rare sensitivity. This homage has merit. He warned against unregulated commercial enterprise in the colonies. The future, he said, depended on "rich indigenous culture and trade."

"If we want to impose our ways of seeing and behaving with arrogance and rigidity," he said, "the Africans will suffer tremendously." The imperial project, he suggested, should be seen as an enterprise that would be "mutually acceptable" as "a work needing time and patience."

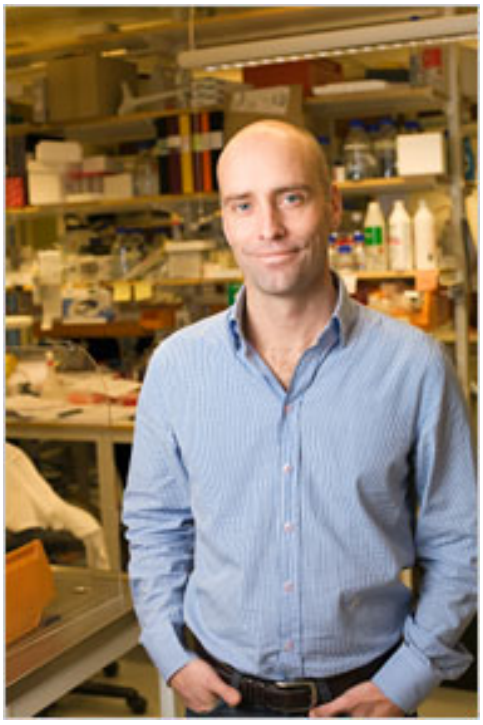
But it was not to be. Brazza, having served France as commissioner-general of Congo and Gabon for 12 years, is summarily dismissed in 1898. Then the French government divides control of millions of acres among 44 private concessionary companies.

There are reports of atrocities, and in 1905 Brazza offers to return to conduct an official inquiry. He meets constant opposition, but persists. Then, during the last days of his trip, he suddenly falls ill. He dies — poisoned, his wife believes. She forbids the proffered honor of burying him in the Pantheon in Paris. The French government suppresses his report. And darkness, with its many origins, remains.

"Brazza in Congo: A Life and Legacy" runs through April 17 at Casa Italiana Zerilli-Marimò, New York University, 24 West 12th Street, Greenwich Village; (212) 998-8739. "Brazza: A Symbol for Humanity" opens on Tuesday and runs through April 19 at the National Arts Club, 15 Gramercy Park South, Manhattan; (212) 475-3424.

http://www.nytimes.com/2009/03/30/arts/design/30braz.html?ref=design

Heart Muscle Renewed Over Lifetime, Study Finds
By NICHOLAS WADE



In a finding that may open new approaches to treating heart disease, Swedish scientists have succeeded in measuring a highly controversial property of the human heart: the rate at which its muscle cells are renewed during a person's lifetime.

The finding upturns what has long been conventional wisdom: that the heart cannot produce new muscle cells and so people die with the same heart they were born with.
About 1 percent of the heart muscle cells are replaced every year at age 25, and that rate gradually falls to less than half a percent per year by age 75, concluded a team of researchers led by Dr. Jonas Frisen of the Karolinska Institute in Stockholm. The upshot is that about half of the heart's muscle cells are exchanged in the course of a normal lifetime, the Swedish group calculates. Its results are to be published Friday in the journal Science.
"I think this will be one of the most important papers in cardiovascular medicine in years," said Dr. Charles Murry, a heart researcher at the University of Washington in Seattle. "It helps settle a longstanding controversy about whether the human heart has any ability to regenerate itself."
If the heart can generate new muscle cells, researchers can hope to develop drugs that might accelerate the process, since the heart fails to replace cells that are killed in a heart attack.
The dogma that the heart cannot generate new muscle cells has been challenged since 1987 by a somewhat lonely skeptic, Dr. Piero Anversa, now of the Harvard Medical School. Dr. Anversa maintains that heart muscle cells are renewed so fast that a person dying at age 80 has replaced the heart four times over. Many other researchers have doubted this assertion.
Cell turnover rates can easily be measured in animals by making their cells radioactive and seeing how fast they are replaced. Such an experiment, called pulse-labeling, could not ethically be done in people. But Dr. Frisen realized several years ago that nuclear weapons tested in the atmosphere until 1963 had in fact labeled the cells of the entire world's population.
The nuclear blasts generated a radioactive form of carbon known as carbon-14. The amount of carbon-14 in the atmosphere has gradually diminished since 1963, when above-ground tests were banned, as it has been incorporated into plants and animals or diffused into the oceans.

In the body, carbon-14 in the diet gets into the DNA of new cells and stays unchanged for the life of the cell. Because the level of carbon-14 in the atmosphere falls each year, the amount of carbon-14 in the DNA can serve to indicate the cell's birth date, Dr. Frisen found.

Four years ago he used his new method to assess the turnover rate of various tissues in the body, concluding that the average age of the cells in an adult's body might be as young as 7 to 10 years. But there is a wide range of ages — from the rapidly turning over cells of the blood and gut to the mostly permanent cells of the brain.

Dr. Frisen has successfully applied his method to the heart muscle cells, but had to navigate a series of technical obstacles created by the special behavior of the cells. Many have two nuclei, instead of the usual one, and within these double nuclei the DNA may be duplicated again. "I was really impressed at the level of rigor they put into this analysis," Dr. Murry said, calling it a "scientific tour de force."

The finding that heart muscle cells do regenerate, though at a considerably slower rate than Dr. Anversa predicted, is a "reasonable conclusion to a hotly contested issue," Dr. Murry said. "Anversa went out on a limb, and I think he was partly right."

Dr. Loren Field, a heart expert at the Indiana University School of Medicine, said he had found that heart muscle cells regenerated in mice at the same rate that Dr. Frisen had found in people. Despite the controversy created by Dr. Anversa's claims, there has long been agreement that there is a low but detectable rate of cell renewal in the heart, Dr. Field said. The goal now, in his view, is "to try to tickle the system to enhance it."

Dr. Anversa, for his part, said he was "ecstatic" at Dr. Frisen's confirmation of his view that the heart could generate new muscle cells, but suggested that the new measurements might have underestimated the rate at which new cells are formed. Since heart muscle cells contract 70 times a minute, they seem likely to need renewing more often than Dr. Frisen's measurements suggest, he said. "Now let's discuss the magnitude of the process, and that will let us think about how we can apply this concept to heart failure," Dr. Anversa said.

Dr. Frisen said he did not agree that the rate of regeneration had been underestimated. He said it would now be worth trying to understand how the regeneration of heart muscle cells was regulated.

A zebrafish, for instance, can regenerate large regions of its heart after injury, and possibly a similar response could be induced in people. It could also be that the heart does generate many new muscle cells after a heart attack but that the cells fail to establish themselves. Drugs that kept any such new cells alive could be helpful, Dr. Frisen said.

http://www.nytimes.com/2009/04/03/science/03heart.html?ref=science

Hal, Call Your Office: Computers That Act Like Physicists

By KENNETH CHANG

Isaac, meet Hal.

Theoretical physicists are not yet obsolete, but scientists have taken a couple of steps toward replacing themselves.

In an article in Friday's issue of the journal Science, two Cornell scientists describe a computer program that sifts raw and imperfect data to uncover fundamental laws of nature. The achievement could mean that insights that once emerged from the genius of scientists like Isaac Newton might now pop out of computers like, perhaps, the Hal 5000 in "2001: A Space Odyssey.""One of the biggest problems in science today is moving forward and finding the underlying principles in areas where there's lots and lots of data but where there are theoretical gaps," said Hod Lipson, a professor of computer and information science at Cornell and an author of the Science paper. "I think this is going to be an important tool."

In the same issue of Science, scientists in Britain have built a robot that can not only devise a hypothesis but can also run and analyze experiments to test the hypothesis.

The Cornell computer program uses a technique called genetic programming that starts with random guesses at a solution and then employs an evolution-inspired algorithm to shuffle and change pieces of the equations until it finds a solution that works. In the past, genetic programming has been used to generate models to describe phenomena like the flow of fluids orthe gyrations of stock prices.

The twist of the Cornell research is that Dr. Lipson and Michael Schmidt, a graduate student, used the technique to look for combinations of the experimental variables that remained constant even as the variables changed over time. Such invariant equations often point to a fundamental natural law.

Thus, instead of an equation describing, for example, the back-and-forth swaying of a pendulum, the computer discovered principles like the conservation of energy and momentum. "You get something that is deeper about the data," Dr. Lipson said.

The system successfully found such physical laws within experimental data taken from complex, chaotic systems like a double pendulum — a pendulum with a pivot joint in the middle. "If you just look at the data plainly, it's difficult to see if there's anything systematic going on there," Dr. Lipson said. "But despite that fact, when the algorithm analyzed that data, it could see laws that we know are correct."

When the scientists fed the computer random numbers, the computer correctly found nothing.

"It's a nice piece of work," said John R. Koza, a computer scientist at Stanford who pioneered genetic programming. "It's another good example of how genetic programming can do things that are comparable to what human scientists can do."The scientists in Britain, led by Ross D. King, a professor at Aberystwyth University, built a robotic scientist they named Adam. Using artificial intelligence, it came up with a hypothesis about genes in baker's yeast and the enzymes produced by the genes. It then designed and ran experiments to test its hypothesis. Using the results, it revised its hypothesis and ran more experiments before arriving at its conclusions.

Human scientists then repeated the experiments. Adam was right.

"It's actually showed you can make the system sophisticated enough to discover novel scientific knowledge," Dr. King said.A follow-up robot is named Eve.

Neither Dr. Lipson or Dr. King thinks their creations will put scientists out of work any time soon. "It's helping scientists and making science more efficient," Dr. King said. Robotic descendants of Adam might be able to conduct many of the numbingly repetitive experiments currently performed by graduate students, giving them more time to think about the actual science, he said.

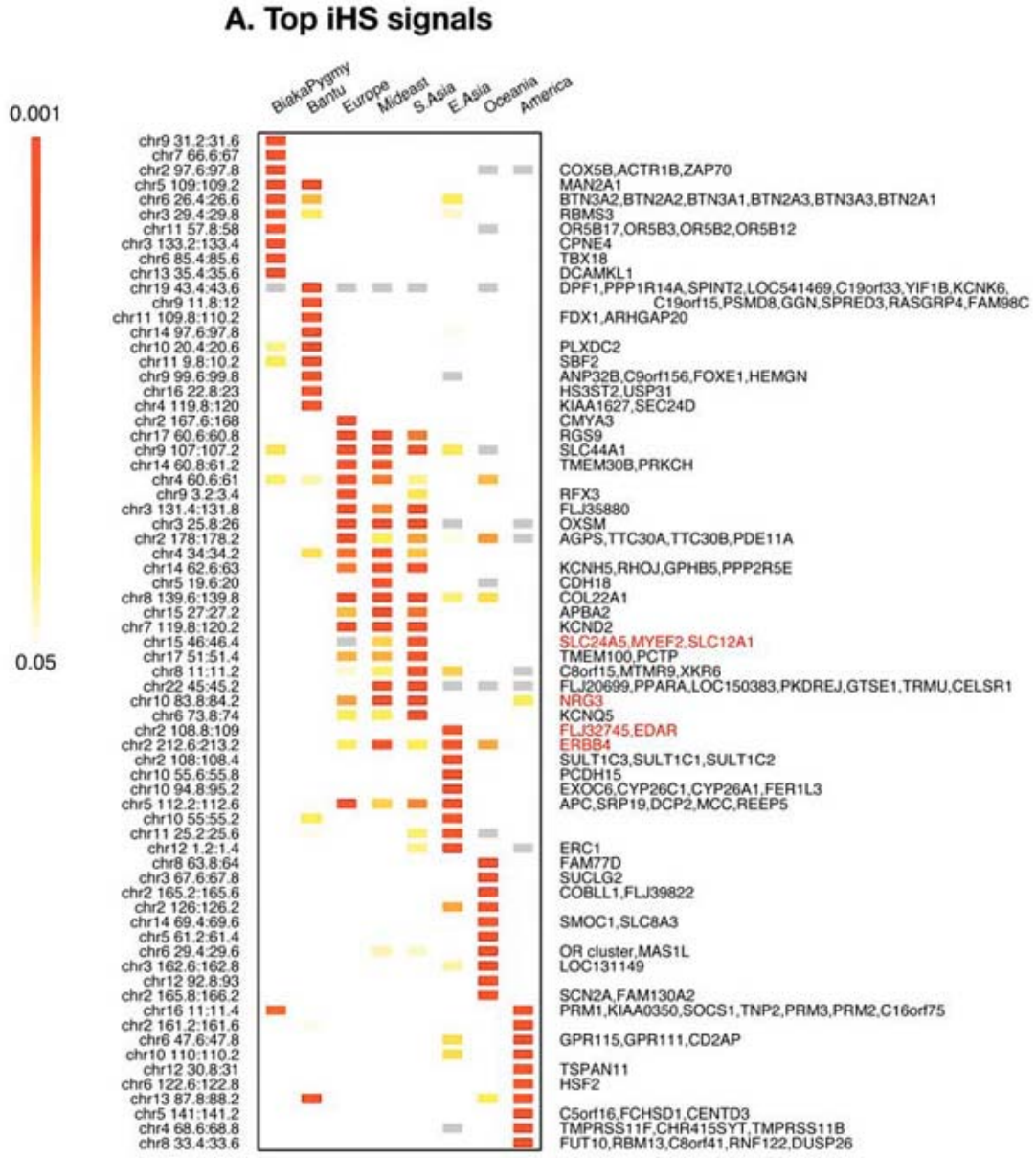
Dr. Lipson and Mr. Schmidt have taken their genetic programming approach from classical physics, which Newton solved centuries ago, and are now applying it to biology, where many mysteries remain. Using data on the concentrations of chemicals that take part in metabolic reactions, the computer program has dutifully discovered some new laws that perplex the human scientists.

"It's as if you go to an oracle and you ask, 'Tell me what's going on here,' and you get this equation, but then it doesn't come with any explanation," Dr. Lipson said. "We're pretty sure they're correct. But we don't know where they're coming from. We don't know what they're explaining."

http://www.nytimes.com/2009/04/07/science/07robot.html?ref=science

A New Look at Race and Natural Selection

By NICHOLAS WADE



In a worldwide survey of 50 populations, a team of geneticists has identified many fingerprints of natural selection in the human genome. These are sites on the genome where specific sequences of DNA show signs of having become more common in the population, presumably because they helped their owners adapt to new climates, diseases or other factors.

The genetic regions where natural selection has acted turn out to differ in various populations, doubtless because each has been molded by different local forces on each continent.
This chart shows the sites along the genome (listed at the left) at which natural selection has occurred in the genome of eight regional groups (shown at top). These are 1) Biaka pygmies, 2) Bantu-speaking Africans, 3) Western Europeans, 4) Middle Easterners, 5) South Asians (people of Pakistan and India), 6) East Asians, 7) Oceanians and 8) Native Americans. The colored bars show the degree of selection at

each site, with yellow denoting a signal of clear but moderate statistical significance and red denoting high statistical significance.
The three West Eurasian groups show very similar patterns of selection, which probably occurred before they separated into three geographically distinct populations but after their ancestors split from those of East Asians.
Because the human genome is still so little understood, in most cases the genes at the sites of selection (shown along the right) are of unknown function. One exception is that of genes affecting skin color that have been under strong selective pressure in non-African populations. These include the gene SLC24A5 (shown in red, at center of chart), one version of which has been favored in European, Middle Eastern and South Asian populations. SLC24A5 is not under selection in East Asians, who presumably acquired their pale skin through a different set of genes, an example of what is known as convergent evolution.
Another set of genes found to be under selection in non-African populations are three NRG or neuregulin genes (the third, NRG3, is shown in red) and a receptor gene they all interact with (ERBB4, also in red). The NRG genes make signaling proteins that are active in the developing embryo in shaping tissues like the brain, heart and breast. A variant of NRG1 has been implicated in schizophrenia. The researchers do not know which of the several roles of the neuregulin genes has caused it to come under selection.
The principal human races presumably emerged as the populations of each continent responded to different evolutionary pressures. "Our work supports the notion that regional populations have adapted in a variety of ways, some shared, some not, to the selective pressures they encountered as they dispersed from the ancestral African homeland some 80,000 years ago," said Jonathan Pritchard, a population geneticist at the University of Chicago.
The authors of the new study are Dr. Pritchard and his colleagues Joseph Pickrell and Graham Coop. It was published online last month in Genome Research. It is the first to look for signals of selection in DNA samples gathered by the Human Genome Diversity Project.

http://www.nytimes.com/2009/04/02/science/02visuals-web.html?ref=science

Stem Cell Breakthrough: 'Switch' Created That Turns Stem Cells Into Muscle

Scientists have created a "switch" that allows mutations to be turned on in muscle stem cells -- work could lead to a drug that would allow people to grow new muscle cells. (Credit: iStockphoto/Carlos Santa Maria)

ScienceDaily (Apr. 1, 2009) — In a genetic engineering breakthrough that could help everyone from bed-ridden patients to elite athletes, a team of American researchers—including 2007 Nobel Prize winner Mario R. Capecchi—have created a "switch" that allows mutations to be turned on in muscle stem cells to monitor muscle regeneration in a living mammal.

For humans, this work could lead to a genetic switch, or drug, that allows people to grow new muscle cells to replace those that are damaged, worn out, or not working for other reasons (e.g., muscular dystrophy). In addition, this same discovery also gives researchers a new tool for the study of difficult-to-treat muscle cancers.

"We hope that the genetically-engineered mouse models we developed will help scientists and clinicians better understand how to make muscle stem cells regenerate muscle tissue," said Charles Keller, M.D., assistant professor at the University of Texas Health Science Center and a senior researcher involved in the work. "For our own work on childhood muscle cancers, we also hope to understand how tumors start and progress, and to develop therapies that are less toxic than chemotherapy."

The scientists made their discovery by breeding special mice with a specific gene, called "Cre," which, when activated, can trigger mutations in muscle stem cells. This Cre trigger is restricted to muscle stem cells and requires a special drug for it to be activated. In one part of the study, using fluorescent techniques, the researchers were able to visualize stem cells and their derivatives in order to pinpoint exactly where muscle tissue was being made. In another part of the study, the scientists were able to activate tumor-causing mutations in muscle stem cells, providing valuable insights into the origins of muscle tumors, which have been previously elusive.

"This is basic science at its best," said Gerald Weissmann, M.D, Editor-in-Chief of The FASEB Journal. "This study in mice has not only shown us how stem cells turn into muscle in the living body, but brought us closer to the day when we can use stem cells to repair wounded flesh or a maimed physique."

Journal reference:

1. Koichi Nishijo et al. **Biomarker system for studying muscle, stem cells, and cancer in vivo**. *FASEB J.*, 2009; DOI: 10.1096/fj.08-128116

Adapted from materials provided by Federation of American Societies for Experimental Biology, via EurekAlert!, a service of AAAS
http://www.sciencedaily.com/releases/2009/03/090330154806.htm

New Insights Into How Brain Responds To Viral Infection

ScienceDaily (Apr. 1, 2009) — Scientists at Columbia University Mailman School of Public Health have discovered that astrocytes, supportive cells in the brain that are not derived from an immune cell lineage, respond to a molecule that mimics a viral infection using cellular machinery similar to that used by classical immune cells in the blood.

While scientists have been aware of the capacity of astrocytes to trigger an innate immune response when encountering a foreign agent, this work provides a new understanding of the complex mechanisms responsible for induction and regulation of inflammation in the brain and has significant implications for both the diagnosis and treatment of brain infections.

The study is published as the cover article in the April 2009 issue of The FASEB Journal.

In the course of trying to contain and neutralize a virus that has breached the protective barrier of the central nervous system, immune mediators secreted by astrocytes may injure other cells and tissues in the vicinity and cause additional life-threatening inflammation.

By defining the nature of inflammatory responses by brain astrocytes, this study has implications for both the diagnosis of chronic infections of the central nervous system, as well as the treatment of acute and chronic brain infections. Viral infections of the brain are associated with extremely high morbidity and mortality; in most cases, the specific microbial cause is unknown. Even when a viral cause is clear, the specific antiviral tools at our disposal remain limited. This work provides a means for implementation of a more general therapeutic approach to viral brain infections that may be effective across a wide range of viruses, or even where a virus is suspected but the offending agent cannot be identified.

"Studies such as this take us one step closer to understanding both the risk and benefit associated with antiviral immune response and may lead to new treatment strategies," said W. Ian Lipkin, MD, senior author of the paper, director of the Mailman School of Public Health's Center for Infection and Immunity, John Snow Professor of Epidemiology, and professor of Neurology and Pathology.

The researchers compared two methods of exposing a cell to this virus-like challenge—one from outside the cell and the other by direct delivery into the cell's cytoplasm. By culturing the supportive cells known as astrocytes obtained from the brains of newborn mice and exposing them to a virus-like molecule (called Poly I:C) from the outside and the inside, the scientists were able to show for the first time the differences between extracellular and intracellular immune response in these supportive brain cells.

Depending on whether the virus-like challenge was introduced extracellularly or intracellularly, the astrocytes produced different levels of inflammatory mediators (cytokines). The researchers were also able to show that a sensor protein known as MDA-5 is critical for astrocytes to be able to recognize viral molecules appearing in a cell's cytoplasm, and when astrocytes were engineered to express dysfunctional MDA-5, this immune response was selectively blocked.

"These findings create an opportunity for targeted design of drugs that may help to curb infection-induced brain inflammation and restrict the extent of damage," said Joari De Miranda, MD, PhD, lead author of the paper and postdoctoral research scientist at the Mailman School of Public Health's Center for Infection and Immunity.

There are a number of diseases that this work can impact in terms of diagnosis and treatment: viral encephalitis; brain disorders associated with congenital viral infections; and neurological or neurodevelopmental disorders suspected of having an immune or inflammatory trigger, such as schizophrenia and autism. There also may be broader implications for the treatment of a wide range of immune-mediated neurologic diseases, such as multiple sclerosis and Parkinson's disease.

Other members of the research team at the Mailman School of Public Health include Mady Hornig, MD, associate professor of Epidemiology and director of translational research at the Center for Infection and Immunity, and Kavitha Yaddanapudi, PhD, postdoctoral research scientist.

This work was supported by the U.S. National Institutes of Health's National Institute of Allergy and Infectious Diseases, National Heart, Lung and Blood Institute, and National Institute of Neurological Disorders and Stroke, and Google.org.

Journal reference:

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Adapted from materials provided by Columbia University's Mailman School of Public Health.
http://www.sciencedaily.com/releases/2009/03/090331133341.htm

Higher Hospital Safety Rating Not Associated With Lower Risk Of In-hospital Death

ScienceDaily (Apr. 1, 2009) — Hospitals that reported higher scores on measures of safe practices did not have a significantly lower rate of in-hospital deaths compared to hospitals that reported lower scores on these measures, according to a new study.

The Leapfrog Group is a nonprofit business coalition that provides information regarding hospital safety and quality to its members (large companies that purchase health care) and to consumers. Its primary method of evaluating hospitals is via voluntary participation in the Leapfrog Hospital Survey. Initially, these annual surveys assessed hospitals' adoption of 3 initiatives. In 2004, a fourth initiative was added, the Safe Practices Survey (consisting of hospitals' self-report of structural and process measures). Approximately 1,100 urban hospitals have completed this survey in recent years, with results reported to the public on the Internet. "… to our knowledge it is not yet confirmed that higher scores on the survey correlate with actual outcomes. This issue is pertinent, because survey scores reported on the Internet are ranked by quartiles, which likely suggests to consumers that hospitals in the highest quartile provide safer care than those in lower quartiles," the authors write.

Leslie P. Kernisan, M.D., of the University of California, San Francisco, and colleagues examined the relationship between scores reported by urban hospitals on the 2006 Safe Practices Survey and risk of in-hospital death. A Safe Practices Score (SPS) was determined for each hospital as well as 3 alternative scores based on shorter versions of the original survey. Analysis determined the relationship between quartiles of SPS and risk-adjusted inpatient mortality, after adjusting for hospital discharge volume and teaching status.

Mortality data were obtained from the Nationwide Inpatient Sample, a database that includes information on inpatient discharge. Of 1,075 hospitals completing the 2006 Safe Practices Survey, 155 (14 percent) were identifiable in the National Inpatient Sample (1,772,064 discharges). Of these discharges, 37,033 resulted in an inpatient death (2.09 percent). The researchers found that quartiles of SPS were not a significant predictor of mortality. From the lowest to highest quartile of SPS, inpatient death rates adjusted for patient and hospital characteristics were 1.97 percent, 2.04 percent, 1.96 percent, and 2.00 percent. Results were similar in the subgroup analyses. None of the 3 alternative survey scores was associated with risk-adjusted inpatient mortality.

"In this first study of the relationship between survey scores and hospital outcomes, we studied a national sample of hospitals and found no relationship between quartiles of score and in-hospital mortality, regardless of whether we adjusted for expected mortality risk and certain hospital characteristics," the researchers write.

"It is possible that inviting hospitals to self-report on their patient safety practices and then assigning them to quartiles of score is not an effective way to assess hospital quality and safety. Our findings should not be interpreted, however, as indicating that the safe practices are not important or that they cannot be measured in an informative and valid way. Rather, future work should seek to establish valid methods for assessing adherence to the safe practices. Further research is needed to determine how performance on the Safe Practices Survey or other instruments designed to measure safe practices performance may correlate with other outcomes of interest to patients and policy makers."

Journal reference:

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Adapted from materials provided by JAMA and Archives Journals.
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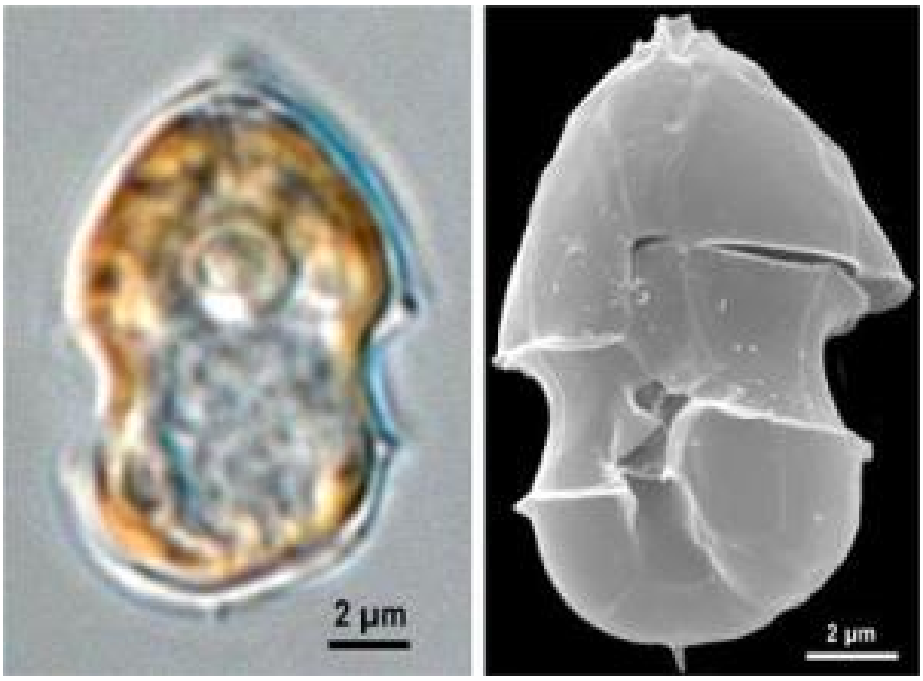
Cause Of Mussel Poisoning Identified



Azadinium spinosum causes mussel poisoning by the production of azaspiracid (left: light microscopic image, right: SEM). (Credit: Urban Tillmann, Alfred Wegener Institute)

ScienceDaily (Apr. 1, 2009) — The origin of the neurotoxin azaspiracid has finally been identified after a search for more than a decade.

The azaspiracid toxin group can cause severe poisoning in human consumers of mussels after being enriched in the shellfish tissues. The scientific periodical *European Journal of Phycology* reports in its current issue (Vol. 44/1: p. 63-79) that a tiny algal species, the dinoflagellate Azadinium spinosum, is responsible.

Researchers from the Alfred Wegener Institute for Polar and Marine Research in the Helmholtz Association have isolated and described the hitherto unknown organism as a new genus and species of dinoflagellate. They successfully isolated the organism and multiplied it in pure laboratory cultures, subsequently identifying it as the producer of azaspiracid toxin.

Eating mussels is a special treat for many people, although it is not completely without danger. It has been known for a long time that consumption of mussels and other bivalve shellfish can cause poisoning in humans, with symptoms ranging from diarrhea, nausea, and vomiting to neurotoxicological effects, including paralysis and even death in extreme cases. Although "shellfish poisoning" can also be caused by pathogenic viruses and bacteria, many cases are due to gastrointestinal toxins and/or neurotoxins produced by certain marine microscopic plankton, the so-called "toxic algae". Mussels can filter a high amount of these toxic microorganisms from the seawater column, and after ingestion they retain the toxins and accumulate them in their edible flesh.

Azaspiracids comprise one group of these microalgal toxins The first known azaspiracid poisonings occurred in the Netherlands in 1995 after consumption of mussels from Ireland. While the toxin itself has been quite well investigated, the question of the origin remained inconclusive until now despite intensive research. According to published investigations by Irish researchers, the dinoflagellate species Protoperidinium crassipes (previously regarded as harmless) has been blamed as the origin of the toxins since 2003.

Researchers from the Working Group on Ecological Chemistry, particularly the biologist Dr. Urban Tillmann and the chemist Dr. Bernd Krock from the Alfred Wegener Institute for Polar and Marine Research were able to show that Protoperidinium is only the vector and not the producer of the toxins, just like other voracious protozoa and mussels. They isolated a small alga from the North Sea off the Scottish east coast and described it as a new dinoflagellate species Azadinium spinosum while providing evidence of its azaspiracid production in the laboratory.

"We are able to produce so-called gene probes from our laboratory cultures with the help of molecular techniques", explains Tillmann. "These gene probes prove the existence of the toxin-producing algae in seawater samples and they offer an effective future early warning system for mussel farms", Tillmann continues.

Apart from these applied aspects, the researchers are interested in quite fundamental questions: why does the alga produce these azaspiracid toxins and what are their ecological functions? The researchers have already planned the next expedition in order to further pursue these questions - they will head out into the North Sea with RV Heincke at the end of April 2009.

Journal reference:

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Adapted from materials provided by Helmholtz Association of German Research Centres.
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Genetic Basis For Migration In Monarch Butterflies Uncovered

Monarch butterflies. (Credit: iStockphoto/Paul Tessier)

ScienceDaily (Mar. 31, 2009) — Scientists studying Eastern North American monarch butterflies *(Danaus plexippus)* have uncovered a suite of genes that may be involved in driving the butterflies to migrate towards Mexico for the winter. Their research describes 40 genes that are linked to the butterflies' compulsion to orientate themselves by an internal 'sun compass' and begin the 4000km journey southwards.

Steven Reppert led a team of researchers from the University of Massachusetts Medical School who performed behavioral and genetic analyses on summer and migratory monarch butterflies. He said, "Our data are the first to provide a link between gene expression profiles in the brain and migratory state in any animal that undergoes long-distance migration. Moreover, our results also provide the first insights into gene expression patterns that may underlie sun compass orientation, a complex process involving the integration of temporal and spatial information".

Monarch butterflies begin flying south in the fall, using their internal clock and a sun compass to orientate themselves. After spending the winter in the warmer climes of Mexico, they begin moving northwards again through the Southern United States, breeding as they go, and spending the late summer in a non-migratory state in the Northern US. Unlike summer butterflies, some of whose offspring become fall migrants, the fall insects are not reproductively active – they have smaller reproductive organs and exhibit reduced sexual behavior. This dampening of their ardour is caused by a reduction in levels of Juvenile Hormone (JH), which allows the butterflies to live longer as well as stopping them from having sex and laying eggs during their long journey south.

The authors tested whether JH levels are also responsible for flight orientation. By treating fall butterflies with a potent JH analog, they induced a summer-like reproductive state, and then looked at their oriented flight behavior in a flight simulator, and gene expression profiles in their brains. Repperts said, "We found that orientated flight behavior was independent of JH activity. Furthermore, in contrast to the non-migratory summer butterflies, the fall butterflies showed significantly different activation patterns in a suite of 40 JH-independent genes, showing that seasonal changes in genomic function help define the migratory state".

Journal reference:

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Adapted from materials provided by BMC Biology, via EurekAlert!, a service of AAAS.
http://www.sciencedaily.com/releases/2009/03/090330200615.htm

Cracking The Crusts Of Neutron Stars

NSCL professor Bill Lynch inspects the mini-ball, a detector at the MSU laboratory used to analyze fragments produced when nuclei collide at high velocities. (Credit: Harley Seeley, MSU)

ScienceDaily (Mar. 31, 2009) — Research by Michigan State University scientists is helping shed light on neutron stars, city-sized globs of ultra-dense matter that occasionally collapse into black holes.A team led by Betty Tsang, a professor at MSU's National Superconducting Cyclotron Laboratory, has had some success in measuring a key nuclear quality that may make it easier to describe the outer crusts of such stars.

A neutron star is produced when a massive star explodes as a supernova and then collapses onto itself. The result is one of the oddballs of the universe, a star that is roughly 15 miles in diameter but more massive than the sun. On Earth, a teaspoon of a neutron star – think of a dense pudding of nuclear matter, most of it neutrons and all of it packed tightly together – would weigh about 1 billion metric tons if it were taken from the inner crust of the neutron star. If the teaspoon were taken from the denser interior where neutrons are more tightly packed, the matter could weigh up to 10 billion metric tons.Atomic nuclei are composed of positively charged protons and neutral neutrons. Proton-neutron forces help to bind a nucleus together while proton-proton and neutron-neutron interactions exert a pressure that tend to push a nucleus apart or support a neutron star against collapse into a black hole. This pressure can be obtained by determining how the symmetry energy, which is difference between the energy of a system of only neutrons and another with equal numbers of neutrons and protons, depends on the density.Tsang, along with Bill Lynch and Pawel Danielewicz, also professors in the NSCL, were interested in refining the understanding of symmetry energy, estimates of which have ranged widely in most theoretical models describing neutron stars.To do this work, the researchers studied third-of-the-speed-of-light collisions of tin nuclei wherein nuclear densities were varied during a series of experiments at the NSCL's Coupled Cyclotron Facility.

Tsang's result, to be published in Physical Review Letters, helps to describe the crust of neutron stars where the density of nuclear matter is about half of normal nuclear density. New and planned more powerful accelerator facilities in Japan, Germany and the United States will help to further characterize symmetry energy in the ultra-dense cores of such stars.Among those facilities is the Facility for Rare Isotope Beams, a $550 million project scheduled to be built at MSU.

Tsang's research is supported in part by the National Science Foundation, which provides funding both for NSCL and the Joint Institute for Nuclear Astrophysics.

Adapted from materials provided by National Superconducting Cyclotron Laboratory at Michigan State University, via Newswise.

http://www.sciencedaily.com/releases/2009/03/090325185506.htm

Palm Oil Development May Threaten Amazon

This graph shows palm oil prices from January 2000 to January 2009 according to the World Bank. (Credit: R. A. Butler)

ScienceDaily (Mar. 31, 2009) — Oil palm cultivation is a significant driver of tropical forest destruction across Southeast Asia. It could easily become a threat to the Amazon rainforest because of a proposed change in Brazil's legislation, new infrastructure and the influence of foreign agro-industrial firms in the region, according to William F. Laurance, senior scientist at the Smithsonian Tropical Research Institute in Panama.

Laurance and Rhett A. Butler warn in *Tropical Conservation Science*, that oil palm expansion in the Brazilian Amazon is likely to occur at the expense of natural forest as a result of a proposed revision to the forest code that requires landowners to retain 80 percent forest on lands in the Amazon. The new law would allow up to 30 percent of this reserve to consist of oil palm.

Expansion may be driven by economics. As the world's highest-yielding oil-containing seed source, oil palm is likely to offer better financial returns and to employ larger numbers of people than cattle ranching and mechanized soy farming, the dominant agricultural activities in Brazilian Amazon. Furthermore, oil palm producers will benefit from a "logging subsidy," whereby timber harvested from a tract of land helps to offset the cost of establishing a plantation. Before the recent run-up in palm oil prices, logging had been a factor in the profitability of oil palm plantations in Southeast Asia.

"Oil palm expansion could be accelerated by, as well as contribute to, the drivers promoting forest loss by buoying the price of land, encouraging infrastructure expansion and offering a new form of land use in the region," said Laurance. "Oil palm plantations are effectively biological deserts relative to even logged forests; research in Asia suggests an 80 percent drop-off among major animal groups."

Expansion of oil palm cultivation could also have an impact on the climate. According to research by scientists at the Woods Hole Research Center, the 2.3 million square kilometers of land in the Brazilian

Amazon suitable for oil palm cultivation store 42 billion tons of carbon. Conversion of primary forest to plantations releases at least 60 percent of above-ground biomass.

While Laurance and Butler are concerned that oil palm development could spur large-scale forest conversion in Amazonia, they propose ways to temper the most serious environmental impact of the expansion.

"Developers can be encouraged to adopt cultivation methods promoted by the Roundtable on Sustainable Palm Oil, an industry-led initiative to improve its environmental performance. These include using natural pest control and composting in place of synthetic pesticides and fertilizers whenever possible, implementing no-burn policies and creating catchment ponds to reduce water pollution," said Butler. "The Brazilian government could require oil palm plantations to establish riparian buffer zones, maintain habitat corridors and protect wetlands areas to reduce impacts on biodiversity."

"Because oil palm plantations offer higher yields on a per hectare basis than either soy or beef production, one could argue that the replacement of existing cattle pasture with oil palm—without displacing ranchers or farmers into forest areas—might not be such a bad thing," said Butler. "But it is absolutely critical that the transition be managed responsibly. Otherwise, destruction of the Amazon by industrial forces will continue apace."

Adapted from materials provided by Smithsonian Tropical Research Institute, via EurekAlert!, a service of AAAS.
http://www.sciencedaily.com/releases/2009/03/090324101755.htm

Tornado-like Rotation Is Key To Understanding Volcanic Plumes

In 2008, the Mount Chaiten eruption in southern Chile showed what appeared to be a volcanic plume wrapped in a sheath of lightning. (Credit: Photo by UPI/Landov)

ScienceDaily (Mar. 31, 2009) — A 200-year-old report by a sea captain and a stunning photograph of the 2008 eruption of Mount Chaiten are helping scientists at the University of Illinois better understand strong volcanic plumes.

In a paper to appear in the March 26 issue of the journal Nature, the scientists show that the spontaneous formation of a "volcanic mesocyclone" – a cyclonically rotating columnar vortex – causes the volcanic plume to rotate about its axis. The rotation, in turn, triggers a sheath of lightning and creates waterspouts or dust devils. The origins of these volcanic phenomena were previously unexplained.

"Rotation is an essential element of a strong volcanic plume," said Pinaki Chakraborty, a postdoctoral researcher and the paper's lead author. "By taking into account the rotation, we can better predict the effects of volcanic eruptions."

In 2008, a photograph of the Mount Chaiten eruption in southern Chile showed what appeared to be a volcanic plume wrapped in a sheath of lightning. A search for references to other occurrences of lightning sheaths led Chakraborty, mechanical science and engineering professor Gustavo Gioia and geology professor Susan W. Kieffer to an obscure paper by a sea captain, published in 1811.

In that paper, the sea captain reported his observations of a volcanic vent that emerged from the sea in the Azores archipelago and formed a large volcanic plume.

According to the captain, the plume rotated on the water "like an (sic) horizontal wheel" and was accompanied by continuous "flashes of lightning" and a "quantity of waterspouts."

This conjunction of rotation, lightning and waterspouts (or dust devils on land) is characteristic of a familiar meteorological phenomenon seemingly unrelated to volcanic plumes: a tornadic thunderstorm.

The same process that creates a mesocyclone in a tornadic thunderstorm also creates a volcanic mesocyclone in a strong volcanic plume, Chakraborty said. "What happens in tornadic thunderstorms is analogous to what happens in strong volcanic plumes."

A strong volcanic plume consists of a vertical column of hot gases and dust topped with a horizontal "umbrella." A volcanic mesocyclone sets the entire plume rotating about its axis. The mesocyclone spawns waterspouts or dust devils, and groups the electric charges in the plume to form a sheath of lightning, as was so prominently displayed in the eruption of Mount Chaiten.

The rotation of strong volcanic plumes may be verified by observations from space, the scientists report. On June 15, 1991, the eruption of Mount Pinatubo in the Philippines was recorded by a satellite snapping hourly images. The images show that the edge of Pinatubo's umbrella was rotating about its center, consistent with the presence of a volcanic mesocyclone.

The images also show that after rotating for a while, the umbrella lost axial symmetry and became lobate in plan view. This loss of axial symmetry is another effect of the rotation, which destabilizes the edge of the umbrella and makes it lobate, the scientists report.

Lobate umbrellas have been found in satellite images of other volcanoes, including Mount Manam in Papua New Guinea, Mount Reventador in Ecuador and Mount Okmok in the Aleutian Islands.

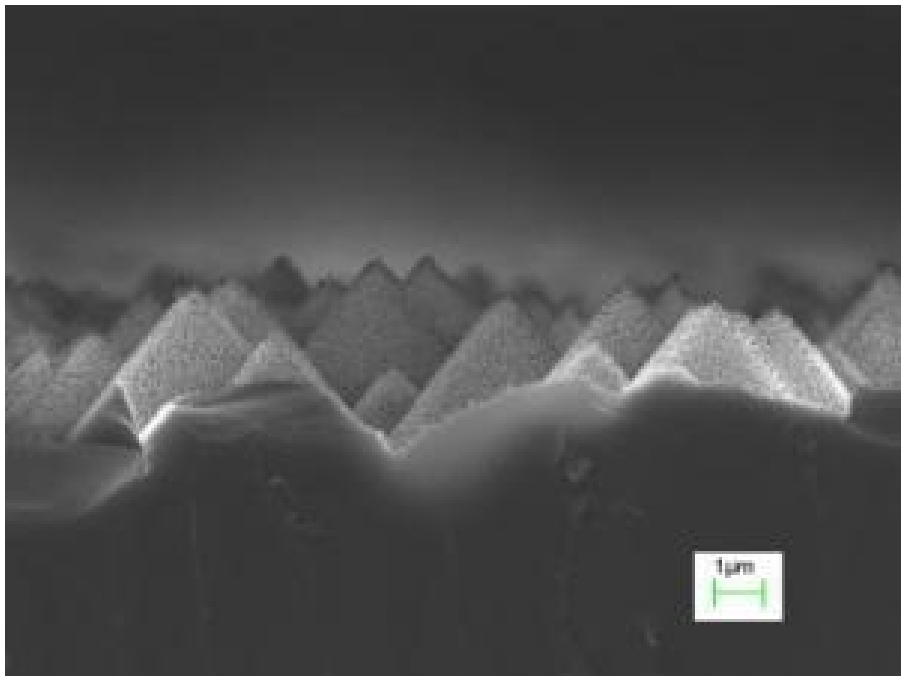
Satellite images of future volcanic plumes taken at intervals of a few minutes would make it possible to trace the evolution of umbrellas in detail, Gioia said. In addition, some of the tools commonly used in the study of thunderstorms could be deployed for the study of volcanic eruptions.

"The structure and dynamics of volcanic mesocyclones, as well as the presence of lightning sheaths, might be verified with Doppler radar and lightning mapping arrays, two technologies that have been scarcely used in volcanology," Gioia said.

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

http://www.sciencedaily.com/releases/2009/03/090325142505.htm

Superhydrophobic: Self-cleaning, Low-reflectivity Treatment Boosts Efficiency For Photovoltaic Cells



This image shows silicon pyramid structures etched for one minute using hydrogen fluoride/hydrogen peroxide/water solution. The resulting structure has roughness at the micro and nanometer scales. (Credit: Image courtesy of C.P. Wong)

ScienceDaily (Mar. 31, 2009) — Using two different types of chemical etching to create features at both the micron and nanometer size scales, researchers at the Georgia Institute of Technology have developed a surface treatment that boosts the light absorption of silicon photovoltaic cells in two complementary ways.

The surface treatment increases absorption both by trapping light in three-dimensional structures and by making the surfaces self-cleaning – allowing rain or dew to wash away the dust and dirt that can accumulate on photovoltaic arrays. Because of its ability to make water bead up and roll off, the surface is classified as superhydrophobic.

"The more sunlight that goes into the photovoltaic cells and the less that reflects back, the higher the efficiency can be," said C.P. Wong, Regents' professor in Georgia Tech's School of Materials Science and Engineering. "Our simulations show that we can potentially increase the final efficiency of the cells by as much as two percent with this surface structure."

Supported by the National Science Foundation (NSF) and the National Electric Energy Testing Research and Applications Center (NEETRAC) at Georgia Tech, the research will be described March 24th at the Spring 2009 National Meeting of the American Chemical Society in Salt Lake City.

The silicon etching treatment mimics the superhydrophobic surface of the lotus leaf, which uses surface roughness at two different size scales to create high contact angles that encourage water from rain or condensation to bead up and run off. As the water runs off, it carries with it any surface dust or dirt – which also doesn't adhere because of the unique surface properties.

In the silicon surface treatment, the two-tier roughness – created with both micron- and nano-scale structures – works in the same way as the lotus leaf, minimizing contact between the water or dust and the surface, Wong noted.

"When a water droplet reaches the surface, it sits on top of this two-tier roughness and only about three percent of it is in contact with the silicon," he explained.

Preparation of the superhydrophobic surface begins with use of a potassium hydroxide (KOH) solution to etch the silicon surface. The solution preferentially removes silicon along crystalline planes, creating micron-scale pyramid structures in the surface.

An e-beam process is then used to apply nanometer-scale gold particles to the pyramid structures. Using a solution of hydrogen fluoride (HF) and hydrogen peroxide (H2O2), a metal-assisted etching process – with gold as the catalyst – produces the nanometer-scale features. The feature size is controlled by the diameter of the gold particles and the length of time the silicon is exposed to the etching.

Finally, the gold is removed with a potassium iodide (KI) solution and the surface coated with a fluorocarbon material, perfluorooctyl tricholosilane (PFOS).

The combination of increased light absorption from the textured surface and the self-cleaning ability both help boost absorption of sunlight hitting the silicon surface.

"A normal silicon surface reflects a lot of the light that comes in, but by doing this texturing, the reflection is reduced to less than five percent," said Dennis Hess, a professor in the Georgia Tech School of Chemical and Biomolecular Engineering. "As much as 10 percent of the light that hits the cells is scattered because of dust and dirt of the surface. If you can keep the cells clean, in principle you can increase the efficiency. Even if you only improve this by a few percent, that could make a big difference."

Even in desert areas where constant sunlight provides ideal conditions for photovoltaic arrays, nighttime dew should provide enough moisture to keep the cells clean, Wong said.

The research team, which also included Yonghao Xiu, Shu Zhang and Yan Liu, is working with Georgia Tech's University Center of Excellence for Photovoltaics Research and Education -- headed by Professor Ajeet Rohatgi of Georgia Tech's School of Electrical and Computer Engineering -- to evaluate the surface treatment with real solar cells.

However, adoption of the superhydrophobic surface treatment will ultimately depend on its long-term robustness and cost.

"Because the structures are so small, they are fairly fragile," Hess noted. "Mechanical abrasion to the surface can destroy the superhydrophobicity. We have tried to address that here by creating a large superhydrophobic surface area so that small amounts of damage won't affect the overall surface."

Large scale cost estimates haven't yet been done, but Hess said the additional etching and vacuum deposition steps shouldn't add dramatically to the already complex manufacturing process used for fabricating silicon PV cells.

In addition to photovoltaic cells, the surface treatment could be used to create anti-bacterial coatings on medical equipment, micro-electromechanical devices that don't stick together, and improved microfluidic devices.

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

http://www.sciencedaily.com/releases/2009/03/090324171552.htm

'First Economical Process' For Making Biodiesel Fuel From Algae

This is the feedstock transferring system for algae biodiesel. (Credit: United Environment & Energy LLC)

ScienceDaily (Mar. 31, 2009) — Chemists reported development of what they termed the first economical, eco-friendly process to convert algae oil into biodiesel fuel — a discovery they predict could one day lead to U.S. independence from petroleum as a fuel.The study was presented recently at the 237th National Meeting of the American Chemical Society.

One of the problems with current methods for producing biodiesel from algae oil is the processing cost, and the New York researchers say their innovative process is at least 40 percent cheaper than that of others now being used. Supply will not be a problem: There is a limitless amount of algae growing in oceans, lakes, and rivers, throughout the world.Another benefit from the "continuously flowing fixed-bed" method to create algae biodiesel, they add, is that there is no wastewater produced to cause pollution.

"This is the first economical way to produce biodiesel from algae oil," according to lead researcher Ben Wen, Ph.D., vice president of United Environment and Energy LLC, Horseheads, N.Y. "It costs much less than conventional processes because you would need a much smaller factory, there are no water disposal costs, and the process is considerably faster."A key advantage of this new process, he says, is that it uses a proprietary solid catalyst developed at his company instead of liquid catalysts used by other scientists today. First, the solid catalyst can be used over and over. Second, it allows the continuously flowing production of biodiesel, compared to the method using a liquid catalyst. That process is slower because workers need to take at least a half hour after producing each batch to create more biodiesel. They need to purify the biodiesel by neutralizing the base catalyst by adding acid. No such action is needed to treat the solid catalyst, Wen explains.

He estimates algae has an "oil-per-acre production rate 100-300 times the amount of soybeans, and offers the highest yield feedstock for biodiesel and the most promising source for mass biodiesel production to replace transportation fuel in the United States." He says that his firm is now conducting a pilot program for the process with a production capacity of nearly 1 million gallons of algae biodiesel per year. Depending on the size of the machinery and the plant, he said it is possible that a company could produce up to 50 million gallons of algae biodiesel annually.Wen also says that the solid catalyst continuous flow method can be adapted to mobile units so that smaller companies wouldn't have to construct plants and the military could use the process in the field.

The National Science Foundation funded Wen's research.

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

http://www.sciencedaily.com/releases/2009/03/090325222006.htm

New RFID Technology Tracks And Monitors Nuclear Materials

Argonne nuclear engineer Yung Liu examines data using the radio-frequency identification device developed at the laboratory. The technology allows users not only track nuclear materials, but also remotely monitor environmental and physical conditions such as temperature and humidity. (Credit: Image courtesy of DOE/Argonne National Laboratory)

ScienceDaily (Mar. 31, 2009) — Radio frequency identification (RFID) devices have widely been used for tracking for years; recently, scientists from U.S. Department of Energy's (DOE) Argonne National Laboratory have developed a unique tracking technology that also monitors the environmental and physical conditions of containers of nuclear materials in storage and transportation.

"RFID technology is ideally suited for management of nuclear materials during both storage and transportation," said Dr. Yung Liu, Argonne senior nuclear engineer and RFID project manager. "Key information about the nuclear materials is acquired in real-time," he explained.

Data on the status and history of each individual container are available with a click of the mouse and can be used to augment and modernize DOE's existing management systems for nuclear materials.

"The Argonne system can simultaneously monitor thousands of drums 24 hours a day, seven days a week. Any abnormal situation, such a loss of seal, a sudden shock, a rise in temperature or humidity, can trigger an alarm for immediate action," Liu explained.

The monitoring of tens of thousands of radioactive and fissile material packages has been a challenge for DOE to ensure accountability, safety, security and worker and public health.

"The RFID system that Dr. Liu and his group developed with collaborators will help DOE overcome this challenge," said Dr. James Shuler, Manager of DOE Packaging Certification Program, Office of Environmental Management.

The system is comprised of active transponders, or tags with long-life batteries (>10 years), on each package, readers that collect information from the tags, control computer, and application software. The information is constantly updated and communicated via a secured network, thus decreasing the need for manned surveillance. Explained Liu, "information can be retrieved promptly by local and authorized off-site users via a secured network for action."

This RFID technology also has applications outside the nuclear field and may be used for other hazardous materials or any valued material, according to Liu.

"This new Argonne RFID technology, expected to be patented, has applications in many industries and as the technology is further developed, its usefulness is bound to grow," Liu said.

Funding for this project was made by the U.S. Department of Energy, Office of Environmental Management. The Office of Environmental Management (EM) is responsible for the risk reduction and safe cleanup of the environmental legacy of the Nation's nuclear weapons program and government-sponsored nuclear energy research and is one of the largest, most diverse, and technically complex environmental programs in the world.

Adapted from materials provided by DOE/Argonne National Laboratory.

http://www.sciencedaily.com/releases/2009/03/090324151951.htm

Nine Lives: Cats' Central Nervous System Can Repair Itself And Restore Function

Scientists stu
dying a mysterious neurological affliction in cats have discovered a surprising ability of the central nervous system to repair itself and restore function. (Credit: iStockphoto/Mariya Bibikova)

ScienceDaily (Mar. 31, 2009) — Scientists studying a mysterious neurological affliction in cats have discovered a surprising ability of the central nervous system to repair itself and restore function.

In a study published March 30, 2009 in the *Proceedings of the National Academy of Sciences*, a team of researchers from the University of Wisconsin-Madison reports that the restoration in cats of myelin — a fatty insulator of nerve fibers that degrades in a host of human central nervous system disorders, the most common of which is multiple sclerosis — can lead to functional recovery.

"The fundamental point of the study is that it proves unequivocally that extensive remyelination can lead to recovery from a severe neurological disorder," says Ian Duncan, the UW-Madison neuroscientist who led the research. "It indicates the profound ability of the central nervous system to repair itself."

The finding is important because it underscores the validity of strategies to reestablish myelin as a therapy for treating a range of severe neurological diseases associated with the loss or damage of myelin, but where the nerves themselves remain intact.

Myelin is a fatty substance that forms a sheath for nerve fibers, known as axons, and facilitates the conduction of nerve signals. Its loss through disease causes impairment of sensation, movement, cognition and other functions, depending on which nerves are affected.

The new study arose from a mysterious affliction of pregnant cats. A company testing the effects on growth and development in cats using diets that had been irradiated reported that some cats developed severe neurological dysfunction, including movement disorders, vision loss and paralysis. Taken off the diet, the cats recovered slowly, but eventually all lost functions were restored.

"After being on the diet for three to four months, the pregnant cats started to develop progressive neurological disease," says Duncan, a professor of medical sciences at the UW-Madison School of

Veterinary Medicine and an authority on demyelinating diseases. "Cats put back on a normal diet recovered. It's a very puzzling demyelinating disease."

The afflicted cats were shown to have severe and widely distributed demyelination of the central nervous system, according to Duncan. And while the neurological symptoms exhibited by the cats are similar to those experienced by humans with demyelination disorders, the malady does not seem to be like any of the known myelin-related diseases of humans.

In cats removed from the diet, recovery was slow, but all of the previously demyelinated axons became remyelinated. The restored myelin sheaths, however, were not as thick as healthy myelin, Duncan notes.

"It's not normal, but from a physiological standpoint, the thin myelin membrane restores function," he says. "It's doing what it is supposed to do."

Knowing that the central nervous system retains the ability to forge new myelin sheaths anywhere the nerves themselves are preserved provides strong support for the idea that if myelin can be restored in diseases such as multiple sclerosis, it may be possible for patients to regain lost or impaired functions: "The key thing is that it absolutely confirms the notion that remyelinating strategies are clinically important," Duncan says.

The exact cause of the neurological affliction in the cats on the experimental diet is unknown, says Duncan, who was not involved in the original study of diet.

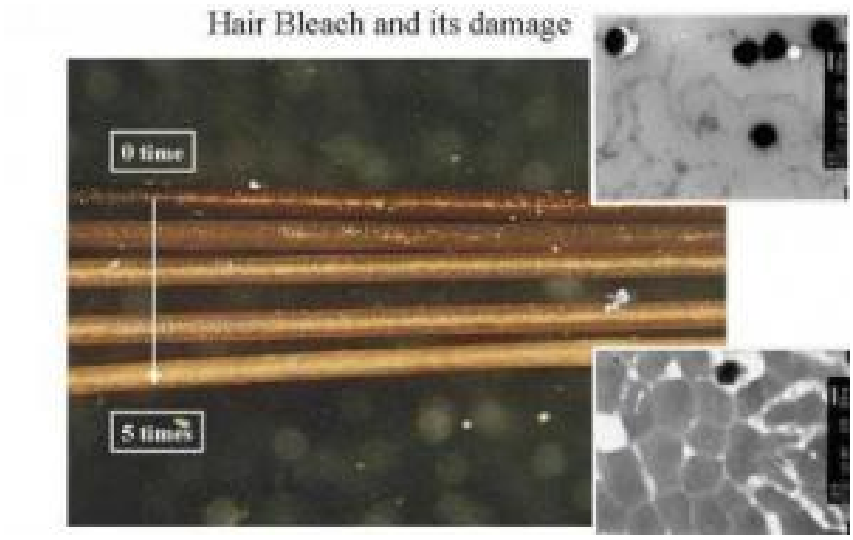
"We think it is extremely unlikely that [irradiated food] could become a human health problem," Duncan explains. "We think it is species specific. It's important to note these cats were fed a diet of irradiated food for a period of time."

In addition to Duncan, authors of the new PNAS study include Alexandra Brower of the Wisconsin Veterinary Diagnostic Laboratory; Yoichi Kondo and Ronald Schultz of the UW-Madison School of Veterinary Medicine; and Joseph Curlee, Jr. of Harlan Laboratories in Madison.

Adapted from materials provided by University of Wisconsin-Madison, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/03/090330200722.htm

'Green' Hair Bleach May Become Environmentally Friendly Consumer Product



The color changes from conventional bleach are apparent as is the corresponding damage caused to hair fibers (bottom image). (Credit: Kenzo Koike)

ScienceDaily (Mar. 31, 2009) — Scientists from Japan today reported development of what could be the world's first "green" hair bleach, an environmentally friendly preparation for lightening the color of hair on the head and other parts of the body without the unwanted effects of the bleaches used by millions of people each year.Speaking at the 237th National Meeting of the American Chemical Society, Kenzo Koike, Ph.D., pointed out that traditional hair bleaches rely on hydrogen peroxide. Peroxide is highly effective in oxidizing, or breaking down, melanin, the black pigment that gives hair a dark color.

However, peroxide bleaches have several disadvantages. "Bleach usually has to be repeated, for example, once every three months, in order to keep the satisfactory level of color because hair grows 1 cm. each month," explained Koike, who is with the Kao Corporation's Beauty Research Center in Tokyo. "In changing from a dark brown to a light blonde color, consumers may have to bleach several times. Repeated bleaching may compound another disadvantage of hydrogen peroxide — hair damage."He added that hydrogen peroxide is a harsh material. Repeated use can leave hair brittle and lifeless, with almost no attractive sheen. It also can irritate the scalp and other parts of the body.

Those unwanted effects have set scientists on a quest for milder bleaching agents, added Koike, who will discuss ways to improve color removal, including making it more effective and convenient. Koike said that his new "green" hair treatment may be the long-awaited solution.In the ACS report, he described isolation of an enzyme from a strain of Basidiomycete ceriporiopsis, a type of "white-rot" fungus that has also shown potential to degrade and clean up pollutants in soil. The enzyme naturally degrades melanin. It has the added benefit of combating the effects of free radicals, highly reactive agents produced by hydrogen peroxide that are responsible for its damaging effects in making hair brittle, dull, and difficult-to-manage."I think this is the first enzyme found that degrades melanin," he says, adding that it could be added to traditional hair bleaches to prevent hair damage, leading to hair care products that use less hydrogen peroxide.Laboratory tests show that the enzyme is effective in bleaching synthetic melanin and melanin in human hair. Koike is working on incorporating it into conventional peroxide hair bleaches. Because the enzyme needs hydrogen peroxide to complete a chemical reaction, a small amount of peroxide would be needed for a product to work. So far, researchers are hampered by having access to only small amounts of the enzyme — a problem they expect to solve and move ahead with further tests, including clinical trials on humans.

Koike's short-term goal is pinning down how the enzyme affects melanin. "Although I expect it can degrade melanin by its oxidation, we don't know the mechanism of the reaction. We should examine it and test it more and more."

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

http://www.sciencedaily.com/releases/2009/03/090324171420.htm

New Theory On Largest Known Mass Extinction In Earth's History

Hypothetically speaking, large areas of the hyper saline Zechstein Sea and its direct environment could have looked like this, which in the Permian Age was situated about where present day Central Europe is. At the end of the Permian Age the Zechstein Sea was irrevocably disconnected from the open sea and the remaining sections of sea soon dried out after that. As a result the microbial-limited halogenated gases from the Zechstein Sea stopped and vegetation was able to regenerate again. The pink colour of the Zechstein Sea was probably brought about by microbes with an extreme preference for salt, as is the case with salt lakes today. In the background sand dunes can be recognised from a landscape with hardly any water. (Credit: Dr. Karsten Kotte/Universität Heidelberg)

ScienceDaily (Mar. 31, 2009) — The largest mass extinction in the history of the earth could have been triggered off by giant salt lakes, whose emissions of halogenated gases changed the atmospheric composition so dramatically that vegetation was irretrievably damaged.At least that is what an international team of scientists has reported in the most recent edition of the *Proceedings of the Russian Academy of Sciences (Dokladi Earth Sciences).* At the Permian/Triassic boundary, 250 million years ago, about 90 percent of the animal and plant species ashore became extinct. Previously it was thought that volcanic eruptions, the impacts of asteroids, or methane hydrate were instigating causes.

The new theory is based on a comparison with today's biochemical and atmospheric chemical processes. "Our calculations show that airborne pollutants from giant salt lakes like the Zechstein Sea must have had catastrophic effects at that time", states co-author Dr. Ludwig Weißflog from the Helmholtz-Center for Environmental Research (UFZ). Forecasts predict an increase in the surface areas of deserts and salt lakes due to climate change. That is why the researchers expect that the effects of these halogenated gases will equally increase. The team of researchers from Russia, Austria, South Africa and Germany investigated whether a process that has been taking place since primordial times on earth could have led to global mass extinctions, particularly at the end of the Permian. The starting point for this theory was their discovery in the south of Russia and South Africa that microbial processes in present-day salt lakes naturally produce and emit highly volatile halocarbons such as chloroform, trichloroethene, and tetrachloroethene.

They transcribed these findings to the Zechstein Sea, which about 250 million years ago in the Permian Age, was situated about where present day Central Europe is. The Zechstein Sea with a total surface area of around 600.000 km^2 was almost as large as France is today. The hyper saline flat sea at that time was

exposed to a predominantly dry continental desert climate and intensive solar radiation – like today's salt seas. "Consequently, we assume that the climatic, geo-chemical and microbial conditions in the area of the Zechstein Sea were comparable with those of the present day salt seas that we investigated," Weißflog said.

In their current publication the authors explain the similarities between the complex processes of the CO_2-cycle in the Permian Age as well as between global warming from that time and at present. Based on comparable calculations from halogenated gas emissions in the atmosphere from present-day salt seas in the south of Russia, the scientists calculated that from the Zechstein Sea alone an annual VHC emissions rate of at least 1.3 million tonnes of trichloroethene, 1.3 million tonnes of tetrachloroethene, 1.1 million tonnes of chloroform as well as 0.050 million tonnes of methyl chloroform can be assumed. By comparison, the annual global industrial emissions of trichloroethene and tetrachloroethene amount to only about 20 percent of that respectively, and only about 5 percent of the chloroform from the emissions calculated for the Zechstein Sea by the scientists. Incidentally, the industrial production of methyl chloroform, which depletes the ozone layer, has been banned since 1987 by regulation of the Montreal Protocol.

"Using steppe plant species we were able to prove that halogenated gases contribute to speeding up desertification: The combination of stress induced by dryness and the simultaneous chemical stressor „halogenated hydrocarbons" disproportionately damages and destabilize the plants and speeds up the process of erosion," Dr. Karsten Kotte from the University of Heidelberg explained.

Based on both of these findings the researchers were able to form their new hypothesis: At the end of the Permian Age the emissions of halogenated gases from the Zechstein Sea and other salt seas were responsible in a complex chain of events for the world's largest mass extinction in the history of the earth, in which about 90 percent of the animal and plant species of that time became extinct.According to the forecast from the International Panel on Climate Change (IPCC), increasing temperatures and aridity due to climate change will also speed up desertification, increasing with it the number and surface area of salt seas, salt lagoons and salt marshlands. Moreover, this will then lead to an increase in naturally formed halogenated gases. The phytotoxic effects of these substances become intensified in conjunction with other atmospheric pollutants and at the same time increasing dryness and exponentiate the eco-toxicological consequences of climate change.

The new theory could be like a jigsaw piece that contributes to solving the puzzle of the largest mass extinction in the history of the earth. "The question as to whether the halogenated gases from the giant salt lakes alone were responsible for it or whether it was a combination of various factors with volcanic eruptions, the impact of asteroids, or methane hydrate equally playing their role still remains unanswered," Ludwig Weißflog said. What is fact however is that the effects of salt seas were previously underestimated.In their publication the researchers working with Dr. Ludwig Weißflog from the UFZ and Dr. Karsten Kotte from the University of Heidelberg want to showed that recent salt lakes and salt deserts of south-east Europe, Middle Asia, Australia, Africa, America can not only influence the regional but also the global climate. The new findings on the effects of these halogenated gases are important for revising climate models, which form the basis for climate forecasts.

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Adapted from materials provided by Helmholtz Centre For Environmental Research - UFZ.

http://www.sciencedaily.com/releases/2009/03/090330102659.htm

Tiny But Toxic: Mechanism Of Neurodegeneration In Alzheimer's Disease Discovered

ScienceDaily (Mar. 31, 2009) — Tiny, toxic protein particles severely disrupt neurotransmission and inhibit delivery of key proteins in Alzheimer's disease, two separate studies by Marine Biological Laboratory (MBL) researchers have found.The particles are minute clumps of amyloid beta, which has long been known to accumulate and form plaques in the brain of Alzheimer's patients.

"These small particles that haven't aggregated into plaques—these are increasingly being seen as the really toxic species of amyloid beta," says Scott Brady of University of Illinois College of Medicine, who has been an MBL investigator since 1982.Brady and his colleagues found that these particles inhibit neurons from communicating with each other and with other target cells in the body.

"The disease symptoms for Alzheimer's are associated not with the death of the neurons – that is a very late event – but with the loss of functional connections. It's when the neuron is no longer talking to its targets that you start to get the memory deficits and dementia associated with the disease," Brady says.

The amyloid beta particles activate an enzyme, CK2, which in turn disrupts the "fast axonal transport" system inside the neuron, Brady found. This transport system has motor proteins that move various kinds of cargo (including neurotransmitters and the associated protein machinery for their release) from place to place in the neuron on microtubule tracks.Brady's findings are complemented by a new study by Rudolfo Llinás of New York University School of Medicine. Brady and Llinás both conduct neuroscience research at the MBL using the giant nerve cell of the Woods Hole squid, Loligo paeleii, as a model system.

Llinás found that activation of CK2 blocks neurotransmission at the synapse – the point where the neuron connects to its target."Disruptions in the fast axonal transport system are probably key elements in the pathogenesis of Alzheimer's and other adult-onset neurodegenerative diseases, such as Parkinson's and ALS," says Brady. "It doesn't mean that is the only thing going on, or that it is the triggering feature of the disease. But we do know that changes in the fast axonal transport system are sufficient to cause the 'dying back' of neurons that is characteristic of these diseases."

The new findings suggest the possibility of designing a drug to inhibit CK2 activation in Alzheimer's patients. However, a prior study by Brady found that activation of another enzyme, GSK3, in Alzheimer's also disrupts the fast axonal transport system. It may therefore be necessary to inhibit both enzymes.

"There haven't yet been any therapies designed for Alzheimer's with the idea of protecting the fast axonal transport system," says Brady. "But if there were, they would have to inhibit the activation of both CK2 and GSK3. We can't think of it as a single thing going wrong. There are several things going wrong."

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Adapted from materials provided by Marine Biological Laboratory, via EurekAlert!, a service of AAAS
http://www.sciencedaily.com/releases/2009/03/090326120841.htm

New Solutions For The Arsenic-poisoning Crisis In Asia

A team led by soil scientist Scott Fendorf, above, has discovered how arsenic enters the groundwater below the Himalayas. (Credit: L.A. Cicero)

ScienceDaily (Apr. 2, 2009) — Every day, more than 140 million people in southern Asia drink groundwater contaminated with arsenic. Thousands of people in Bangladesh, Cambodia, India, Myanmar and Vietnam die of cancer each year from chronic exposure to arsenic, according to the World Health Organization. Some health experts call it the biggest mass poisoning in history.

More than 15 years ago, scientists pinpointed the source of the contamination in the Himalaya Mountains, where sediments containing naturally occurring arsenic were carried downstream to heavily populated river basins below.

But one mystery remained: Instead of remaining chemically trapped in the river sediments, arsenic was somehow working its way into the groundwater more than 100 feet below the surface. Solving that mystery could have significant implications for policymakers trying to reverse the mass poisoning, said Stanford University soil scientist Scott Fendorf.

"How does the arsenic go from being in the sediment loads, in solids, into the drinking water?" said Fendorf, a professor of environmental Earth system science and a senior fellow at Stanford's Woods Institute for the Environment.

To find out, he launched a field study in Asia in 2004 with two Stanford colleagues: Chris Francis, an assistant professor of geological and environmental sciences, and Karen Seto, now at Yale University. The initial study was funded with a two-year Woods Institute Environmental Venture Projects grant. Five years later, the research team appears to have solved the arsenic mystery and is working with policymakers and government officials to prevent the health crisis from escalating.

"The real thing is, how do we help the people who are there?" Fendorf said. "But first, we have to understand the coupling of hydrology—the way the water is flowing—with the chemistry and biology."

Finding a study site

Arsenic-laden rocks in the Himalayas feed into four major river systems: the Mekong, Ganges-Brahmaputra, Irrawaddy and Red. Epidemiologists first identified arsenic poisoning in the 1980s in the Ganges-Brahmaputra Delta in Bangladesh. The sudden occurrence of the disease was linked to the increased use of wells for drinking water.

Scientists had long assumed that the contamination process occurred deep underground, in buried sediments that release arsenic into aquifers 100 to 130 feet below the surface. But Fendorf and his colleagues had data suggesting otherwise. They suspected that the arsenic actually dissolved at a much higher depth, very close to the surface. "As the water starts to move down into the soil, it picks up arsenic. That was our hypothesis," he said. "We needed to follow the chemistry of the surface water as it moved down into the groundwater."

Fendorf and his colleagues began their fieldwork in the Brahmaputra River basin of Bangladesh. However, creating a hydrology model was a challenge, because the landscape was dotted with irrigation wells that alter the natural path of water. "When you draw out how the water might flow, it looks like spaghetti," Fendorf explained. "Before we even started we said there is no way this is going to be possible."

The researchers needed a less-developed site that was chemically, biologically and geologically similar to Bangladesh. The Mekong River in Cambodia offered a perfect alternative. Its headwaters are only 100 miles away from those of the Brahmaputra River. "All the chemistry up in the Himalayas is similar," Fendorf added. "The transport down the big river system is very similar as well."

More importantly, the Cambodia site was mostly undeveloped. "Cambodia had been under a 35-year civil war that had really repressed its development, so it was in essence Bangladesh 40 or 50 years ago," he said. "In some ways it would actually be setting the clock back and getting a snapshot back in time. By virtue of having this more simplistic system, we could really track the entire water flow."

Field results

The new field site was located just south of Cambodia's capital, Phnom Penh. Fendorf hired local workers to drill wells at three different depths throughout the 20-square-mile site. Testing the water for dissolved arsenic at various depths allowed the researchers to pinpoint where the toxin was migrating into the aquifer. To observe solids, they also installed water-sampling devices a foot or two below the surface. The data they collected allowed them to put together a model of arsenic cycling in the river delta.

"We found out that, sure enough, within the first 2 to 3 feet from the surface, arsenic was coming out of the solids—that is, the sediments transported down from the Himalayas—and into the water, and then it migrated down into the aquifer," Fendorf said. Aquifers are the source of drinking water for people who use wells throughout Cambodia, Bangladesh, Myanmar, India and Vietnam.

The culprits responsible for dissolving the arsenic turned out to be bacteria that live in the soil and sediment of the river basin. The researchers discovered that arsenic flowing down the river from the Himalayas sticks to rust particles called iron oxides. Upon reaching the river delta, these arsenic-laden particles are buried by several layers of soil, creating an oxygen-free, or anaerobic, environment. Normally, bacteria use oxygen to breathe. But in an anaerobic environment, they can use other chemicals, including rust and arsenic. As the bacteria metabolize the iron and arsenic, they convert it to a form that readily dissolves in water.

"As these sediments get buried very rapidly, the bacteria go through an anaerobic metabolism that dissolves the iron minerals and the arsenic with it," Fendorf said. "The arsenic goes into the water and the problem starts."

The results, published in the journal Nature, confirmed Fendorf's hypothesis: Arsenic contamination was occurring near the surface and, in fact, would take at least 100 years to reach the aquifer below. The Stanford team also showed that the 100-year-scale cycling of arsenic into the aquifer was a natural process that had been occurring for thousands of years, preceding any human influence. "We showed that there is a perpetual source of arsenic that replenishes from the surface," Fendorf said.

Solutions to the crisis

Understanding the area's hydrology will allow developers to strategically install wells that draw from areas free of dissolved arsenic, providing clean, drinkable water. Such targeted excavation can be extremely accurate, Fendorf said.

But what if a village needs a well but is unable to find an arsenic-free location to install it? Fendorf has proposed several solutions, including installing arsenic filters, collecting rainwater and purifying surface water. Each option has pros and cons, he said.

Filtering arsenic from well water raises the problem of how to dispose of leftover waste. "There aren't hazardous waste landfill sites," he noted. Additionally, the filter approach requires a dependable monitoring system. "If you do have a failure of the filter, how do you know when it occurs, and how are you going to be testing for that?" he asked.

Harvesting rainwater with collection tanks or rooftop gutters can be effective in certain locations and for certain people, he said. But areas with longer dry seasons require big tanks that are often too expensive. "These are areas where people are making less than $2 a day," Fendorf noted.Another option is to use a disinfectant to purify surface water collected from ponds or rivers. The problem, he said, is that the filters have to be very cheap and easy to use. To solve the problem, Fendorf has been collaborating with Resource Development International (RDI), a non-governmental organization in Cambodia that makes affordable filters from locally discarded clay and rice hulls.

With these challenges in mind, Fendorf and Stanford post-doctoral scholar Matt Polizzotto have proposed finding the best option on a village-by-village basis. Beginning March 24, Fendorf will co-host a four-day meeting on arsenic poisoning in Siam Reap, Cambodia, with about 60 experts, including government officials, scholars, NGOs and funding agencies, such as the World Bank. The meeting was convened by the American Geophysical Union and the Woods Institute."The first three days will be devoted to the arsenic groundwater problem," Fendorf said. "We hope to converge on a resolution, as a scientific body, on what we agree about the problem, what remains unresolved and what needs to be done to fill the gap. The final day of the meeting will look more holistically at the water problem, examining best options for bringing safe drinking water to the populace."

Land-use changes

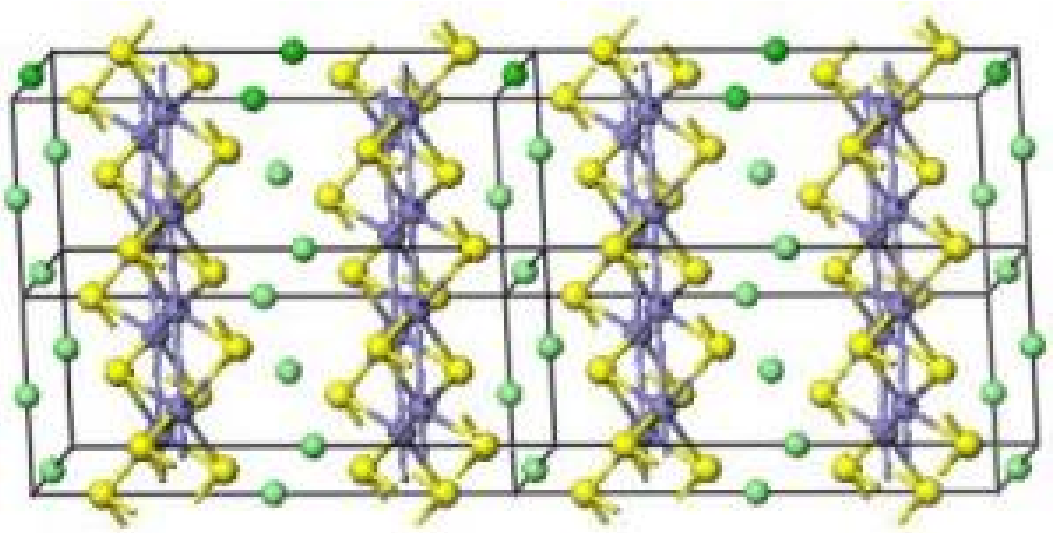
According to Fendorf, the new understanding of arsenic cycling comes at a critical time for Cambodia, which is finally recovering from years of political unrest and is looking to bolster its economy by installing wells for drinking water and irrigation, and excavating soil to make roads and bricks. Such land-use changes could affect arsenic flow patterns throughout the delta, he warned, although in some cases, this may not be a bad thing. "The land-use changes will definitely modify the arsenic levels," he said. "Sometimes they might increase the level, and sometimes they might decrease it, depending on where they are situated and what the surrounding environment is like."Although Fendorf and his colleagues came to Cambodia focused on understanding the science of arsenic contamination, they soon realized that what mattered most was the potential to make a difference in the lives of individuals. For example, the researchers tested each well they drilled for arsenic contamination. If it tested clean, they installed an additional well for domestic use and offered it to the landowner. If a well proved contaminated, the researchers would buy the landowner a rainwater-harvesting unit locally made by RDI.

"If we can give people a clean well or a rainwater harvesting unit, that's going to go a lot further, in the short term at least, than any of our study results," Fendorf said.

Adapted from materials provided by Stanford University.

http://www.sciencedaily.com/releases/2009/03/090325091830.htm

Magnetism Governs Properties Of Iron-based Superconductors



NIST research shows that magnetism plays a key role in iron pnictide superconductors' crystal structure. (Iron is purple; arsenic is yellow; calcium is green.) Only if the iron's magnetism is taken into account do calculations of the distance between these crystal layers match up with lab measurements. Magnetism's importance to their physical properties make it a likely factor in the iron pnictides' ability to superconduct, say team members. (Credit: Yildirim, NIST)

ScienceDaily (Apr. 2, 2009) — Though a year has passed since the discovery of a new family of high-temperature superconductors, a viable explanation for the iron-based materials' unusual properties remains elusive. But a team of scientists working at the National Institute of Standards and Technology (NIST) may be close to the answer.The team has found strong evidence that magnetism is a pivotal factor governing the physical properties of iron pnictides, a group of materials that conduct electricity without resistance at temperatures of up to 56 kelvin (-217 degrees celsius). Iron pnictides are composed of regularly spaced layers of iron sandwiched between other substances. And although -217 might sound pretty cold, they are the first class of materials found to superconduct at that high a temperature since the discovery of copper-based superconductors more than two decades ago.

The team's evidence shows that, without taking magnetism into account, theoretical calculations of iron pnictides' inner structure do not line up with actual lab measurements. Factor in magnetism, though, and these discrepancies vanish—a decisive difference that, according to theorist Taner Yildirim, could imply that magnetism is also key to iron pnictide superconductivity."Without considering magnetism, for example, the calculated distance between iron layers—a distance that has been thoroughly measured—comes out to be wrong," says Yildirim, of NIST's Center for Neutron Research. "However, provided that we consider magnetic spin in our calculations, we can explain almost all of the iron pnictides' structural and dynamic properties."Yildirim gave an invited talk at the March meeting of the American Physical Society, where he presented theoretical evidence demonstrating how magnetism controls basic aspects of iron pnictides as the position of the atoms, the materials' phase transition, i.e. the sudden changes in the structure with temperature, and—probably, Yildirim says—their superconducting properties."Determining the mechanism of superconductivity in iron pnictide systems is very important in solving the long-standing mystery of the high temperature superconductor phenomena in general," Yildirim says. "Once we have such an understanding of this strange phenomenon, we can then make predictions and design new materials with even higher superconductivity temperatures."

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

http://www.sciencedaily.com/releases/2009/03/090325132452.htm

Carbon Capture Has A Sparkling Future, New Findings Show

Carbon dioxide gas can dissolve in underground water -- like bottled sparkling water. (Credit: iStockphoto/Dirk Rietschel)

ScienceDaily (Apr. 2, 2009) — New research shows that for millions of years carbon dioxide has been stored safely and naturally in underground water in gas fields saturated with the greenhouse gas. The findings – published in *Nature* April 1 – bring carbon capture and storage a step closer.

Politicians are committed to cutting levels of atmospheric carbon dioxide to slow climate change. Carbon capture and storage is one approach to cut levels of the gas until cleaner energy sources are developed.

But the risks around the long-term storage of millions of cubic metres of carbon dioxide in depleted gas and oil fields has met with some concern, not least because of the possibility of some of the gas escaping and being released back to the atmosphere. Until now, researchers couldn't be sure how the gas would be securely trapped underground.

Naturally-occurring carbon dioxide can be trapped in two ways. The gas can dissolve in underground water – like bottled sparkling water. It can also react with minerals in rock to form new carbonate minerals, essentially locking away the carbon dioxide underground.

Previous research in this area used computer models to simulate the injection of carbon dioxide into underground reservoirs in gas or oil fields to work out where the gas is likely to be stored. Some models predict that the carbon dioxide would react with rock minerals to form new carbonate minerals, while others suggest that the gas dissolves into the water. Real studies to support either of these predictions have, until now, been missing.

To find out exactly how the carbon dioxide is stored in natural gas fields, an international team of researchers - led by the University of Manchester - uniquely combined two specialised techniques. They measured the ratios of the stable isotopes of carbon dioxide and noble gases like helium and neon in nine gas fields in North America, China and Europe. These gas fields were naturally filled with carbon dioxide thousands or millions of years ago.

They found that underground water is the major carbon dioxide sink in these gas fields and has been for millions of years.

Dr Stuart Gilfillan, the lead researcher who completed the project at the University of Edinburgh said: "We've turned the old technique of using computer models on its head and looked at natural carbon dioxide gas fields which have trapped carbon dioxide for a very long time."

"By combining two techniques, we've been able to identify exactly where the carbon dioxide is being stored for the first time. We already know that oil and gas have been stored safely in oil and gas fields over millions of years. Our study clearly shows that the carbon dioxide has been stored naturally and safely in underground water in these fields."

Professor Chris Ballentine of the University of Manchester, the project director, said: "The universities of Manchester and Toronto are international leaders in different aspects of gas tracing. By combining our expertise we have been able to invent a new way of looking at carbon dioxide fields. This new approach will also be essential for monitoring and tracing where carbon dioxide captured from coal-fired power stations goes when we inject it underground – this is critical for future safety verification."

Professor Barbara Sherwood Lollar of the University of Toronto and co-author of the study hopes the new data can be fed into future computer models to make modelling underground carbon capture and storage more accurate.

The work was funded by the Natural Environment Research Council and the Natural Sciences and Engineering Research Council of Canada.

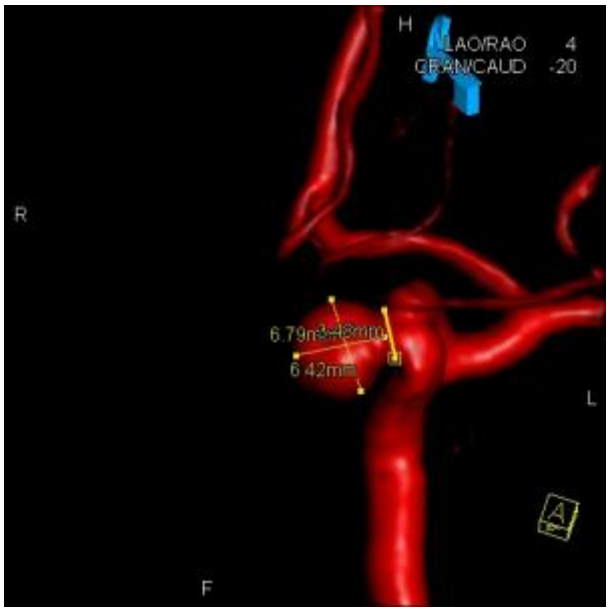
Journal reference:

1. Stuart M. V. Gilfillan, Barbara Sherwood Lollar, Greg Holland, Dave Blagburn, Scott Stevens, Martin Schoell, Martin Cassidy, Zhenju Ding, Zheng Zhou, Georges Lacrampe-Couloume & Chris J. Ballentine. **Solubility trapping in formation water as dominant CO_2 sink in natural gas fields**. *Nature*, 2009; 458 (7238): 614 DOI: 10.1038/nature07852

Adapted from materials provided by Natural Environment Research Council, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/04/090401134602.htm

Brain Surgery On Monday, Home On Tuesday



Norma Wooley's aneurysm was 6.42 mm. across. (Credit: Image courtesy of Loyola University Health System)

ScienceDaily (Apr. 2, 2009) — Norma Wooley checked into Loyola University Hospital on a recent Monday morning for brain surgery to repair a life-threatening aneurysm.

She went home on Tuesday, cured of the slurred speech, drooping face and worst headache of her life.

Dr. John Whapham used a less-invasive technique that's becoming increasingly common in brain surgery. The Loyola University Health System neurologist inserted a catheter (thin tube) in an artery in Wooley's leg and guided it up to her brain. The catheter released tiny platinum coils into the bulging aneurysm, effectively sealing it off.

"She went home the next morning with a Band Aid on her leg," Whapham said.

Whapham, 36, is part of a new generation of neurologists who are using catheters to repair aneurysms, open clogged arteries, extract blood clots and repair blood vessel malformations in the brain. He also opens blocked carotid arteries in the neck. The catheter technique is much less invasive and risky than traditional brain surgery, which involves cutting a large opening in the skull.

Catheter technology, originally developed for heart surgery, has been modified for narrower and more challenging blood vessels in the brain. "here has been a huge evolution in devices over the last five years," Whapham said. Whapham is an assistant professor in the Departments of Neurology and Neurological Surgery, Loyola University Chicago Stritch School of Medicine.

Whapham recently joined Loyola University Health System. He is board certified in neurology and has completed fellowships in endovascular neurosurgery, diagnostic cerebral angiography and stroke/neuro-critical care.

Wooley, 54, of St. Charles, Ill., is one of Whapham's first patients at Loyola. Her successful treatment illustrates the benefits of performing brain surgery with catheters rather than scalpels.

Wooley had a cerebral aneurysm, a weak spot in a blood vessel that balloons out and fills with blood. About six million Americans -- 1 in 50 people -- have brain aneurysms that could rupture. Each year, aneurysms burst in about 25,000 people, and most die or suffer permanent disabilities, according to the Brain Aneurysm Foundation.

Wooley's aneurysm was roughly one-fourth inch across, and shaped like a gumball. It could burst at any time and cause a debilitating or fatal stroke. Her clinical presentation was suspicious for what's called a "sentinel hemorrhage," in which an aneurysm on the brink of rupture will often perforate without catastrophic clinical or radiographic findings. One day at work, Wooley began slurring her words, as if she had been drinking. Her mouth and eyelid drooped, and she had a headache that felt like someone was hitting her on the back of her head with a baseball bat. An ambulance took her to a local hospital, and she was transferred to Loyola.

"My brain was ready to explode," she said.

Traditional open-brain surgery to repair aneurysms is highly invasive, and recovery can take months. Many patients wind up with cognitive deficits that can, for example, make it impossible to do complex jobs.

Between 80 percent and 90 percent of brain aneurysms can be repaired with less-invasive catheters. Tiny coils of platinum wire are passed through the catheter and released into the bulging aneurysm. The aneurysm fills up with coils, causing the blood to clot. "It's like filling a bathtub with concrete," Whapham said.

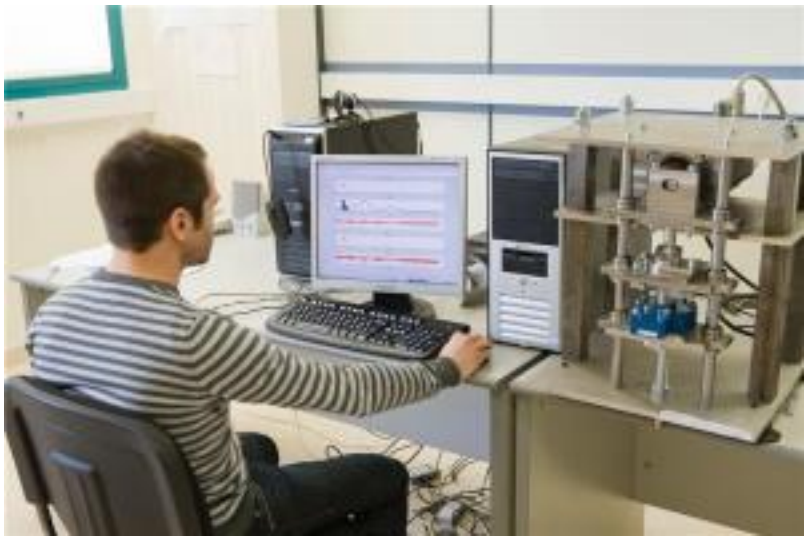
A landmark clinical trial known as ISAT randomly assigned aneurysm patients to receive either open brain surgery or catheter surgery. The catheter group had significantly lower rates of death and disability. Whapham said catheter surgery techniques and devices have improved dramatically since the study was published in 2002 in the British journal Lancet. "Technology is getting better by the week," he said.

Wooley also gives credit to Whapham. "I put my life in his hands, and he gave it back to me," she said.

Adapted from materials provided by Loyola University Health System.

http://www.sciencedaily.com/releases/2009/03/090325162628.htm

Restoring Teeth: Glass Fiber Posts Favor More Resistant And More Beautiful Smiles, Study Finds



A test machine that allows researchers to study the behaviour of posts under repeated mastication loads. (Credit: Image courtesy of Universitat Jaume I)

ScienceDaily (Apr. 1, 2009) — Restoring teeth to not only offer a beautiful smile but also a highly resistant one is the ultimate goal of the project undertaken by members of the Biomechanics and Ergonomy research group at the Universitat Jaume I (UJI) of Castelló, Spain. To this end, they have concluded that the ideal material for designing posts, which serve to bond the restored piece to the root, is glass fibre.

Initially, metallic posts were considered to be more resistant but less aesthetic, according to Ximo Sancho, a member of the Department of Mechanical Engineering and Construction at the UJI.

However, contrary to what was commonly believed, glass fibre and other similar materials are much more resistant than metallic materials. Metallic materials had slightly fallen into disuse because, in spite of being considered to be more resistant, teeth blackened owing to the material covering them being transparent.The first phase of the project entitled “Optimising Dental Intraradicular Post Design Through Biomechanical Simulation and Experimental Testing” concludes that, compared with steel, glass fibre supports a greater load, does not require measurements to be as precise when sizing posts and, furthermore, the tooth’s root is not affected in the event of fracture, unlike metallic posts.

Researchers at the UJI are planning to patent a test machine that allows them to study the behaviour of posts under repeated mastication loads. Initially, the studies carried out at the UJI had examined the behaviour of posts by conducting a fracture strength test on them with a universal test machine. The new machine designed at the UJI will have four independently working columns. This will speed up the tests needed to learn the response to a load that is sometimes repeated more than one million times.

The UJI began this research in 2003 having received a proposal from the Department of Stomatology at the University of Valencia.“They didn’t have the capacity or the appropriate means to conduct this kind of tests, so we started a line of collaboration”, Ximo Sancho explains. In this way, a demand for increasing health practitioners’ knowledge on this issue was met because, despite studies being conducted on partial aspects of posts, no study had been done to obtain the ideal post.

The design of this ideal post will be covered in a new phase of this project. Once it has been achieved, the post design may be patented, or may be acquired by a manufacturing company as several companies have shown interest in this design. For the time being, the results of the first phase of the project have already been published in scientific circles. This has allowed dental surgeons to know the advantages of glass fibre posts and the conclusions to be incorporated into university teaching.

Adapted from materials provided by Universitat Jaume I.

http://www.sciencedaily.com/releases/2009/03/090324111816.htm

Physical Activity May Strengthen Children's Ability To Pay Attention

Charles Hillman and Darla Castelli, professors of kinesiology and community health, have found that physical activity may increase students' cognitive control -- or ability to pay attention -- and also result in better performance on academic achievement tests. (Credit: Photo by L. Brian Stauffer)

ScienceDaily (Apr. 1, 2009) — As school districts across the nation revamped curricula to meet requirements of the federal "No Child Left Behind" Act, opportunities for children to be physically active during the school day diminished significantly.

Future mandates, however, might be better served by taking into account findings from a University of Illinois study suggesting the academic benefits of physical education classes, recess periods and after-school exercise programs. The research, led by Charles Hillman, a professor of kinesiology and community health and the director of the Neurocognitive Kinesiology Laboratory at Illinois, suggests that physical activity may increase students' cognitive control – or ability to pay attention – and also result in better performance on academic achievement tests.

"The goal of the study was to see if a single acute bout of moderate exercise – walking – was beneficial for cognitive function in a period of time afterward," Hillman said. "This question has been asked before by our lab and others, in young adults and older adults, but it's never been asked in children. That's why it's an important question."

For each of three testing criteria, researchers noted a positive outcome linking physical activity, attention and academic achievement.Study participants were 9-year-olds (eight girls, 12 boys) who performed a series of stimulus-discrimination tests known as flanker tasks, to assess their inhibitory control.

On one day, students were tested following a 20-minute resting period; on another day, after a 20-minute session walking on a treadmill. Students were shown congruent and incongruent stimuli on a screen and asked to push a button to respond to incongruencies. During the testing, students were outfitted with an electrode cap to measure electroencephalographic (EEG) activity."What we found is that following the acute bout of walking, children performed better on the flanker task," Hillman said. "They had a higher rate of accuracy, especially when the task was more difficult. Along with that behavioral effect, we also found that there were changes in their event-related brain potentials (ERPs) – in these neuroelectric signals that are a covert measure of attentional resource allocation."

One aspect of the neuroelectric activity of particular interest to researchers is a measure referred to as the P3 potential. Hillman said the amplitude of the potential relates to the allocation of attentional resources.

"What we found in this particular study is, following acute bouts of walking, children had a larger P3 amplitude, suggesting that they are better able to allocate attentional resources, and this effect is greater in the more difficult conditions of the flanker test, suggesting that when the environment is more noisy – visual noise in this case – kids are better able to gate out that noise and selectively attend to the correct stimulus and act upon it."In an effort to see how performance on such tests relates to actual classroom learning, researchers next administered an academic achievement test. The test measured performance in three areas: reading, spelling and math.Again, the researchers noted better test results following exercise."And when we assessed it, the effect was largest in reading comprehension," Hillman said. In fact, he said, "If you go by the guidelines set forth by the Wide Range Achievement Test, the increase in reading comprehension following exercise equated to approximately a full grade level.

"Thus, the exercise effect on achievement is not statistically significant, but a meaningful difference."Hillman said he's not sure why the students' performance on the spelling and math portions of the test didn't show as much of an improvement as did reading comprehension, but suspects it may be related to design of the experiment. Students were tested on reading comprehension first, leading him to speculate that too much time may have elapsed between the physical activity and the testing period for those subjects.

"Future attempts will definitely look at the timing," he said. Subsequent testing also will introduce other forms of physical-activity testing."Treadmills are great," Hillman said. "But kids don't walk on treadmills, so it's not an externally valid form of exercise for most children. We currently have an ongoing project that is looking at treadmill walking at the same intensity relative to a Wii Fit game – which is a way in which kids really do exercise."

Still, given the preliminary study's positive outcomes on the flanker task, ERP data and academic testing, study co-author Darla Castelli believes these early findings could be used to inform useful curricular changes."Modifications are very easy to integrate," Castelli said. For example, she recommends that schools make outside playground facilities accessible before and after school.

"If this is not feasible because of safety issues, then a school-wide assembly containing a brief bout of physical activity is a possible way to begin each day," she said. "Some schools are using the Intranet or internal TV channels to broadcast physical activity sessions that can be completed in each classroom."

Among Castelli's other recommendations for school personnel interested in integrating physical activity into the curriculum:

- scheduling outdoor recess as a part of each school day;
- offering formal physical education 150 minutes per week at the elementary level, 225 minutes at the secondary level;
- encouraging classroom teachers to integrate physical activity into learning.

An example of how physical movement could be introduced into an actual lesson would be "when reading poetry (about nature or the change of seasons), students could act like falling leaves," she said.

The U. of I. study appears in the current issue of the journal *Neuroscience*. Along with Castelli and Hillman, co-authors are U. of I. psychology professor Art Kramer and kinesiology and community health graduate student Mathew Pontifex and undergraduate Lauren Raine.

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

http://www.sciencedaily.com/releases/2009/03/090331183800.htm

Teens Cool Off From Sports With Each Succeeding Winter

Three teenaged siblings enjoying a winter ride on a toboggan. Many teens do not get enough exercise in the winter months. (Credit: iStockphoto/Dan Driedger)

ScienceDaily (Apr. 1, 2009) — Although winter's grasp has subsided to spring, its effects could have a long term impact on the exercise patterns of teenagers. According to a five-year study, while teens are generally more active in warmer months, significant drops in physical activity during winter months contributes to a general slowdown in exercise habits throughout adolescence that could persist over time.

Study investigators – from the Centre de Formation Médicale du Nouveau-Brunswick of the Université de Moncton and Université de Sherbrooke, the Université de Montréal and McGill University – counter that declines in physical activity could be offset by promoting a diversity of physical activities including those that can be enjoyed during winter.

"While physical activity augments in spring and summer, these increases do not compensate for winter drop offs, which contribute to declining physical activity throughout adolescence," says Mathieu Bélanger, lead author of the study, research director at the Centre de formation médicale du Nouveau-Brunswick and epidemiologist at the Centre de recherche Beausejour. "Throughout our five-year study, the average daily number of physical activity sessions among participants decreased by nearly one third. The sharpest declines occurred during the coldest months."

As part of the study, 1293 students initially aged 12 to 13 years were monitored from grade 7 to grade 11. Participants were recruited from 10 schools in the Montreal area and were asked to report involvement in physical activity over different seasons. Results were then compared to weather data from Environment Canada.

"Poor weather is one of the most frequently reported barriers to the practice of physical activity," says Jennifer O'Loughlin a researcher from the Université de Montréal's department of social and preventive medicine Centre Hospitalier de l'Université de Montréal.

"In this study we found weather conditions did affect participation in physical activities, but the effects of climate were very modest, suggesting the impact of seasons on physical activity is not solely related to weather changes," says O'Loughlin.

Bélanger and colleagues hypothesised that weather curtailed spontaneous and unplanned physical activities among teens, since adolescents favour structured activities. What's more, planned activities unfold to preset schedules and are less likely to be cancelled because of inclement weather.

The research team advises that winter activities of all types be promoted to curb drops in physical activity among teens. "We are not advocating that indoor physical activities be preferred to outdoor activities, simply that efforts be made to ensure that a variety of activities be available during winter," cautions Bélanger.

Journal reference:

1. Bélanger et al. **Influence of Weather Conditions and Season on Physical Activity in Adolescents**. *Annals of Epidemiology*, 2009; 19 (3): 180 DOI: 10.1016/j.annepidem.2008.12.008

Adapted from materials provided by University of Montreal.
http://www.sciencedaily.com/releases/2009/03/090331112635.htm

New Molecular Force Probe Stretches Molecules, Atom By Atom

ScienceDaily (Apr. 1, 2009) — Chemists at the University of Illinois have created a simple and inexpensive molecular technique that replaces an expensive atomic force microscope for studying what happens to small molecules when they are stretched or compressed.

The researchers use stiff stilbene, a small, inert structure, as a molecular force probe to generate well-defined forces on various molecules, atom by atom.

"By pulling on different pairs of atoms, we can explore what happens when we stretch a molecule in different ways," said chemistry professor Roman Boulatov. "That information tells us a lot about the properties of fleeting structures called transition states that govern how, and how fast, chemical transformations occur."

Boulatov, research associate Qing-Zheng Yang, postdoctoral researcher Daria Khvostichenko, and graduate students Zhen Huang and Timothy Kucharski describe the molecular force probe and present early results in a paper accepted for publication in *Nature Nanotechnology.* The paper is to be posted on the journal's website on March 29.

Similar to the force that develops when a rubber band is stretched, restoring forces occur in parts of molecules when they are stretched. Those restoring forces contain information about how much the molecule was distorted, and in what direction.

The molecular force probe allows reaction rates to be measured as a function of the restoring force in a molecule that has been stretched or compressed.

This information is essential for developing a chemomechanical kinetic theory that explains how force affects rates of chemical transformations.

Such a theory will help researchers better understand a host of complex phenomena, from the operation of motor proteins that underlie the action of muscles, to the propagation of cracks in polymers and the mechanisms by which living cells sense forces in their surroundings.

"Localized reactions offer the best opportunity to gain fundamental insights into the interplay of reaction rates and molecular restoring forces," Boulatov said, "but these reactions are extremely difficult to study with a microscopic force probe."

Microscopic force probes, which are utilized by atomic force microscopes, are much too large to grab onto a single pair of atoms. Measuring microns in size, the probe tips contact many atoms at once, smearing experimental results.

"By replacing microscopic force probes with small molecules like stiff stilbene, we can study the relationship between restoring force and reaction rate for localized reactions," Boulatov said. "The more accurately we know where our probe acts, the better control we have over the distortion, and the easier it is to interpret the results."

Using conventional methods, Boulatov and his students first attach stiff stilbene to a molecule they wish to study. Then they irradiate the resulting molecular assembly with visible light. The light causes the stilbene to change from a fully relaxed shape to one that exerts a desired force on the molecule. The chemists then measure the reaction rate of the molecule as a function of temperature, which reveals details of what caused the reaction to accelerate.

One type of chemical transformation the researchers studied is the breaking of one strong (covalent) chemical bond at a time. The experimental results were sometimes counterintuitive.

"Unlike a rubber band, which will always break faster when stretched, pulling on some chemical bonds doesn't make them break any faster; and sometimes it's a bond that you don't pull on that will break instead of the one you do pull," Boulatov said. "That's because experiences in the macroscopic world do not map particularly well to the molecular world."

Molecules do not live in a three-dimensional world, Boulatov said. Molecules populate a multi-dimensional world, where forces applied to a pair of atoms can act in more than three dimensions.

"Even small molecules will stretch and deform in many different ways," Boulatov said, "making the study of molecular forces even more intriguing."

Funding was provided by the National Science Foundation, the U.S. Air Force Office of Scientific Research, the American Chemical Society Petroleum Research Fund and the U. of I. The National Center for Supercomputing Applications and the U.S. Department of Defense High-Performance Computing Modernization Program provided computational resources.

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

http://www.sciencedaily.com/releases/2009/03/090329143318.htm

Humanoid Robot Helps Scientists Understand Intelligence

Researchers from the Department of Computing work on iCub. (Credit: Image courtesy of Imperial College London)

ScienceDaily (Apr. 1, 2009) — A humanoid robot newly acquired by Imperial College London will lead to a deeper understanding of human intelligence, says scientists. The College's Departments of Computing and Electrical and Electronic Engineering believe that iCub, about the size of a three year old child, will further their research into cognition, the process of knowing that includes awareness, perception, reasoning and judgement.

Researchers want to learn more about how humans use cognition to interact with their world. They believe iCub's human-like body will help them to understand how this is done.

iCub has mechanical joints that enable it to move its head, arms, fingers, eyes and legs similarly to the way that humans do. Professor Murray Shanahan, of the Department of Computing, says this is important because cognition is very much tied up with the way we interact with the world.

"Nature developed cognition for us in order to make us better at interacting with the physical and social world," he explains. "If we want to understand the nature of cognition better then we really need to understand it in the context of something that moves or interacts with objects. That is where iCub can help us."

The team will test their theories about cognition by creating a computer simulation of a brain, which will replicate how neurons in real brains communicate through short bursts of electrical energy. In people, this process helps us to interact with the physical world. For instance, the electrical signals sent by neurons control muscles that enable people to lift a cup to the mouth to sip on a drink.

The team will link the computer simulation of a brain to iCub so that it can process information about its environment and send bursts of electrical energy to its motors to allow it to move its arms, head, eyes and fingers to carry out very simple tasks such as lifting a ball and moving it from one place to another.

If the researchers are successful, they will have made an important step in reproducing the way that humans use cognition to interact in their world. Professor Shanahan says:

"I'm really interested in the fundamental scientific questions about ourselves and about the nature of our own brains and how they allow us to do the kinds of things that we do each day. If we can test our theories about cognition by building and experimenting with robots, then we may just be one step closer to really beginning to understand what makes us tick."

In the long term, they believe their research could help develop a new generation of intelligent factory robots that have much more versatility and do a wider variety of jobs.

Scientists are also interested in the part of cognition that allows humans to work with one another to carry out tasks.

They will develop computer programs that will allow iCub to interact with a human so that they can carry out a task together, such as building a Lego castle from scratch.

If they succeed, they will have demonstrated the cognitive processes that enable social interaction between humans, and have created a viable way for robots to interact with humans to help them to do things. Dr Yiannis Demiris, of the Department of Electrical and Electronic Engineering, adds:

"We are really interested in making robots more empathetic to our needs. Imagine owning a robot like iCub who could be intelligent enough to understand that you are struggling to lift a heavy box and it helps you to carry it or imagine getting it to help you put up a shelf or do the housework because it recognises that you are ill. The work that we are doing could one day make this a reality."

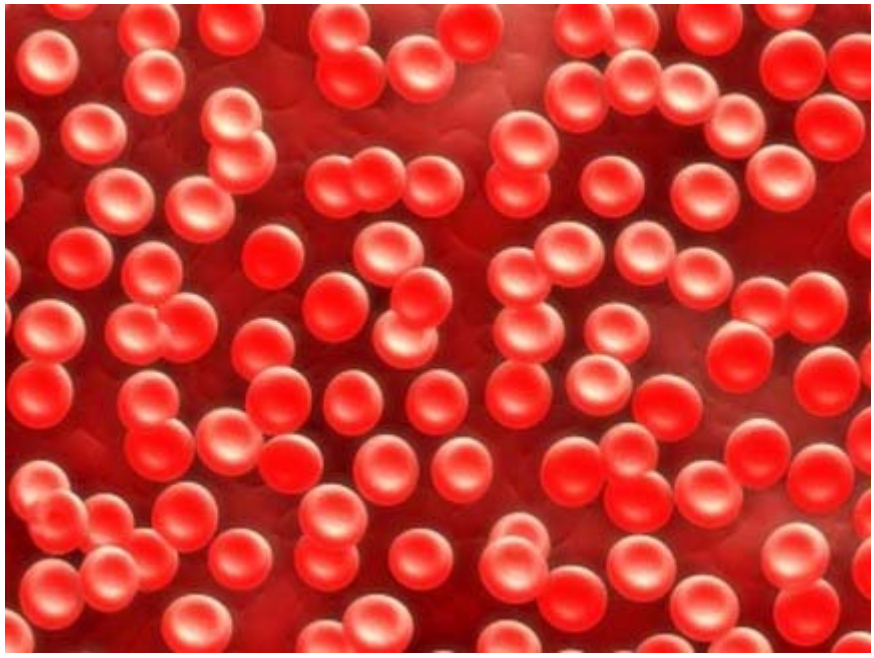
Imperial received iCub in December 2008 as part of an ongoing project funded by the European Commission. Researchers expect to get their first results from their experiments in the next three to five years.

Adapted from materials provided by Imperial College London.

http://www.sciencedaily.com/releases/2009/04/090401114818.htm

New Therapies Break Sickle Cell's Painful Grip

By: David Richardson



Sickle cell anemia, the first genetic disorder recognized by medicine, is still not well understood.

Identified in 1910 by James B. Harrick in Chicago, the disease affects close to 100,000 people in the United States, mostly African American, and millions worldwide. The consequences for patients are devastating.

According to Sophie Lanzkron, director of the Sickle Cell Center for Adults at Johns Hopkins University, 30 percent of sickle cell patients experience pain 90 percent of days. "This is a tough disease; they have intermittent episodes of excruciating pain — they can't go to college or have careers. Patients spend their lives just trying to manage the pain."

With no objective measure of the disease, Lanzkron said patients are frequently stigmatized when they seek medical attention — being mistaken for addicts in search of narcotics — and treated with disdain by emergency-room personnel unfamiliar with the disorder.

The physiological consequences of sickle cell anemia include severe damage to organ systems, particularly to the kidneys and lungs, and can reduce life expectancy for those with sickle cell to the mid-40s. Complications include life-threatening infections and stroke — even in young children.

Children who suffer intermittent attacks miss school with predictable consequences for their lives and for their futures. Meanwhile, their caregivers must miss work to tend to them. Added to this are the health-care costs. Sickle cell patients, Lanzkron said, are often "understandably depressed."

"There are so many unmet needs in this patient population," says Lanzkron, "and I see people come in with horrible complications."

But researchers are targeting the disease with new multidisciplinary approaches with promising results. Combining a novel chemotherapy protocol with a proven bone marrow transplant technique, Robert Brodsky, director of the hematology division at Johns Hopkins University Medicine, announced the cure [**see correction below**] of an adult sickle cell anemia patient — Pamela Newton of Capitol Heights, Md. And researchers with the National Institutes of Health have developed innovative techniques spanning the spectrum from chemotherapy to irradiation to move step-by-step towards a cure for sickle cell and related disorders.

More than meets the eye

Normal red blood cells are disk-shaped and flexible, explained Lanzkron, allowing them to squeeze through tiny capillaries to bring oxygen and nutrients into every part of the body.

In those with sickle cell, their red blood cells contain unusual polymers that intermittently cause the cells to lose their elasticity and lock into a sickle shape, massing and tangling to block blood vessels and capillaries. That's where the pain starts. "But we know it's more complicated than that," she said. The sickle cells also have a reduced oxygen capacity and shortened life expectancy compared to normal blood cells, and they seem to have a negative impact on the blood vessels themselves, "It affects the whole environment."

"Scientists believe (the) sickle cell trait developed in malarial regions over time through natural selection," said Lanetta B. Jordan, chief medical officer with the Sickle Cell Disease Association of America. It persists, she says, "because of the survival benefit it confers against malaria."

Lanzkron elaborated: "People carrying the trait can still get malaria, but they are less likely to die from it." But, she said, "There is no harm in having the trait," which is carried by a recessive gene.

However, when two parents have the trait, their offspring each have a one-in-four chance of having sickle-cell disease. Although mostly associated with blacks in the United States, the disorder is also seen among Latinos, Asians and others with Mediterranean or African ancestry.

Aside from the not-always-effective pain medications, only two approved treatments exist for sickle cell, Jordan said — the chemotherapy drug hydroxyurea to ameliorate crises and bone marrow transplant.

An Elusive and Risky Cure

Bone marrow transplants have been recognized as a cure for sickle cell for more than 20 years, but they have always required a perfect tissue match between the donor and the recipient. Only siblings can meet that requirement, and even then, the odds are one in four of a perfect match. However, because sickle cell is hereditary, closely matched siblings also have a high probability of sharing the disorder.

Lanzkron describes a lifesaving operation: "We give the patient agents that knock out the bone marrow; then it's like getting a transfusion. We harvest a bit of marrow from the donor and infuse it into the patient.

"The bone marrow cells do the rest. They know where to go." It sounds deceptively simple, but Lanzkron says that a bone marrow transplant has between a 10 percent to 20 percent mortality rate. Although the procedure has been used to cure the disease in about 200 patients — all of them children — bone marrow transplant is so problematic in adults that it is rarely attempted except in life-threatening circumstances.

"It is very difficult for adults to embark on a transplant course because, by that time, they have experienced so many transfusions that finding a match in itself is a challenge," Jordan explained. Furthermore, in adulthood, mounting complications and decades of organ damage may render patients too fragile to withstand the chemotherapy required to make it work.

Over the past year, important advances have been made both in widening the pool of potential marrow donors and in lowering the risks of bone marrow transplant.

The intensive chemotherapy regimen, employed up until the 1990s to make way for bone marrow transplants, destroys the patient's native bone marrow so that a graft can take root. But if the graft fails, the patient, with his own marrow obliterated, can no longer produce new blood cells and must be re-transplanted immediately in order to survive.

But this scenario is turning around dramatically thanks to Brodsky's innovative technique developed at Johns Hopkins. Brodsky and his team, who reported the first adult cure in May of last year, took a new approach by utilizing a less toxic chemotherapy regime than customarily used for bone marrow transplants.

It employs just enough chemotherapy to prevent the patient's immune system from rejecting the donated stem cells while preserving as much of the patient's bone marrow as possible.

Three days after the bone marrow transplant, doctors dose the patient with the drug cyclophosphamide to kill off the donor's lymphocytes (white blood cells that attack foreign cells) before they can begin an attack upon the body of their new host. This combination therapy gives the recipient patient's new stem cells a chance to establish themselves in the bone marrow and begin producing healthy blood cells while a compatible — and home-grown — immune system develops.

Most significantly, Brodsky said the procedure allows for transplants not only between fully matched siblings, but also between half-matched pairs, expanding the potential donor pool to parents and other relatives.

Immunosupressive Advances for Sickle Cell and Related Disorders
Jonathan Powell, a National Institutes of Health research fellow, has been collaborating with Dr. John Tisdale at NIH on a different approach, which shows promise not only for sickle cell, but also for thalassemia, Diamond-Blackfan anemia and other severe congenital blood disorders.

Following Tisdale and Powell's protocol, the donor receives specialized chemotherapy for five days with injections of G-CSF, an agent that stimulates white blood cell formation, to prepare the marrow for transplantation. The cells, once harvested, are frozen for five months before being infused into the patient. Patients undergo their own course of immune suppressing chemotherapy, and are given a single dose of full-body radiation to retard the immune system's response to the donated stem cells.

According to Powell, 10 of the 11 people with sickle cell anemia who have undergone this procedure have taken well to the grafts. And in both studies, failure is not necessarily of dire consequence.

Javier Bolaños-Meade, assistant professor of oncology at Johns Hopkins, says with the reduced chemotherapy approach used by both NIH and Hopkins, "the worst case scenario is that the transplant doesn't take — then we're back to square one and the person ends up still having sickle cell," but their bone marrow recovers and they can survive to try an alternative therapy.

Powell said NIH's results have been promising "not in numbers, but in the positive response the patients have had. It shows that we're on the right track.

"There are no major technical hurdles left. Bone marrow transplant is a way to cure sickle cell — unequivocally."

In January 2009, NIH's bone marrow transplant study was expanded to include not only fully matched adults, but also children and half-matched donor/recipient pairs, and recruitment for these new participants is currently under way; likewise for an ongoing study at Hopkins.

Powell says he is exploring collaboration between the NIH study and Brodsky's research at Hopkins that would draw upon the best of both worlds. "We may end up combining ideas."

Bolaños-Meade, who led the Hopkins research team, is also confident and says sickle cell shows some of the best results for transplant therapy for any blood disorder. "Given that this is a common condition, if there's a way to correct the problem, we believe we can have a profound impact."

***Correction:** In an earlier version, we said that Johns Hopkins researcher Robert Brodsky and his colleagues developed "the first-ever cure of an adult sickle cell anemia patient." Dr. Brodsky says that Pamela Newton was cured, but her case is not the first ever adult cure for sickle cell — other adult patients have successfully received bone marrow transplants and been cured. The approach being developed at Johns Hopkins potentially allows for broader application of bone marrow transplants to cure sickle cell. Brodsky notes that this new technique, used for the first time on Ms. Newton, was probably the first successful haploidentical bone marrow transplant for sickle cell — he's unaware of others, but he's not 100 percent certain that there aren't more out there.

http://www.miller-mccune.com/health/new-therapies-break-sickle-cell%E2%80%99s-painful-grip-1038