Infoteca's E-Journal

An Electronic Compilation of Scientific and Cultural Information by
Sistema de Infotecas Centrales, Universidad Autónoma de Coahuila

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Rise in 'school terror attacks'
By Sean Coughlan
BBC News, education and family

"Brutal attacks" on teachers and pupils are being used as a tactic of terror and political violence, says an international report.

A report from the United Nations Educational, Scientific and Cultural Organisation warns of a "significant increase" in attacks on education.

These include assassinations and bomb attacks on staff and pupils in 31 countries around the world.

The report warns of the "degradation" of communities facing such atrocities.

"Education under Attack 2010", a report from the United Nations agency published on Wednesday, reveals a pattern of systematic attacks on teachers, pupils, schools and universities.

Acid attacks

Warning of a rise in attacks in the past three years, the report highlights teachers being murdered in Thailand, the destruction of schools in Afghanistan, sexual attacks on schoolgirls in the Democratic Republic of Congo and "narco-guerrillas" trying to control schools in Brazil.

TYPES OF SCHOOL ATTACK
- Kidnapping and torture
- Gun and rocket attacks
- Explosions
- Mass poisoning
- Sexual violence
- Burning buildings
- Forced recruitment of child soldiers Source: Unesco

It identifies new trends, including "the direct killing and mass poisoning of schools students in Afghanistan and the mass abduction of pupils for recruitment as suicide bombers in Pakistan".

The report begins with a case study - describing the attack on a group of schoolgirls and their teachers in southern Afghanistan in 2008, in which assailants, opposed to the education of women, poured battery acid on the pupils' faces.

Report author, Brendan O'Malley, says attacks on staff and students are much more widespread than had been previously recognised.

"The sheer volume of attacks on education documented demonstrates that the demolition of schools and assassination of students and teachers is by no means limited to supporters of the Taliban fighting in the hills of Afghanistan."

Attacks intensified dramatically in Pakistan, India, Thailand and Afghanistan, says the report.

And it identifies several different strands behind the increase in attacks on education.

Attacks on schools can be used by rebels as way of attacking the state - such as Maoist insurgents in India.

Intimidation

They can also have specific goals - such as in Afghanistan - where attacks oppose the education of women.

Schools and teachers can be attacked as symbolic targets in ethnic, religious or ideological conflicts, such as assaults by Islamist separatists in Thailand, the report says.

And the intimidation of academics can be a way of silencing political opponents and restricting human rights campaigns.

Schools can also be destroyed in military action - with widespread damage caused to education by conflicts in Georgia, Pakistan and Gaza.

There are "grave concerns" in the report over the abuse of teacher trade unionists in Colombia - where 90 teachers were murdered between 2006 and 2008.

Fears of children being abducted and forced to join armed groups was another barrier to education.

Mr O'Malley says "it is hard for us to grasp what it is like for children and teachers to turn up to classes not knowing whether they are going to be blown up by a bomb or picked off by assassins".

And he says such attacks have a profound long-term impact.

"Once a pattern of attacks is established in any one area, there is a multiplier effect, spread by the fear of more to come. Parents will be afraid to send their children to school, teachers will be afraid to go to work," says Mr O'Malley.

"In the worst affected areas the cumulative impact will be years of education that will take years to regain if they can be at all.

"And there are the long-term effects on education systems, where graduates no longer want to go into teaching - because it is too dangerous. Or governments shelve investment or even put off repairing and reopening destroyed buildings, fearing the money will be wasted if attacks are repeated."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/uk_news/education/8500404.stm

Published: 2010/02/10 15:09:18 GMT

Après le Déluge
By CAROLINE WEBER

PARIS UNDER WATER

How the City of Light Survived the Great Flood of 1910

By Jeffrey H. Jackson

Illustrated. 262 pp. Palgrave Macmillan. $27

Paris may be known as the City of Light, but “the City of Water” would be just as apt. Since its origins as an island outpost in the middle of the Seine, the city owes some of its greatest advantages — its trading routes, military security and fertile farmland — to its riverside position. That placement has also, however, long made Paris vulnerable to flooding. The city’s Roman name, Lutetia, is said to derive from the Latin word for mud (lutum), and one of its oldest neighborhoods, the Marais, was originally just that: a marsh. In 814, an unnamed author remarked that “when God wants to punish the people of Paris by water, he sends such a flood and overflows the river Seine.” Divine retribution or not, the deluge is an age-old Parisian problem and accounts for its otherwise improbable-sounding motto: Fluctuat nec Mergitur (“She is tossed about by the waves but does not sink”).

So she does not sink. But in late January 1910, she seemed perilously close to doing so, as unusual weather conditions combined with faulty engineering along the city’s quays to unleash a record-breaking flood. On Jan. 21, observant Parisians noticed that their river — swollen by months of torrential rainfall, flooding in its tributaries and an unseasonably early winter thaw — had risen six feet above its usual level. On Jan. 28, it peaked at 20 feet above normal, higher than it had measured in 250 years. By this time, yellowish, debris-ridden water had cascaded over the Seine’s stone battlements and seeped up through oversaturated soil throughout the city, transforming streets into canals and public squares into lagoons. The distinction between Right and Left Banks, which had defined Paris since time immemorial, had all but washed away. Within the space of a week, the City of Light had become, as Jeffrey H. Jackson writes in “Paris Under Water,” “a drowned city.”

Jackson, a professor of history at Rhodes College in Memphis, explains in an afterword that he discovered the story of the Paris flood not long before Hurricane Katrina ravaged New Orleans, and parallels between the two catastrophes are apparent throughout the book. (These emerge most clearly in the cases where the aid provided to victims is presented as scant and slow to come, as when one city official laments: "The situation is indescribable, and the help which we have waited for is not sufficient.") Wisely, though, Jackson mentions more recent natural disasters only in his epilogue and otherwise keeps a strict narrative attention on Paris in 1910. The result is a tight, concentrated tale of adversity and survival — of the ravages the untamed waters wrought and of the citizens' courageous efforts to save their city (and themselves) from ruin.

Though heroes abound in Jackson's story, his noblest character is the intrepid Louis Lépine. Lépine's responsibilities as Paris's prefect of police included not only law and order but also street and river traffic, train schedules, telecommunications, fire-fighting, the food supply, waste disposal and public health. In late January 1910, all of these things demanded Lépine's attention as floodwater rendered entire sections of Paris impassable except by boat or makeshift walkway. The flood trapped residents in their homes, toppled telegraph lines, and inundated Métro tunnels and train tracks. It also gave rise to looting, street violence and food shortages, not to mention a devastating fire at a suburban vinegar factory. Overflowing cesspools and sewers — as well as flotillas of drowned rats in the Seine — then raised the specter of a typhoid epidemic. Fortunately, Lépine was just the man to handle these crises, endowed as he was not only with a military sense of discipline (he was a decorated war veteran), stoicism and courage, but also with an earnest desire to make Parisians "see him as their man, the one who could keep them safe."

To that end, Lépine worked tirelessly, traipsing throughout the soggy city in his rubber boots and bowler hat to identify problems and devise solutions. Teams of his officers conducted rescue missions, delivered supplies, built walkways, manned ferries, reinforced quays, cleared debris, apprehended criminals, quelled street violence and provided food and shelter to the dispossessed. Given the magnitude of the disaster, though, Lépine's crew needed additional help, which they received from engineers, soldiers, sailors, members of the clergy and the Red Cross.

Everyday Parisians also pitched in, many of them displaying extraordinary valor. With just a single boat at his disposal, for instance, one Monsieur Coutant evacuated nearly 70 people from his neighborhood. (Still, Coutant couldn't resist shouting, "I can't be everywhere!" when his charges became too demanding.) For many commentators, this spirit of self-sacrifice represented the triumph of French brotherhood over entrenched sociopolitical divisions.

Despite many real acts of heroism, this "vision of complete social harmony in the face of disaster, in which political enemies gave up their differences to come together," was also, in part, a myth. After the humiliations of the Franco-Prussian War (in which Prussia occupied Paris, then annexed Alsace-Lorraine) and the scandal of the Dreyfus Affair (in which a trumped-up treason case against a Jewish army officer uncovered the shocking anti-Semitism of many French conservatives), national unity was in short supply. In this context, "Paris's much-vaunted solidarity" became an expedient political fiction: a flag around which, finally, the battered nation could rally. To avoid this ideological trap, Jackson tells his story in an evenhanded way, describing the egotism, violence and treachery that surfaced alongside loftier reactions. At the same time, he has a modest agenda of his own, which he lays out in the book's conclusion.

"Maybe," he suggests, "Paris can serve as a beginning point for thinking about how urban residents can reconnect with one another, since it is impossible to know when nature may present an unexpected challenge and when depending on one's neighbors may determine one's survival." At once pragmatic and inspiring, this proposal has much to recommend it, if like the survivors of the great Paris flood, one would rather swim than sink.

Caroline Weber, a professor of French literature at Barnard College and Columbia University, is a frequent contributor to the Book Review.

http://www.nytimes.com/2010/01/31/books/review/Weber-t.html?nl=books&emc=booksupdateema3

Fusion energy hurdle swept aside

By Jason Palmer
Science and technology reporter, BBC News

A major hurdle to producing fusion energy using lasers has been swept aside, results in a new report show.

The controlled fusion of atoms - creating conditions like those in our Sun - has long been touted as a possible revolutionary energy source.

However, there have been doubts about the use of powerful lasers for fusion energy because the "plasma" they create could interrupt the fusion.

An article in Science showed the plasma is far less of a problem than expected.

The report is based on the first experiments from the National Ignition Facility (Nif) in the US that used all 192 of its laser beams.

Along the way, the experiments smashed the record for the highest energy from a laser - by a factor of 20.

Star power

Construction of the National Ignition Facility began at Lawrence Livermore National Laboratory in 1997, and was formally completed in May 2009.

The goal, as its name implies, is to harness the power of the largest laser ever built to start "ignition" - effectively a carefully controlled thermonuclear explosion.

INERTIAL CONFINEMENT FUSION
- 192 laser beams are focused through holes in a target container called a hohlraum
- Inside the hohlraum is a tiny pellet containing an extremely cold, solid mixture of hydrogen isotopes

- Lasers strike the hohlraum's walls, which in turn radiate X-rays
- X-rays strip material from the outer shell of the fuel pellet, heating it up to millions of degrees
- If the compression of the fuel is high enough and uniform enough, nuclear fusion can result

It is markedly different from current nuclear power, which operates through splitting atoms - fission - rather than squashing them together in fusion.

Proving that such a lab-based fusion reaction can release more energy than is required to start it - rising above the so-called breakeven point - could herald a new era in large-scale energy production.

In the approach Nif takes, called inertial confinement fusion, the target is a centimetre-scale cylinder of gold called a hohlraum.

It contains a tiny pellet of fuel made from an isotope of hydrogen called deuterium.

During 30 years of the laser fusion debate, one significant potential hurdle to the process has been the "plasma" that the lasers will create in the hohlraum.

The fear has been that the plasma, a roiling soup of charged particles, would interrupt the target's ability to absorb the lasers' energy and funnel it uniformly into the fuel, compressing it and causing ignition.

Siegfried Glenzer, the Nif plasma scientist, led a team to test that theory, smashing records along the way.

"We hit it with 669 kilojoules - 20 times more than any previous laser facility," Nif's Siegfried Glenzer told BBC News.

That isn't that much total energy; it's about enough to boil a one-litre kettle twice over.

However, the beams delivered their energy in pulses lasting a little more than 10 billionths of a second.

By way of comparison, if that power could be maintained, it would boil the contents of more than 50 Olympic-sized swimming pools in a second.

'Dramatic step'

Crucially, the recent experiments provided proof that the plasma did not reduce the hohlraum's ability to absorb the incident laser light; it absorbed about 95%.

But more than that, Dr Glenzer's team discovered that the plasma can actually be carefully manipulated to increase the uniformity of the compression.

"For the first time ever in the 50-year journey of laser fusion, these laser-plasma interactions have been shown to be less of a problem than predicted, not more," said Mike Dunne, director of the UK's Central Laser Facility and leader of the European laser fusion effort known as HiPER.

"I can't overstate how dramatic a step that is," he told BBC News. "Many people a year ago were saying the project would be dead by now."

Adding momentum to the ignition quest, Lawrence Livermore National Laboratory announced on Wednesday that, since the Science results were first obtained, the pulse energy record had been smashed again.

They now report an energy of one megajoule on target - 50% higher than the amount reported in Science.

The current calculations show that about 1.2 megajoules of energy will be enough for ignition, and currently Nif can run as high as 1.8 megajoules.

Dr Glenzer said that experiments using slightly larger hohlraums with fusion-ready fuel pellets - including a mix of the hydrogen isotopes deuterium as well as tritium - should begin before May, slowly ramping up to the 1.2 megajoule mark.

"The bottom line is that we can extrapolate those data to the experiments we are planning this year and the results show that we will be able to drive the capsule towards ignition," said Dr Glenzer.

Before those experiments can even begin, however, the target chamber must be prepared with shields that can block the copious neutrons that a fusion reaction would produce.

But Dr Glenzer is confident that with everything in place, ignition is on the horizon.

He added, quite simply, "It's going to happen this year."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8485669.stm

Published: 2010/01/28 23:12:53 GMT

Herbal remedy's epilepsy warning

People with epilepsy should be warned that using a popular herbal remedy may increase the risk of seizures, researchers say.

German scientists, writing in the Journal of Natural Products, said they had found 10 written reports of seizures linked to ginkgo biloba.

They said they were convinced the herb could have a "detrimental effect".

A leading UK epilepsy charity said the evidence was not yet compelling, although it said care was needed.

" **We are now convinced, however, that ginkgo biloba medications and other products can have a detrimental effect on a person's health condition** "
University of Bonn researchers

Ginkgo biloba remedies - made from the leaves of the tree of the same name - is used by many thousands of people in the UK as a remedy for health problems ranging from depression and memory loss, to headaches and dizziness.

The team from the University of Bonn focused on a particular chemical compound in the herb called ginkgotoxin.

They said that evidence suggested that it might alter a chemical-signalling pathway in the body linked to epileptic seizures, and potentially interfere with the effectiveness of anti-seizure medications.

In addition to any benefits, which still remained unproven, they wrote, there was a "clear potential for adverse effects", particularly in susceptible patients

Even though there was no definitive proof that the herb had been the cause of the increase in seizures in the reported cases, patients should be warned about the possibility, and manufacturers asked to test their ginkgo products for levels of the toxin.

'Be aware'

Professor John Duncan, from the National Society for Epilepsy, said that the current evidence did not necessarily warrant restrictions on the use of the remedy.

He said: "We believe that some herbs, for example St John's wort, are linked to a higher risk of seizures, but there is still not a great deal of evidence about problems related to ginkgo.

"We would say that if someone who has epilepsy wants to take this remedy, they should simply be aware of the possibility."

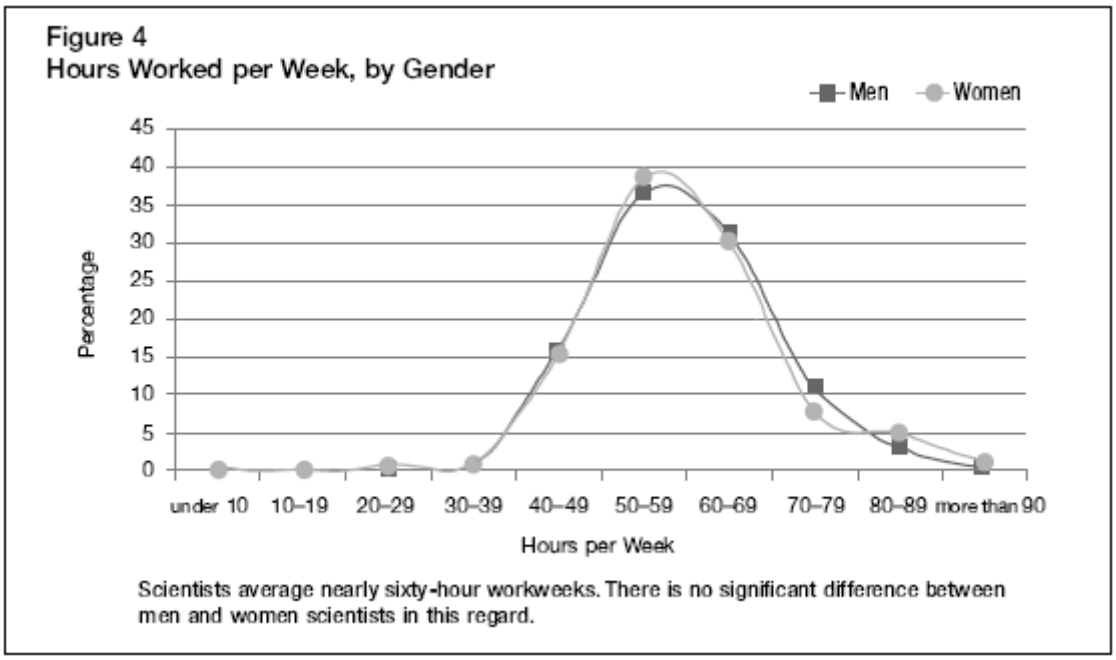
Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8485609.stm

Published: 2010/01/29 00:23:59 GMT

Housework Is an Academic Issue

How to keep talented women scientists in the lab, where they belong.

By Londa Schiebinger and Shannon K. Gilmartin



Scientists are likely not to be interested in thinking about housework. Since René Descartes, Western culture has stringently separated matters of mind from body. Housework is, however, related to the life of the mind. Scientists wear clean clothes to the lab (at least from time to time), eat food procured and prepared by someone, and live in reasonably clean houses. This labor used to be done by stay-athome wives. The single-earner wage of the 1950s, for example, covered the cost of unpaid services that wives performed. Now, housework is often done by wives and partners who are also full-time professionals—and the women we discuss in this study are scientists at thirteen of the top research universities in the United States.

Findings from our study, based on data collected in 2006–07, show that despite women's considerable gains in science in recent decades, female scientists do nearly twice as much housework as their male counterparts. Partnered women scientists at places like Stanford University do 54 percent of the cooking, cleaning, and laundry in their households; partnered men scientists do just 28 percent. This translates to more than ten hours a week for women— in addition to the nearly sixty hours a week they are already working as scientists—and to just five hours for men. When the call came from Stockholm early one October morning, Nobel Prize– winner Carol W. Greider was not working in her lab or sleeping. She was doing laundry. She is far from alone. Highly talented women scientists are investing substantial time in housework.

These findings have important policy implications. Over the past three decades, governments, universities, and industries have dedicated often robust resources to efforts to increase the number of women scientists—and yet progress in attracting more women to science has stalled. The 2009 National Academies report *Gender Differences at Critical Transitions* stresses that research must explore "gender differences in the obligations outside of professional responsibilities" in order to understand women's career choices and outcomes more fully.

In this study, we zero in on the obligation of household labor. We analyze the division of household labor in scientists' homes and their strategies to lighten the household load in order to maintain highly productive careers. We argue that work done in the home is very much an academic issue—not peripheral in any way to scientists' professional lives. Understanding how housework relates to women's careers is one new piece in the puzzle of how to attract more women to science.

Our policy recommendation provides a new solution to one key aspect of balancing life and work. We propose that employers provide benefits to support housework. Many universities already offer retirement, health-care, and child-care supplements; some even support housing and tuition benefits. We recommend that institutions provide a package of flexible benefits that employees can customize to support aspects of their private lives in ways that save time and enhance professional productivity. Institutions need to think of housework benefits as part of the structural cost of doing business. With lab costs running into the millions of dollars, supporting the human resource involved—scientists' ability to be more productive—takes full advantage of investments in space and equipment.

This policy recommendation hinges on the principle that outsourced household labor must be professionalized responsibly— with competitive wages and health-care, family-care, and retirement benefits—and that employers must conduct due diligence on the household service providers with whom they contract. As political scientists John Bowman and Alyson Cole have noted in a recent article in *Signs: Journal of Women in Culture and Society*, "Do Working Mothers Oppress Other Women?" employing others to perform housework is subject to much political, legal, and sociological debate, even in gender-progressive countries like Sweden. "Rather than blaming women who hire housecleaners," they write, "progressives should aim instead at elevating the status of this labor." They argue that commodifying household labor helps to reduce illegal employment in domestic services and create real, properly compensated jobs; it also helps to end working women's double shifts and advance gender equality in the home.

But current cultural struggles about who exactly should be doing the housework go well beyond concerns about equality for women. The United States faces global competition in science, while at the same time highly trained women scientists at top research universities invest talent, time, and energy managing households. Is this a use of resources that we can afford? Are there ways that universities might better capture the talents of women scientists for science?

Who Does What?

This article draws on the rich data collected in the Managing Academic Careers Survey, administered by Stanford University's Michelle R. Clayman Institute for Gender Research to full-time faculty at thirteen leading research universities across the United States. Our larger report, *Dual-Career Academic Couples: What Universities Need to Know*, provides details about sampling and survey methodology. Here, we focus on the 1,222 tenured and tenure-track faculty respondents in the natural sciences who indicated that they are partnered with someone of the other sex (910 men and 312 women). While we collected data for same-sex couples, the number of scientists with samesex partners is too small for extensive quantitative analysis. Previous literature suggests that same-sex couples may have more egalitarian divisions of labor relative to their heterosexual peers; this topic, along with issues of household labor for faculty members who are single, is worthy of future research.

Among several survey items relating to partnerships and households, respondents were asked to report their percent share, their partner's percent share, and "paid help/other's" percent share of seven household tasks, parenting, and elder care. Findings indicate that scientists' homes reflect a traditional division of domestic labor. Women scientists at elite research universities, like most women across the United States, continue to do the lion's share of housework (figure 1). Their share of core household tasks (defined as cooking and grocery shopping, laundry, and housecleaning) is almost double that of men scientists (54 percent versus 28 percent). These tasks exhaust nearly twenty hours a week (as compared with four to five hours a week for more periodic tasks like yard and car care, house repair, and finances), meaning that

women take on a significantly larger share of the most time-intensive jobs.1 Men and women also employ others to help with household labor, a point to which we return below.

We examined variations in household labor by partner's employment status (figure 2). It comes as no surprise that men scientists with stay-at-home partners do the least core household labor in our study. It is part of the current social contract that stay-at-home wives do the majority (76 percent) of core domestic work. Only thirteen women scientists in our sample have a stay-at-home partner; while these women take on proportionately less work than their partners, they still assume a greater share of core tasks than do most men scientists.

Does the division of household labor vary between academic couples (where both partners are academics—and in this sample at least one is a scientist) and other dual-career couples (where one partner is a scientist and one is employed outside the home)? We found few differences between these households. In the main, the woman does substantially more work than her male partner, regardless of the type of couple.

Interestingly, men scientists with academic partners have found their way into the kitchen and currently take on 41 percent of cooking and grocery shopping (figure 2). Academic couples have among the more equitable divisions of cooking labor across all groups. Men scientists with employed, nonacademic partners do only 33 percent of their household cooking, whereas women scientists in those relationships do 61 percent.

While still not taking on a full half of cooking responsibilities, men contribute significantly more here than they do to other core housework tasks. This is important because cooking and its attendant duties are estimated to consume about nine hours a week—and up, depending on the demands of gourmet palates.

Women also assume a disproportionate share of child and elder care. In our sample, women scientists do 54 percent of parenting labor in their households, and men scientists do 36 percent ("parenting labor" refers to physical, psychosocial, and intellectual responsibilities). The extra hours women put in have real consequences for their careers. As Mary Ann Mason and Marc Goulden have shown in their much cited 2002 *Academe* article, "Do Babies Matter?" women who have children within five years of receiving their doctorate are less likely to achieve tenure than are men with "early babies."

Generational Patterns

What about generational issues? Are young men doing more household work? Our data show little generational variation. Across all ranks, women scientists in dual-career couples perform more core housework than do similarly situated men scientists (figure 3). Men assistant professors take on significantly more core housework than do men full professors (35 percent versus 28 percent), but this still falls well below that of their female partners (at 59 percent, with the 4 percent balance for these couples assigned to "paid help/other"). The persistence of these gender differences across rank is consistent with research showing that girls do more housework than boys even at a very young age.

Professional Hours Worked

The issue of domestic labor is directly related to the question of how many hours people work professionally. In our survey, we asked an "hours worked" question in part to test former Harvard University president Lawrence H. Summers's notion that "high powered" faculty work professionally eighty hours a week. We asked, "How many hours per week on average do you work?" recognizing that at times people have push periods where they may work eleven to fifteen hours a day.

Our findings show that very few scientists—thirty-four men and eighteen women (4 percent of our sample)— work the Summers eighty-plus-hour week (figure 4). People who work eighty hours a week

are on the job 11.4 hours a day, seven days a week (hours are self-reported). One wonders about the potential to sustain these schedules over a professional lifetime.

Partnered science faculty in our sample average nearly sixty hours a week at work. Men and women scientists log the same number of hours (mean hours for men is 56.4, mean for women 56.3, and standard deviations—about 11—are the same as well). Up to sixty hours of concentrated work a week (and not just hours spent away from home) over the long haul requires tremendous commitment. And as one senior chemist in our survey remarked, working long hours does not necessarily foster creativity.

Hiring Household Help

Our study also reveals an important strategy women deploy to manage household labor and remain scientifically productive: "outsourcing," or employing others to help with this work. At each rank, women scientists outsource twice as much core housework as do men scientists (figure 3). Despite significantly lower salaries, women assistant professors outsource the same proportion of housework as men full professors. Senior-ranking women outsource 20 percent of their basic housework. For these women, employing others to assist with housework does not equalize divisions of labor, but it does somewhat lighten their share, and it shaves off almost four hours from the total weekly household load. Housecleaning is subcontracted to third parties more than any other core household task (figure 1).

Interestingly, our data suggest that employing others to help with core housework is characteristic of highly productive science faculty (where productivity is defined as total self-reported number of published articles over one's career) even after rank, gender, salary, and one's own share of labor are controlled (analysis was limited to scientists in dual-career partnerships). This is true for both women and men—we often find that practices that are good for women's careers also assist men in reaching their career goals.

Nearly sixty-hour workweeks, combined with a disproportionate share of household labor and child care, make young women think twice about careers in academic science. As Mason and Goulden put it in their 2004 *Academe* article, "Do Babies Matter? (Part II)," "this model is not very attractive for women who hope to succeed in academia." Indeed, their recent research indicates that women PhDs turn away from academic science because they face a culture that precludes time and responsibility for home, family, and life. Considering the cost of training PhD scientists, this is an expensive proposition for science and society.

The Stalled Revolution

U.S. society has witnessed "half of a revolution" with respect to women. Women have entered the workforce in large numbers; they have entered the sciences, become university professors, deans, and presidents—this latter in rather astonishing proportions (half of the presidents of Ivy League universities currently are women). The public world is changing, pushed forward by legislation and institutional action. The private world of the home, however, remains largely mired in tradition. In *The Mind Has No Sex?* Londa Schiebinger has documented how the workplace separated and became distinct from the domestic sphere in Western societies only about two hundred years ago and how this separation undergirded the exclusion of women from modern universities and professional life more generally. These divides are historical and can be changed.

For more than forty years, women in the United States have struggled to create equality in the home. Women's strategy has been to get men to assume their responsibilities and do their fair share. Some, like the sociologist Arlie Hochschild in her 1975 *Second Shift*, argue the need for men's participation in terms of equality of burdens and responsibilities. Others, like Sharon Meers and Joanne Strober in their 2009 *Getting to 50/50*, argue for this in terms of the pleasure of full participation in private life. And nationally, men are doing more. Suzanne Bianchi, John Robinson, and Melissa Wilkie have shown in their 2006 *Changing Rhythms of American Family Life* that almost 70 percent of married fathers today report doing

housework, versus 54.4 percent in 1965; married men now take on 33.3 percent of household labor, versus 11.3 percent in the 1960s.

But men are still not taking their full share of responsibility. Our larger study of the U.S. academic workforce reveals one reason why. While men professors in our crossdiscipline sample (that is, faculty overall, not just scientists) report giving personal goals priority over professional ones at a slightly higher rate than women (22 percent versus 19 percent), they also report giving their own careers higher priority than those of their partners. In response to the survey question, "In your relationship, whose career is considered primary?" half of men in academic couples marked "mine," compared with only 20 percent of women. The majority of women marked that each partner's career is "equal" (59 percent versus 45 percent of men). Economist Robert Drago and higher education specialist Carol Colbeck's "The Mapping Project: Exploring the Terrain of U.S. Colleges and Universities for Faculty and Families" shows that when men value their careers over their partners', women academics tend to comply, all too often recalibrating their career goals to facilitate those of their husbands.

What Institutions Can Do

Universities have developed over the past two hundred years to fit men's lives, both as faculty members and as students. From the nineteenth to the mid-twentieth century, university professors were predominantly men—with stay-at-home wives who organized and cared for the household. As women have entered universities, in large numbers since the 1970s, both as students and as faculty members, universities are slowly being remade also to fit women's lives. Many reforms have focused, for example, on policies for family leave, stopping the tenure clock, providing child care, and the like. These measures, however, remain insufficient.

Our policy recommendation provides a solution to one key aspect of balancing work and life. We propose that institutions extend their current benefits program to support assistance with household labor. Few universities to date have looked at reforms related to housework. U.S. employers tend to provide specific benefits for health care, day care, and sometimes even housing and college tuition. We recommend that institutions offer instead a "cafeteria" or "flexstyle" benefits plan from which employees could tailor a package to meet their particular needs (retirement benefits should remain as they are now, fixed and not optional).

Employee needs can change over the course of a lifetime. Younger people, for example, may need assistance with household labor when salaries are low. Those who have children may choose to put resources into child care and later into college tuition. Some employees may need help with elder care. A flexible benefits package—providing a specific yearly dollar amount—could be used for any aspect of private life that saves employee time and hence enhances productivity. One appealing aspect of this benefit proposal is its inclusivity—one need not be partnered or have children to gain access to the full range of services under its umbrella.

To our knowledge, U.S. employers generally do not provide a benefit to assist with housework. Some non-U.S. companies, such as Sony Ericsson in Sweden, do. There, the company pays for housecleaning from select service providers. The Swedish government is currently experimenting with tax relief on domestic services, believing that, despite initial costs, Sweden will benefit in the long run by creating new jobs and reducing illegal employment and exploitation in services for cleaning, gardening, and cooking. In the United States, the effort to provide benefits for domestic labor revalues housework that has never been represented in the nation's gross domestic product. Housework has been invisible labor carried out by women behind closed doors and often in the wee hours of the morning. This work needs to be lifted out of the private sphere of the family and put onto the national grid. The United States needs to capture the talents of its female scientific workforce for science.

Given the recent economic downturn, we understand that this may not be the right time to argue for expanding employee benefits. Our proposal, however, addresses longterm problems and long-term solutions. Providing benefits to support housework continues dominant social trends of the past forty

years: U.S. institutions have stepped into the domestic sphere to support aspects of private life, from health-care benefits to child-care supplements. Institutions now need to step in to support housework.

Note

We thank Shelley Correll, Paula England, Patricia Jones, Dan Ryan, and Myra Strober for their comments on this essay. We thank the Michelle R. Clayman Institute at Stanford University for funding for this project.

1. Household hour estimates for this study are derived from Mary Ann Mason and Marc Goulden, "Do Babies Matter (Part II)? Closing the Baby Gap," Academe 90 (November–December 2004): 10–15; and the 2007 American Time Use Survey (http://www.bls.gov/tus/tables/a1_2007.pdf). Using Mason and Goulden's data, we calculate that a two-person academic household devotes approximately twenty-four hours a week to housework. Seven household tasks in our "Managing Academic Careers" survey (see figure 1) are then distributed across these twenty-four hours; tasks were roughly weighted according to American Time Use Survey daily estimates for each.

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To the Power of Many

On the importance of faculty committing not just to supporting graduate students but also to organizing themselves.

By Jamie Owen Daniel

Lest it not be clear from what follows, let me emphasize at the outset that I believe faculty should publicly and tenaciously support graduate student organizing campaigns. I state this not only from my perspective as a staff member of the largest higher education local in Illinois, University Professionals of Illinois Local 4100, which represents faculty and staff at seven of the state's public institutions, as well as graduate student employees at the University of Illinois at Springfield, but also from my experience organizing my own graduate program at the University of Wisconsin– Milwaukee, which bargained its first contract in 1998.

I subsequently helped mobilize support for graduate students at the University of Illinois at Chicago when I was a faculty member there. They succeeded in their organizing campaign, winning recognition in 2004 and a first contract in 2006, but only after a grueling decade of struggle. They are currently bargaining their second contract. During the long campaign, many faculty worked with graduate students, building support for the students' drive through legislative initiatives, departmental resolutions, faculty senate debates, and letters to the editor and other outreach to the broader public, as well as outreach to community organizations and other labor unions.

But important as I know this backing has been and will continue to be, if faculty limit their activities to offering support for graduate student organizing drives, they ultimately sell the students—and, I will argue, themselves—woefully short and limit the positive impact such drives can have on campus power relations. There are at least two other, more difficult actions faculty must take to ensure that their well-intentioned support for graduate student unionization has more than passing influence.

First, while anyone who has been part of an organizing campaign knows how much work goes into it, and how thrilling it is to see that work result in a majority's voting to unionize, what many organizers do not realize is that winning the first election is just the beginning of a long and arduous process. AFL-CIO statistics confirm that fewer than half of all organizing drives result in the formation of a union local, and of these only half succeed in negotiating a first contract. Especially in states that have not passed "card-check" legislation—and this is the great majority of them—a long time can elapse between counting the ballots and getting the university to recognize the union, and as long a time again between recognition and winning the first contract. As I noted above, the University of Illinois at Chicago Graduate Employees Organization was recognized in August 2004, but it took two years to settle its first contract.

That first contract is the most important one, because it will form the foundation on which subsequent contracts are built, and no university—indeed, no management structure in any other industry whatsoever—will balk at investing as much time and money as it can get away with to wear down the new union's often inexperienced bargaining team to the point that its members settle for weak or inadequate contract language. In addition, and again, like management in other industries, most university administrations will have already spent millions on union-busting law firms to block and delay the organizing drive, and they will usually retain the same firms to advise them on how to push through as many concessions as they can in first-contract language. (The same law firm that Yale University hired to bust its graduate organizing drive, for example, was also paid millions by the University of Illinois to fight the ultimately successful graduate organizing drives at the campuses in Urbana- Champaign and Chicago and then to advise the administration as both groups went to the table.)

So, just as faculty can and should organize support during the initial organizing drive, they must understand this as merely a first step. They should commit just as strongly—if not even more so—to supporting graduate unions during their strategic contract campaigns and to helping ensure that the first

contract as well as any that are bargained subsequently are actually implemented. Just as the organizing drive is ultimately wasted effort if it does not result in a first contract, that first contract is not worth the considerable effort it takes to bargain if its language is not strong or if the contract is not actually implemented. In other words, faculty must commit to building a permanent structure of support for their unionized graduate students. Bargaining a contract, especially a first contract, requires considerable intellectual and emotional commitment, and faculty can continue supporting students after the organizing drive by committing to strategic contract campaigns to support the team at the table.

This leads me to my second point: the best way for faculty to support graduate organizing and to build a muscular and permanent structure of support for their students' unions is to organize themselves. If they can form actual unions, they should; and if they cannot because of the 1980 *Yeshiva* decision (ruling that private college faculty are managers and therefore not entitled to bargain collectively) or because they work in one of the few states that prohibit public employees from collective bargaining, they can form organizations that walk, talk, and act like unions. Graduate student unions bring substantially less power and leverage to the table if they go there alone; likewise, administrations can continue to pit graduate students against adjunct and tenure-track faculty, and these faculty groups against each other, if graduate students and faculty do not share a common power base. Writing letters to the editor and getting resolutions passed at professional meetings are valuable expressions of support, but they will not have anywhere near the same impact on a recalcitrant administration as will a unified body of union members, organized across constituencies. Like all managers, university administrations know the difference between noise and power.

We have seen that, as administrations rely increasingly on private money and hire increasing numbers of administrators to administer it, the power of faculty senates has shrunk and administrations have loaded more work on everyone they employ (see, for example, the January 2009 study by the Delta Project of the relationship between administrative bloat and decreased money for faculty and students, "Trends in College Spending: Where Does the Money Come From? Where Does It Go?"). Faculty should be as concerned and as militant about stabilizing their own wages and working conditions as they are about those of their students, for the conditions under which many faculty members work are no less tenuous. Tenure is a valuable process for ensuring that one has a job, but it has no impact whatsoever on what the working conditions of that job will be.

As an organizer working on unionized campuses and as an assistant professor working on a nonunion campus, I have seen that the benefits of belonging to a union go far beyond the power and leverage exercised at the bargaining table, and I have seen the more obvious material benefits a contract provides. A strong union contract is also a social contract, and a strong union can function as a structure to ensure greater social justice for everyone working, and learning, on a campus. For just as most unions are rooted in the belief that an injury to one is an injury to all, so too do most unions help ensure that benefits to one are benefits to all. These benefits include greater academic freedom; a more stable and productive relationship between administrators, faculty, and staff; and a stronger and more unified focus on the educational needs of our students.

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http://www.aaup.org/AAUP/pubsres/academe/2010/JF/feat/owen.htm

The Miracle of Vitamin D: Sound Science, or Hype?

By TARA PARKER-POPE

Stuart Bradford

Imagine a treatment that could build bones, strengthen the immune system and lower the risks of illnesses like diabetes, heart and kidney disease, high blood pressure and cancer.

Some research suggests that such a wonder treatment already exists. It's vitamin D, a nutrient that the body makes from sunlight and that is also found in fish and fortified milk.

Yet despite the health potential of vitamin D, as many as half of all adults and children are said to have less than optimum levels and as many as 10 percent of children are highly deficient, according to a 2008 report in The American Journal of Clinical Nutrition.

As a result, doctors are increasingly testing their patients' vitamin D levels and prescribing daily supplements to raise them. According to the lab company Quest Diagnostics, orders for vitamin D tests surged more than 50 percent in the fourth quarter of 2009, up from the same quarter a year earlier. And in 2008, consumers bought $235 million worth of vitamin D supplements, up from $40 million in 2001, according to Nutrition Business Journal.

But don't start gobbling down vitamin D supplements just yet. The excitement about their health potential is still far ahead of the science.

Although numerous studies have been promising, there are scant data from randomized clinical trials. Little is known about what the ideal level of vitamin D really is, whether raising it can improve health, and what potential side effects are caused by high doses.

And since most of the data on vitamin D comes from observational research, it may be that high doses of the nutrient don't really make people healthier, but that healthy people simply do the sorts of things that happen to raise vitamin D.

"Correlation does not necessarily mean a cause-and-effect relationship," said Dr. JoAnn E. Manson, a Harvard professor who is chief of preventive medicine at Brigham and Women's Hospital in Boston.

"People may have high vitamin D levels because they exercise a lot and are getting ultraviolet-light exposure from exercising outdoors," Dr. Manson said. "Or they may have high vitamin D because they are health-conscious and take supplements. But they also have a healthy diet, don't smoke and do a lot of the other things that keep you healthy."

Dr. Manson is leading a major study over the next five years that should provide answers to these questions and more. The nationwide clinical trial is recruiting 20,000 older adults, including men 60 and older and women 65 and older, to study whether high doses of vitamin D and omega-3 fatty acids from fish-oil supplements will lower risk for heart disease and cancer. (Learn about taking part in the study at www.vitalstudy.org.)

Dr. Manson said fish-oil supplements were included in the study because they are another promising treatment that suffers from a dearth of clinical trial evidence. In addition, both vitamin D and fish oil are known to have an anti-inflammatory effect, but each works through a different pathway in the body, so there may be an added health benefit in combining them.

Study participants will be divided into four groups. One will take both vitamin D and fish oil pills. Two will take either a vitamin D or a fish-oil supplement and a placebo. The fourth will take two placebo pills.

Vitamin D is found throughout the body and acts as a signaling mechanism to turn cells on and off. Right now, the recommended dose from food and supplements is about 400 international units a day for most people, but most experts agree that is probably too low. The Institute of Medicine is reviewing guidelines for vitamin D and is expected to raise the recommended daily dose.

Study participants will take 2,000 I.U.'s of vitamin D3, believed to be the form most easily used by the body. The study will use one-gram supplements of omega-3 fish oil, about 5 to 10 times the average daily intake.

The vitamin D dose is far higher than what has been used in other studies. The well-known Women's Health Initiative study, for instance, tracked women taking 400 units of vitamin D and 1,000 milligrams of calcium. The study found no overall benefit from the supplements, although women who consistently took their pills had a lower risk of hip fracture. Even so, many experts think 400 units is far too low for any additional health benefits.

Another study, of 1,200 women, looked at the effects of 1,500 milligrams of calcium and 1,000 units of vitamin D. Women who took both supplements showed a lower risk for breast cancer over the next four years, but the numbers of actual cases — seven breast cancers in the placebo group and four in the supplement group — were too small to draw meaningful conclusions.

Although consumers may be tempted to rush out and start taking 2,000 I.U.'s of vitamin D a day, doctors warn against it. Several recent studies of nutrients, including vitamins E and B, selenium and beta carotene, have proved disappointing — even suggesting that high doses do more harm than good, increasing risk for heart problems, diabetes and cancer, depending on the supplement.

Despite the promise of vitamin D in observational studies, research into other supplements shows it's difficult to document a benefit in otherwise healthy people, and virtually impossible to predict potential harms, notes Dr. Eric A. Klein, chairman of the Glickman Urological and Kidney Institute at the Cleveland Clinic. Dr. Klein recently worked as national coordinator for Select, a study of vitamin E and selenium for prostate cancer. The study seemed promising, but in the end it showed no benefit from the supplements and a potentially higher risk for diabetes in selenium users.

"My sentiment is that the lesson we have learned form large trials with other vitamin supplements, including Select, is that there is no proven health or preventative benefit for dietary supplements in nutritionally replete populations, which accounts for most of the people who enter this sort of clinical

trial," Dr. Klein said. "It makes more sense to me to study dietary supplements or vitamins in populations who are deficient."

People most at risk for vitamin D deficiency are older, have diabetes or kidney disease, stay indoors or have darker skin. African-American teenagers are at particularly high risk, possibly because in addition to their dark skin, they are less likely at that age to drink milk or play outside.

The scientific community continues to debate the optimum level of vitamin D. In general, people are considered to be deficient if they have blood levels below 15 or 20 nanograms per milliliter. But many doctors now believe vitamin D levels should be above 30. The ideal level isn't known, nor is it known at what point a person is getting too much vitamin D, which can lead to kidney stones, calcification in blood vessels and other problems.

People's vitamin D levels are influenced by whether they have light or dark skin, where they live, how much time they spend outdoors and by fish and milk consumption. To raise vitamin D without supplements, a person could increase sun exposure for 10 to 15 minutes a day. Eating more fish can help — a 3.5-ounce serving of wild fresh salmon has 600 to 1,000 I.U.'s of vitamin D — but it would take a quart of milk a day to get the recommended dose of vitamin D.

"What we know is that there are a lot of people who are vitamin D deficient based on estimates from national surveys," said Dr. Michal L. Melamed, assistant professor of medicine at Albert Einstein College of Medicine in the Bronx. "But we don't know what happens when the curve shifts to the other end. There probably is a risk to having too much vitamin D in the system."

http://well.blogs.nytimes.com/2010/02/01/the-miracle-of-vitamin-d-sound-science-or-hype/?nl=health&emc=healthupdateema1

Abstract Thoughts? The Body Takes Them Literally

By NATALIE ANGIER

The theory of relativity showed us that time and space are intertwined. To which our smarty-pants body might well reply: Tell me something I didn't already know, Einstein.

Researchers at the University of Aberdeen found that when people were asked to engage in a bit of mental time travel, and to recall past events or imagine future ones, participants' bodies subliminally acted out the metaphors embedded in how we commonly conceptualized the flow of time.

As they thought about years gone by, participants leaned slightly backward, while in fantasizing about the future, they listed to the fore. The deviations were not exactly Tower of Pisa leanings, amounting to some two or three millimeters' shift one way or the other. Nevertheless, the directionality was clear and consistent.

"When we talk about time, we often use spatial metaphors like 'I'm looking forward to seeing you' or 'I'm reflecting back on the past,' " said Lynden K. Miles, who conducted the study with his colleagues Louise K. Nind and C. Neil Macrae. "It was pleasing to us that we could take an abstract concept such as time and show that it was manifested in body movements."

The new study, published in January in the journal Psychological Science, is part of the immensely popular field called embodied cognition, the idea that the brain is not the only part of us with a mind of its own.

"How we process information is related not just to our brains but to our entire body," said Nils B. Jostmann of the University of Amsterdam. "We use every system available to us to come to a conclusion and make sense of what's going on."

Research in embodied cognition has revealed that the body takes language to heart and can be awfully literal-minded.

You say you're looking forward to the future? Here, Ma, watch me pitch forward!

You say a person is warm and likable, as opposed to cold and standoffish? In one recent study at Yale, researchers divided 41 college students into two groups and casually asked the members of Group A to hold a cup of hot coffee, those in Group B to hold iced coffee. The students were then ushered into a testing room and asked to evaluate the personality of an imaginary individual based on a packet of information.

Students who had recently been cradling the warm beverage were far likelier to judge the fictitious character as warm and friendly than were those who had held the iced coffee.

Or maybe you are feeling the chill wind of social opprobrium. When researchers at the University of Toronto instructed a group of 65 students to remember a time when they had felt either socially accepted or socially snubbed, those who conjured up memories of a rejection judged the temperature of the room to be an average of five degrees colder than those who had been wrapped in warm and fuzzy thoughts of peer approval.

The body embodies abstractions the best way it knows how: physically. What is moral turpitude, an ethical lapse, but a soiling of one's character? Time for the Lady Macbeth Handi Wipes. One study showed that participants who were asked to dwell on a personal moral transgression like adultery or cheating on a test were more likely to request an antiseptic cloth afterward than were those who had been instructed to recall a good deed they had done.

When confronted with a double entendre, a verbal fork in the road, the body heeds Yogi Berra's advice, and takes it. In a report published last August in Psychological Science, Dr. Jostmann and his colleagues Daniel Lakens and Thomas W. Schubert explored the degree to which the body conflates weight and importance. They learned, for example, that when students were told that a particular book was vital to the curriculum, they judged the book to be physically heavier than those told the book was ancillary to their studies.

The researchers wanted to know whether the sensation of weightiness might influence people's judgments more broadly.

In a series of experiments, study participants were asked to answer questionnaires that were attached to a metal clipboard with a compartment on the back capable of holding papers. In some cases the compartments were left empty, and so the clipboard weighed only 1.45 pounds. In other cases the compartments were filled, for a total clipboard package of 2.29 pounds.

Participants stood with either a light or heavy clipboard cradled in their arm, filling out surveys. In one, they were asked to estimate the value of six unfamiliar foreign currencies. In another, students indicated how important they thought it was that a university committee take their opinions into account when deciding on the size of foreign study grants. For a third experiment, participants were asked how satisfied they were with (a) the city of Amsterdam and (b) the mayor of Amsterdam.

In every study, the results suggested, the clipboard weight had its roundabout say. Students holding the heavier clipboard judged the currencies to be more valuable than did those with the lightweight boards. Participants with weightier clipboards insisted that students be allowed to weigh in on the university's

financial affairs. Those holding the more formidable board even adopted a more rigorous mind-set, and proved more likely to consider the connection between the livability of Amsterdam and the effectiveness of its leader.

As Dr. Jostmann sees it, the readiness of the body to factor physical cues into its deliberations over seemingly unrelated and highly abstract concerns often makes sense. Our specific clipboard savvy notwithstanding, "the issue of how humans view gravity is evolutionarily useful," he said.

"Something heavy is something you should take care of," he continued. "Heavy things are not easily pushed around, but they can easily push us around." They are weighty affairs in every tine of the word.

The cogitating body prefers a hands-on approach, and gesturing has been shown to help children master math.

Among students who have difficulty with equations like 4 + 5 + 3 = __ + 3, for example, performance improves markedly if they are taught the right gestures: grouping together the unique left-side numbers with a two-fingered V, and then pointing the index finger at the blank space on the right.

To learn how to rotate an object mentally, first try a pantomime. "If you encourage kids to do the rotation movement with their hands, that helps them subsequently do it in their heads," said Susan Goldin-Meadow of the University of Chicago, "whereas watching others do it isn't enough."

Yesterday is regrettable, tomorrow still hypothetical. But you can always listen to your body, and seize today with both hands.

http://www.nytimes.com/2010/02/02/science/02angier.html?ref=health

Infection Persists, Despite Vaccine

By NICHOLAS BAKALAR

A vaccine introduced in 2000 has been highly effective in reducing the number of severe lung, blood and brain infections in infants and children. But at the same time, a serious and sometimes fatal complication has become more common.Researchers report that the rate of the complication, pneumococcal empyema (pronounced em-pye-EE-ma), an accumulation of dense pus between the outer surface of the lung and the chest wall, increased after the vaccine came into widespread use. The infected material is so thick that it interferes with breathing; surgery is often required.

Before the 7-valent pneumococcal conjugate vaccine, or PCV7, was available, pneumococcal disease in the United States annually caused more than 700 cases of meningitis in children, 13,000 blood infections, about 5 million ear infections and 200 deaths. Children under 2 are at highest risk for serious disease, which can be hard to treat because some pneumococcus strains have become drug-resistant.Researchers using information from hospital discharge data found that while the hospitalization rate for children with pneumococcal disease had sharply declined, those hospitalized were more likely to be so sick they needed surgery. The analysis appears in the January issue of Pediatrics.

One reason, the scientists believe, is that other known strains of pneumococcus have flourished without competition from the seven covered by the vaccine. Dr. Su-Ting T. Li, the lead author of the study, said newly evolving pneumococcal strains might also be a problem. Dr. Li, an assistant professor of pediatrics at the University of California, Davis, said the PCV7 vaccine was unquestionably effective. “Vaccination is working to decrease the incidence of pneumococcal pneumonia, sepsis and meningitis,” she said, referring to infections of the lungs, blood and brain. “But it’s not decreasing the incidence of empyema.” Compared with 1997, she found, children hospitalized with pneumococcus infections in 2006 were twice as likely to have empyema.Pneumococcal vaccines for adults have been available for more than 30 years, but until the introduction of PCV7, none would work in children under 2. The Centers for Disease Control and Prevention now recommends the vaccine for all children under 5.

The researchers came to their conclusion by analyzing the Kids’ Inpatient Database, a nationally representative sample of hospital inpatient stays for children. In 2006, an estimated 2,898 children under 18 were hospitalized with empyema. Most were younger than 5, and for unknown reasons, the greatest increase was among children 2 to 4. The overall empyema rate in 2006 was 3.7 per 100,000 children, compared with 2.2 per 100,000 in 1997, an increase of almost 70 percent.Catherine A. Lexau, an epidemiologist with the Minnesota Department of Health, mentioned some of the study’s weaknesses. Discharge data may not be accurate, she said, and the study has fewer findings for the particular organisms that caused the pneumonia or empyema.The criticism is apt because other organisms besides pneumococcus can cause empyema, and the database the researchers used does not consistently identify which germs were involved. But looking only at the cases that specified pneumococcal disease, researchers found that children were less likely to be hospitalized than before the advent of the vaccine but much more likely to have empyema as a complication.

Other researchers found the work valuable and persuasive. Dr. Carrie L. Byington, a professor of pediatrics at the University of Utah, said that the broad national sample gave the study strength and that the findings were consistent with smaller regional studies. She also noted that pneumococcal disease was a global problem, much worse in many countries than it is in the United States.

While PCV7 all but eliminated disease caused by the seven strains it was designed for, there are more than 80 other pneumococcal strains. This may soon change, Dr. Byington said: a new vaccine, already approved in Europe and now under review by the Food and Drug Administration, will cover six additional strains of pneumococcus, including the ones suspected of causing the most serious disease

http://www.nytimes.com/2010/02/02/health/02pneumo.html?ref=health

Children: Quality of Life With Cochlear Implants
By RONI CARYN RABIN

Children with the surgically implanted hearing aids called cochlear implants rate their quality of life as highly as children with normal hearing, according to one of the first studies that looked at children as well as their parents.

The findings are important, the researchers said, because deaf children often feel socially isolated, have trouble making friends and tend to have low self-esteem as a result. The lead author, Betty A. Loy, said the information would be useful to parents making decisions about cochlear implants for their babies.

"They want to know: 'Is my kid going to be made fun of? Is my kid going to be bullied? How is my kid going to feel about themselves with this apparatus on their head?' " said Dr. Loy, of the Dallas Cochlear Implant Program.

The researchers asked 84 children with cochlear implants how they felt about themselves, their family lives, their friends and school. Parents were questioned separately, and the responses were compared with those of a control group of 1,501 children the same ages, 8 to 16, with normal hearing. The paper appears in the Feb. 1 issue of Otolaryngology — Head and Neck Surgery.

Though the overall quality-of-life scores were very similar to those of the control group, the younger children appeared to be happier than the adolescents but scored their family lives lower than did children with normal hearing.

http://www.nytimes.com/2010/02/02/health/research/02children.html?ref=health

Practicing on Patients, Real and Otherwise

By PAULINE W. CHEN, M.D.

Near the end of my surgical training, I spent three months as chief resident of a hospital trauma team. Two other doctors-in-training and I formed the first-line emergency room response, assessing and resuscitating patients who had been mangled, burned or otherwise injured. It was my first experience as a leader, but each of us was already fairly proficient and we all got along. I was confident that we would work well together.

I was wrong.

During our first week, one of the senior trauma surgeons played a video of one of our resuscitations, and I was reminded not of some slick made-for-television emergency room scene, but of the Three Stooges. In white coats.

One resident stood at the patient's side, holding a rubber tube in one hand and a syringe in the other, unsure of which to use first. The other resident kept bumping into the nurses and the respiratory therapist as he paced alongside the patient. I watched myself standing at the head of the bed mumbling orders that no one could hear. The patient had sustained only minor injuries and ultimately survived; but his outcome had little to do with our team. Other than the one experienced nurse in the room and the senior surgeon who showed up 10 minutes into the resuscitation, no one seemed to know what to do or how to coordinate their actions with everyone else's.

Although my team quickly gained the experience that would truly help us save patients, our growing competence came because we were submerging ourselves in trauma resuscitations day after day and night after night. We were learning as generations of doctors before us had — under the supervision of more experienced doctors, through trial and error, and on real patients.

Now it appears that this old paradigm of sinking or swimming with real patients is beginning to change, thanks to a growing field in medical education.

Medical simulation training, which is similar to that used in aviation and in the military, uses mannequins, computers, virtual reality or actors posing as patients to teach doctors, nurses and other clinicians. While simulation training has been used in medicine for nearly 40 years, it has until recently been limited primarily to teaching standard techniques like chest compressions in cardiopulmonary resuscitation or pelvic exams.

But over the last few years, as the technology and training techniques have advanced, experts in the field have begun to broaden the scope of training. No longer confined to isolated procedures, simulation can now recreate entire clinical situations, giving clinicians the opportunity to develop skills in what is often identified as one of the major causes of errors and quality issues in health care: poor teamwork and communication.

"Even if we are good individually, we are not always good at working collectively as a team," said Dr. David M. Gaba, one of the earliest proponents of simulation in medical training and now associate dean for immersive and simulation-based learning at Stanford University School of Medicine. "Simulation can help develop decision-making, teamwork and team management skills."

Anesthesia residents at Stanford, for example, must go through an extensive simulated situation in which the "patient," a specialized mannequin, develops a severe, unexpected allergic reaction and then dies. During this training, the residents must provide and coordinate medical care with other members of the team and then conduct the difficult conversation with the patient's "wife," a live actor who has been trained to play the role of a shocked and then grieving widow.

"One of the beauties of simulation is you can let people practice those skills necessary in real-life medicine," Dr. Gaba said. "You have to be able to handle more than just the cognitive or procedural skills; you have to be able to execute all those things while talking to the patient or the patient's family."

Not all doctors, however, are eager to train in a simulated environment, since even the most sophisticated simulations require suspending belief. The "patient" with low oxygen levels does not have bluish lips but a little blue light shining in her mouth. The grieving "spouse" is a well-versed but hired actor. And the dying trauma "victim" appears as flushed — and rubbery — as he was on arrival.

"It's not the real thing, and doctors are often hesitant at first," said Dr. Mark Smith, senior director of simulation and innovation at Banner Health, a nonprofit system that just opened a 55,000-square-foot simulation training center in Arizona, the largest of its kind in the United States. "But pretty quickly, doctors realize how nice it is to practice in an environment without consequences."

The training can be quite challenging, too. Some of the simulated situations at the Banner Simulation Medical Center require as long as four hours to complete and take place in one of the center's operating rooms, intensive care units or emergency department.

While research has shown that simulation training in specific procedures like the placement of catheters into a central vein can significantly decrease errors, it has been difficult to design and conduct studies that assess the effects of improved teamwork. Nonetheless, medical simulation experts believe that such training can only help clinicians.

"In sports, we would never have all the team members practice alone and then go off to perform," said Dr. Haru Okuda, executive director of the New York City Health and Hospitals Corporation Institute of Medical Simulation and Advanced Learning. "It doesn't make sense to have clinicians training alone either."

The company will be opening a 10,000-square-foot training facility this fall at the Jacobi Medical Center in the Bronx, and Dr. Okuda plans to instruct some 14,000 clinicians over the next three years. “In the simulation world, you can practice to mastery,” he said. “In this way we can standardize the quality of care across our hospitals so that if, for example, a patient went to one hospital to deliver a baby, she would get the same level of care available at any other hospital in our system.”

The cost of these innovative training centers is high. The Banner Simulation Center cost $12 million to build, and the New York City Health and Hospitals Corporation Institute will require $10 million to complete. And unlike other investments, medical simulation training centers rarely generate revenue.

“Some people might ask, ‘Where’s my return on investment?’ ” Dr. Smith said. “But it’s really all about cost savings and patient care. We take such better care of our patients when we’ve got these skills. It’s no longer acceptable to learn on patients. It’s just not right.”

Which is true, though with one important caveat.

“Simulation allows you to do a lot of things safely and in a controlled fashion,” Dr. Gaba said. “But simulation will never completely replace practicing the craft of medicine under more experienced hands. People aren’t airplanes or machines. People are human beings, and we don’t come with instruction manuals.”

Or, as a friend who flies for a major international carrier told me recently: “You can get everything in a simulation except for the feeling, the real feeling, of the last 200 feet of landing.”

http://www.nytimes.com/2010/01/29/health/28chen.html?ref=health

News Photos, on the Move, Make News

By RANDY KENNEDY

In the middle of December two trailer trucks left New York City bound for Austin, Tex., packed with a precious and unusual cargo: the entire collection of pictures amassed over more than half a century by the Magnum photo cooperative, whose members have been among the world's most distinguished photojournalists.

It is one of the most important photography archives of the 20th century, consisting of more than 180,000 images known as press prints, the kind of prints once made by the collective to circulate to magazines and newspapers. They are marked on their reverse sides with decades of historical impasto — stamps, stickers and writing chronicling their publication histories — that speaks to their role in helping to create the collective photo bank of modern culture.

"The trucks had GPS, and I was so nervous, I was tracking every single second of the trip," Mark Lubell, Magnum's director, said.

Since Magnum's founding in 1947 by Robert Capa, Henri Cartier-Bresson, George Rodger, David Seymour and William Vandivert, the prints have always been kept at the agency's headquarters, which has moved around Manhattan. But like many other photo agencies Magnum began digitally scanning its archive many years ago, and in 2006, the cooperative's membership voted to begin exploring a sale, whose proceeds would be used to help reinvent Magnum for a new age.

Then last year, after discussions between Mr. Lubell and various scholarly institutions around the country, the archive was quietly sold to MSD Capital, the private investment firm for the family of Michael S. Dell, the computer tycoon. And the new owners have reached an agreement with the Harry Ransom Center at the University of Texas at Austin to place it there, for study and exhibition, for at least the next five years. It will be the first time that the archive, which for the last several years had been crowded onto shelves at Magnum's modest offices on West 25th Street, will be accessible to scholars and the public.

Thomas F. Staley, the director of the Ransom Center — which has become well known for its collections of the papers of writers like Edgar Allan Poe, James Joyce and Don DeLillo — said that it planned to scan every image (Magnum itself has scanned fewer than half), to begin historical research and to organize exhibitions centered on portions of the archive.

"It catches so many of the world's great photojournalists in one fell swoop," Mr. Staley said. "These were the best of the best in their field. We want to make it a research collection. We want to bring scholars in to work in it, time and time again."

Neither Magnum nor MSD — made up of Mr. Dell and two managing partners, Glenn R. Fuhrman and John C. Phelan, both well-known art collectors — would comment about the price of the sale, which included only the prints. (The image rights will be retained by the collective's photographers and their estates.) But a person with knowledge of the transaction, who was not authorized to discuss it and spoke on the condition of anonymity, said the Ransom Center had insured the collection for more than $100 million.

The Magnum archive joins a parade of other collections of vintage photographic prints, including those of The New York Times and the National Geographic Society, that have changed hands in the past few years, as publications and photo agencies, moving aggressively to digitization, have realized they are sitting on valuable historical property.

Like other photo agencies, Magnum has seen its fortunes decline in recent years, along with those of the magazines and newspapers that once published the work of its photographers more regularly. The best known of these pictures went on to have long financial afterlives, thanks to licensing agreements that placed them everywhere from television to books and Web sites. But in a world of camera-phone images, bloggers and inexpensive photojournalism flooding the Internet, the cooperative's finances have suffered.

"You could see the handwriting on the wall," said Mr. Lubell, who took over as director six years ago, "and the handwriting was shrinking and shrinking." With the proceeds from the sale the agency — which represents the work of 13 estates and 51 current members, including well-known photographers like Bruce Davidson, Eve Arnold, Susan Meiselas, Martin Parr and Alec Soth — will try to recreate itself as a media entity on the Web, relying less on publications and more on its ability to tell its own stories of world events and trends.

The earliest pictures in the archive date from before Magnum's founding, to the work of photographers like Capa during the Spanish Civil War. The latest are from 1998, when the cooperative stopped using press prints as a way to circulate its images. In between those years are images that make it seem as if a Magnum photographer was present at almost every significant world event — D-Day, the civil rights movement, the rise of Fidel Castro — and also around to capture almost every celebrity and newsmaker: Gandhi, Monroe, Sinatra, Kennedy, Ali.

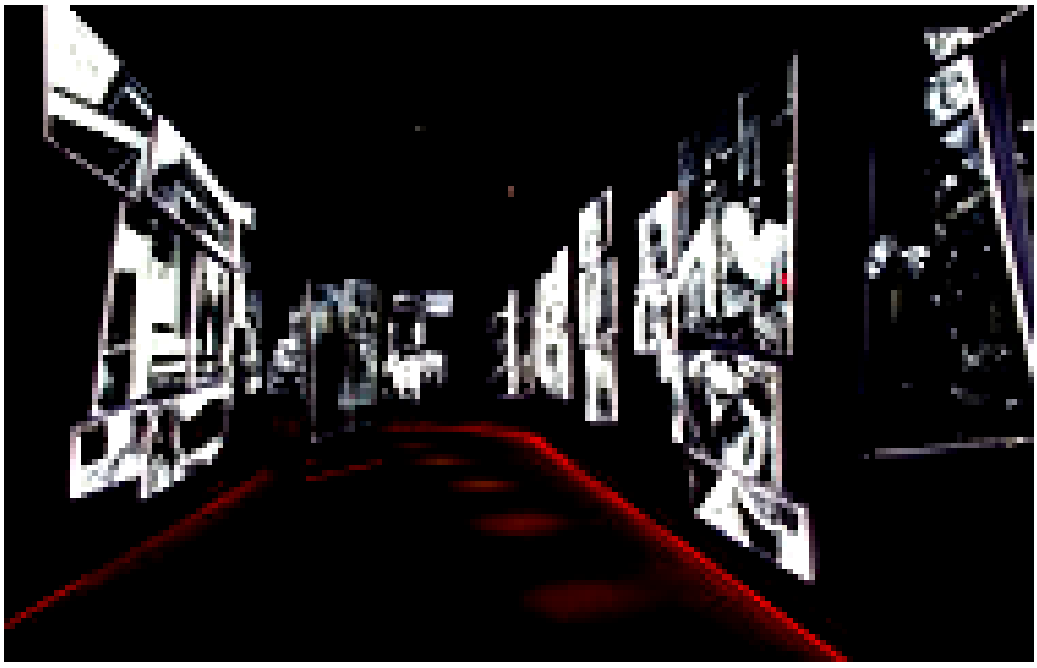
"For prints that worked this hard and traveled this much, they're really in quite good condition," Mr. Lubell said.

And they are relics from an age of photography that has now almost fully passed. "Given the technical changes that have taken place in the world of photography, including the digitization of images," Mr. Fuhrman of MSD Capital, said in a statement, "a collection of prints like these will never exist again."

http://www.nytimes.com/2010/02/02/arts/design/02magnum.html?ref=arts

International Civil Rights Center and Museum
Four Men, a Counter and Soon, Revolution

By EDWARD ROTHSTEIN



GREENSBORO, N.C. — The sign still says "F. W. Woolworth Co." in bright gold letters running across the building on South Elm Street, just as it did 50 years ago. And within that two-story structure, the same stainless steel dumbwaiters and commercial appliances line the mirrored walls. The lunch counter, which includes a bowling-alley-long tabletop that must dwarf any currently in use, is largely intact; the original chrome and vinyl chairs are still mounted in the floor. This site is an authentic, half-century-old relic, a remnant of the mundane, the insignificant, the quaint.

But one of the achievements of the International Civil Rights Center and Museum, which is opening Monday in that former Woolworth building, is that you begin to understand how such a place became a pivot in the greatest political movement of the 20th century.

In the museum's 30,000 square feet of exhibition space, the mundane luncheonette reminds us that a cataclysmic social transformation took place over the right to be ordinary. For that was what was at stake — not subtle and arcane matters of law or obscure practices that challenged eccentric codes of behavior, but the basic acts of daily life: eating, drinking, sleeping, working, playing. It was here, at this luncheonette counter, that four 17-year-old freshmen at the all-black Agricultural and Technical College of North Carolina — Joseph A. McNeil, Franklin E. McCain, David L. Richmond and Ezell A. Blair Jr. — arrived on Feb. 1, 1960, sat down and ordered some food.

And when they were refused — refused because they were black, because much of Greensboro was racially segregated, and because Woolworth headquarters had decreed that the company policy was "to abide by local custom" — the four students continued to sit in mute protest.

They returned the next day and the next. Within a week 1,000 protesters and counterprotesters packed the store. By the end of March "sit-ins" had spread to 55 cities in 13 states. By mid-April the Student Nonviolent Coordinating Committee had been established to expand student involvement. And by the end of July, when the Greensboro Woolworth's counter was finally desegregated, this form of nonviolent protest had become one of the central strategies of the American civil rights movement.

So not long after this Woolworth announced its closing in 1993, the building was acquired with the hope of making it a museum. It took $23 million in public and private funds to fulfill that vision; the museum's architects are the Freelon Group of Durham, N.C., and its exhibitions were designed by Eisterhold Associates of Kansas City, Mo.

Its founders, Melvin Alston, a Guilford County commissioner, and Representative Earl Jones of the North Carolina legislature, are expected to attend Monday morning's opening ceremony on the 50th anniversary of the sit-in, along with state and national officials. One of the original protesters, Mr. McCain, a retired chemist who made his career in Charlotte, is scheduled to speak. Two others, Mr. McNeil and Jibreel Khazan (the name Mr. Blair now uses) will also be onstage; the fourth, Mr. Richmond, died in 1990.

Of course, since this museum was conceived, civil rights institutions and memorials have been proliferating, but the task of capturing the full scope of the movement seems ever more imposing. As it recedes in time, its history grows not smaller and simpler but grander and more complex. And this museum, in a region where ordinary life was a matter of bitter conflict, looks at the movement not as an uplifting triumph — which it surely was, however imperfect and however incomplete — but as a heroic battle fought through a dark maze of grim restrictions and dangerous confrontations. No doubt it was that as well.

As the museum's executive director, Amelia Parker, explained in an interview, one purpose of the museum is to remind the visitor just what was at stake in the seemingly innocuous act of approaching the lunch counter. It celebrates that protest while also resurrecting for the visitor the full scope of the Jim Crow laws against which the movement rebelled. It does this so vividly that it inspires an emotional reaction: dismay at the moral blindness and anger at the injuries caused. One weakness of the museum's opening exhibitions is that they try to amplify events or sentiments when they are powerful enough to speak on their own.

So far has consciousness changed in 50 years that just the sight of signs of Jim Crow segregation in an opening gallery is chilling, with declarations of "White Only" or "For Colored" joined by one earlier sign announcing a slave auction. "Plenty of good Negroes," it proclaims, "non-quality sold by the dozen." With such an example, the sarcasm of the display — the signs are seen behind a scrim of the American flag and the words "All men are created equal" — seems bluntly superfluous.

The passions behind those signs can be more directly felt in a Hall of Shame, through which, Ms. Parker said, visitors under 12 will be allowed to pass only when accompanied by an adult. On fractured frames and accompanied by sound effects of water hoses or tree limbs creaking with the weight of lynched bodies are horrific photographs of racist violence: the 1930 lynching of two men in Marion, Ind.; the 1919 burning of the body of a black man, Will Brown, in Omaha; police dogs attacking protesters in Birmingham, Ala., in 1963; the swollen, battered face of Emmett Till at his open-coffin funeral in Chicago in 1955. The images enforce a visceral sense of the brutish racial hatred at work.

It is almost a relief to enter a small theater showing a filmed dramatization of a dorm-room bull session in which four freshmen discuss their plans to sit at the Woolworth lunch counter. You then pass through a Hall of Courage, which imagines the walk the four protesters took, approaching Woolworth (in a historical photo) in the distance. You pass by images of stores and homes and trees — touching reminders of the mundane — and as you get closer, you pass by looming images of the inspirational heroes in whose path these young men are said to be walking, including W. E. B. Du Bois, Sojourner Truth, Frederick Douglass, Rosa Parks, the Rev. Dr. Martin Luther King Jr. and Gandhi.

Unfortunately these figures seem less to suggest influence than to exaggerate the stature of the four young men, who can be admired for their achievement without such sanctification. Far more effective would have been to stick with the mundane tone of the luncheonette exhibit itself. Visitors sit at the long counter (part of which is a reproduction; an eight-foot portion of the original is on display at Smithsonian's National Museum of American History in Washington) and gaze into mirrors that become video screens seeming to reflect the sit-in.

Then, leaving the luncheonette, you pass back into the Jim Crow world of the second half of the museum. The impact and sweep of these galleries are actually more intense than the bursts of violence seen earlier, because here you see the full scope of segregation and its system of laws and customs.

You pass through a reproduction of an arch leading into the Greensboro train depot, labeled "Colored Entrance." (One side of the depot was built as a lesser duplicate of the other.) A little farther on is a double-sided Coca-Cola machine from this era (the date is not specified): one side of the machine was meant to serve whites, and the others blacks. One side advertises soda for 5 cents, the other 10, though it is not clear who was meant to get the better bargain.

There are images of segregated buses, want ads specifying the race of the desired employee, a sign from a Birmingham theater ("Colored must sit in balcony"), the door from a bathroom of a Greensboro store labeled "Colored Women." A 1941 "Negro Motorist Green-Book," published for black tourists, is on display, resembling an AAA guide, listing establishments in every state and major city that would welcome them: hotels, restaurants, garages, beauty parlors, haberdashers.

The effect is overwhelming and unrelenting, mixing image and spare text, recounting the importance of black churches and the scope of the attacks on them, the segregation of hospitals and medical care, the baleful effects of separate and unequal education. There are interactive displays of racially loaded literacy tests, a survey of legal challenges and courtroom strategies, and, all too briefly, a history of the movement's evolution and a Wall of Remembrance naming its martyrs.

The point, of course, is not to show a collection but to share an experience. In this the museum is fully successful. The taste of justified bitterness runs through it.

But there is an important qualification to be made. Photographs and objects weren't labeled when I saw them last week, and it was unclear how much detail would be available about times and places. The images of racial violence that were a prelude to the Woolworth exhibit include events that took place as early as 1919 and as late as 1963, well after the sit-in. And the movement itself is more complicated than suggested. There were effective sit-ins before Greensboro. There also were debates over the strategy (the national NAACP initially opposed sit-ins). And later splits among both black and white activists are elided. This museum is not a history of the movement.

There is an ahistorical tendency here, in which particular detail is put aside for broad impact. To a certain extent this must be done in any commemoration, particularly one as fraught with passion and urgency as this. But more attention to the nuances of the movement wouldn't have hurt the museum's cause; it would have strengthened it.

And finally, when generalizing outward, the museum is less intent on the movement's successes (which should be made more evident) than on the existence of continuing and unresolved problems. It ends with a gallery that cites President Obama's speech on the anniversary of the fall of the Berlin Wall, which stressed how many walls exist that must still come down. There is even a piece of the Berlin Wall here, along with a tribute to the worldwide impact of nonviolent protest movements.

But those movements had little to do with the fall of the wall. It is also difficult to shift perspectives so dramatically and globally celebrate a tactic when the museum's concerns have been so different. Surely it is enough that one has been immersed in a story of a struggle that was so necessary, so compelling and, on balance, so triumphant.

The International Civil Rights Center and Museum is at 132 South Elm Street, Greensboro, N.C.; (336) 274-9199, sitinmovement.org.

http://www.nytimes.com/2010/02/01/arts/design/01museum.html?ref=design

Tino Sehgal
In the Naked Museum: Talking, Thinking, Encountering

By HOLLAND COTTER

If you've ever wanted to see the interior of the Guggenheim Museum in its pristine state, now's the time. For the solo show of the young European artist Tino Sehgal, the great spiraling rotunda, recently ablaze with Kandinskys, has been cleared out. There isn't a painting in sight.

Yet the space isn't empty. On the rotunda's ground floor, a man and woman entwine in a changing, slow-motion amorous embrace. On the ramps above, people walk and talk in pairs or clusters at a leisurely pace, with new participants periodically joining conversations as others drop away.

Mr. Sehgal's art is made up almost entirely of such balletic tableaus and social encounters. His work has features of theater and dance — he trained as a dancer — but is made for museums, galleries and art fairs, places that depend for their existence on a proliferation of valuable things.

Things are a problem for Mr. Sehgal, who lives in Berlin and studied political economy before he studied dance. He thinks the world has too many of them, that production is ceaseless and technology destructive. His art is a response to these perceived realities as they play out microcosmically in the context of the art industry. His goal is to create a counter-model: to make something (a situation) from virtually nothing (actions, words) and then let that something disappear, leaving no potentially marketable physical trace.

Arranging for disappearance isn't easy in an age of omnipresent recording devices, which explains why the first thing you see at the Guggenheim is a sign forbidding the taking of photographs. This is standard Sehgal practice. But unless you know why, the prohibition comes across as calculatedly tantalizing.

His rule may be unenforceable in this day and age. Still, it turns the museum into a zone of sort-of secrecy. It piques both the voyeur and the skeptic in us. It amps up the star-power mystique surrounding artists, which in Mr. Sehgal's case is considerable. Now 34, he has been having solo shows since his mid-20s and has become a fixture on the international biennial circuit.

When you arrive, though, tensions and doubts tend to dissipate. For one thing, there's practically nothing to see, much less to catch on film. The sensuous pas de deux, titled "Kiss," is in progress. As

choreography it will hold no surprises for anyone familiar with contemporary dance. Taken as living sculpture, it has amusing moments: every so often, the performers strike erotic poses derived from Courbet, Rodin, Brancusi and Jeff Koons.

Far more interesting is the element of duration.

Through the run of the show, "Kiss" will be performed every day in the same spot during regular museum hours, from the time the doors open in the morning till they close at night. Each pair of performers — professional dancers rehearsed by Mr. Sehgal — will appear in roughly three-hour shifts, then be seamlessly replaced by another pair. Like a static sculpture, the piece is continually visible, but also constantly moving and changing. When the show ends, it will evaporate.

Mr. Sehgal created "Kiss" and other sculptural pieces like it in the early 2000s. He then moved on to work that makes viewers part of the action. The second of the two Guggenheim pieces, "This Progress," which originated in 2006, is one of these. It is visually far less concentrated than "Kiss" — it is even in some sense invisible — but more embracing and filling.

It begins when you walk a short way up the rotunda ramp. A child comes over to greet you. My greeter, a girl of 9 or 10, introduced herself as Giuliana and stated matter-of-factly, "This is a piece by Tino Sehgal." She invited me to follow her and asked if she could ask me a question. "What is progress?" I gave a broad answer, then at her request, a clarifying example. We went further up the ramp.

Soon we were joined by a young man, a teenager, who said his name was Will. Giuliana carefully and accurately paraphrased for him my response to her question and slipped away. I walked on with Will, who commented on my comments on progress, which prompted me to try to refine my initial thoughts.

About halfway up the rotunda, Will was replaced by Tom, whom I took to be in his mid-30s and who introduced a new topic.

He had read a scientific report that morning saying that dinosaurs, long envisioned as drab-gray and green, might have been brightly colored, even gaudily striped. We had both, we said, been fascinated by dinosaurs as kids, as was his young son today. And now everyone would have to reimagine them, though artists already had done that. So Maurice Sendak's "Where the Wild Things Are" turns out to be natural history. Art beats science to the punch.

As we neared the last stretch of the ramp, Tom handed me over to Bob, who was, like me, in late middle age and who broached another topic. He had just returned from Bulgaria where he had talked with a range of people over 20 about their feelings about the state of their country and lives. He found, he said, a pervasive nostalgia for life under Communism, a yearning for a society that promised to take care of everyone.

As we talked the idea of progress became increasingly complicated, ambiguous in value, simultaneously positive and negative. Is a sensitivity to ambiguity in general more prevalent now, we wondered, than in the 1960s when Bob and I were young? Bob said for his son, who is in his 30s, ambiguity is the rule. Where we had moral heroes, he can find none. I was about to press on with this when Bob stopped and said gently, as if on cue, "The piece is called 'This Progress,' " and walked off.

As I made my way alone back down Frank Lloyd Wright's loopy, utopian ramp I passed other visitors and their guides (or interpreters, to use Mr. Sehgal's preferred term) in conversation. I later learned that a few verbal elements — Bob's closing line and Giuliana's opening questions — were scripted.

Everything else was extemporaneous. The interpreters had rehearsed timing with Mr. Sehgal, but otherwise, like the visitors, operated without instructions. No two conversations would ever be the same.

The only traces that would remain — I deliberately made no notes until later — would be remembered ideas.

A similarly material-free version of art was, of course, espoused by 1960s Conceptualism, though as Mr. Sehgal has pointed out, it was rarely achieved. Certain early Conceptualists reduced art to the bare minimum — gestures, empty spaces — ostensibly in resistance to a voracious market. But they also documented that work in drawings, photographs and videos, which became market fodder.

Mr. Seghal's scrupulous avoidance of documentation is meant as a corrective to that dynamic. And he takes the argument further by questioning the political premise on which such Conceptualism was founded.

Resisting the market, he insists, is misguided, always was. After all, artists have to make a living. He contends that the overproduction of material things is the crucial issue, the root source of bad ecology, bad economics and bad values.

For his part he is happy to market his physically impermanent art. He sells the pieces, for prices that reach into six figures, as editions; the sales agreements are oral; only the cash paid in is tangible. He stipulates that he or someone associated with him must oversee the execution of a sold piece.

If unauthorized changes are made, the result will be considered inauthentic, a fake. The edition of "Kiss" at the Guggenheim belongs to the Museum of Modern Art, which means MoMA alone has the right to execute or loan it. The Guggenheim, which has borrowed it, does not yet own a Sehgal.

To his detractors he is the perfect artist for the present profit-addled art industry. On the one hand, he pontificates about the perils of material production; on the other, he helps keep the money flowing into the market's object-spewing system. And how innovative is his work? It stands on the shoulders of a constellation of influences, from Allan Kaprow, Fluxus and the Judson Dance Theater in the 1960s and '70s to Andrea Fraser and Felix Gonzalez-Torres in the 1980s and '90s. (Mr. Sehgal is young; so is much of his audience, which is unlikely to recognize when new is recycled old. The one form of transience the art industry depends on is the transience of memory.)

I understand those reservations. But against them I set my encounter with the show, organized by Nancy Spector, the museum's deputy director and chief curator; Nat Trotman, associate curator; and Katherine Brinson, assistant curator. I like "Kiss," but just O.K. It's sexy, driven, complete, but radiates a familiar chic.

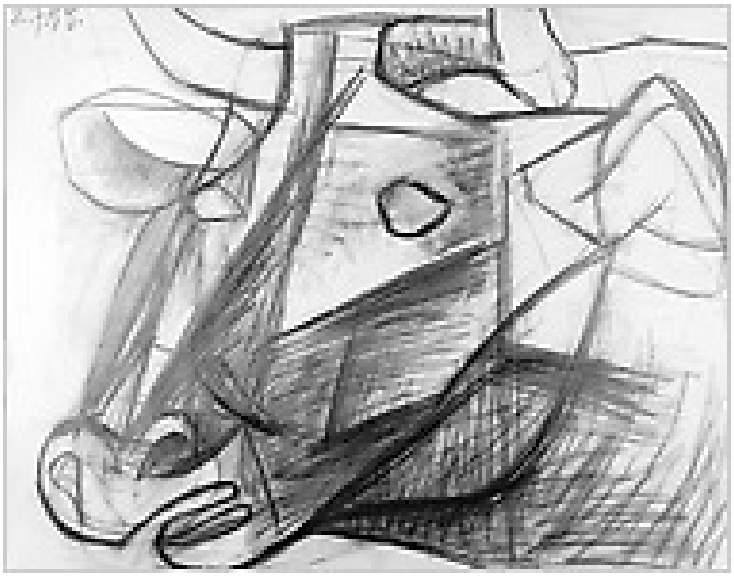
By contrast "This Progress" was awkward, rambling, indeterminate, peppered with doubt and ambiguity. (Why, I began to wonder as I walked and talked and listened, had I answered Giuliana's question as I did? What would I say if I were asked again?)

Still, at the end, after Bob had disappeared, I felt stirred up, but light and refreshed, the way I sometimes — but not that often — do when I feel that I've met art in some very bare-bones way. It really is about life. It really is about communication. It really does have no answers. And it really is addictive. I was primed to go back for more.

"Tino Sehgal" continues through March 10 at the Guggenheim Museum, 1071 Fifth Avenue, at 89th Street; (212) 423-3500, guggenheim.org.

http://www.nytimes.com/2010/02/01/arts/design/01tino.html?ref=design

Europe on the Upper East Side
By ROBERTA SMITH



The Upper East Side gallery scene can often seem a bit staid, but it has its mercurial side. For one thing, the art in its contemporary galleries frequently pushes the envelope. For another, its many semiprivate dealers occasionally mount shows en masse, whether by plan or coincidence, that amount to collective mood swings. Sometimes Asian art is ascendant, or 19th- and early-20th-century American art. Right now the neighborhood has broken out in exhibitions of European drawings.

Friday and Saturday are officially — emphasis on officially — the last days of "Master Drawings New York," an annual weeklong constellation of exhibitions, now in its fourth incarnation, that coincides with the old master auctions and the Winter Antiques Show. That event, at the Park Avenue Armory, is open through Sunday, and some of the gallery shows are up well beyond that.

Some semiprivate dealers have staged their only public exhibitions of the year; others have put their spaces at the disposal of out-of-town dealers or space-challenged local ones. The effect is something like an art fair, but more focused in terms of material and more geographically spread out at sites better appointed, more spacious and vastly more architecturally interesting than the average art fair booth. Factor in some other galleries in the area showing drawings (including contemporary ones), and there's quite a bit to look at, most of it on or just off Madison Avenue between 66th and 81st Streets.

The work is primarily European, from the 16th century almost to the present, with high concentrations of Italian, French, Dutch-Flemish and English drawings from the 17th century to the early 19th. Marquee names are scarce, but there are many extraordinary talents who are all but unknown to those of us outside the specialized world of drawings.

Which is to say that you never know what you'll see, and that you won't necessarily know what you're looking at. The unpredictability provides great exercise for the eye, whether amateur or expert — though in some cases not much exertion is required.

At the Didier Aaron gallery (32 East 67th Street), for example, you'd almost have to be blind not to be intrigued by a drawing of people standing and sitting in a large, colonnaded space centered on an imposing history painting, which is displayed beneath a skylight. The work of Jean-Pierre Norblin de la Gourdaine — a new name to many — it dates from 1805-10, but feels awfully prescient: The set-up is a precise precursor of Thomas Struth's photographs from the last two decades of people looking at prominent artworks in museums and churches.

Double Takes

Also at Didier Aaron, Addison Fine Arts from San Francisco has set up shop with a range of English and European drawings and watercolors — including works by Pinturricchio and Rembrandt — and at least one instance of illuminating confusion. What I thought was a western landscape of a mountain waterfall by the 20th-century American artist Rockwell Kent was in fact an unusually modern-looking watercolor view of the Swiss-Italian Alps by the Briton Francis Towne , from 1789.

Similar surprises can be had at Jill Newhouse Gallery (4 East 81st Street), where works from the collection of Curtis O. Baer, are on view through Feb. 26. Keep an eye out for an early, uncharacteristically blocky rendering of a man's back that Odilon Redon made in 1860 when he was but 20, and a late, rather scary ink drawing of birdlike figures by Max Beckmann that you might almost think was by Wifredo Lam.

While the offerings at Newhouse range back to the 17th-century Dutch, those at the Jan Krugier Gallery (980 Madison Avenue, near 76th Street) are devoted almost exclusively to the 19th- and 20th-century French and Spanish. One of the stars here is a Picasso charcoal of a large bull's head from around 1955 that (like Ms. Newhouse's Redon) seems more chiseled than drawn.

Some galleries are fairly strict in their national orientation. The drawings that José de la Mano has brought from Madrid are almost all Spanish, ranging from early-17th-century works to two drawings by Luis Feito, a little-known Modernist born in 1927. Visiting his display on the second floor of the Arader Gallery at 1016 Madison Avenue, near 78th Street, has an added perk: the generous stairway is lined with wonderful botanical prints — an Arader specialty — of American trees by the 18th-century British naturalist Mark Catesby.

Next door, at Mitchell-Innes & Nash, at 1018 Madison, Lowell Libson of London is showing mostly 18th- and 19th-century English drawings, including works by Constable, Gainsborough and John Martin. But there are also English scenes by foreigners, most notably four small, resonant ink studies from the 1660s of lush London parks. They are the work of Michel van Overbeek, possibly a Dutch merchant who drew as he traveled, given the geographical range of his subjects and the apparent lack of paintings by him.

Another London dealer, James Mackinnon, has brought a mostly English selection to Clinton Howell Antiques (150 East 72nd Street), including a radiant watercolor of the Eton College Library by Augustus Charles Pugin (1762-1832) that is one of the few richly reported interiors in the shows. And a third London establishment, Stephen Ongpin Fine Art, at Mark Murray Fine Paintings (39 East 72nd Street), has topped off an imposing mix of mostly French and Italian drawings dating as far back as the early 16th century — a Virgin and Child by Ridolfo Ghirlandaio, the son of Domenico — with more recent English works, including L. S. Lowry's first attempt at watercolor. He made it on the spot in 1952, at 65, when the daughter of a friend he was visiting doubted that he was a famous artist.

Identity Searches

Attribution questions abound in this field, turning the week into an opportunity for dealers to draw on one another's expertise. One of the first things to be seen in a show mounted by Mia N. Weiner, a private dealer from Connecticut, at L'Antiquaire & the Connoisseur (36 East 73rd Street, through next Friday) is "Study of an Anguished Female Head," with a typed label reading, "Flemish, 17th-century." Scrawled over it in pencil are the words "Maybe C. de Crayer" — "a suggestion by someone more knowledgeable than I," Ms. Weiner said. She also said she had dispatched an assistant to the Frick Library to seek out a photograph of a Caspar de Crayer painting that might be based on the drawing.

Monroe Warshaw, a private Manhattan dealer who is having his first public exhibition at the Alexander Gallery (942 Madison Avenue, between 74th and 75th Streets, through next Friday) buys almost nothing

but unattributed drawings and then sets about consulting with art historians and curators. “Otherwise, it’s no fun,” he said.

The result in this instance is a cluster of fascinating Flemish and German drawings that have been looked into on Mr. Warshaw’s behalf by a young doctoral candidate named Edward Wouk, who may be on hand to talk about his research. He is especially forthcoming about a large sheet depicting sculptures of sandaled feet that was drawn in the 1530s from Roman statues and fragments that may all have been in the same private collection in Rome. Mr. Wouk and Mr. Warshaw have attributed the work to a little-known artist with the pleasing name Hermannus Posthumus.

On another wall, an exquisite drawing shows a Venus-like figure whose tree-branch arms transform her into Daphne, but whose proportions shout Northern Europe. Mr. Warshaw is convinced that it is the only known drawing by Georg Aberl, a southern German artist from the early 17th century, though he concedes that not everyone agrees.

Nissman, Abromson Ltd. from Brookline, Mass., has an especially beautiful show at Praxis International Art (25 East 73rd Street). The Italian drawings here include one of a young boy eating that was, then wasn’t and now is again by Veronese, and a deft study for a relief that is almost certainly by Pietro Bernini, father of the genius Gian Lorenzo, that helps to explain the son’s preciosity. A charmingly crisp view of skaters on a frozen canal is by Auguste-Xavier Leprince (1799-1826), who didn’t live long enough to leave much of a mark on history. A quizzical-looking young woman in a small portrait by the German painter Franz Krüger (1797-1857) has a softer charm.

A Day Out, Spoiled

Don’t miss a dark outdoor image from the 1890s by the Italian Post-Impressionist Giovanni Segantini. Heavily worked in conte crayon and ink, like an exceedingly muscular Seurat, it shows a boy breaking bread with two shifty-looking men. It suggests a classic Impressionist picnic gone awry, and may have an autobiographical basis: at an early age, to seek his fortune in art, Segantini stole money and ran away from home, only to conned out of his start-up cash by experienced grifters.

Next door to Praxis, at 23 East 73rd Street, are three floors of shows. Trinity Fine Arts is showing mostly British works of the 19th and 20th centuries. At Mary-Anne Martin/Fine Art, 20th-century Mexican works prevail, with Rufino Tamayo and Gunther Gerzso standing out (through next Friday). The private New York dealer Richard A. Berman is ensconced at C. G. Boerner with drawings and watercolors ranging from the 16th century to Picasso and beyond.

At 5 East 73rd Street, the Craig F. Starr Gallery, which is not participating in “Master Drawings New York,” has, by coincidence, a display of 20 spare, jewel-like watercolor and pencil works by the American Post-Minimalist Richard Tuttle (through Feb. 13). Their adamant economy suggests that there is more than one way to be a master.

So do the bracingly feminist drawings of Ida Applebroog at Hauser & Wirth at 32 East 69th Street (through March 6). In a large group of small drawings from 1969 the artist concentrates on depicting her genitals; these relatively realistic renderings are contrasted with an installation of recent drawings in which she revisits the theme with more flamboyance.

There’s a conspicuous concentration of quality at 19 East 66th Street, where both David Tunick and Simon Dickinson have shows, and Thomas Williams and Andrew Wyld of London are elegantly encamped at Dickinson. Start at the top, where Mr. Tunick’s display includes a 15th-century drawing from the circle of Rogier van der Weyden. Depicting the swooning Virgin supported by the two Marys, it feels so solid that it might almost be a drawing of a carved sculpture.

At Dickinson, I had trouble knowing who was showing what, but the works range from Jacques Callot through Boucher and Fragonard to Picasso and a Kees van Dongen gouache of a woman in a hat, from 1908, that provides some early fluorescent color. Mr. Wyld has Thomas Lawrence's 1790 portrait in pencil, charcoal and colored chalk of Lord Thomas Pelham-Clinton, a haughty, sharp-eyed boy looking none too happy in an off-the-shoulder dress.

And uptown at Shepherd & Derom Galleries (58 East 79th Street, through Feb. 20), the New York dealer Margot Gordon's selection of French and Italian drawings includes a striking portrait of a woman in red and black chalk by Federico Zuccaro. Also here is the dealer Crispian Riley-Smith from London, with Dutch and Flemish drawings, among them a rare Crucifixion by Hans Bol from the late 15th century and a crystalline view of the harbor at Delft in gray ink and wash by Joannis Jacobus Bijlaert (1734-1809). It is based on an earlier print, which accounts for its slightly archaic look and caption.

Further Steps

Two of the galleries are a bit farther afield, but worth the extra walk.

To the east, at 252 East 68th Street, Stiebel Ltd. has an engaging array of mostly French drawings that veer among big and not-big names (through next Friday). Standouts include a Renoir study for female bathers, so refined that you might almost take it for an Ingres, and a strange, collagelike drawing of a woman surrounded by the heads of 27 male admirers of greatly varying ages. Its attribution has shifted from Louis-Léopold Boilly (1761-1845) to Jean-Baptiste Isabey (1767-1855) and is now leaning toward Boilly's son, Julien (1796-1874).

North of the action, at Carlton Hobbs (60 East 93rd Street), you can study the beautiful drawings Jean-Luc Baroni has brought from Paris. A stunning pastel portrait of Antonio Canova by the Irish artist Hugh Douglas Hamilton would seem to be the last word in realism. A hurried ink drawing by Guercino from around 1630 is reminiscent of Goya in its portrayal of spectators at a bullfight cringing behind, and peering in unison through, a horizontally slatted barricade.

Mr. Baroni's drawings are part of an exhibition titled, a tad off-puttingly, "In the Grand Manner" (through Tuesday), together with the rare, distinguished and often eccentric European antiques that Mr. Hobbs handles. A standout among these is a very large gold and silver-giltwood model of the Temple of Solomon from 1876 that looks something like a cross between the Bank of England and the James A. Farley Post Office on Eighth Avenue.

In the grandest manner of all is the gallery's building itself: an enormous Louis XV-style mansion designed by John Russell Pope and completed in 1931. Three lots wide, it has few equals in this town in terms of sheer drop-dead majesty. It's a setting that puts the old back in master.

http://www.nytimes.com/2010/01/29/arts/design/29masters.html?ref=design

Magnesium Supplement Helps Boost Brainpower

Increasing magnesium intake may be a valid strategy to enhance cognitive abilities. (Credit: iStockphoto/Vasiliy Yakobchuk)

ScienceDaily (Feb. 2, 2010) — New research finds that an increase in brain magnesium improves learning and memory in young and old rats. The study, published in the January 28th issue of the journal *Neuron*, suggests that increasing magnesium intake may be a valid strategy to enhance cognitive abilities and supports speculation that inadequate levels of magnesium impair cognitive function, leading to faster deterioration of memory in aging humans.

Diet can have a significant impact on cognitive capacity. Identification of dietary factors which have a positive influence on synapses, the sites of communication between neurons, might help to enhance learning and memory and prevent their decline with age and disease. Professor Guosong Liu, Director of the Center for Learning and Memory at Tsinghua University in Beijing, China, led a study examining whether increased levels of one such dietary supplement, magnesium, boosts brain power.

"Magnesium is essential for the proper functioning of many tissues in the body, including the brain and, in an earlier study, we demonstrated that magnesium promoted synaptic plasticity in cultured brain cells," explains Dr. Liu. "Therefore it was tempting to take our studies a step further and investigate whether an increase in brain magnesium levels enhanced cognitive function in animals."

Because it is difficult to boost brain magnesium levels with traditional oral supplements, Dr. Liu and colleagues developed a new magnesium compound, magnesium-L-threonate (MgT) that could significantly increase magnesium in the brain via dietary supplementation. They used MgT to increase magnesium in rats of different ages and then looked for behavioral and cellular changes associated with memory.

"We found that increased brain magnesium enhanced many different forms of learning and memory in both young and aged rats," says Dr. Liu. A close examination of cellular changes associated with memory

revealed an increase in the number of functional synapses, activation of key signaling molecules and an enhancement of short- and long-term synaptic processes that are crucial for learning and memory.

The authors note that the control rats in this study had a normal diet which is widely accepted to contain a sufficient amount of magnesium, and that the observed effects were due to elevation of magnesium to levels higher than provided by a normal diet.

"Our findings suggest that elevating brain magnesium content via increasing magnesium intake might be a useful new strategy to enhance cognitive abilities," explains Dr. Liu. "Moreover, half the population of industrialized countries has a magnesium deficit, which increases with aging. This may very well contribute to age-dependent memory decline; increasing magnesium intake might prevent or reduce such decline."

Story Source:

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

Journal Reference:

1. Inna Slutsky, Nashat Abumaria, Long-Jun Wu, Chao Huang, Ling Zhang, Bo Li, Xiang Zhao, Arvind Govindarajan, Ming-Gao Zhao, Min Zhuo, Susumu Tonegawa and Guosong Liu. **Enhancement of Learning and Memory by Elevating Brain Magnesium**. *Neuron*, Jan. 28, 2010

http://www.sciencedaily.com/releases/2010/01/100127121524.htm

Researchers Track Evolution and Spread of Drug-Resistant Bacteria Across Hospitals and Continents

ScienceDaily (Feb. 2, 2010) — An international team of researchers has used high resolution genome sequencing to track a particularly virulent strain of MRSA as it traveled between South America, Europe and Southeast Asia. The findings shed light on how these deadly bacteria are able to spread from patient to patient in a single hospital and, on a larger scale of geography and time, between countries and entire continents.

The researchers included scientists from Rockefeller University, the Wellcome Trust Sanger Institute and the University of Bath in the United Kingdom, Instituto de Tecnologia Química e Biológica (ITQB) in Portugal and a hospital in Thailand.

"MRSA is responsible for over 18,000 fatalities in the United States each year according to CDC estimates, a number virtually identical to the current fatality rate of AIDS in the USA," says Alexander Tomasz, who is Dr. Plutarch Papamarkou Professor and head of the Laboratory of Microbiology and Infectious Disease at Rockefeller.

Earlier studies by Rockefeller andITQB scientists demonstrated that the most successful MRSA strains belong to a limited number of families, or clones, that are responsible for the overwhelming majority -- more than 80 percent -- of all MRSA disease in hospitals worldwide.

In the new research, the scientists focused on one of the most successful MRSA clones, called the Brazilian MRSA, which was first identified at Rockefeller in 1995 and which has the DNA sequence type assignment ST239 (SCCmec III). Isolates of Brazilian MRSA are resistant to virtually all currently available antibacterial agents except vancomycin.

Colleagues at ITQB in Portugal and Susana Gardete, a postdoctoral fellow in the Laboratory of Microbiology and Infectious Disease at Rockefeller, prepared DNA from more than 40 of the Brazilian MRSA isolates recovered between 1982 and 2003 from a variety of sources in Europe, South America and Asia. These preparations were analyzed by colleagues at the Sanger Institute using a new, very high throughput DNA sequencing technology.

The findings reported in *Science* provide an unparalleled view of the evolutionary history and age of the Brazilian MRSA clone. It was possible to show that the most likely birthplace of Brazilian MRSA was actually Europe, from where it spread to South America and Asia. From there, it continued to evolve and was reintroduced to Europe at a later date.

Applying the same technology to 20 Brazilian MRSA samples recovered from individual patients in a single Thai hospital within the short timeframe of a few weeks, the scientists were able to trace with precision the patient-to-patient spread of the MRSA bacterium.

"The remarkable insights that this study provides into the stages of evolution of a major human pathogen illustrates the power of collaboration between evolutionary biologists, experts in DNA sequencing and bioinformatics and epidemiologists who can provide carefully selected and characterized strain collections for each study," says Tomasz.

For more than 20 years, Tomasz and Hermínia de Lencastre, a senior research associate in his laboratory, have collected isolates of MRSA patients all over the world. These carefully characterized samples are stored in freezers at ITQB and Rockefeller as part of the CEM/NET Initiative, an ongoing international project in molecular epidemiology first organized by de Lencastre and Tomasz in 1995.

"The application of full genome sequencing described in the *Science* report provides us with a view of how MRSA evolves on two different scales of time and geography," says de Lencastre. "It not only

documents evolution on the timescales of decades and over the geography of entire continents, but also on the shorter timescale of a few weeks within the confines of a single hospital in Thailand."

"It would be interesting to add to these two stories a third one in which we applied full DNA sequencing on an even shorter scale of time and space," says Tomasz. "In a recent study published in *PNAS* in 2007 we were able to track the in vivo evolution of multidrug resistance in a single MRSA lineage recovered from a patient undergoing a three-month course of chemotherapy."

Story Source:

Adapted from materials provided by Rockefeller University.

Journal Reference:

1. Harris et al. **Evolution of MRSA During Hospital Transmission and Intercontinental Spread**. *Science*, 2010; 327 (5964): 469 DOI: 10.1126/science.1182395

http://www.sciencedaily.com/releases/2010/01/100131191304.htm

White Roofs May Successfully Cool Cities, Computer Model Demonstrates

A construction crew works on a white roof in Washington, D.C. (Credit: Copyright American Geophysical Union, photo by Maria-José Viñas)

ScienceDaily (Feb. 2, 2010) — Painting the roofs of buildings white has the potential to significantly cool cities and mitigate some impacts of global warming, a new study indicates. The new NCAR-led research suggests there may be merit to an idea advanced by U.S. Energy Secretary Steven Chu that white roofs can be an important tool to help society adjust to climate change.

But the study team, led by scientists at the National Center for Atmospheric Research (NCAR), cautions that there are still many hurdles between the concept and actual use of white roofs to counteract rising temperatures.

"Our research demonstrates that white roofs, at least in theory, can be an effective method for reducing urban heat," says NCAR scientist Keith Oleson, the lead author of the study. "It remains to be seen if it's actually feasible for cities to paint their roofs white, but the idea certainly warrants further investigation."

The study is slated for publication later this winter in *Geophysical Research Letters*. It was funded by the National Science Foundation, NCAR's sponsor.

Cities are particularly vulnerable to climate change because they are warmer than outlying rural areas. Asphalt roads, tar roofs, and other artificial surfaces absorb heat from the Sun, creating an urban heat island effect that can raise temperatures on average by 2-5 degrees Fahrenheit (about 1-3 degrees Celsius) or more compared to rural areas. White roofs would reflect some of that heat back into space and cool temperatures, much as wearing a white shirt on a sunny day can be cooler than wearing a dark shirt.

The study team used a newly developed computer model to simulate the amount of solar radiation that is absorbed or reflected by urban surfaces. The model simulations, which provide scientists with an idealized view of different types of cities around the world, indicate that, if every roof were entirely painted white, the urban heat island effect could be reduced by 33 percent. This would cool the world's cities by an average of about 0.7 degrees F, with the cooling influence particularly pronounced during the day, especially in summer.

The authors emphasize that their research should be viewed as a hypothetical look at typical city landscapes rather than the actual rooftops of any one city. In the real world, the cooling impact might be somewhat less because dust and weathering would cause the white paint to darken over time and parts of roofs would remain unpainted because of openings such as heating and cooling vents.

In addition, white roofs would have the effect of cooling temperatures within buildings. As a result, depending on the local climate, the amount of energy used for space heating and air conditioning could change, which could affect both outside air temperatures and the consumption of fossil fuels such as oil and coal that are associated with global warming. Depending on whether air conditioning or heating is affected more, this could either magnify or partially offset the impact of the roofs.

"It's not as simple as just painting roofs white and cooling off a city," Oleson says.

More cooling for certain cities

The research indicated that some cities would benefit more than others from white roofs, depending on such factors as:

- Roof density. Cities where roofs make up more of the urban surface area would cool more.
- Construction. Roofs that allow large amounts of heat from the Sun to penetrate the interior of a building (as can happen with metal roofs and little insulation) are less effective in cooling outside temperatures when painted white.
- Location. White roofs tend to have a larger impact in relatively warm climates that receive strong, year-round sunlight.

While the model did not have enough detail to capture individual cities, it did show the change in temperatures in larger metropolitan regions. The New York area, for example, would cool in summer afternoons by almost 2 degrees Fahrenheit.

A new technique

The study team used a new computer model, developed by Oleson and colleagues, that is designed to assess the impacts of a changing climate on urban populations and explore options for countering rising temperatures. This urban canyon model simulates temperature changes in city landscapes, capturing such factors as the influence of roofs, walls, streets, and green spaces on local temperatures. Oleson has successfully linked it to a computer simulation of worldwide climate, the NCAR-based Community Climate System Model, thereby enabling researchers to study the interactions between global climate change and urban areas.

The new model does not yet have the power to replicate the architecture and design of specific cities. Instead, the research team created abstractions of cities in the model, using classes of population density, urban design, and building construction. Oleson and his colleagues plan to continue refining the model to provide more information for policymakers concerned about protecting urban populations from the risks associated with heat waves and other changes in climate.

"It's critical to understand how climate change will affect vulnerable urban areas, which are home to most of the world's population," says NCAR scientist Gordon Bonan, a co-author of the study.

Story Source:

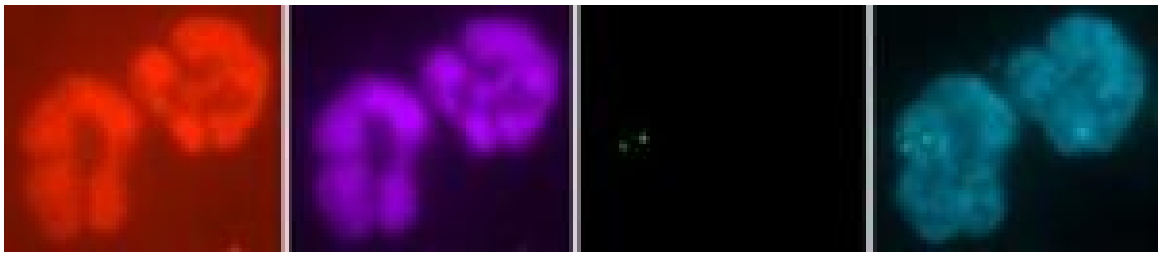
Adapted from materials provided by National Center for Atmospheric Research.

Journal Reference:

1. Keith Olson, Gordon Bonan, Johannes Feddema. **The Effects of White Roofs on Urban Temperature in a Global Climate Model**. *Geophysical Research Letters*, 2010; (in press)

http://www.sciencedaily.com/releases/2010/02/100201145445.htm

Tumor Suppressor P53 Prevents Cancer Progression in Cells With Missegregated Chromosomes



Thompson and Compton introduced a single fluorescent mark into the genome of a diploid cell line, induced missegregation, and identified the cells that incorrectly carried two or zero marks (green) on their DNA (blue). These cells arrested due to increased levels of the tumor suppressor p53 (purple) and its transcriptional target, the cyclin-dependent kinase inhibitor p21 (red). (Credit: Thompson, S.L., and D.A. Compton. 2010. J. Cell Biol. doi:10.1083/jcb. 200905057.)

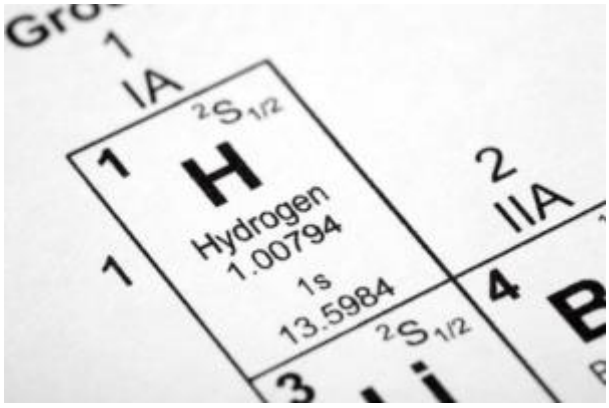
ScienceDaily (Feb. 2, 2010) — Cells missegregate a chromosome approximately once every hundred divisions. But don't be too alarmed: new research in the *Journal of Cell Biology* shows that the tumor suppressor p53 limits the growth of cells with incorrect numbers of chromosomes and prevents their progression toward cancer. The study appears online February 1.Tumor cells tend to missegregate chromosomes at a particularly high frequency (a condition known as chromosomal instability, or CIN), which is probably why they are often aneuploid (i.e., they carry an abnormal number of chromosomes). In 2008, Sarah Thompson and Duane Compton, from Dartmouth Medical School, revealed that most CIN in tumor cells was caused by incorrect attachments between mitotic spindle microtubules and kinetochores, and that inducing misattachments in normal cells was sufficient to generate high rates of chromosome missegregation. There was a small but significant wrinkle to this story, however: normal, diploid cells stopped proliferating as soon as they gained or lost a chromosome, so they never converted into a cancer-like aneuploid cell line.To investigate why normal cells stop proliferating when they missegregate their DNA, Thompson and Compton engineered a human cell line to carry a unique fluorescent mark on one of its chromosomes. This allowed them to identify and follow by live microscopy the cells that missegregated a chromosome.The researchers induced missegregation and then looked for cells that had gained or lost a fluorescent mark within their genome. These cells failed to proliferate, and showed elevated levels of p53 and one of its transcriptional targets, the cell cycle inhibitor p21. Cells lacking p53 became aneuploid after induced missegregation, indicating that the p53 pathway normally serves to limit the propagation of cells with odd numbers of chromosomes.How is p53 activated by chromosome missegregation? Thompson and Compton think that a change in chromosome number leads to an imbalance in gene expression, resulting in a stress response and cell cycle arrest that is vital to avoid cancer. "By combining loss of p53 with increased missegregation rates, we can convert a diploid cell into something …. that looks like a tumor cell," says Compton. Furthermore, these aneuploid cells develop an inherent genomic instability reminiscent of genuine cancer cells, perhaps because imbalanced gene expression also causes disruptions to mitosis.A recent study demonstrated that chromosome missegregation initiates tumorigenesis by causing cells to lose tumor suppressors like p53. "It's like a self-fulfilling prophecy," argues Compton. "If you missegregate a chromosome encoding p53, you make the cells deficient in p53, so they're able to propagate and missegregate more chromosomes."There are circumstances in which nontumor cells tolerate aneuploidy just fine, but, in most cases, healthy cells keep a tight check on chromosome number. "I think it affects a lot of different pathways," says Compton. "The next question to ask is which pathways are sensitive to aneuploidy, and how do tumor cells overcome those problems?"

Reference: Thompson, S.L., and D.A. Compton. 2010. J. Cell Biol. doi:10.1083/jcb. 200905057.

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

http://www.sciencedaily.com/releases/2010/02/100201091624.htm

Superconducting Hydrogen? Researchers Model Three Hydrogen-Dense Metal Alloys



Periodic table detail of hydrogen. (Credit: iStockphoto/David Freund)

ScienceDaily (Feb. 1, 2010) — Physicists have long wondered whether hydrogen, the most abundant element in the universe, could be transformed into a metal and possibly even a superconductor -- the elusive state in which electrons can flow without resistance.

They have speculated that under certain pressure and temperature conditions hydrogen could be squeezed into a metal and possibly even a superconductor, but proving it experimentally has been difficult. High-pressure researchers, including Carnegie's Ho-kwang (Dave) Mao, have now modeled three hydrogen-dense metal alloys and found there are pressure and temperature trends associated with the superconducting state -- a huge boost in the understanding of how this abundant material could be harnessed.

The study is published in the January 25, 2010, early, on-line edition of the *Proceedings of the National Academy of Sciences.*

All known materials have to be cooled below a very low, so-called, transition temperature to become superconducting, making them impractical for widespread application. Scientists have found that in addition to chemical manipulation to raise the transition temperature, superconductivity can also be induced by high pressure. Theoretical modeling is very helpful in defining the characteristics and pressures that can lead to high transition temperatures. In this study, the scientists modeled basic properties from first principles -- the study of behavior at the atomic level -- of three metal hydrides under specific temperature, pressure, and composition scenarios. Metal hydrides are compounds in which metals bind to an abundance of hydrogen in a lattice structure. The compounds were scandium trihydride (ScH_3), yttrium trihydride (YH_3) and lanthanum trihydride (LaH_3).

"We found that superconductivity set in at pressures between roughly 100,000 to 200,000 times atmospheric pressure at sea level (10 to 20 GPa), which is an order of magnitude lower than the pressures for related compounds that bind with four hydrogens instead of three," remarked Mao, of Carnegie's Geophysical Laboratory. Lanthanum trihydride stabilized at about 100,000 atmospheres and a transition temperature of -- 423°F (20 Kelvin), while the other two stabilized at about 200,000 atmospheres and temperatures of -427 °F (18 K) and -387 °F (40 K) for ScH_3 and YH_3 respectively.

The researchers also found that two of the compounds, LaH_3 and YH_3, had more similar distributions of vibrational energy to each other than to ScH_3 at the superconducting threshold and that the transition temperature was highest at the point when a structural transformation occurred in all three. This result suggests that the superconducting state comes from the interaction of electrons with vibrational energy through the lattice. At pressures higher than 350,000 atmospheres (35 GPa) superconductivity disappeared and all three compounds became normal metals. In yttrium trihydride, the superconductivity

state reappeared at about 500,000 atmospheres, but not in the others. The scientists attributed that effect to its different mass.

"The fact that the models predicted distinctive trends in the behavior for these three related compounds at similar temperatures and pressures is very exciting for the field," commented Mao. "Previous to this study, the focus has been on compounds with four hydrogens. The fact that superconductivity is induced at lower pressures in the trihydrides makes them potentially more promising materials with which to work. The temperature and pressures ranges are easily attainable in the lab and we hope to see a flurry of experiments to bear out these results." The team at Carnegie has embarked on their own experiments on this class of trihydrides to test these models.

Authors on the paper were Duck Young Kim, Ralph H. Scheicher, Ho-kwang Mao, Tae E. Kang, and Rajeev Ahuja. The work is supported by EFree, an Energy Frontier Research Center funded by the U. S. Department of Energy.

Story Source:

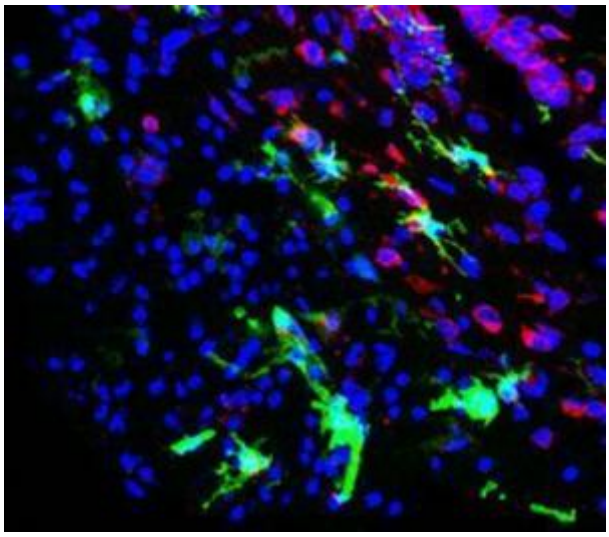
Adapted from materials provided by Carnegie Institution.

Journal Reference:

1. Duck Young Kim, Ralph H. Scheicher, Ho-kwang Mao, Tae W. Kang, and Rajeev Ahuja. **General trend for pressurized superconducting hydrogen-dense materials**. *Proceedings of the National Academy of Sciences*, 2010; DOI: 10.1073/pnas.0914462107

http://www.sciencedaily.com/releases/2010/01/100125172954.htm

First Evidence That the Brain's Native Dendritic Cells Can Muster an Immune Response



Protecting the brain. New experiments show a special population of the immune system's sentinels, dendritic cells (green), at work in the brain. Brain dendritic cells gather around the border of stroke-damaged brain tissue and also stimulate T cells (red) to fight off infections. (Credit: Image courtesy of Rockefeller University)

ScienceDaily (Feb. 1, 2010) — The human brain is a delicate organ, robustly defended. A thick skull shields it from any direct exposure to the outside world, and the blood-brain barrier keeps out any foreign substances that are circulating within. New research shows that the brain may have its own specialized immune defenses, too.

In 2008, researchers at Rockefeller University first identified a population of dendritic cells, the sentinels of the immune system, that was native to the brain. Now they have shown that these cells are not likely sleeping on the job. In experiments published recently in *Proceedings of the National Academy of Sciences* and *Brain Behavior and Immunity*, the researchers show that these brain dendritic cells can muster the immune system's soldier T cells when confronted by certain threats. They also show that, unlike dendritic cells from elsewhere in the body, brain dendritic cells line up along the periphery of stroke-damaged brain tissue, perhaps as a barricade protecting the healthy cells outside.

"We knew they were there and now we know they are immunologically functional," says Karen Bulloch, director of Rockefeller's Neuroimmunology and Inflammation Program, which was funded by the Peter Deane Trust following the initial discovery of brain dendritic cells. Bulloch is a research associate professor who works with Bruce S. McEwen's Harold and Margaret Milliken Hatch Laboratory of Neuroendocrinology and the Laboratory of Cellular Physiology and Immunology headed by Ralph M. Steinman, who discovered dendritic cells in 1973.

Dendritic cells capture and process foreign substances called antigens before presenting them to T cells, which multiply and attack the invaders. To test their activity in the brain, the researchers, led by Rockefeller graduate Andres Gottfried-Blackmore, now a student at Weill Cornell Medical College, injected a mouse brain with interferon-γ, an immune-response molecule produced during specific inflammatory responses. They found that the interferon increased the number of brain dendritic cells without recruiting dendritic cells from elsewhere in the immune system. They then exposed the dendritic cells to a model antigen called OVA, prompting a proliferation of OVA-specific T cells. The brain dendritic cells also proved far more effective at stimulating T cell proliferation in the same test than similar immune-related cells called microglia, which reside in the brain in huge numbers. The difference suggests a specialized role for brain dendritic cells.

In other experiments, led by postdoctoral fellow Jennifer Felger and in collaboration with the laboratory of Costatino Iadecola at Weill Cornell, researchers studied the response of brain dendritic cells labeled with a fluorescent protein after inducing strokes in mice. Unlike dendritic cells from elsewhere in the body, which were drawn into the stroke-damaged tissues, brain dendritic cells closed ranks around the perimeter of the damage, forming a barrier between stricken and healthy tissues.

Brain dendritic cells remain largely mysterious, but their immune-related activity suggests they play an important part in protecting the brain. The researchers are also interested in finding out what they do when they are not battling threats such as strokes or infections. "It is equally important to understand what they do when they are not defending the brain," Bulloch says.

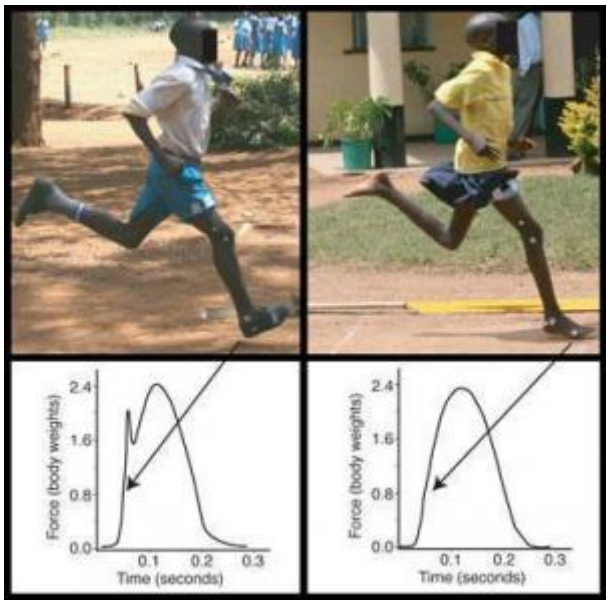
Proceedings of the National Academy of Sciences 106, 20918-20923 (December 8, 2009) Acute in vivo exposure to interferon-γ enables resident brain dendritic cells to become effective antigen presenting cells Andres Gottfried-Blackmore, Ulrike W. Kaunzner, Juliana Idoyaga, Judit C. Felger, Bruce S. McEwen and Karen Bulloch Brain, Behavior and Immunity online: November 13, 2009 Brain dendritic cells in ischemic stroke: Time course, activation state, and origin Jennifer C. Felger, Takato Abe, Ulrike W. Kaunzner, Andres Gottfried-Blackmore, Judit Gal-Toth, Bruce S. McEwen, Costantino Iadecola and Karen Bulloch

Story Source:

Adapted from materials provided by Rockefeller University.

http://www.sciencedaily.com/releases/2010/01/100131192110.htm

Barefoot Running: How Humans Ran Comfortably and Safely Before the Invention of Shoes



"Running barefoot or in minimal shoes is fun but uses different muscles," said Harvard professor Daniel Lieberman. "If you've been a heel-striker all your life, you have to transition slowly to build strength in your calf and foot muscles." (Credit: Image courtesy of Harvard University)

ScienceDaily (Feb. 1, 2010) — New research is casting doubt on the old adage, "All you need to run is a pair of shoes."

Scientists have found that those who run barefoot, or in minimal footwear, tend to avoid "heel-striking," and instead land on the ball of the foot or the middle of the foot. In so doing, these runners use the architecture of the foot and leg and some clever Newtonian physics to avoid hurtful and potentially damaging impacts, equivalent to two to three times body weight, that shod heel-strikers repeatedly experience.

"People who don't wear shoes when they run have an astonishingly different strike," says Daniel E. Lieberman, professor of human evolutionary biology at Harvard University and co-author of a paper appearing this week in the journal *Nature*. "By landing on the middle or front of the foot, barefoot runners have almost no impact collision, much less than most shod runners generate when they heel-strike. Most people today think barefoot running is dangerous and hurts, but actually you can run barefoot on the world's hardest surfaces without the slightest discomfort and pain. All you need is a few calluses to avoid roughing up the skin of the foot. Further, it might be less injurious than the way some people run in shoes."

Working with populations of runners in the United States and Kenya, Lieberman and his colleagues at Harvard, the University of Glasgow, and Moi University looked at the running gaits of three groups: those who had always run barefoot, those who had always worn shoes, and those who had converted to barefoot running from shod running. The researchers found a striking pattern.

Most shod runners -- more than 75 percent of Americans -- heel-strike, experiencing a very large and sudden collision force about 1,000 times per mile run. People who run barefoot, however, tend to land with a springy step towards the middle or front of the foot.

"Heel-striking is painful when barefoot or in minimal shoes because it causes a large collisional force each time a foot lands on the ground," says co-author Madhusudhan Venkadesan, a postdoctoral researcher in applied mathematics and human evolutionary biology at Harvard. "Barefoot runners point

their toes more at landing, avoiding this collision by decreasing the effective mass of the foot that comes to a sudden stop when you land, and by having a more compliant, or springy, leg."

The differences between shod and unshod running have evolutionary underpinnings. For example, says Lieberman, our early Australopith ancestors had less developed arches in their feet. Homo sapiens, by contrast, has evolved a strong, large arch that we use as a spring when running.

"Our feet were made in part for running," Lieberman says. But as he and his co-authors write in *Nature*: "Humans have engaged in endurance running for millions of years, but the modern running shoe was not invented until the 1970s. For most of human evolutionary history, runners were either barefoot or wore minimal footwear such as sandals or moccasins with smaller heels and little cushioning."

For modern humans who have grown up wearing shoes, barefoot or minimal shoe running is something to be eased into, warns Lieberman. Modern running shoes are designed to make heel-striking easy and comfortable. The padded heel cushions the force of the impact, making heel-striking less punishing.

"Running barefoot or in minimal shoes is fun but uses different muscles," says Lieberman. "If you've been a heel-striker all your life you have to transition slowly to build strength in your calf and foot muscles."

In the future, he hopes, the kind of work done in this paper can not only investigate barefoot running, but can provide insight into how to better prevent the repetitive stress injuries that afflict a high percentage of runners today.

"Our hope is that an evolutionary medicine approach to running and sports injury can help people run better for longer and feel better while they do it," says Lieberman, who has created a web site, www.barefootrunning.fas.harvard.edu, to educate runners about the respective merits of shod and barefoot running.

The *Nature* paper arose out of the senior honors theses of two Harvard undergraduates, William A. Werbel '08 and Adam E. Daoud '09, both of whom went to Africa with Lieberman to help collect data for this study.

Lieberman's co-authors on the *Nature* paper are Venkadesan and Daoud at Harvard; Werbel, now at the University of Michigan; Susan D'Andrea of the Providence Veterans Affairs Medical Center in Providence, R.I.; Irene S. Davis of the University of Delaware; and Robert Ojiambo Mang'Eni and Yannis Pitsiladis of Moi University in Kenya and the University of Glasgow in Scotland.

The research was funded by the American School of Prehistoric Research, the Goelet Fund, Harvard University, and Vibram USA.

Story Source:

Adapted from materials provided by Harvard University.

http://www.sciencedaily.com/releases/2010/01/100127134241.htm

How Blood Flow Force Protects Blood Vessels

ScienceDaily (Feb. 1, 2010) — Most people know that exercise protects against heart attack and stroke, but researchers have spent 30 years unraveling the biochemistry behind the idea.but researchers have spent 30 years unraveling the biochemistry behind the idea. One answer first offered by researchers at the University of Rochester Medical Center is that athletic hearts push blood through arteries with greater force, which alone triggers reactions that protect against dangerous clogs in blood vessels.

In the latest study out of Rochester, published recently in the journal *Blood,* researchers demonstrated that they are very close to understanding every step in one flow-sensitive chain reaction that protects arteries. Each step provides an opportunity to mimic with drugs the proven ability of fast, steady blood flow to open up blood vessels and avert the inflammation and blood clots that come with atherosclerosis.

Past research at the Medical Center and elsewhere had determined that two genes, Krüppel-like factor 2 (KLF2) and endothelial nitric oxide synthase (eNOS), are turned on by blood flow force to reverse atherosclerosis, but not how. The current study found for the first time that flow causes a structural change in the enzyme histone deacetylase 5 (HDAC5), which in turn influences whether the two key genes are turned on.

"Obviously we should all be exercising to get our hearts pumping fast, which increases blood flow force through our vessels with all of these molecular benefits," said Zheng-Gen Jin, Ph.D., associate professor of Medicine within the Aab Cardiovascular Research Institute (CVRI) at the University of Rochester Medical Center, and corresponding author for the study. "Beyond that, the designers of future therapies may manipulate HDAC5 to fine-tune the action of protective genes."

Forcing It

The current study revolves around a signaling process called phosphorylation, in which enzymes called kinases attach a set of molecules called a phosphate group to a target to switch life processes on or off. In cells lining blood vessels (endothelial cells), the attachment of a phosphate group to an HDAC5 kicks it out of the cell's nucleus, perhaps by hiding a label that says it belongs there.

To study whether blood flow force represents one the signals that cause HDAC5 nuclear export, the team designed a virus to invade the cells and swap out the key building blocks that make possible its phosphorylation via blood flow force. Weiye Wang, also a member of the CVRI and first author of the paper, designed the virus. He also attached a fluorescent tag to HDAC5 in the mutated cells so the team could track it as it moved.

What the team found for the first time is that blood flow force (also called sheer stress) does indeed cause the phoshorylation, and export from the nucleus, of HDAC5 in endothelial cells. Importantly, the team also found that flow, by removing HDAC5 from the scene, forces it to break away from the molecule it usually attaches to in the nucleus: myocyte enhancer factor-2 (MEF2).

When free, MEF2 is known to drive the expression of Krüppel-like factor 2, which calls for increases in the supply of endothelial nitric oxide synthase (eNOS). eNOS then builds more of the nitric oxide that tells muscles surrounding arteries to relax, which increases blood flow and lowers blood pressure. When cells were engineered with HDAC5 incapable of being phosphorylated by flow, HDAC5 never left the nucleus, remained stuck to MEF2 and completely blocked the expression of KLF2 and eNOS.

Furthermore, taking away the ability of fast, steady flow to phosphorylate HDAC5 greatly weakened a second lifesaving benefit of flow: it prevents white blood cells from sticking to the cells lining blood vessels, an early, necessary step in the development of atherosclerosis. Fatty diets cause cholesterol deposits to build up within arterial walls, deposits that white blood cells "see" as infections and home in

on to drive inflammatory disease. By increasing KLF2 expression, blood flow force is believed to prevent adhesion molecules on cells lining arteries from snagging white blood cells as they float by.

The team also showed through a series of experiments that flow-induced HDAC5 phosphorylation depends on the well known calcium/calmodulin pathway. The team theorizes that the force of flow changes the shape of calcium channels on the surface of endothelial cells, which enables calcium to rush into the cells and turn on calmodulin, which attaches to an as yet unidentified kinase that phosphorylates HDAC5.

Identifying such an enzyme would complete the first diagram of a flow-sensitive, protective signaling pathway. Jin's lab has zeroed in on calmodulin-dependent kinases as likely suspects, and is designing experiments that will shut down the genes coding for them to see if that stops the phosphorylation of HDAC5 by flow. Should that be the case, the team will seek to screen for drug candidates that encourage the action of these enzymes.

Along with Jin and Wang, the effort was led at the Aab CVRI by Chang Hoon Ha, Bong Sook Jhun and Chelsea Wong. Mukesh Jain led a partnering effort at the Case Western Reserve University School of Medicine. Much of the early work in area was done in the labs of Bradford Berk, M.D., Ph.D., CEO of the University of Rochester Medical Center, and Jun-ichi Abe, M.D., Ph.D., associate professor within the Aab CVRI. Funding for the work of Jin's team came from the American Heart Association, the American Diabetes Association and the National Heart, Lung and Blood Institute (NHLBI), part of the National Institutes of Health. The article was published online on Dec. 30, 2009.

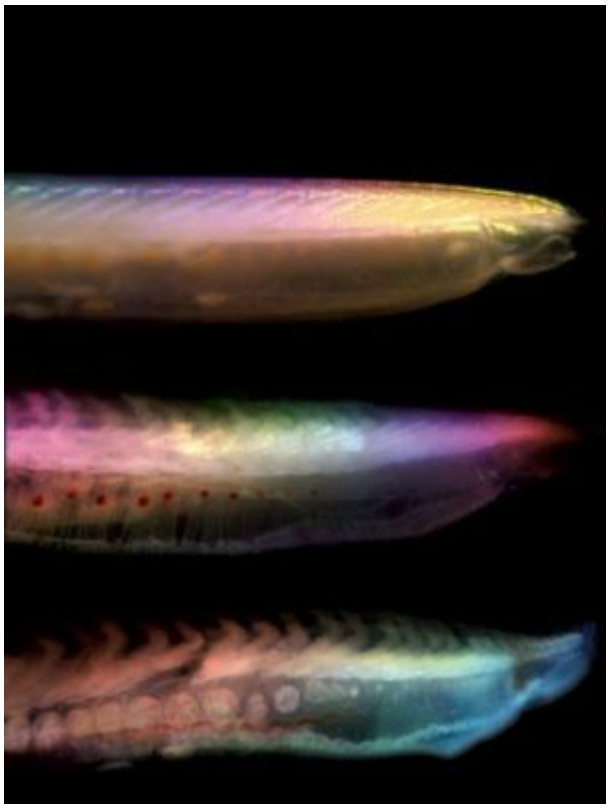
"If we could free MEF2 from HDAC5 with a drug, we could mimic flow force to enhance KLF2 and eNOS expression and reverse inflammation in vessel walls," Jin said. "That promises to be extremely useful, and potentially to stave off disease underway in the blood vessels of humans."

Story Source:

Adapted from materials provided by University of Rochester Medical Center.

http://www.sciencedaily.com/releases/2010/01/100128165125.htm

Novel Studies of Decomposition Shed New Light on Our Earliest Fossil Ancestry



These are three rotting fish heads. A sequence of images showing how the characteristic features of the body of amphioxus, a close living relative of vertebrates, change during decay. Colors are caused by interference between the experimental equipment and the light illuminating the specimens. (Credit: Mark Purnell, Rob Sansom, Sarah Gabbott, University of Leicester)

ScienceDaily (Feb. 1, 2010) — Decaying corpses are usually the domain of forensic scientists, but palaeontologists have discovered that studying rotting fish sheds new light on our earliest ancestry.

The researchers, from the Department of Geology at the University of Leicester, devised a new method for extracting information from 500 million year old fossils -they studied the way fish decompose to gain a clearer picture of how our ancient fish-like ancestors would have looked. Their results indicate that some of the earliest fossils from our part of the tree of life may have been more complex than has previously been thought.

Their findings were published on Jan 31, ahead of print in Advance Online Publication (AOP) of the science journal *Nature*.

Dr Rob Sansom, lead author of the paper explains: "Interpreting fossils is in some ways similar to forensic analysis -- we gather all the available clues to put together a scientific reconstruction of something that happened in the past. Unlike forensics, however, we are dealing with life from millions of years ago, and we are less interested in understanding the cause or the time of death. What we want to get at is what an animal was like before it died and, as with forensic analysis, knowing how the decomposition that took place after death altered the body provides important clues to its original anatomy."

This is something that palaeontologists sometimes overlook, according to Sansom, "probably because spending hundreds of hours studying the stinking carcasses of rotting fish is not something that appeals to everyone." But the rewards are worth the discomfort.

Fish-like fossils from half a billion years ago are recognised as being part of our evolutionary history because they possess characteristic anatomical features, such as a tail, eyes and the precursor of a backbone. Sansom continues: "It seems contradictory, but decomposition is an important part of the process by which animals become preserved and fossilized, so by knowing how these important anatomical features change as they rot, we are better able to correctly interpret the most ancient fossils representing the lowest branches of our part of the evolutionary tree."

"These fossils provide our only direct record of when and how our earliest vertebrate ancestors evolved" adds Dr Mark Purnell, one of the leaders of the study. "Did they appear suddenly, in an evolutionary explosion of complexity, or gradually over millions of years? What did they look like? -- in what ways did they differ from their worm-like relatives and how did this set the stage for later evolutionary events? Answers to these fundamental questions -- the how, when and why of our own origins -- remain elusive because reading the earliest vertebrate fossil record is difficult."

The scarcity of branches in this part of the evolutionary tree could reflect rapid, explosive evolution or the simple fact that, because they lacked bones or teeth, the earliest vertebrates left few fossils.

This is the area in which Dr Sarah Gabbott, who with Purnell conceived the Leicester study, is an expert: "Only in the most exceptional circumstances do soft-tissues, such as eyes, muscles and guts, become fossilized, yet it is precisely such remains that we rely on for understanding our earliest evolutionary relatives: half-a-billion years ago it's pretty much all our ancestors had."

The results published in *Nature*, show that some of the characteristic anatomical features of early vertebrate fossils have been badly affected by decomposition, and in some cases may have rotted away completely. Knowing how decomposition affected the fossils means our reconstructions of our earliest ancestors will be more scientifically accurate.

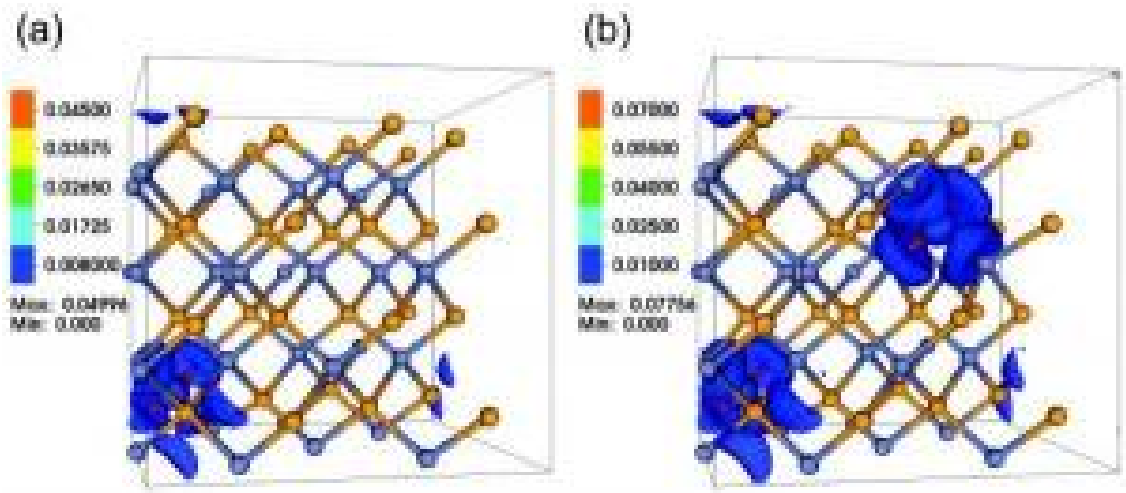
The work was funded by the Natural Environment Research Council (NERC).

Story Source:

Adapted from materials provided by University of Leicester, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2010/01/100131142434.htm

Converting Waste Heat Into Electricity? Mismatched Alloys Are a Good Match for Thermoelectrics



Contour plots showing electronic density of states in HMAs created from zinc selenide by the addition of (a) 3.125-percent oxygen atoms, and (b) 6.25 percent oxygen. The zinc and selenium atoms are shown in light blue and orange. Oxygen atoms (dark blue) are surrounded by high electronic density regions. (Credit: Image provided by Junqiao Wu)

ScienceDaily (Feb. 1, 2010) — Employing some of the world's most powerful supercomputers, scientists at Lawrence Berkeley National Laboratory have shown that mismatched alloys are a good match for the future development of high performance thermoelectric devices. Thermoelectrics hold enormous potential for green energy production because of their ability to convert heat into electricity.Computations performed on "Franklin," a Cray XT4 massively parallel processing system operated by the National Energy Research Scientific Computing Center (NERSC), showed that the introduction of oxygen impurities into a unique class of semiconductors known as highly mismatched alloys (HMAs) can substantially enhance the thermoelectric performance of these materials without the customary degradation in electric conductivity.

"We are predicting a range of inexpensive, abundant, non-toxic materials in which the band structure can be widely tuned for maximal thermoelectric efficiency," says Junqiao Wu, a physicist with Berkeley Lab's Materials Sciences Division and a professor with UC Berkeley's Department of Materials Science and Engineering who led this research."Specifically, we've shown that the hybridization of electronic wave functions of alloy constituents in HMAs makes it possible to enhance thermopower without much reduction of electric conductivity, which is not the case for conventional thermoelectric materials," he says.

Collaborating with Wu on this work were Joo-Hyoung Lee and Jeffrey Grossman, both now at the Massachusetts Institute of Technology. The team published a paper on these results in *Physical Review Letters.*

Seebeck Effect and Green Energy

In 1821, the German-Estonian physicist Thomas Johann Seebeck observed that a temperature difference between two ends of a metal bar created an electrical current in between, with the voltage being directly proportional to the temperature difference. This phenomenon became known as the Seebeck thermoelectric effect and it holds great promise for capturing and converting into electricity some of the vast amounts of heat now being lost in the turbine-driven production of electrical power. For this lost heat to be reclaimed, however, thermoelectric efficiency must be significantly improved.

"Good thermoelectric materials should have high thermopower, high electric conductivity, and low thermal conductivity," says Wu. "Enhancement in thermoelectric performance can be achieved by reducing thermal conductivitythrough nanostructuring. However, increasing performance by increasing thermopower has proven difficult because an increase in thermopower has typically come at the cost of a decrease in electric conductivity."To get around this conundrum, Wu and his colleagues turned to HMAs, an unusual new class of materials whose development has been led by another physicist with Berkeley Lab's Materials Sciences Division, Wladyslaw Walukiewicz. HMAs are formed from alloys that are highly mismatched in terms of electronegativity, which is a measurement of their ability to attract electrons. The partial replacement of anions with highly electronegative isoelectronic ions makes it possible to fabricate HMAs whose properties can be dramatically altered with only a small amount of doping. Anions are negatively charged atoms and isoelectronic ions are different elements that have identical electronic configurations.

"In HMAs, the hybridization between extended states of the majority component and localized states of the minority component results in a strong band restructuring, leading to peaks in the electronic density of states and new sub bands in the original band structure," Wu says. "Owing to the extended states hybridized into these sub bands, high electric conductivity is largely maintained in spite of alloy scattering."In their theoretical work, Wu and his colleagues discovered that this type of electronic structure engineering can be greatly beneficial for thermoelectricity. Working with the semiconductor zinc selenide, they simulated the introduction of two dilute concentrations of oxygen atoms (3.125 and 6.25 percent respectively) to create model HMAs. In both cases, the oxygen impurities were shown to induce peaks in the electronic density of states above the conduction band minimum. It was also shown that charge densities near the density of state peaks were substantially attracted toward the highly electronegative oxygen atoms.

Wu and his colleagues found that for each of the simulation scenarios, the impurity-induced peaks in the electronic density of states resulted in a "sharp increase" of both thermopower and electric conductivity compared to oxygen-free zinc selenide. The increases were by factors of 30 and 180 respectively."Furthermore, this effect is found to be absent when the impurity electronegativity matches the host that it substitutes," Wu says. "These results suggest that highly electronegativity-mismatched alloys can be designed for high performance thermoelectric applications."

Wu and his research group are now working to actually synthesize HMAs for physical testing in the laboratory. In addition to capturing energy that is now being wasted, Wu believes that HMA-based thermoelectrics can also be used for solid state cooling, in which a thermoelectric device is used to cool other devices or materials."Thermoelectric coolers have advantages over conventional refrigeration technology in that they have no moving parts, need little maintenance, and work at a much smaller spatial scale," Wu says. This project was supported under Berkeley Lab's Laboratory Directed Research and Development Program.

Story Source:

Adapted from materials provided by DOE/Lawrence Berkeley National Laboratory.

Journal Reference:

1. Joo-Hyoung Lee,Junqiao Wu,and Jeffrey C. Grossman. **Enhancing the Thermoelectric Power Factor with Highly Mismatched Isoelectronic Doping**. *Physical Review Letters*, PRL 104, 016602 (2010) DOI: 10.1103/PhysRevLett.104.016602

http://www.sciencedaily.com/releases/2010/01/100127113755.htm

New Species of Tyrannosaur Discovered in Southwestern U.S.

The skull of the holotype specimen (NMMNH P-27469) of Bistahieversor sealeyi on display in the Cretaceous Seacoast exhibit at the New Mexico Museum of Natural History and Science. (Credit: Photo by David Baccadutre, New Mexico Museum of Natural History and Science.)

ScienceDaily (Feb. 1, 2010) — New Mexico is known for Aztec ruins and the Los Alamos National Laboratory. Paleontologists Thomas Williamson of the New Mexico Museum of Natural History and Thomas Carr of Carthage College is now bringing a new superstar to the state.

Bistahieversor sealeyi (pronounced: bistah-he-ee-versor see-lee-eye) is a new species of tyrannosaur discovered in the Bisti/De-na-zin Wilderness of New Mexico. Tyrannosaurs include the famous meat-eating dinosaurs like *T. rex*, with their characteristic body and skull shape and their mouthful of ferocious teeth that make them easy for paleontologists and kids to recognize.

The skull and skeleton of *Bistahieversor* were collected in the first paleontological excavation from a federal wilderness area, and the specimen was airlifted from the badlands by a helicopter operated by the Air Wing of the New Mexico Army National Guard. "*Bistahieversor sealeyi* is the first valid new genus and species of tyrannosaur to be named from western North America in over 30 years," says Williamson.

Tyrannosaurs are best known from 65-75 million year old sediments from the Rocky Mountain region of North America. *Bistahieversor* provides important insights into the evolutionary history of the group.

"*Bistahieversor* is important because it demonstrates that the deep snout and powerful jaws of advanced tyrannosaurs like *T. rex* were special adaptations that evolved around 110 million years ago, after the eastern and western halves of North America were separated by a shallow sea," says Carr.

Bistahieversor was different from other tyrannosauroids in having an extra opening above its eye, a complex joint at its "forehead," and a keel along its lower jaw; it also had more teeth than its distant relative *T. rex*.

Bistahieversor skulls and skeletons collected from the Bisti/De-na-zin Wilderness and from the lands of the Navajo Nation are currently on display at the New Mexico Museum of Natural History.

The finding is detailed in the January issue of the *Journal of Vertebrate Paleontology*.

Story Source:

Adapted from materials provided by Society of Vertebrate Paleontology.

http://www.sciencedaily.com/releases/2010/01/100131220341.htm

Effects of Forest Fire on Carbon Emissions, Climate Impacts Often Overestimated

This stand replacement fire on Cache Mountain burned in the central Oregon Cascade Range in 2002, killing nearly all the overstory trees. By 2007 other non-tree vegetation began to grow back, however, somewhat offsetting the carbon releases from dead wood decomposition. (Credit: Photo by Garrett Meigs, Oregon State University)

ScienceDaily (Feb. 1, 2010) — A recent study at Oregon State University indicates that some past approaches to calculating the impacts of forest fires have grossly overestimated the number of live trees that burn up and the amount of carbon dioxide released into the atmosphere as a result.

The research was done on the Metolius River Watershed in the central Oregon Cascade Range, where about one-third -- or 100,000 acres -- of the area burned in four large fires in 2002-03. Although some previous studies assumed that 30 percent of the mass of living trees was consumed during forest fires, this study found that only 1-3 percent was consumed.

Some estimates done around that time suggested that the B&B Complex fire in 2003, just one of the four Metolius fires, released 600 percent more carbon emissions than all other energy and fossil fuel use that year in the state of Oregon -- but this study concluded that the four fires combined produced only about 2.5 percent of annual statewide carbon emissions.

Even in 2002, the most extreme fire year in recent history, the researchers estimate that all fires across Oregon emitted only about 22 percent of industrial and fossil fuel emissions in the state -- and that number is much lower for most years, about 3 percent on average for the 10 years from 1992 to 2001.

The OSU researchers said there are some serious misconceptions about how much of a forest actually burns during fires, a great range of variability, and much less carbon released than previously suggested. Some past analyses of carbon release have been based on studies of Canadian forests that are quite different than many U.S. forests, they said.

"A new appreciation needs to be made of what we're calling 'pyrodiversity,' or wide variation in fire effects and responses," said Garrett Meigs, a research assistant in OSU's Department of Forest Ecosystems and Society. "And more studies should account for the full gradient of fire effects."

The past estimates of fire severity and the amounts of carbon release have often been high and probably overestimated in many cases, said Beverly Law, a professor of forest ecosystems and society at OSU.

"Most of the immediate carbon emissions are not even from the trees but rather the brush, leaf litter and debris on the forest floor, and even below ground," Law said. "In the past we often did not assess the effects of fire on trees or carbon dynamics very accurately."

Even when a very severe fire kills almost all of the trees in a patch, the scientists said, the trees are still standing and only drop to the forest floor, decay, and release their carbon content very slowly over several decades. Grasses and shrubs quickly grow back after high-severity fires, offsetting some of the carbon release from the dead and decaying trees. And across most of these Metolius burned areas, the researchers observed generally abundant tree regeneration that will result in a relatively fast recovery of carbon uptake and storage.

"A severe fire does turn a forest from a carbon sink into an atmospheric carbon source in the near-term," Law said. "It might take 20-30 years in eastern Oregon, where trees grow and decay more slowly, for the forest to begin absorbing more carbon than it gives off, and 5-10 years on the west side of the Cascades."

Since fire events are episodic in nature while greenhouse gas emissions are continuous and increasing, climate change mitigation strategies focused on human-caused emissions will have more impact than those emphasizing wildfire, the researchers said. And to be accurate, estimates of carbon impacts have to better consider burn severity, non-tree responses, and below-ground processes, they said.

"Even though it looks like everything is burning up in forest fires, that simply isn't what happens," Meigs said. "The trees are not vaporized even during a very intense fire. In a low-severity fire many of them are not even killed. And in the Pacific Northwest, the majority of burned area is not stand-replacement fire."

Fire suppression has resulted in a short-term reduction of greenhouse gases, the researchers said, but on a long-term basis fire will still be an inevitable part of forest ecosystems. Timber harvest also has much more impact on carbon dynamics than fire. Because of this, forest fires will be a relatively minor player in greenhouse gas mitigation strategies compared to other factors, such as human consumption of fossil fuels, they said.

Global warming could cause higher levels of forest fire and associated carbon emissions in the future, the researchers said, although there are many uncertainties about how climate change will affect forests, and no indication that forest fire carbon emissions will become comparable to those caused by fossil fuel use.

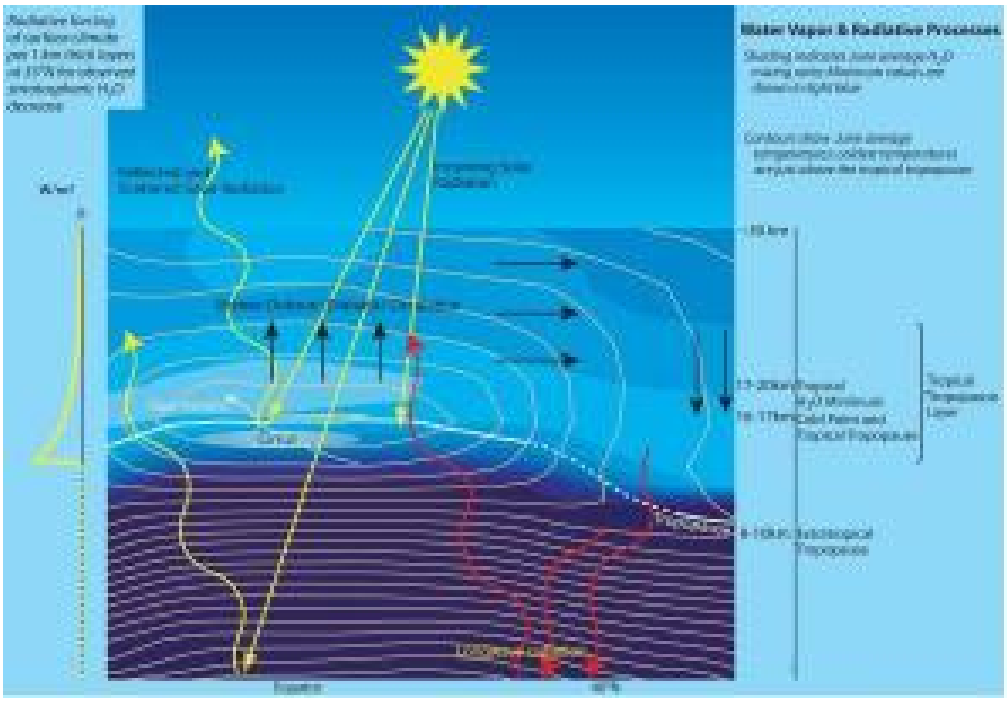
This research was published recently in the journal Ecosystems, and funded by the U.S. Department of Energy.

Story Source:

Adapted from materials provided by Oregon State University.

http://www.sciencedaily.com/releases/2010/01/100127121532.htm

Stratospheric Water Vapor Is a Global Warming Wild Card



Water vapor and radiative processes. (Credit: Image courtesy of National Oceanic and Atmospheric Administration)

ScienceDaily (Feb. 1, 2010) — A 10 percent drop in water vapor ten miles above Earth's surface has had a big impact on global warming, say researchers in a study published online January 28 in the journal *Science*. The findings might help explain why global surface temperatures have not risen as fast in the last ten years as they did in the 1980s and 1990s.

Observations from satellites and balloons show that stratospheric water vapor has had its ups and downs lately, increasing in the 1980s and 1990s, and then dropping after 2000. The authors show that these changes occurred precisely in a narrow altitude region of the stratosphere where they would have the biggest effects on climate.

Water vapor is a highly variable gas and has long been recognized as an important player in the cocktail of greenhouse gases -- carbon dioxide, methane, halocarbons, nitrous oxide, and others -- that affect climate.

"Current climate models do a remarkable job on water vapor near the surface. But this is different -- it's a thin wedge of the upper atmosphere that packs a wallop from one decade to the next in a way we didn't expect," says Susan Solomon, NOAA senior scientist and first author of the study.

Since 2000, water vapor in the stratosphere decreased by about 10 percent. The reason for the recent decline in water vapor is unknown. The new study used calculations and models to show that the cooling from this change caused surface temperatures to increase about 25 percent more slowly than they would have otherwise, due only to the increases in carbon dioxide and other greenhouse gases.

An increase in stratospheric water vapor in the 1990s likely had the opposite effect of increasing the rate of warming observed during that time by about 30 percent, the authors found.

The stratosphere is a region of the atmosphere from about eight to 30 miles above the Earth's surface. Water vapor enters the stratosphere mainly as air rises in the tropics. Previous studies suggested that stratospheric water vapor might contribute significantly to climate change. The new study is the first to relate water vapor in the stratosphere to the specific variations in warming of the past few decades.

Authors of the study are Susan Solomon, Karen Rosenlof, Robert Portmann, and John Daniel, all of the NOAA Earth System Research Laboratory (ESRL) in Boulder, Colo.; Sean Davis and Todd Sanford, NOAA/ESRL and the Cooperative Institute for Research in Environmental Sciences, University of Colorado; and Gian-Kasper Plattner, University of Bern, Switzerland.

Story Source:

Adapted from materials provided by National Oceanic and Atmospheric Administration.

http://www.sciencedaily.com/releases/2010/01/100131145840.htm

New 'Suicide' Molecule Halts Rheumatoid Arthritis

Rheumatoid Arthritis. A researcher from Northwestern University Feinberg School of Medicine has invented a novel way to halt and even reverse rheumatoid arthritis. He developed an imitation of a suicide molecule that floats undetected into overactive immune cells responsible for the disease. (Credit: iStockphoto/Stan Rohrer)

ScienceDaily (Feb. 1, 2010) — A researcher from Northwestern University Feinberg School of Medicine has invented a novel way to halt and even reverse rheumatoid arthritis. He developed an imitation of a suicide molecule that floats undetected into overactive immune cells responsible for the disease.

Whimsically referred to as Casper the Ghost, the stealthy molecule causes the immune cells to self-destruct.

The approach, tested on mice, doesn't carry the health risks of current treatments.

"This new therapy stopped the disease cold in 75 percent of the mice," reported Harris Perlman, the lead author and an associate professor of medicine at Feinberg. "The best part was we didn't see any toxicity. This has a lot of potential for creating an entirely new treatment for rheumatoid arthritis."

The study will be published in the February issue of *Arthritis & Rheumatism*.

Healthy immune cells are supposed to die after they attack an invading virus or bacteria. But in rheumatoid arthritis, the immune cells called macrophages live and go rogue. They proliferate in the blood, build up in the joints and invade cartilage and bone. Currently, there is no effective, nontoxic way to stop them.

Perlman discovered that immune cells in rheumatoid arthritis are low in a critical molecule called Bim, whose job is to order the cells to self-destruct. To correct that shortage, Perlman developed an imitation of the molecule, called BH3 mimetic. When Harris injected his drug into mice with rheumatoid arthritis, it floated ghostlike into their macrophages and bam!, the misbehaving immune cells self destructed.

In his research, Harris showed the molecule could prevent the development of rheumatoid arthritis as well as trigger a remission of existing disease. After the drug was injected in animals with the disease, joint swelling was reduced and bone destruction decreased.

Current treatments for rheumatoid arthritis include low-level chemotherapy and steroids. These are not always effective, however, and they are frequently accompanied by side effects. A newer class of therapy, which is sometimes used in combination with chemotherapy and steroids, is biologic response modifiers. These are antibodies or other proteins that reduce the inflammation produced by the hyperactive immune cells. These biologics don't work for everyone, though, and can be associated with side effects including the risk of infection.

Perlman said the next step is to develop nanotechnology for a more precise method of delivering the drug. His research was supported by the National Institute of Arthritis, Musculoskeletal and Skin Diseases and the National Institute of Allergy and Infectious Disease.

Story Source:

Adapted from materials provided by Northwestern University.

http://www.sciencedaily.com/releases/2010/01/100128130223.htm

Hospital Scanner Could Curb Nuclear Waste Threat

Soil columns being injected with Tc tracer at Manchester Royal Infirmary. (Credit: Image courtesy of University of Manchester)

ScienceDaily (Feb. 1, 2010) — Medical equipment used for diagnosis of patients with heart disease and cancer could be a key weapon in stopping nuclear waste seeping into the environment, according to new research.

A team of scientists from the Universities of Manchester and Leeds have joined forces with experts in nuclear medicine at Manchester Royal Infirmary, using medical gamma-ray cameras to track radioactive isotopes in soil samples from a US civil nuclear site.

This is the first time the technique, which is used in hospitals for heart, bone and kidney scanning, has been used to study the environmental behaviour of nuclear waste -- and its success could help scientists find new ways of using bacteria to control the spread of radioactivity.

Radioactive isotopes of the element technetium (Tc) are produced in bulk by nuclear facilities, while a specific isotope of Tc with a very short life is routinely used as a medical tracer in human bodies.

Nuclear fission of Uranium has released tonnes of Tc from nuclear facilities over the past decades, with the element remaining radioactive for thousands of years.

But although the short lived medical isotope is chemically indistinguishable from that in long lived waste, it can be used safely in tests.

In the study researchers from The University of Manchester, led by Prof Jon Lloyd, took soil samples from the Oak Ridge nuclear facility in the United States and successfully tracked the movement of medical Tc through the soil.

Scientists at The University of Leeds were then asked to verify the observations using a special microscope technique called Transmission electron microscopy (TEM).

With the help of DNA analysis the Manchester team confirmed that certain microbes -- and particularly some that use ferric iron for energy -- can fix Tc in place in soils.

Researchers found that nearly all the Tc remained fixed when ferric iron was present with these 'iron-reducing' bacteria.

This finding itself is not new -- Professor Lloyd and his colleagues had previously reported that microbes in laboratory cultures could perform this role in fixing Tc.

But the researchers' success in using the gamma camera could see the technique being used to probe how Tc and ferric iron move together in far more complex soil systems more representative of the 'real world' -- helping develop future remediation techniques.

Prof Jon Lloyd from the School of Earth, Atmospheric and Environmental Science (SEAES) at The University of Manchester, said: "Using this medical scanning technique we were able to explore, in real time, the mobility of one of the most problematic and mobile radionuclides in sediments.

"Our success will allow scientists to accurately monitor the success of new biological methods in trapping radioactive elements in sediments and stopping them spreading further into the natural environment."

The findings coincide with the opening of a new Research Centre for Geological Disposal at The University, supported by a £1.4m endowment from BNFL, while a new Nuclear Medicine Centre recently opened at the Manchester Royal Infirmary, as part of the £500m Central Manchester Hospitals development.

Prof Lloyd added: "Investment in these two diverse but important areas of scientific research has helped bring about interesting and unexpected research findings that could ultimately have great benefit for society."

The research was published in a special edition of the American Chemical Society journal *Environmental Science and Technology*.

Story Source:

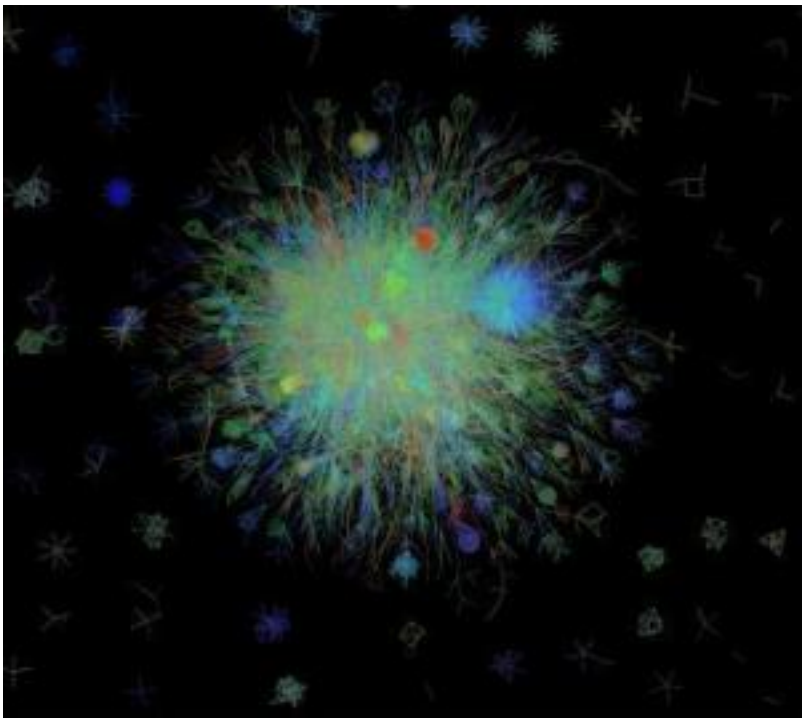
Adapted from materials provided by University of Manchester.

Journal Reference:

1. Lear et al. **Probing the Biogeochemical Behavior of Technetium Using a Novel Nuclear Imaging Approach**. *Environmental Science & Technology*, 2010; 44 (1): 156 DOI: 10.1021/es802885r

http://www.sciencedaily.com/releases/2010/01/100129111757.htm

New Computation Model Predicts Gene Function



Each line of this AraNet network represents a functional link between two genes. The colors indicate the strength of the link using a red-blue heat map scheme.The image includes about 100,000 functional links made among about 10,000 Arabidopsis genes. (Credit: Image courtesy Sue Rhee)

ScienceDaily (Feb. 1, 2010) — Scientists have created a new computational model that can be used to predict gene function of uncharacterized plant genes with unprecedented speed and accuracy. The network, dubbed AraNet, has over 19,600 genes associated to each other by over 1 million links and can increase the discovery rate of new genes affiliated with a given trait tenfold. It is a huge boost to fundamental plant biology and agricultural research.

Despite immense progress in functional characterization of plant genomes, over 30% of the 30,000 *Arabidopsis* genes have not been functionally characterized yet. Another third has little evidence regarding their role in the plant.

"In essence, AraNet is based on the simple idea that genes that physically reside in the same neighborhood, or turn on in concert with one another are probably associated with similar traits," explained corresponding author Sue Rhee at the Carnegie Institution's Department of Plant Biology. "We call it guilt by association. Based on over 50 million scientific observations, AraNet contains over 1 million linkages of the 19,600 genes in the tiny, experimental mustard plant *Arabidopsis thaliana*. We made a map of the associations and demonstrated that we can use the network to propose that uncharacterized genes are linked to specific traits based on the strength of their associations with genes already known to be linked to those characteristics."

The network allows for two main types of testable hypotheses. The first uses a set of genes known to be involved in a biological process such as stress responses, as a "bait" to find new genes ("prey") involved in stress responses. The bait genes are linked to each other based on over 24 different types of experiments or computations. If they are linked to each other much more frequently or strongly than by chance, one can hypothesize that other genes that are as well linked to the bait genes have a high probability of being involved in the same process. The second testable hypothesis is to predict functions for uncharacterized genes. There are 4,479 uncharacterized genes in AraNet that have links to ones that

have been characterized, so a significant portion of all the unknowns now get a new hint as to their function.

The scientists tested the accuracy of AraNet with computational validation tests and laboratory experiments on genes that the network predicted as related. The researchers selected three uncharacterized genes. Two of them exhibited phenotypes that AraNet predicted. One is a gene that regulates drought sensitivity, now named Drought sensitive 1 (Drs1). The other regulates lateral root development, called Lateral root stimulator 1 (Lrs1). The researchers found that the network is much stronger forecasting correct associations than previous small-scale networks of *Arabidopsis* genes.

"Plants, animals and other organisms share a surprising number of the same or similar genes -- particularly those that arose early in evolution and were retained as organisms differentiated over time," commented a lead and corresponding author Insuk Lee at Yonsei University of South Korea. "AraNet not only contains information from plant genes, it also incorporates data from other organisms. We wanted to know how much of the system's accuracy was a result of plant data versus non-plant derived data. We found that although the plant linkages provided most of the predictive power, the non-plant linkages were a significant contributor."

"AraNet has the potential to help realize the promise of genomics in plant engineering and personalized medicine," remarked Rhee. "A main bottleneck has been the huge portion of genes with unknown function, even in model organisms that have been studied intensively. We need innovative ways of discovering gene function and AraNet is a perfect example of such innovation.

"Food security is no longer taken for granted in the fast-paced milieu of the changing climate and globalized economy of the 21st century. Innovations in the basic understanding of plants and effective application of that knowledge in the field are essential to meet this challenge. Numerous genome-scale projects are underway for several plant species. However, new strategies to identify candidate genes for specific plant traits systematically by leveraging these high-throughput, genome-scale experimental data are lagging. AraNet integrates all such data and provides a rational, statistical assessment of the likelihood of genes functioning in particular traits, thereby assisting scientists to design experiments to discover gene function. AraNet will become an essential component of the next-generation plant research."

The research is published in the January 31st, advanced on-line *Nature Biotechnology* and was supported by the Carnegie Institution for Science, the National Research Foundation of Korea, Yonsei University, The National Science Foundation, the National Institutes of Health, and the Packard Foundation.

Story Source:

Adapted from materials provided by Carnegie Institution, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2010/01/100131142436.htm

Why Does Time Fly By As You Get Older?

by Robert Krulwich

February 1, 2010

Yes, we all get older. But now, getting older has become a video fetish; all kinds of people take pictures of themselves every day for six, seven, eight years and then blend the images together into a ... well, if you've missed the Web craze, Homer Simpson's "Every Day" is a perfect catcher-upper.

Not only can you see Homer switching jobs (cavalryman, Indian, king, infantryman, fisherman, fireman), you watch his body grow, swell, swag. As with all things Simpson, the physical changes are dramatic.

But what these videos don't show are the psychological changes, and one of the most universal changes is that as humans age, they change the way they feel about time.

Faster And Faster And Faster

As people get older, "they just have this sense, this feeling that time is going faster than they are," says Warren Meck, a psychology professor at Duke University.This seems to be true across cultures, across time, all over the world.

No one is sure where this feeling comes from. Scientists have theories, of course, and one of them is that when you experience something for the very first time, more details, more information gets stored in your memory. Think about your first kiss.

Neuroscientist David Eagleman of Baylor College of Medicine says that since the touch of the lips, the excitement, the taste, the smell — everything about this moment is novel — you aren't embroidering a bank of previous experiences, you are starting fresh.

Have you noticed, he says, that when you recall your first kisses, early birthdays, your earliest summer vacations, they seem to be in slow motion? "I know when I look back on a childhood summer, it seems to have lasted forever," he says.

That's because when it's the "first", there are so many things to remember. The list of encoded memories is so dense, reading them back gives you a feeling that they must have taken forever. But that's an illusion. "It's a construction of the brain," says Eagleman. "The more memory you have of something, you think, 'Wow, that really took a long time!'

"Of course, you can see this in everyday life," says Eagleman, "when you drive to your new workplace for the first time and it seems to take a really long time to get there. But when you drive back and forth to your work every day after that, it takes no time at all, because you're not really writing it down anymore. There's nothing novel about it."

That may be because the brain records new experiences — especially novel and exciting experiences — differently. This is even measurable. Eagleman's lab has found that brains use more energy to represent a memory when the memory is novel.

So, first memories are dense. The routines of later life are sketchy. The past wasn't really slower than the present. It just feels that way.

There are all kinds of arguments one could have with this theory, but before we poke it, we want you to feel it.

Here's a celebration of dense early memories from a very recently departed (not to heaven, just back to California) intern at NPR, Maggie Starbard. With a bunch of friends (Caitlin Fitch, Mark Turner and Mike Eckelkamp), Maggie decided to dwell on a lazy beach where kids are collecting dense memories by the truckload:

Now for the pokes. Who said that novel experiences belong exclusively to the young?

Older people have novel experiences — lots of them. Some of us have crazier middle ages than youths. We fall in love, out of love. Then our parenting years are filled with watching our babies' first thises, first thats. Retired people travel — if they can afford to — to duplicate some of those rushes of novel experiences.

Yes, it's true, the youngest years are chock full of novelty, but Duke's Warren Meck points out that when you hit your 60s and 70s, and time is beginning to run out, experiences get more precious and once again you remember all the details.

So take this "novelty" explanation for why time moves faster as you age and weigh it as you will.

Other theories may prove more satisfying.

Professors Meck and Eagleman explore a number of them on our *All Things Considered* broadcast. If you wish to hear the "Aging Brain" theory of why time goes faster, or the "How Long Have You Been Alive?" explanation, they await you at the top of this page, where the button says "Listen."

Special thanks to Dan Madorsky for sound design on the radio story. Warren Meck's work has been featured on the BBC documentaries The Body Clock *(1999) and* Time *(2006). Jay Ingram's essay "Time Passes Faster" (which helped me think through the radio story) is included in a collection called* The Velocity of Honey *published in 2003. David Eagleman directs the* Laboratory for Perception and Action *at Baylor College of Medicine in Houston. His new novel,* Sum, *has been featured on NPR/WNYC's* Radiolab.

http://www.npr.org/templates/story/story.php?storyId=122322542

Easy = True

How 'cognitive fluency' shapes what we believe, how we invest, and who will become a supermodel

By Drake Bennett

Imagine that your stockbroker - or the friend who's always giving you stock tips - called and told you he had come up with a new investment strategy. Price-to-earnings ratios, debt levels, management, competition, what the company makes, and how well it makes it, all those considerations go out the window. The new strategy is this: Invest in companies with names that are very easy to pronounce.

This would probably not strike you as a great idea. But, if recent research is to be believed, it might just be brilliant.

One of the hottest topics in psychology today is something called "cognitive fluency." Cognitive fluency is simply a measure of how easy it is to think about something, and it turns out that people prefer things that are easy to think about to those that are hard. On the face of it, it's a rather intuitive idea. But psychologists are only beginning to uncover the surprising extent to which fluency guides our thinking, and in situations where we have no idea it is at work.

Psychologists have determined, for example, that shares in companies with easy-to-pronounce names do indeed significantly outperform those with hard-to-pronounce names. Other studies have shown that when presenting people with a factual statement, manipulations that make the statement easier to mentally process - even totally nonsubstantive changes like writing it in a cleaner font or making it rhyme or simply repeating it - can alter people's judgment of the truth of the statement, along with their evaluation of the intelligence of the statement's author and their confidence in their own judgments and abilities. Similar manipulations can get subjects to be more forgiving, more adventurous, and more open about their personal shortcomings.

Because it shapes our thinking in so many ways, fluency is implicated in decisions about everything from the products we buy to the people we find attractive to the candidates we vote for - in short, in any situation where we weigh information. It's a key part of the puzzle of how feelings like attraction and belief and suspicion work, and what researchers are learning about fluency has ramifications for anyone interested in eliciting those emotions.

"Every purchase you make, every interaction you have, every judgment you make can be put along a continuum from fluent to disfluent," says Adam Alter, a psychologist at the New York University Stern

School who co-wrote the paper on fluency and stock prices. “If you can understand how fluency influences judgment, you can understand many, many, many different kinds of judgments better than we do at the moment.”

A handful of scholars have already started to explore the ways that advertisers, educators, political campaigners, or anyone else in the business of persuasion can use these findings. And some of the implications are surprising. For example, to get people to think through a question, it may be best to present it less clearly. And to boost your self-confidence, you may want to set out to write a dauntingly long list of all the reasons why you’re a failure.

Our sensitivity to - and affinity for - fluency is an adaptive shortcut. According to psychologists, it helps us apportion limited mental resources in a world where lots of things clamor for our attention and we have to quickly figure out which are worth thinking about.

Most of the time, the shortcut works pretty well. If something feels notably easy to decipher, whether it’s a piece of text or the shape of an object or the particulars of a person’s face, there’s a good chance it’s because we’ve previously done the work of processing it, and that it’s something we’ve encountered before. Cognitive fluency signals familiarity - some psychologists argue that the eerie experience of déjà vu is simply when we’re fooled by the unexpected ease of taking in a piece of sensory information, and interpret that as a memory of having been there or seen it before.

An instinctive preference for the familiar made sense in the prehistoric environment in which our brains developed, psychologists hypothesize. Unfamiliar things - whether they were large woolly animals, plants we were thinking of eating, or fellow human beings - needed to be carefully evaluated to determine whether they were friend or foe. Familiar objects were those we’d already passed judgment on, so it made sense not to waste time and energy scrutinizing them.

According to Norbert Schwarz, a leading fluency researcher, the late psychologist Robert Zajonc used to explain the evolutionary logic behind this tendency succinctly. “He’d say, ‘If it is familiar, it has not eaten you yet.’ ”

“That gut feeling of familiarity determined by ease of processing is a very effective shorthand,” says Schwarz, a psychologist at the University of Michigan. “Having to sit down and analyze every time whether something is familiar would not be a good idea.”

Our bias for the familiar, however, can be triggered in settings where there’s little purpose to it. In the 1960s, Zajonc did a series of experiments that uncovered what he dubbed the “mere exposure” effect: He found that, with stimuli ranging from nonsense words to abstract geometric patterns to images of faces to Chinese ideographs (the test subjects, being non-Chinese speakers, didn’t know what the ideographs meant), all it took to get people to say they liked certain ones more than others was to present them multiple times.

More recent work suggests that people assign all sorts of specific characteristics to things that feel familiar. Like beauty. Psychologists have identified what they call the “beauty-in-averageness” effect - when asked to identify the most attractive example of something, people tend to choose the most prototypical option. For example, when asked to identify the most appealing of a group of human faces, people choose the one that is a composite of all the others. And it’s not just faces: Studies have found a similar tendency when people are asked to identify what makes for an attractive dog or car or watch. Some psychologists suggest that much of what we perceive as beauty is just the fact that the most prototypical faces and dogs and watches are the easiest to process, because they share the most with all the other faces and dogs and watches that we’ve seen and stored in our perceptual inventory.

"These faces fit right in there. In effect, you've already learned the facial features, so people like them," says Piotr Winkielman, a psychologist at the University of California San Diego who has done research on fluency and attractiveness.

Winkielman doesn't claim that beauty is entirely explained by fluency, but he argues that the effect is powerful, all the more so because we're unaware of it. Indeed, the power of the effect, combined with the ease with which psychologists can fool people into mistaking the sensation of fluency for actual familiarity, helps explain the current popularity of research into the phenomenon.

"People are very sensitive to the experience of ease or difficulty, but very insensitive to where that feeling comes from," says Schwarz.

One thing that fools us, for example, is font. When people read something in a difficult-to-read font, they unwittingly transfer that sense of difficulty onto the topic they're reading about. Schwarz and his former student Hyunjin Song have found that when people read about an exercise regimen or a recipe in a less legible font, they tend to rate the exercise regimen more difficult and the recipe more complicated than if they read about them in a clearer font.

Playing with legibility can also change perceptions in subtler, less predictable ways. Alter and Daniel Oppenheimer, a psychologist at Princeton University who also co-wrote the stocks and fluency paper, have found that when a personal questionnaire is presented in a less legible font, people tend to answer it less honestly than if it is written in a more legible one. Alter and two other psychologists, Simon Laham and Geoffrey Goodwin, also found that, when presenting people with written descriptions of moral transgressions, increasing the contrast between text and background to make it easier to read the description made people more forgiving.

To Alter, it's a demonstration not so much of the power of fluency but of its opposite, what psychologists call "disfluency." Even at the level of a trickier font, the experience of disfluency makes people wary and uncomfortable. That sensation, Alter argues, is enough to make them less forthcoming and also less forgiving in their moral judgments.

"Disfluency functions as a cognitive alarm," Alter says. "It sets up a cognitive roadblock and makes people think, and it triggers a sense of risk and concern."

It isn't just visual cues that have this sort of effect. Matthew McGlone, a psychologist at the University of Texas, has found that auditory cues can shape people's perception of truth. McGlone did a study in which he presented subjects with a series of unfamiliar aphorisms either in rhyming or nonrhyming form: "Woes unite foes," for example, versus "Woes unite enemies." He found that people tended to see the rhyming ones as more accurate than the nonrhyming ones, despite the fact that, substantively, the two were identical. Phrases that are easier on the ear aren't just catchy and easy to remember, McGlone argues, they also feel inherently truer. He calls it "the rhyme-as-reason effect."

The persuasive power of repetition, clarity, and simplicity is something that people who set out to win others' trust - marketers, political candidates, speechwriters, suitors, and teachers - already have an intuitive sense of if they're good at what they do. What the fluency research is showing is just how profound the effect can be, and just how it works.

And some of the more interesting ramifications of the new work come from the suggestion that disfluency, rather than fluency, can sometimes be what's called for. Work on product marketing by Schwarz and Hyejeung Cho has found, for example, that while creating a sense of disfluency in potential consumers is likely to make them see a product as less familiar, it also makes them see it as more innovative.

And a few studies suggest that disfluency works well as a prompt to get people to think carefully and catch mistakes. Alter and Oppenheimer found that using a more difficult font can get students to do better on the Cognitive Reaction Test, a three-question test that usually trips up people answering intuitively. In another study, they found that disfluency also led people to think more abstractly. Schwarz and Song found that a difficult font can dramatically increase the number of people who correctly respond to the question, "How many animals of each kind did Moses take on the Ark?" (The answer is "none" - Moses wasn't on the Ark.)

In other words, to get people to think carefully and to prevent them from making silly mistakes, make them work to process the question: make the font hard to read, the cadence awkward, and the wording unfamiliar.

Some researchers are also starting to look at the question of how to change people's responses to cognitive fluency. Winkielman is part of a team of researchers who, in a forthcoming study, looked at the relationship between mood and the desire for fluency. They found that happy people are less interested in familiar, fluent stimuli - in this case abstract visual patterns - than sad people. According to Winkielman, this makes sense: When we're unhappy, we seek out stability and a sense of safety; when we're happy, we're more open to the unfamiliar.

"Fluent things are familiar, but also boring and comfortable," he says. "Disfluency is intriguing and novel. Sometimes you like comfort food, like when you're sick. And usually you want to try something new when you're more comfortable."

It may be possible to tactically use disfluency to improve our own everyday lives, as well. Schwarz has found that the ease or difficulty of thinking something can sometimes neutralize the actual content of the thoughts themselves. Along with Lawrence Sanna of the University of North Carolina, Schwarz has looked at fluency and self-confidence. The two found that, if the goal was to boost college students' confidence before an exam, getting them to list a few reasons why they were going to succeed was more effective than getting them to list many reasons. Because it was harder, the students who were asked to think of more ways to succeed were actually less confident, even though they ended up with longer lists.

And Schwarz and Sanna found a converse effect when they asked students to think of reasons they would not do well: Students asked to come up with a longer list of reasons they would fail reported feeling more confident than those asked for a shorter list. Indeed, they reported feeling as confident as the students who had been asked to come up with the short list of ways to succeed - by the authors' calculation, thinking of 12 ways to fail had the same effect as thinking of three ways to succeed.

In unpublished research, Schwarz has found a similar effect with marital happiness: Couples asked to come up with a short list of good qualities about each other reported higher levels of marital happiness than the other couples in the study - but so did those couples asked to come up with a long list of each other's bad qualities.

"Having to come up with many good things about your spouse is terrible, because it becomes difficult and then you think she's obviously not that wonderful," Schwarz says. "Coming up with a few bad things about your spouse, that's bad because it's not that hard. Having to come up with a lot of bad things, since it's hard, it means she's not that bad at all. The difficulty that you have tells you that there are not many such things."Results like these suggest that feeling good about yourself may in part be a matter of having a hard time feeling bad, and that confidence and even success might be triggered by interventions that do nothing but make failure seem the more intimidating possibility. The human brain, for all its power, is suspicious of difficulty, but perhaps we can learn to use that.

Drake Bennett is the staff writer for Ideas. E-mail drbennett@globe.com. ■

http://www.boston.com/bostonglobe/ideas/articles/2010/01/31/easy__true/?page=full

'Immune jab' blocks chronic pain

A treatment already used for immune diseases like rheumatoid arthritis appears to also work for chronic pain, scientists have discovered.

One small dose of intravenous immunoglobulin (IVIG) reduced pain in just under half of patients treated.

The pain relief lasted five weeks, on average, with few or no side effects, Annals of Internal Medicine reports.

The Liverpool University experts now plan bigger trials on more patients with Complex Regional Pain Syndrome.

Unrelenting pain

Also known as Reflex Sympathetic Dystrophy, Complex Regional Pain syndrome (CRPS) involves a malfunction of the nervous system that causes often unrelenting pain.

It usually develops after an injury or trauma to a limb, and continues after the injury has healed.

Experts are not entirely sure why some people develop CRPS, but the latest discovery of how to treat it suggests it might be partly down to inflammation and a heightened immune response to the damage.

The immunoglobulin treatment contains blood antibodies that help dampen inflammation.

" **We have seen the same in our patients in more acute stages of the disease** "
Pain expert Professor Franz Blaes

The team at Liverpool's Pain Research Institute tested the treatment on 13 of their patients who had been experiencing chronic pain for the past six months at least.

Although the treatment did not work for every single patient, for many it provided significant relief.

Lead researcher Dr Andreas Goebel said the real effect of this treatment in clinic may turn out to be even greater because the therapy can be given in higher doses, and repeated treatment may have additional effects.

"IVIG is normally repeated every four weeks and we are working to develop ways which would allow patients to administer the treatment in their own home," he said.

Professor Franz Blaes, of the University of Giesseu in Germany, has also been trialling the treatment in CRPS patients.

He said: "We have seen the same in our patients in more acute stages of the disease. Some of the patients really do benefit - probably between thirty and fifty percent of them.

"It may be that stopping the inflammation stops the problem.

"It is quite an expensive treatment and, as yet, we are not able to tell who will respond until we try it. But we are working on that."

Longstanding CRPS affects about 1 in 5,000 people in the UK.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8491362.stm

Published: 2010/02/02 00:02:36 GMT

Elderly excluded from drug trials

A charter against ageism in clinical trials is being launched by a group of geriatricians from Europe.

The EU funded project, called PREDICT, says treatments are less likely to be tested on older people even though the elderly take the most medication.

Trial results from younger people cannot always be extrapolated to the elderly, say the authors.

They want older people to have access to drugs which have been shown to be safe and effective for their age group.

PREDICT set out assess the extent to which the elderly were excluded from clinical trials and to come up with solutions.

They surveyed the medical literature on treatments for conditions which were common among elderly people and found clear evidence that the elderly were underrepresented.

For example, the average age of patients in clinical trials of treatments for high blood pressure is 63, although 44% of patients are over 70 when they are first diagnosed.

" **The elderly are underrepresented in clinical trials because of ageism** "
Stephen Jackson, Professor of Professor of Clinical Gerontology from King's College London

The researchers interviewed health professionals in nine countries and conducted more than 50 focus groups with elderly people and their carers.

They concluded that both doctors and patients felt that more elderly people should be included in trials.

"If treatments are not evaluated for elderly people it is difficult for doctors to balance the risks and benefits" said Dr Gary Mills, Director of Medical Economics and Research Centre, Sheffield, who is one of the co-ordinators of the project.

'Practical steps'

Dr Mills said people conducting trials may need to take practical steps to help the elderly participate, such as going to their house rather than expecting them to travel.

The British Geriatrics Society welcomed the project. Their spokesman Professor David Oliver said the under-representation of elderly people in clinical trials was a "serious problem".

He said it was easier for drug companies to carry out testing on younger people, but this means the trial group is "not representative" of the majority of taking medicines.

He added that drugs might be more or less effective on the elderly than younger older people, and might have different side effects.

"Doctors try to practise evidence-based medicine, but this is not possible if there are not enough elderly people in the trials."

'Ageism'

Stephen Jackson, Professor of Professor of Clinical Gerontology from King's College, London, said the reasons why not enough elderly people are included in trails go beyond practical difficulties.

"The elderly are underrepresented in clinical trials because of ageism," he said.

He pointed out that elderly people often have more than one condition and that makes it more complicated for those conducting trials to include them.

People conducting trials think it is "too much trouble" to include older people he said. This would not change without regulation, he added.

Age Concern welcomed the initiative. Andrew Harrop their Head of Policy said: "More and more people will be living longer and many with multiple long-term conditions.

"Addressing the shortfall in the numbers of older people taking part in clinical trials is crucial to ensure the well-being of a growing proportion of the population."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8487509.stm

Published: 2010/02/01 11:38:12 GMT

How to whip up a frothy frog nest
By Rebecca Morelle
Science reporter, BBC News

Scientists have revealed how frogs perform the architectural feat of building floating foam nests.

These meringue-like structures, which help the amphibians protect their young, are renowned for their stability under the harshest of conditions.

Now, by filming Tungara frogs, researchers have found that they are built using a meticulously timed, three-stage construction process.

The research is published in the Royal Society's journal Biology Letters.

The team says that knowing more about how the foam is created could help scientists create "bio-foams" for use in medical applications, such as treating injuries at the scenes of accidents.

Floating fortresses

Tungara frogs, like many frogs species, create foam nests to protect their young as they mature from eggs to tadpoles.

But while these floating refuges look delicate, as if they could collapse into the pond they sit upon at any moment, they are in fact remarkably sturdy.

Malcolm Kennedy, an author of the paper, from the University of Glasgow, said: "These are exposed to full sunlight, high temperatures, all kinds of infections, including parasitic ones, and yet they survive for four days without any damage, until the tadpoles leave - or if there aren't any eggs, they'll last for two weeks.

"And unlike other foams, they do not damage the membranes of eggs and sperm. They are a remarkable biological material.

"But until now, we did not now quite how the frogs used these material and made the foams."

To find out more, the research team went to Trinidad in the West Indies to train their cameras on amorous pairs of Tungara frogs (*Engystomops pustulous*).

By studying the footage, frame by frame, the researchers found that the small brown amphibians whipped up their nests in several phases.

Professor Kennedy explained: "In order to begin, the male sits on the back of the female, and puts his legs underneath her legs, to collect a foam-precursor fluid."

The male frog then begins to whip this up, mixing in air bubbles by vigorously kicking his legs. He does this in short bursts, gradually increasing this "mixing" duration each time.

"This overcomes some of the biophysical problems; if he mixes for too long in the beginning, then this would disperse the fluid and it wouldn't make a foam at all," said Professor Kennedy.

Like clockwork

In this first phase, this frothy bubble raft contains no eggs. But as the male moves on to stage two of construction, he gradually begins to blend in eggs, provided by the female, who is all the while sitting beneath him. He carefully manoeuvres the eggs into the centre of the foam.

" **This material is resistant to bacterial and microbial damage** "
Professor Kennedy

As the male does this, the length of time that he spends mixing and resting remains exactly the same.

Professor Kennedy says: "They do this about 200 times - they are a bit like clockwork at this stage.

"Eventually they build this 'meringue'."

Finally, in the "termination stage", the frog starts to slow down; the period between each mixing session gradually increases until finally the nest is complete.

The team believes that understanding this nest building process could help us to create a similar foam in the laboratory.

Professor Kennedy said: "This material is resistant to bacterial and microbial damage - and if you could make a spray can that could produce this, it could potentially be used on burn victims, for example, because it would prevent them from infection, but it doesn't damage cells."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8481102.stm

Published: 2010/01/29 11:31:38 GMT

Quakes 'decade's worst disasters'

Almost 60% of the people killed by natural disasters in the past decade lost their lives in earthquakes, a UN-backed report has revealed.

Storms were responsible for 22% of lives lost, while extreme temperatures caused 11% of deaths from 2000 to 2009.

In total, 3,852 disasters killed more than 780,000 people, according to a report by the Centre for Research on Epidemiology of Disasters (CRED).

Asia was the worst-affected continent, accounting for 85% of all fatalities.

The decade's deadliest disaster was the 2004 Asian tsunami, which killed more than 220,000 people when a series of waves devastated coastal areas around the Indian Ocean.

Cyclone Nargis, which swept across Burma in 2008 claimed 138,000 lives, while the European heatwave of 2003 was blamed for 72,000 deaths.

Data from CRED estimated that a further two billion people were affected by the catastrophes, which left a trail of destruction that cost in excess of US $960bn (£598bn).

'Be prepared'

"Earthquakes are the deadliest nature hazard of the past 10 years and remain a serious threat for millions of people worldwide," said Magareta Wahlstrom, the UN secretary general's special representative for disaster risk reduction.

She added that eight out 10 of the world's most populous cities were located on fault lines, including Tokyo, Mexico City and Mumbai.

"Seismic risk is a permanent risk and cannot be ignored," Ms Wahlstrom told reporters.

Referring to the magnitude 7.0 earthquake that struck Haiti on 12 January, in which up to 200,000 people are feared to have lost their lives, she said it is was essential that such widespread devastation could not be repeated.

"Risk reduction will be a main priority in [Haiti], and we will be working with our partners to ensure that it is central in the reconstruction."

It is estimated that about a third of the nation's population of nine million people have been directly affected by the aftermath of the quake.

Professor Debarati Guha-Sapir, director of CRED, said that while nothing could be done to prevent natural disasters, the degree of damage was determined by factors that could be addressed, such as urbanisation, urban planning and deforestation.

"The number of catastrophic events has more than doubled since the 1980-89 decade," he observed.

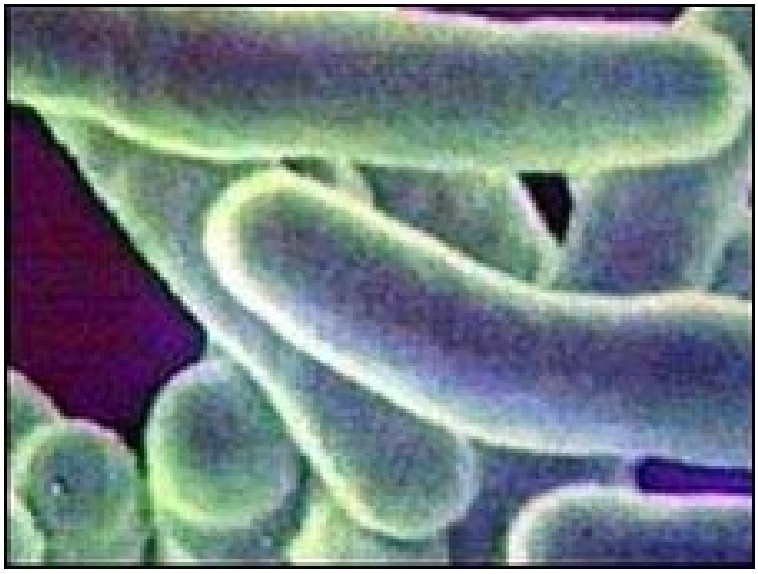
"In contrast, the number of affected people has increased at a slower rate. This may be due to better community preparedness and prevention."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8487798.stm

Published: 2010/01/29 18:37:24 GMT

Vaccine 'could cut HIV TB deaths'

A vaccine could cut tuberculosis cases among HIV-positive Africans by almost two-fifths, a US study suggests.



The lung infection is the most common cause of death among HIV patients in the continent.

Journal Aids reports that Dartmouth Medical School research involving 2,000 people found significantly fewer TB cases in vaccinated patients.

An expert said the jab could be a cheaper option for countries struggling to find money for extra anti-HIV drugs.

" **TB is a massive problem - a third of people living with HIV in Africa are infected with it** "
Alvaro Bermejo, International HIV/Aids Alliance

HIV patients are particularly vulnerable to TB because their immune systems are compromised.

The vaccine works by boosting the immune responses of patients who have already been given the BCG vaccine earlier in life.

In itself, the BCG jab may offer some protection against TB, but this is far from certain, and protection may only last a few years after immunisation.

The researchers from Dartmouth Medical School in the US tested it among 2,000 HIV positive patients in Tanzania over a seven-year period.

The number of confirmed TB cases was 39% lower in the vaccinated group.

First vaccine

Professor Ford von Reyn, who led the study, said it was a "significant milestone".

One theory now suggests that patients could be given the booster jab as soon as they are diagnosed with HIV, before antiretroviral drugs are needed.

Alvaro Bermejo, executive director at the International HIV/Aids Alliance, said that the other way of fighting TB in HIV patients might be to give them antiretrovirals earlier, an expensive option compared with a vaccination programme.

He said: "This is a very important finding - it is the first time we are going to have a vaccine which is influential in preventing opportunistic infections in HIV patients.

"TB is a massive problem - a third of people living with HIV in Africa are infected with it.

"The reduction of 39% seen in Tanzania, although not fabulous, is a good result."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8488287.stm

Published: 2010/01/30 00:33:18 GMT

Overweight elderly 'live longer'

Moderately overweight elderly people may live longer than those of normal weight, an Australian study suggests.

But being very overweight or being underweight shortened lives.

The report, which was published in the Journal of the American Geriatric Society, said dieting may not be beneficial in this age group.

But the study of 9,200 over-70s also found that regardless of weight, sedentary lifestyles shortened lives, particularly for women.

The study by the University of Western Australia set out to find out what level of body mass index (BMI) was associated with the lowest risk of death in the elderly.

" **Concerns have been raised about encouraging apparently overweight older people to lose weight** "
Professor Leon Flicker, University of Western Australia

For younger people, there is a well established health risk from being overweight or obese.

Overweight best

The team tracked the number of deaths over 10 years among volunteers who were aged 70 - 75 at the start of the study.

It found that those with a BMI which classed them as overweight not only had the lowest overall risk of dying, they also had the lowest risk of dying from specific diseases: cardiovascular disease, cancer and chronic respiratory disease.

The overall death rate among the obese group was similar to that among those of normal weight.

But those who were very obese had a greater risk of dying during the 10 year period.

Lead researcher, Professor Leon Flicker said: "Concerns have been raised about encouraging apparently overweight older people to lose weight.

"Our study suggests that those people who survive to age 70 in reasonable health have a different set of risks and benefits associated with the amount of body fat to younger people."

The conclusion of this study, that being overweight may be less harmful for elderly people, corroborates the findings of previous research.

Staying still

Sedentary lifestyles shortened lives across all weight groups, doubling the risk of mortality for women over the period studied, and increasing it by 25% for men.

Physical exercise "really matters", said Professor Flicker.

As well as helping to build muscle mass, it has broader health benefits for elderly people, he said.

The authors believe BMI may give a poor reflection of fatty mass in elderly people.

"It may be time to review the BMI classification for older adults," says Professor Flicker.

Professor Kay-Tee Khaw from Cambridge University agreed, noting that optimal weight appears to be higher in older age groups.

"This is important since under-nutrition is an important problem in older people.

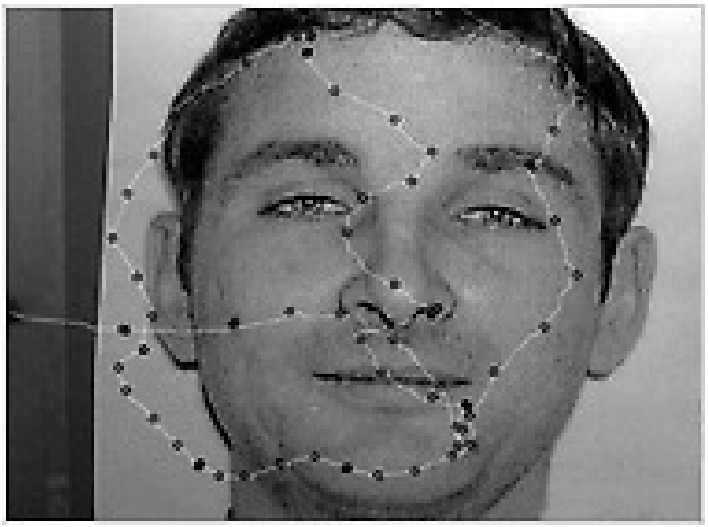
"Waist circumference, which assesses abdominal obesity, appears to be a better indicator of health consequences of obesity" she said.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8483456.stm

Published: 2010/01/29 10:10:01 GMT

If You Swat, Watch Out: Bees Remember Faces

By SINDYA N. BHANOO



A honeybee brain has a million neurons, compared with the 100 billion in a human brain. But, researchers report, bees can recognize faces, and they even do it the same way we do.

Bees and humans both use a technique called configural processing, piecing together the components of a face — eyes, ears, nose and mouth — to form a recognizable pattern, a team of researchers report in the Feb. 15 issue of The Journal of Experimental Biology.

"It's a kind of gluing," said Martin Giurfa, a professor of neural biology at the University de Toulouse, France, and one of the study's authors.

It is the same ability, Dr. Giurfa said, that helps humans realize that a Chinese pagoda and a Swiss chalet are both abodes, based on their components.

"We know two vertical lines, with a hutlike top," he said. "It's a house."

In their research, Dr. Giurfa and his colleagues created a display of hand-drawn images, some faces and some not.

The faces had bowls of sugar water in front of them, while the nonfaces were placed behind bowls containing plain water. After a few failed trips to the bowls without sugar water, the bees kept returning to the sugar-filled bowls in front of the faces, the scientists found.

The images and the bowls were cleaned after every visit, to ensure that the bees were using visual cues to find the sugar and not leaving scent marks.

The researchers found that bees could also distinguish a face that provided sugar water from one that did not.

After several hours' training, the bees picked the right faces about 75 percent of the time, said Adrian Dyer, another author of the study and a vision scientist at Monash University in Australia.

The researchers said that while they were biologists and not computer scientists, they hoped their work could be more widely used, including by face recognition experts. "If somebody else finds it interesting

and it improves airport security, that's great," Dr. Dyer said. "The potential mechanisms can be made available to the wider facial recognition community."

Dr. Giurfa said that the benefit of studying a creature as simple as the bee was in knowing that it did not take a complex neural network to distinguish objects. This could offer hope to technologists, he said.

"We could imagine that through repeat exposure, we may be able to train machines to extract a configuration and know that 'This a motorbike' or no, 'This is rather a dog,' " he said.

But while the research on bees is interesting, it does not help with the most difficult problem technologists are having, said David Forsyth, a computer science professor at the University of Illinois, whose research focuses on computer vision.

That challenging problem is to build systems that can recognize the same people over a period of time, Dr. Forsyth said, after their hair has grown, or when they have sunglasses on, or after they have aged. These are all tasks that humans can usually perform but that computers struggle to replicate.

"I highly doubt that bees can tell the difference," Dr. Forsyth said, adding, "If bees did that, I'd fall off my chair."

Nonetheless, he said, it is important to add to the body of research on face recognition by studying animals.

While computers have become very capable at detecting faces, dependable face recognition by machines continues to be elusive.

"We know almost nothing about recognition, but it is really useful and really hard, and it helps us make decisions about the world," Dr. Forsyth said. "Research into anything about identifying and recognizing seems to be a good thing."

http://www.nytimes.com/2010/02/02/science/02bees.html?ref=science

Panel Suggests 100 Ways Buildings Can Be Greener

By MIREYA NAVARRO

A panel of experts convened by the mayor and City Council issued more than 100 recommendations Monday on how to make New York City's building codes more environmentally sound by imposing energy-saving requirements on construction and renovation work.

The measures, presented to Mayor Michael R. Bloomberg and the Council's speaker, Christine C. Quinn, include rules for insulating glass skyscrapers and a plan that would place temperature controls in individual apartments, eliminating the winter ritual of opening windows to vent excess heat.

Many of the proposals would need to be approved by the City Council.

"A lot of these are incremental gains, but together they amount to a big gain," said the panel's chairman, Russell Unger, the executive director of the New York chapter of the United States Green Building Council, which certifies green design and construction. "By changing code, everybody can have lower utility bills."

The recommendations are the city's latest attempt to reduce the greenhouse gases produced by its buildings, which are estimated to be the source of about 75 percent of the city's emissions over all. In December, the City Council passed legislation requiring owners of New York's largest buildings to pay for energy audits, upgrade lighting and take other steps to reduce energy consumption.

But as with previous green proposals for buildings, many of the improvements suggested on Monday could substantially increase the costs of renovation or construction. The panel of experts, including representatives of the building industry and from environmental groups, said at a briefing that the city must find ways to secure financing and offer other incentives to help developers and managers make the changes.

"In general, the industry supports the overall goal," said Charlotte Matthews, vice president for sustainability at the Related Companies, a major New York developer that has a representative on the task force. She noted that some measures would be less palatable than others, and that in difficult economic times "any change is a little unnerving."

But she said a stiffer code regulating buildings' energy use was essential in meeting the city's long-term environmental demands and "ensuring that all New Yorkers have a healthy home, school and workplace."The panel's wish list includes requiring all commercial and residential buildings that are four stories or taller to meet the nation's latest energy standards. Other proposals call for such buildings to be more airtight and to have minimal insulation.

One proposal would impose higher efficiency standards for heating systems and ban inefficient boilers in the city's largest buildings. Another would phase in individual apartment temperature controls over a 10-year period.Ms. Quinn said about half of the measures would not involve significant expenditures. The real estate industry's participation in the process should help address concerns about costs, she added.

"It's kind of a new way of looking at how we do business with a green perspective," she said.In a statement, Mayor Bloomberg said the recommendations by the panel, which was convened 18 months ago, were critical to meeting the city's goal of reducing greenhouse gas emissions 30 percent by 2030.

http://www.nytimes.com/2010/02/02/science/earth/02green.html?ref=science

Study Finds a Tree Growth Spurt
By LESLIE KAUFMAN

Forests in the eastern United States appear to be growing faster in response to rising levels of carbon dioxide in the atmosphere, a new study has found.

The study centered on trees in mixed hardwood stands on the western edge of the Chesapeake Bay in Maryland that are representative of much of the those on the Eastern Seaboard.

All are growing two to four times as fast as normal, according to a study published in Tuesday's issue of The Proceedings of the National Academy of Sciences.

After controlling for other variables, scientists concluded that the change resulted largely from the increase in carbon dioxide, a major factor in climate change.

Trees are now known to play a vital role in countering global warming because they absorb and store carbon dioxide, the leading heat-trapping gas.

Geoffrey G. Parker, a co-author of the paper and an ecologist with the Smithsonian Environmental Research Center in Edgewater, Md., said his research indicated that the local forests were adapting to the rise in carbon dioxide by absorbing more.

"My guess is that they are already sopping up some of the extra carbon," he said.

But Dr. Parker said it was unclear whether the trend could be sustained. "We don't think this can persist for too long because other limiting factors will come into play, like water availability and soil nutrients," he said.

Since 1987, Dr. Parker has been studying 55 stands of trees along the bay's western edge. Recent censuses have shown that compared with the earlier years, the trees are packing on weight at an additional two tons per acre annually. The scientists track the speed of growth through tree diameter.

Although many variables can affect tree growth, Dr. Parker said he had ruled out all causes for the sustained nature of the recent growth except for warmer temperatures, a longer growing season and the rising level of carbon dioxide in the atmosphere.

Carbon dioxide levels around the research center have increased 12 percent in the last 22 years.

Dr. Parker said that because the trees in his study are representative of those common to much of the Eastern Seaboard, he is eager to know whether other scientists in other areas are recording similar results.

http://www.nytimes.com/2010/02/02/science/earth/02trees.html?ref=science

In the Next Industrial Revolution, Atoms Are the New Bits

- By Chris Anderson
- January 25, 2010 | Wired Feb 2010

In an age of open source, custom-fabricated, DIY product design, all you need to conquer the world is a brilliant idea.
Photo: Dan Winters

The door of a dry-cleaner-size storefront in an industrial park in Wareham, Massachusetts, an hour south of Boston, might not look like a portal to the future of American manufacturing, but it is. This is the headquarters of Local Motors, the first open source car company to reach production. Step inside and the office reveals itself as a mind-blowing example of the power of micro-factories.

In June, Local Motors will officially release the Rally Fighter, a $50,000 off-road (but street-legal) racer. The design was crowdsourced, as was the selection of mostly off-the-shelf components, and the final assembly will be done by the customers themselves in local assembly centers as part of a "build experience." Several more designs are in the pipeline, and the company says it can take a new vehicle from sketch to market in 18 months, about the time it takes Detroit to change the specs on some door trim. Each design is released under a share-friendly Creative Commons license, and customers are encouraged to enhance the designs and produce their own components that they can sell to their peers.

The Rally Fighter was prototyped in the workshop at the back of the Wareham office, but manufacturing muscle also came from Factory Five Racing, a kit-car company and Local Motors investor located just down the road. Of course, the kit-car business has been around for decades, standing as a proof of concept for how small manufacturing can work in the car industry. Kit cars combine hand-welded steel tube chassis and fiberglass bodies with stock engines and accessories. Amateurs assemble the cars at their homes, which exempts the vehicles from many regulatory restrictions (similar to home-built experimental aircraft). Factory Five has sold about 8,000 kits to date.

One problem with the kit-car business, though, is that the vehicles are typically modeled after famous racing and sports cars, making lawsuits and license fees a constant burden. This makes it hard to profit and limits the industry's growth, even in the face of the DIY boom.

Jay Rogers, CEO of Local Motors, saw a way around this. His company opted for totally original designs: They don't evoke classic cars but rather reimagine what a car can be. The Rally Fighter's body was designed by Local Motors' community of volunteers and puts the lie to the notion that you can't create anything good by committee (so long as the community is well managed, well led, and well equipped with tools like 3-D design software and photorealistic rendering technology). The result is a car that puts Detroit to shame.

It is, first of all, incredibly cool-looking — a cross between a Baja racer and a P-51 Mustang fighter plane. Given its community provenance, one might have expected something more like a platypus. But this process was no politburo. Instead, it was a competition. The winner was Sangho Kim, a 30-year-old graphic artist and student at the Art Center College of Design in Pasadena, California. When Local Motors asked its community to submit ideas for next-gen vehicles, Kim's sketches and renderings captivated the crowd. There wasn't supposed to be a prize, but the company gave Kim $10,000 anyway. As the community coalesced around his Rally Fighter, members competed to develop secondary parts, from the side vents to the light bar. Some were designers, some engineers, and others just car hobbyists. But what they had in common was a refusal to design just another car, compromised by mass-market needs and convention. They wanted to make something original — a fantasy car come to life.

While the community crafted the exterior, Local Motors designed or selected the chassis, engine, and transmission thanks to relationships with companies like Penske Automotive Group, which helped the firm source everything from dashboard dials to the new BMW clean diesel engine the Rally Fighter will use. This combination — have the pros handle the elements that are critical to performance, safety, and manufacturability while the community designs the parts that give the car its shape and style — allows crowdsourcing to work even for a product whose use has life-and-death implications.

Local Motors plans to release between 500 and 2,000 units of each model. It's a niche vehicle; it won't compete with the major automakers but rather fill in the gaps in the marketplace for unique designs. Rogers uses the analogy of a jar of marbles, each of which represents a vehicle from a major automaker. In between the marbles is empty space, space that can be filled with grains of sand — and those grains are Local Motors cars.

Local Motors has just 10 full-time employees (that number will grow to more than 50 as it opens build centers, the first of which will be in Phoenix), holds almost no inventory, and purchases components and prepares kits only after buyers have made a down payment and reserved a build date.

Rogers was practically destined for his job. His grandfather Ralph Rogers bought the Indian Motorcycle Company in 1945. When the light Triumph motorcycles began entering the US after World War II, the senior Rogers recognized that his market-leading Chief, a big road workhorse, was uncompetitive. The solution was to make a new light engine so Indian could produce its own cheap, nimble bikes. He went bust trying to develop the motor. It was just too hard to change direction — and eventually he lost the business.

Today, Rogers' grandson intends to do something even more radical — create a whole new way of making cars — on a shoestring budget. His company has raised roughly $7 million, and he thinks that's enough to take it to profitability. The difference between now and then? "They didn't have resources back then to enter the market, because the manufacturing process was so tightly held," he says. What's changed is that the supply chain is opening to the little guys.

The 36-year-old Rogers favors military-style flight suits, an echo of his time as a captain in the Marines, including action in Iraq, and he boasts both a Harvard MBA and a stint as an entrepreneur in China.

While at Harvard, Rogers saw a presentation on Threadless, the open-design T-shirt company, which showed him the power of crowdsourcing. Cars are more complicated than T-shirts, but in both cases there are far more people who can design them than are currently paid to do so — Rogers estimates that less than 30 percent of car design students get jobs at auto companies upon graduation. The rest become frustrated car designers, exactly the pool of talent that might respond to a well-organized vehicle design competition and community. Today, the Local Motors Web site has around 5,000 members. That's a 500-to-1 ratio of volunteer contributors to employees. This is how industries are reinvented.

Here's the history of two decades in one sentence: If the past 10 years have been about discovering post-institutional social models on the Web, then the next 10 years will be about applying them to the real world.

This story is about the next 10 years.

Transformative change happens when industries democratize, when they're ripped from the sole domain of companies, governments, and other institutions and handed over to regular folks. The Internet democratized publishing, broadcasting, and communications, and the consequence was a massive increase in the range of both participation and participants in everything digital — the long tail of bits.

Now the same is happening to manufacturing — the long tail of things.

The tools of factory production, from electronics assembly to 3-D printing, are now available to individuals, in batches as small as a single unit. Anybody with an idea and a little expertise can set assembly lines in China into motion with nothing more than some keystrokes on their laptop. A few days later, a prototype will be at their door, and once it all checks out, they can push a few more buttons and be in full production, making hundreds, thousands, or more. They can become a virtual micro-factory, able to design and sell goods without any infrastructure or even inventory; products can be assembled and drop-shipped by contractors who serve hundreds of such customers simultaneously.

Today, micro-factories make everything from cars to bike components to bespoke furniture in any design you can imagine. The collective potential of a million garage tinkerers is about to be unleashed on the global markets, as ideas go straight into production, no financing or tooling required. "Three guys with laptops" used to describe a Web startup. Now it describes a hardware company, too.

"Hardware is becoming much more like software," as MIT professor Eric von Hippel puts it. That's not just because there's so much software in hardware these days, with products becoming little more than intellectual property wrapped in commodity materials, whether it's the code that drives the off-the-shelf chips in gadgets or the 3-D design files that drive manufacturing. It's also because of the availability of common platforms, easy-to-use tools, Web-based collaboration, and Internet distribution.

We've seen this picture before: It's what happens just before monolithic industries fragment in the face of countless small entrants, from the music industry to newspapers. Lower the barriers to entry and the crowd pours in.

The academic way to put this is that global supply chains have become scale-free, able to serve the small as well as the large, the garage inventor and Sony. This change is driven by two forces. First, the explosion in cheap and powerful prototyping tools, which have become easier to use by non-engineers. And second, the economic crisis has triggered an extraordinary shift in the business practices of (mostly) Chinese factories, which have become increasingly flexible, Web-centric, and open to custom work (where the volumes are lower but the margins higher).

The result has allowed online innovation to extend to the real world. As Cory Doctorow puts it in his new book, Makers, "The days of companies with names like 'General Electric' and 'General Mills' and 'General Motors' are over. The money on the table is like krill: a billion little entrepreneurial opportunities that can be discovered and exploited by smart, creative people."

A garage renaissance is spilling over into such phenomena as the booming Maker Faires and local "hackerspaces." Peer production, open source, crowdsourcing, user-generated content — all these digital trends have begun to play out in the world of atoms, too. The Web was just the proof of concept. Now the revolution hits the real world.

In short, atoms are the new bits.

It all starts with the tools. in a converted brewery in Brooklyn, Bre Pettis and his team of hardware engineers are making the first sub-$1,000 3-D printer, the open source MakerBot. Rather than squirting out ink, this printer builds up objects by squeezing out a 0.33-mm-thick thread of molten ABS plastic. Five years ago, you couldn't get anything like this for less than $125,000.

During a visit in late November, 100 boxes containing the ninth batch of MakerBots are lined up and ready to go out the door (as a customer, I'm thrilled to know that one of them is coming to me). Nearly 500 of these 3-D printers have been sold, and with every one, the community comes up with new uses and new tools to make them even better. For example, a prototype head delivers a resolution of 0.2 mm. Another head can hold a rotating cutter, turning the printer into a CNC router. (CNC is short for computer numerical control, which simply means that the machines are driven by software.) And yet another can print with icing, for desserts.

Out of the box, the MakerBot produces plastic parts from digital files. Want a certain gear right now? Download a design and print it out yourself. Want to modify an object you already have? Scan it (a researcher at the University of Cambridge has developed a technology that will allow you to create a 3-D file by rotating the object in front of your webcam), tweak the bits you want to change with the free SketchUp software from Google, and load it into the ReplicatorG app. Within minutes, you have a whole new physical object: a rip, mix, and burn of atoms.

Other tools offer additional tricks. The $18,000 ShopBot PRSalpha can work door-sized pieces of wood. Or buy a smaller kit for $1,500 at buildyourcnc.com. If metal is your material, try a CNC mill for around $2,000. Or, if you're more into electronics, use the free CadSoft Eagle software to create your own circuit boards, then upload the file to have it fabbed in a few days at places like Advanced Circuits.

So, too, for CNC laser cutters, plasma cutters, water-jet cutters, and lathes. You can make anything from fine jewelry to car chassis this way, and tens of thousands of people are doing just that. We've already seen this DIY creation movement boom around such simple platforms as T-shirts and coffee mugs, then expand into handcrafting at Etsy (which did about $200 million in sales last year). Now it's moving to more complex platforms — like 3-D models and plastic fabrication — and open source electronics hardware like the pioneering Arduino project.

With the tools in place, the second part of this new industrial age is how manufacturing has been opened up to individuals, letting them scale prototypes into full production runs. Over the past few years, Chinese manufacturers have evolved to handle small orders more efficiently. This means that one-person enterprises can get things made in a factory the way only big companies could before.

Two trends are driving this. First, there's the maturation and increasing Web-centrism of business practices in China. Now that the Web generation is entering management, Chinese factories increasingly take orders online, communicate with customers by email, and accept payment by credit card or PayPal, a consumer-friendly alternative to traditional bank transfers, letters of credit, and purchase orders. Plus, the current economic crisis has driven companies to seek higher-margin custom orders to mitigate the deflationary spiral of commodity goods.

For a lens into the new world of open-access factories in China, check out Alibaba .com, the largest aggregator of the country's manufacturers, products, and capabilities. Just search on the site (in English), find some companies producing more or less what you're looking to make, and then use instant messaging to ask them if they can manufacture what you want. Alibaba's IM can translate between Chinese and English in real time, so each person can communicate using their native language. Typically, responses come in minutes: We can't make that; we can make that and here's how to order it; we already make something quite like that and here's what it costs.

Alibaba's chair, Jack Ma, calls this "C to B" — consumer to business. It's a new avenue of trade and one ideally suited for the micro-entrepreneur of the DIY movement. "If we can encourage companies to do

more small, cross-border transactions, the profits can be higher, because they are unique, non-commodity goods," Ma says. Since its founding in 1999, Alibaba has become a $12 billion company with 45 million registered users worldwide. Its $1.7 billion initial public offering on the Hong Kong Stock Exchange in 2007 was the biggest tech debut since Google. Over the past three years, Ma says, more than 1.1 million jobs have been created in China by companies doing ecommerce across Alibaba's platforms.

This trend is playing out in many countries, but it's happening fastest in China. One reason is the same cultural dynamism that led to the rise of *shanzhai* industries. The term shanzhai, which derives from the Chinese word for bandit, usually refers to the thriving business of making knockoffs of electronic products, or as Shanzai.com more generously puts it, "a vendor, who operates a business without observing the traditional rules or practices often resulting in innovative and unusual products or business models." But those same vendors are increasingly driving the manufacturing side of the maker revolution by being fast and flexible enough to work with micro-entrepreneurs. The rise of shanzhai business practices "suggests a new approach to economic recovery as well, one based on small companies well networked with each other," observes Tom Igoe, a core developer of the open source Arduino computing platform. "What happens when that approach hits the manufacturing world? We're about to find out."

Not long ago, all this was impossible. To see how it used to be back in the 20th century, watch the movie *Flash of Genius*. The film, which is based on a true story, starts in the mid-1960s and tells the sad tale of the invention of the intermittent windshield wiper. A lone inventor — college professor Bob Kearns — tinkers in his basement until he finally creates a working prototype. Rather than sell the technology to a big car company, Kearns decides he wants to build his own company and make the wiper himself. Ford signs on to install Kearns' wipers in one of its new models. That means he needs to build a factory. He leases a huge warehouse and starts outfitting it with assembly lines, forklift loaders, and other heavy equipment — a classic industrial-age scene.

How to Build Your Dream

In the age of democratized industry, every garage is a potential micro-factory, every citizen a potential micro-entrepreneur. Here's how to transform a great idea into a great product.

- **1) INVENT** Stop whining about the dearth of cool products in the world — dream up your own. Pro tip: Check the US Patent and Trademark Office Web site to ensure no one else had the idea first.
- **2) DESIGN** Use free tools like Blender or Google's SketchUp to create a 3-D digital model of your invention. Or download someone else's design and incorporate your groundbreaking tweaks.
- **3) PROTOTYPE** You don't need to be Geppetto to crank out a prototype; desktop 3-D printers like MakerBot are available for under $1,000. Just upload a file and watch the machine render your vision in layered ABS plastic.
- **4) MANUFACTURE** The garage is fine for limited production, but if you want to go big, go global — outsource. Factories in China are standing by; sites like Alibaba.com can help you find the right partner.
- **5) SELL** Market your product directly to customers via an online store like SparkFun — or set up your own ecommerce outfit through a company like Yahoo or Web Studio. Then haul your golden goose to Maker Faire and become the poster child for the DIY industrial revolution.

As Kearns is getting close to firing up his facility, Ford abruptly backs out of the deal. With no revenue in sight, the factory shuts down before producing a single wiper.

Eighteen months later, Kearns is walking home in the rain and sees a brand new Ford Mustang turn the corner. The windshield wiper sweeps, then pauses, then sweeps again. His brilliant idea has been stolen. Kearns is ruined and will soon go mad, thus the rest of the movie. (The real-life Kearns eventually sued Ford and Chrysler for patent infringement and, after years of litigation, won nearly $30 million.)

Today, Kearns would do it differently. As before, he would have made the first prototype in his basement. But rather than building a factory, he would have had the electronics fabbed by one company and the enclosure made by another. He then would have paid a wiper manufacturer in China to create a custom assembly with these components. They would have shipped straight to his customers, the car companies, and the whole process would have happened in months, not years — too fast for big companies to beat him. No factory, no lawsuits, no madness. He could have fulfilled his dream of turning his invention into a company without tilting at windmills.

To see this model emerging in the real world, you need only visit TechShop, a chain of DIY workspaces that offer access to state-of-the-art prototyping tools for around $100 a month.

On a recent afternoon at the facility in Menlo Park, California, Michael Pinneo, a successful former executive in the synthetic-diamond business, is machining a vapor- deposition chamber for his newest approach to creating colorless diamonds. Over in the corner stands the base of a rocket lander being developed by a team that's competing in the Google Lunar X Prize. At another table, Stephan Weiss, vice president of Interoptix, and one of his colleagues are assembling circuit boards used to manage electricity grids. They're doing 50-unit runs, which Weiss describes as "too small for a factory but too big for your garage." The devices carry the badge of ABB, a giant engineering firm; the utility customers may never know that they were made by hand in a hackerspace.

This is an incubator for the atoms age. When TechShop founder Jim Newton went looking for an executive to run it, he quickly decided on Mark Hatch, a former Kinko's executive. The analogy is apt: In the same way that Kinko's democratized printing and, in the process, created a national chain of service bureaus, TechShop wants to democratize manufacturing. It now has two additional locations, in Durham, North Carolina, and Beaverton, Oregon, and has plans for hundreds more. One of the spots being considered is San Francisco, within the facilities of the much-shrunken San Francisco Chronicle. The irony is delicious: the seeds of tomorrow's industry growing in the ashes of yesterday's.

Over lunch, Hatch reflects on the arc of manufacturing history. With the rise of the factory in the industrial age, Karl Marx fretted that a tradesman could no longer afford the tools to ply his trade. The economies of scale of industrial production crowded out the individual. Although the benefits of such industrialization were lower prices and better products, the cost was homogeneity. Combined with big-box retailers, the marketplace became increasingly dominated by the fruits of mass production: goods designed for everyone, with the resulting limited diversity and choice that implies.

But today those tools of production are getting so cheap that they are once again within the reach of many individuals. State-of-the-art milling machines that once cost $150,000 are now close to $4,000, thanks to Chinese copies. Everybody's garage is a potential high tech factory. Marx would be pleased.

Blogger Jason Kottke wrestled with what to call this new class of entrepreneurship, these cottage industries with global reach targeting niche markets of distributed demand. "Boutique" is too pretentious, and "indie" not quite right. He observed that others had suggested "craftsman, artisan, bespoke, cloudless, studio, atelier, long tail, agile, bonsai company, mom and pop, small scale, specialty, anatomic, big heart, GTD business, dojo, haus, temple, coterie, and disco business." But none seemed to capture the movement.

So he proposed "small batch," a term most often applied to bourbon. In the spirits world, this implies handcrafted care. But it can broadly refer to businesses focused more on the quality of their products than the size of the market. They'd rather do something they were passionate about than go mass. And these days, when anyone can get access to manufacturing and distribution, that is actually a viable choice. Walmart, and all the compromise that comes with it, is no longer the only path to success.

For a final example of that, swing to the Seattle suburbs to meet Will Chapman of BrickArms. Out of a small industrial space, BrickArms fills gaps in the Lego product line, going where the Danish toy giant

fears to tread: hardcore weaponry, from Lego-scale AK-47s to frag grenades that look like they came straight out of Halo 3. The parts are more complex than the average Lego component, but they're manufactured to an equal quality and sold online to thousands of Lego fans, kids and adults, who want to create cooler scenes than the standard kits allow.

Lego operates on an industrial scale, with a team of designers working in a highly secure campus in Billund, Denmark. Engineers model prototypes and have them fabricated in dedicated machine shops. Then, once they meet approval, they're manufactured in large injection molding plants. Parts are created for kits, and those kits have to be play-tested, priced for mass retail, and shipped and inventoried months in advance of their sale at Target or Walmart. The only parts that make it out of this process are those that will sell in the millions.

Chapman works at a different scale. He designs parts using SolidWorks 3-D software, which can create a reverse image that's used to produce a mold. He sends the file to his desktop CNC router, a Taig 2018 mill that costs less than $1,000, which grinds the mold halves out of aircraft-grade aluminum blocks. Then he puts them in his hand-pressed injection molding machine, melts some resin beads, and pumps them through. A few minutes later, he's got a prototype to show to fans. If they like it, he gets a local toolmaker to reproduce the mold out of steel and a US-based injection molding company to make batches of a few thousand.

Why not have the parts made in China? He could, he says, but the result would be "molds that take much longer to produce, with slow communication times and plastic that is subpar" (read: cheap). Furthermore, he says, "if your molds are in China, who knows what happens to them when you're not using them? They could be run in secret to produce parts sold in secondary markets that you would not even know existed."

Chapman's three sons package the parts, which he sells direct. Today, BrickArms also has resellers in the UK, Australia, Sweden, Canada, and Germany. The business grew so big that in 2008 he left his 17-year career as a software engineer; he now comfortably supports his family of five solely on Lego weapon sales. "I bring in more revenue on a slow BrickArms day than I ever did working as a software engineer." Life is good.

In the mid-1930s, Ronald Coase, then a recent London School of Economics graduate, was musing over what to many people might have seemed a silly question: Why do companies exist? Why do we pledge our allegiance to an institution and gather in the same building to get things done? His answer: to minimize "transaction costs." When people share a purpose and have established roles, responsibilities, and modes of communication, it's easy to make things happen. You simply turn to the person in the next cubicle and ask them to do their job.

But several years ago, Bill Joy, one of the cofounders of Sun Microsystems, revealed the flaw in Coase's model. "No matter who you are, most of the smartest people work for someone else," he rightly observed. Of course, that had always been true, but before, it hardly mattered if you were in Detroit and someone better was in Dakar; you were here and they were there, and that was the end of it. But Joy's point was that this was changing. With the Internet, you didn't have to settle for the next cubicle. You could tap the best person out there, even if they were in Dakar.

Joy's law turned Coase's law upside down. Now, working within a company often imposes higher transaction costs than running a project online. Why turn to the person who happens to be in the next cubicle when it's just as easy to turn to an online community member from a global marketplace of talent? Companies are full of bureaucracy, procedures, and approval processes, a structure designed to defend the integrity of the organization. Communities form around shared interests and needs and have no more process than they require. The community exists for the project, not to support the company in which the project resides.

Thus the new industrial organizational model. It's built around small pieces, loosely joined. Companies are small, virtual, and informal. Most participants are not employees. They form and re-form on the fly, driven by ability and need rather than affiliation and obligation. It doesn't matter who the best people work for; if the project is interesting enough, the best people will find it.

Let me tell you my own story. Three years ago, out on a run, I started thinking about how cheap gyroscope sensors were getting. What could you do with them? For starters, I realized, you could turn a radio-controlled model airplane into an autonomous unmanned aerial vehicle, or drone. It turned out that there were plenty of commercial autopilot units you could buy, all based on this principle, but the more I looked into them, the worse they appeared. They were expensive ($800 to $5,000), hard to use, and proprietary. It was clear that this was a market desperate for competition and democratization — Moore's law was at work, making all the components dirt cheap. The hardware for a good autopilot shouldn't cost more than $300, even including a healthy profit. Everything else was intellectual property, and it seemed the time had come to open that up, trading high margins for open innovation.

To pursue this project, I started DIY Drones, a community site, and found and began working with some kindred spirits, led by Jordi Muñoz, then a 21-year-old high school graduate from Mexico living in Riverside, California. Muñoz was self-taught — with world-class skills in embedded electronics and aeronautics. Jordi turned me on to Arduino, and together we designed an autonomous blimp controller and then an aircraft autopilot board.

We designed the boards the way all electronics tinkerers do, with parts bought from online shops, wired together on prototyping breadboards. Once it worked on the breadboard, we laid out the schematic diagrams with CadSoft Eagle and started designing it as a custom printed circuit board (PCB). Each time we had a design that looked good onscreen, we'd upload it to a commercial PCB fab, and a couple of weeks later, samples would arrive at our door. We'd solder on the components, try them out, and then fix our errors and otherwise make improvements for the next version.

Eventually, we had a design we were happy with. How to commercialize it? We could do it ourselves, getting our PCB fab house to solder on the components, too, but we thought it might be better to partner with a retailer. The one that seemed culturally matched was SparkFun, which designs, makes, and sells electronics for the growing open source hardware community.

The SparkFun operation is in a newish two-story building in an office park outside Boulder, Colorado. The first floor is larger than three basketball courts, with racks of circuit boards waiting to be sold, packed, and shipped on one side and some machines attended by a few technicians on the other. The first two machines are pick-and-place robots, which are available used for less than $5,000. They position tiny electronic components in exactly the right spot on a PCB. Once each batch of boards is done, technicians place them on a conveyor belt that goes into another machine, which is basically just a heater. Called a reflow oven, it cements the parts into place, essentially accomplishing what a worker could do with a soldering iron but with unmatched precision and speed.

The PCBs arrive from SparkFun's partner firm in China, which makes millions of them using automated etching, drilling, and cutting machines. At volume, they cost a few cents each.

That's it. With these elements you can make the basics of everything from a cell phone to a robot (structural elements, such as the case, can be made in low volume with a CNC machine or injection-molded if you need to do it cheaper at higher volume). You can sell these components as kits or find some college students on craigslist to spend a weekend assembling them for you. (I conscript my kids to assemble our blimps. They rotate roles, coveting the quality assurance task where they check the others' work.)

SparkFun makes, stocks, and sells our autopilot and a few other products that we designed; we get to spend our time working on R&D and bear no inventory risk. Some products we wanted to make were too

time-intensive for SparkFun, so we made them ourselves. Now, in a rented Los Angeles garage, we have our own mini SparkFun. Rather than a pick-and-place robot, we have a kid with sharp eyes and a steady hand, and for a reflow oven we use what is basically a modified toaster oven. We can do scores of boards per day this way; when demand outstrips production, we'll upgrade to a small pick-and-place robot.

Every day our Web site takes orders and prints out the shipping labels. Muñoz or one of his workers heat-seals the products in protective electrostatic bags and puts them in shipping envelopes. The retail day ends at 3:30 pm with a run to the post office and UPS to send everything off. In our first year, we'll do about $250,000 in revenue, with demand rising fast and a lot of products in the pipeline. With luck, we'll be a million-dollar business by the third year, which would put us solidly in the ranks of millions of similarly successful US companies. We are just a tiny gear in the economic engine driving the US — on the face of it, this doesn't seem like a world- changing economic model.

But the difference between this kind of small business and the dry cleaners and corner shops that make up the majority of micro-enterprise in the country is that we're global and high tech. Two-thirds of our sales come from outside the US, and our products compete at the low end with defense contractors like Lockheed Martin and Boeing. Although we don't employ many people or make much money, our basic model is to lower the cost of technology by a factor of 10 (mostly by not charging for intellectual property). The effect is felt primarily by consumers; when you take an order of magnitude out of pricing in any market, you can radically reshape it, bringing in more and different customers. Lowering costs is a way to democratize technology, too.

Although it's shrinking, America's manufacturing economy is still the world's largest. But China's growing production sector is predicted to take the number one spot in 2015, according to IHS Global Insight, an economic-forecasting firm. Not all US manufacturing is shrinking, however — just the large part. A Pease Group survey of small manufacturers (less than $25 million in annual sales) shows that most expect to grow this year, many by double digits. Indeed, analysts expect almost all new manufacturing jobs in the US will come from small companies. Ones just like ours.

How big can these small enterprises get? Most of the companies I've described sell thousands of units — 10,000 is considered a breakout success. But one that has graduated to the big leagues is Aliph, which makes the Jawbone noise-canceling wireless headsets. Aliph was founded in 1999 by two Stanford graduates, Alex Asseily and Hosain Rahman, and it now sells millions of headsets each year. But it has no factories. It outsources all of its production. And though more than a thousand people help to create Jawbone headsets, Aliph has just over 80 employees. Everyone else works for its production partners. It's the ultimate virtual manufacturing company: Aliph makes bits and its partners make atoms, and together they can take on Sony.

Welcome to the next Industrial Revolution.

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http://www.wired.com/magazine/2010/01/ff_newrevolution/all/1

The landmark buildings shaping the next decade

The proposed extension to Tate Modern in London

Hugh Pearman

You know them when you see them, the great public buildings. It's all to do with unshakable confidence. The 1842 portico and facade of the British Museum has it. Frank Lloyd Wright's 1959 Guggenheim, in Manhattan, has it, as does Frank Gehry's Bilbao version of 1997. Two utterly different 1970s buildings — the National Theatre, in London, and the Pompidou Centre, in Paris — have it. The question is: will Tate Modern's £215m extension have it? And what else is going to happen over the next decade?

These places are always about so much more than their contents and function. If the entire magnificent collection of the British Museum were to be housed in a distribution warehouse somewhere, we would feel short-changed. Even if there was a nice cafe there, and lots of parking. This was proved the hard way when, back in the 1990s, the Royal Armouries collection moved to a new building in Leeds. It wasn't a bad new building, but it wasn't the Tower of London, where most of the collection had been before. Collapsing visitor numbers, financial embarrassment and a government bail-out ensued.

In the jargon of the tourism business, the "experience" is what counts. Ever stopped to look at your fellow art-lovers in Tate Modern, for instance? Lots of them (not you, obviously) charge around the place in packs. They don't stop to look at anything much. Dwell time per room is minimal. That's where the huge Turbine Hall, with its installations, comes into its own. You can get many roaming packs of cultural tourists in there. So the container — this once overlooked, cathedral-like post-war power station by Giles Gilbert Scott — is more than up to the task of providing the experience. This is why they need to build an extension. It has more than twice the number of visitors it was designed for. It's just been too damn popular.

When the Swiss architects Jacques Herzog and Pierre de Meuron first came up with an idea for an extension, it was a bit over the top: a stack of glass boxes. That was silly, so version two is in brick, like the power station itself. Clever, latticework brick, but brick nonetheless. The key thing, however, is what the building, with its high-level viewing platform, will do for south London. Tate Modern faces north

across the Thames: the symbolism of the fact that its £215m extension will face south is huge. Visitors to London in 2012 will see it, although, tantalisingly, it won't be open by then.

As Bilbao proved, you don't have to be a capital city to draw the crowds. So I'm intrigued by the highly anticipated £72m Museum of Liverpool, the opening of which has now slipped a year to 2011. A sort of stone and glass bow tie by the Danish architects 3XN, it is right next to the famous "Three Graces" Edwardian Pierhead buildings. The museum looks a bit weird from some angles, but is graceful indeed next to some of the other tat now being built close by (in what, incidentally, is still a Unesco-designated World Heritage Site). Liverpool has revived strongly in recent years, but continues to score some thumping architectural misses.

Let's put in a word for the smaller provincial centres: the new £25.5m Marlowe Theatre, in Canterbury, for instance, by the architect Keith Williams, looks promising. Although modern in appearance, with a flytower angled towards the cathedral, it returns to the idea of the tightly stacked, intimate Victorian auditorium; it opens in September 2011. Two good regional art galleries by one of our best architects, David Chipperfield, will also open in 2011 — the Hepworth, in Wakefield, and the Turner Contemporary, in Margate.

It's the big cultural beasts that will get the footfall, however. Such as the City of Birmingham's new filigree-clad £193m main library, by the Dutch architects Mecanoo. It will be built on Centenary Square and should be open for business in 2013. Not so long ago, public libraries seemed to be an endangered species. Not any more. True, they have become noisier places of public resort, and less of a retreat from the world, but the fact that Birmingham is prepared to build a new civic building of that size and quality (we hope) augurs well. The downside? Birmingham happens to have a rather good central library already, a 1970s brutalist affair by John Madin, which some are fighting to keep. Its doom is assured by the fact that it is standing in the way of a £600m commercial redevelopment, which one desperately hopes will be good. The developers are better than most, so it's not impossible.

Just as 2009 saw Greece finally complete its excellent Acropolis Museum, by Bernard Tschumi — thereby throwing down the gauntlet to all those other nations, such as Britain, that used to claim there was nowhere suitable in Athens to house the treasures of antiquity — so a similar exercise is taking place in Egypt. The $600m Grand Egyptian Museum, near the pyramids in Giza, will have no trouble at all drawing the crowds: first, because of where it is; and second, because of its extraordinary design, conceived as an inscription on the desert landscape and clad in a geometric-patterned veil of translucent stone. The Dublin-based Heneghan Peng Architects won the competition in 2002, but construction began only this year. It, too, is meant to open in 2013, but you wouldn't bet against it running on a bit.

With so many cultural building projects happening, you wouldn't think there was a global recession at all. The world's tallest tower, the Burj Dubai, which opens tomorrow, is a beautiful monument to another approach entirely — the one that says it's enough to build anything extreme, and people will come. No: architecture is important, but it doesn't half help to have a culture to back it up. So it will be interesting to see if neighbouring Abu Dhabi's very different approach — to build loads of new museums and galleries by top names, then borrow artefacts from the likes of the Louvre and the Guggenheim to put in them — will work. To put all this in context, Abu Dhabi is spending $27 billion on its cultural district, on Saadiyat island. It will be complete by 2018. Can you really buy yourself a fully formed cultural civilisation so quickly? Well, yes. The great museums of the 19th century all arrived in double-quick time, and ransacked the world for their contents. What's changed, exactly?

http://entertainment.timesonline.co.uk/tol/arts_and_entertainment/visual_arts/architecture_and_design/article6971611.ece

Do we take art a little too seriously?

Marcus Westbury
February 1, 2010

PERHAPS it's because my brain is still on holidays and I'm more inclined to laze around, wander up the street, and generally while away my days unproductively than to take art, culture and its consequences - or anything else for that matter - too seriously.Art is often discussed in reverent tones , we invest in it, create daunting palaces for it. In the scale of reverence, it sits ever so slightly below death and religion. A quick look at my email in-box and you could be forgiven for thinking that art galleries are the new cathedrals, that every artist has an epic backstory, and every show needs to be hyped-up like an Oscar nominee.

But is art itself really all that serious? I hope not - or at least not always.For a start, I'm not sure that all that seriousness actually helps much. The idea that seriousness is somehow a measure of value and that art needs to be treated seriously all the time is a weird one. Much of the time, people value things that make them laugh, cry, scream, think or inspired - much more than they value the worthy and the serious.

Of course art can be very serious. Certainly the content of art, or the issues that underlie it, or the trail of history and life experience that led to it can be very serious indeed. But art itself and the rituals by which we view, trade and discuss it can be downright daft. Perhaps a good rule of thumb is that art itself should be treated as no more or less serious than the emotions or experiences that it evolves from, communicates and represents.For those of us who spend a lot of time with artists, it is a relief to realise that most of them aren't always relentlessly serious. A lot of my favourite artists are very funny people. They invest their work with their sense of humour. All to often it can easily be ruined by the sense of humourless analysis and long-winded explanation. The barrier of superficial seriousness we cloak art in only serves to alienate a lot of artists from their potential audiences.

Ever noticed the hush in an art gallery? Why? Do we mistake art galleries for libraries? You need to be silent in a library so that other people can concentrate on long, wordy passages - if the descriptions are that long and dense in galleries the silence is probably not going to help.There's a place for quiet contemplation in art but it is one of many places. I'd like to think that there's equally a place for loud conversation, robust debate, and animated piss-taking. Any of these could be at least as effective as monk-like concentration when it comes to engaging with and understanding what's up on the walls.

Much the same could be said for the performing arts. Shakespeare's plays benefited a lot from the robust environment in which they were originally presented. The immediate feedback from a loud, loutish and opinionated audience is far more effective in correcting the inevitable weak points in a work than polite silence followed by the occasional scathing review. I'm sure there's data somewhere that will show that the decline in theatre as a major cultural force directly corresponds with the improving behaviour of its audiences.Perhaps galleries and theatres large and small could start marketing days when the general public (and not just the select few who are invited to get drunk and animated on opening nights) could feel encouraged to offer up more genuine responses to the work? How about the occasional tumultuous Tuesday or a wild Wednesday down at the NGV?

Or perhaps mad matinees down at the arts centre? What's the harm as long as no one breaks anything?Far from alienating artists and their audiences, we may find that it actually starts to connect them. Wouldn't it be great if everyone felt comfortable and confident enough in Australia's art and artists to laugh and take the piss.

http://www.theage.com.au/news/entertainment/arts/do-we-take-art-a-little-too-seriously/2010/01/31/1264875969788.html

Straw Homes That Would Have Foiled the Wolf

By: Arnie Cooper | January 28, 2010 | 05:00 AM (PDT) |

Demonstration farm in rural California draws attention with its crop of unique building experiments.

In the United States, the embodiment of permaculture can be found at a 450-acre parcel — the Quail Springs Permaculture Farm — tucked into a piñon- and juniper-covered canyon in Southern California's Cuyama Valley, 32 miles "as the raven flies" from the Pacific Ocean and about 60 miles northwest of Los Angeles.

Here at the base of two "sister mountains" on a windswept desert-like terrain sacred to the area's native Chumash Indians live 14 permanent residents, mostly teachers and "land stewards," along with a handful of interns. All work to restore a landscape laid waste by a century of clear-cutting and grazing, while also hosting seminars and workshops on topics ranging from safe water and green building to creating a carbon economy.

It's applied permaculture, a design science focused on integrating sustainable shelter, energy, food and water for human settlement.

The idea took shape back in the mid-'70s when Bill Mollison, a University of Tasmania lecturer in environmental psychology, and student David Holmgren began collaborating on how to combat the ills of modern industrial agriculture. Their solution was "permaculture" — for "permanent agriculture" — which they outlined in a 1978 book, *Permaculture One: A Perennial Agriculture for Human Settlements*. Originally focused on farming methods, permaculture has since evolved to embrace all aspects of human survival.

At Quail Springs, days are spent perfecting gray-water systems, creating food forests and building bio-swales to keep the limited rainwater from eroding the topsoil. But what's really capturing attention are the buildings constructed with natural products like straw bale, adobe and bamboo.

But don't expect to see this eco-village-in-the-making take final form in your lifetime — or your children's or your grandchildren's — and certainly not in the lifetime of the farm's founders, husband-and-wife team Warren Brush and Cynthia Harvan.

Brush says the undertaking will take 200 years.

"The elders in my life have always shared the idea that a village can't be started in one generation," he explained. The 44-year-old Santa Cruz native says seven generations are needed to bring the necessary cohesiveness between the people and the land.

"That kind of long-term thinking and relationship with place changes how you do everything. And that's a lot of the impetus for what's driving us to use natural as opposed to conventional building processes."

No wonder Quail Springs emphasizes exploring methods and materials that not only preserve natural resources but that can last centuries. Indeed, Brush can be heard frequently citing one rather disarming statistic from the American Contractor's Association Web site: "The average home built conventionally today will only last 40 years before needing to be rebuilt."

This won't work if you have a 200-year plan.

The beginning

Quail Springs' story begins in 1997 when the couple established the Wilderness Youth Project at a Santa Barbara shelter for homeless families. The idea was to help young people experience the personal and practical benefits of exploring the natural world, using a ranch owned by one of the donors. The site (adjacent to Quail Springs) was perfect for helping kids practice animal tracking, food foraging and other survival — or as Brush terms it, "origin" — skills.

After several years, Brush — a pre-med student at the University of California, Santa Barbara, who ended up majoring in botany — noticed that participants were asking for more. "They wanted to know how to apply the ethic of earth and people care to a modern context in the middle of Santa Barbara or L.A. That really unlocked something with my wife, Cindy, and me. We both had this overwhelming feeling that there needed to be this next step."

In May 2004, with the help of the locally based Zannon Family Foundation, Brush in purchased 160 neighboring acres and began his nonprofit grand oeuvre.

To help fulfill its need for healthy, eco-friendly housing and "foster" as Brush says, "independent, entrepreneurial ways of approaching how we keep ourselves alive," they brought in Justin Kirmse and his partner Lyn Giesecke in 2008 to found the Living Craft Project. For Kirmse and Giesecke, the goal was clear-cut: to teach the art of natural building and authentic living. This meant pursuing "the simplest path between the land, our hands, our relationships and what physically sustains us – shelter, water, fire and food."

That also requires a commitment to move away from toxics. Brush cites Paula Baker-LaPorte, a Quail Springs consultant (she and her husband have been promoting "EcoNests" made of clay, straw and wood since 1994) and author of *Prescription for a Healthy House*, who says the typical home uses a minimum of 10,000 toxic chemicals when all the paints, glues, carpets, caulking, etc., are factored in.

And though the endeavor may sound dreamily utopian, the project is as pragmatic as it gets, offering hands-on instruction to transform anyone interested into the ultimate do-it-yourselfer. Last summer the Living Craft Project launched its first apprenticeship project with six apprentices in their late teens to mid-30s from the United States and Belgium. After getting certified following a 72-hour permaculture design course, Kirmse and Giesecke worked with the team to construct a 350-square-foot straw bale

structure (with 100-square-foot light clay-straw attached bedroom) for a young family that stewards the land at Quail Springs.

Meeting the Building Code

Known for its low-cost, easy availability and high insulation value, straw-bale construction got its start in the United States in the early 1900s following the invention of steam-powered bailers in Nebraska. And though it flourished until construction became industrialized in the 1950s, it enjoyed a resurgence in the 1970s.

Unfortunately, straw-bale construction is illegal in several states, including California. At Quail Springs, local officials have postured over unmet building codes, especially those dealing with earthquake safety.

Jim MacDonald, director of the Ventura County Building and Safety Division, said that one of the problems is that building codes are just now starting to catch up with green building techniques. "I'm all for alternative building materials, but I have to be satisfied that it complies with state law. Unfortunately, this presents some difficult rigors to applicants."

It doesn't help that Quail Springs is located just 11 miles from the San Andreas Fault, the seismic spine of the Golden State.

Brush, though, says engineering tests at the University of Nevada's Large-Scale Structures Laboratory found that load-bearing straw bale — the same type built at Quail Springs — demonstrated the highest earthquake resistance of any buildings they'd ever seen, and want to see the construction fostered in the more rattling parts of the globe like Pakistan.

So not only isn't Brush concerned about the Big One — he's looking forward to it.

"We said codes or no codes, we're gonna build this because we're near the fault line, and we'd love to see it go through an earthquake and be able to have that data for other people to learn from."

His go-to-it attitude isn't uncommon among alternative-home gurus; witness the legal travails of Earthship inventor Michael Reynolds.

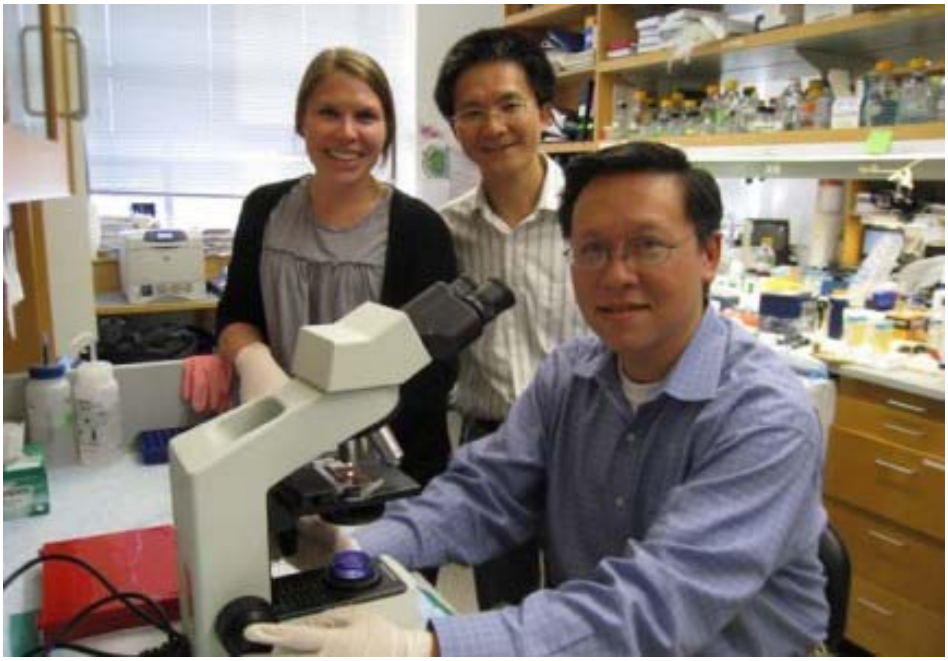
Not that Brush wants to continue going rogue. With the backing of David Eisenberg (chair of the codes committee for the U.S. Green Building Council) Brush is working with local politicians to put pressure on the state to adopt legislation exempting Quail Springs and other research organizations from building-code requirements. Several local universities, including California Polytechnic University and the University of California, have partnered with Quail Springs to test out buildings and sustainable systems that would otherwise be illegal.

"We really want to work with the building department in sharing the data that we're gathering. I'd love to be able to sit down with Jim MacDonald minus the barriers he has of trying to enforce a code that is no longer relevant to our times ecologically," Brush said.

http://www.miller-mccune.com/science-environment/straw-homes-that-would-have-foiled-the-wolf-6938/?utm_source=Newsletter94&utm_medium=email&utm_content=0203&utm_campaign=newsletters

Turning Off Huntington's Disease

By: Joan Trossman Bien | January 31, 2010 | 05:00 AM (PDT) |



Amending the unmutated part of the mutated protein that causes a neurodegenerative disease may lead to a cure.

The diagnosis of Huntington's disease — usually in middle age as most patients learn they might carry the genetic mutation when one of their parents gets sick — dictates an unalterable course that ends in death within a decade or two.

First identified in 1842 and accurately described by George Huntington 30 years later, Huntington's affects one out of 10,000 Americans, primarily those of Western European descent. Although its genetic characteristics and symptoms — starting with jerky movement and continuing into dementia — are well documented, researchers have been baffled by the precise way in which the genetic mutation sets the progression of the disease in motion.

Although the precise gene that produces the mutated protein that leads to Huntington's was identified in 1993, researchers have not been able to develop any meaningful treatment toward a cure or even for the symptoms of the disease. That the mutant protein behind the disease can be found all over the human body makes the effort even harder.

However, scientists at the University of California, Los Angeles, have pinpointed the molecular mechanism responsible for switching on the gene's ability to unleash the disease — in mice. This discovery also revealed a method that prevents the gene from completing its dastardly mission. The team's work was published late last month in the journal *Neuron*.

Dr. X. William Yang of the Semel Institute of Neuroscience and Human Behavior at UCLA was the lead author of the study. Yang said their approach was based on prior studies by other researchers and focused on how cells use a chemical process called phosphorylation — adding a phosphate molecule to the protein — to control how proteins function.

But rather than working on the portion of the protein that was mutated, phosphorylation, in this case, modified a part of the protein that wasn't (although it was next to the long string of amino acids that formed the mutation).

"We are actually the first lab to test [the] hypothesis," Yang said.

Working with two sets of mice carrying the human form of the genetic mutation, the team mimicked phosphorylation on one set, and prevented it on the other. In the former, the experiment deactivated the protein's ill effect — preventing the lab mice from developing symptoms of Huntington's.

"This [finding] can stimulate new research in this area," Yang said. In fact, co-authors of the *Neuron* paper from the University of Pittsburgh and from University of California, Irvine, have studied other aspects of phosphorylation on the mutant protein, preventing it from clumping and helping the body dispose of it instead of letting it build up in neurons.

Yang said the future now holds the promise of discovering a cure. He said Huntington's disease is one of the most common neurodegenerative disorders and is purely genetic, "but we are hoping that the lessons we learn from studying Huntington's disease could be applicable for studying other neurodegenerative disorders that are not purely genetic, like ALS or even Parkinson's."

A test was developed to identify who may be carrying that mutated gene even before any symptoms occur. But the issue of whether the children of a parent with Huntington's should actually take the genetic test has been controversial, mostly because of the absence of effective treatment. Each child of such a parent has a 50/50 chance of carrying the gene.

The UCLA study was funded by the Hereditary Disease Foundation and National Institute of Neurological Disorders and Stroke.

http://www.miller-mccune.com/science-environment/turning-off-huntingtons-disease-8284/

Information: The New Weight-Loss Drug

By: Elisabeth Best | February 2, 2010 | 13:03 PM (PDT)

Research shows that nutritional information about fast food inspires parents to make healthier choices for their kids.

McDonald's Cheeseburger: 300 calories. Small Fries: 230 Calories. One percent Low Fat Chocolate Milk Jug: 170 Calories. Watching your child gain 10 pounds in one year? Priceless.

It's no secret that childhood obesity in America is on the rise. Nor is it surprising that this rise has been paralleled by a growth in the nation's fast-food consumption. But a new study led by Pooja S. Tandon from Seattle Children's Research Institute suggests a new item for Happy Meals: information. She found that parents provided with calorie information on a fast-food menu chose meals for their children with an average of 102 fewer calories than parents without the facts.

The findings, published online in *Pediatrics* on Jan. 25, indicate that nutritionally informed parents may make healthier choices for their kids.

The researchers surveyed 99 parents of 3- to 6-year-olds who sometimes eat in fast-food restaurants about their fast-food dining habits. They presented the parents with sample McDonald's menus featuring product pictures and prices, and asked them to choose a "typical meal" for themselves and their children. The menus included most McDonald's fare, including a variety of sandwiches, sides, drinks and desserts. Half the parents received menus with clearly visible calorie information, and half did not.

The parents who were given the calorie information chose 20 percent fewer calories for their children — 102 on average — than parents without the information on their menus. Tandon suggests that even small calorie adjustments on a regular basis can prevent weight gain, and an extra 100 calories a day could add up to 10 pounds in a year.

"Interestingly, by simply providing parents the caloric information, they chose lower calorie items. This is encouraging, and suggests that parents do want to make wise food choices for their children, but they need help," Tandon was quoted in a release.

Nutritional information didn't, however, lead parents to make smarter food choices for themselves. There wasn't any difference in the calorie counts of the meals parents picked for themselves between the two groups.

This reinforces earlier research suggesting that healthy choices on a menu might actually cause some people to choose less-healthy foods. It seems that putting a salad on the menu erodes some people's ability to choose, for example, a not-so-bad-for-you baked potato over saturated-fat-laden fries.

But even if calorie counts help parents make better choices for their children, a study published earlier this month shows that the counts themselves may be off by as much as 200 percent. On average, Tufts University researchers found that restaurant menu calorie counts were 18 percent lower than the actual calorie content of the food.

So while nutritional menu labeling may help parents select better meals for their children, it's important to keep in mind that the numbers might not be exact (or even close).

http://www.miller-mccune.com/health/information-the-new-weight-loss-drug-8261/

Attacking Breast Cancer in its Heel

By: Elisabeth Best | January 25, 2010 | 04:55 AM (PDT) |

Research suggests a possible specific target for drugs fighting the most common type of breast cancer.

Today in Mice fans already know that rodents are no stranger to cancer research. Whether it's the discovery of the unique cancer-fighting gene of the naked mole rat or the creation of a mouse model of melanoma, we see progress as, well, progress.A study in the Jan. 19 issue of *Cancer Cell* reports on researchers who believe they have identified where the most common form of breast cancer originates, which may offer a hope for better targeting drugs at the disease's Achilles' heel.

Specifically, researchers from Tufts University School of Medicine, the Sackler School of Graduate Biomedical Sciences at Tufts and the Tufts Medical Center have figured out exactly which breast cells drive the development of certain breast cancer tumors. The team, led by Charlotte Kuperwasser and Philip Hinds, also identified the protein that allows these cells to differentiate, which can ultimately lead to the runaway growth that is cancer.Scientists have found it difficult to distinguish between the cells that make up the entire mammary tissue and those where cancer begins, and have even debated whether there was anything to distinguish. The Tufts team discovered that luminal-like breast cancers (the two most common types, and which are sensitive to hormones) originate from self-renewing cells known as lobule progenitors. When working properly, these cells create milk-producing structures in the breast tissue during pregnancy and lactation.

After identifying the cells, the researchers inhibited a protein in them, called cyclin D1, which allows them to self-renew and differentiate. Genetically altering lab mice, they made sure the gene known to cause luminal-like breast cancer was present but they also inactivated the cyclin D1. The team found that with the protein knocked out, mice didn't develop breast tumors.According to the researchers, the next step is to see if shutting off cyclin D1 can slow or reverse the growth of already-developing tumors. If it does, they say, breast cancer-fighting drugs might have a new target.

http://www.miller-mccune.com/health/attacking-breast-cancer-in-its-heel-7426/

Sneezing is a Game Changer

By: Tom Jacobs | January 22, 2010 | 14:55 PM (PDT) |

How to change minds about the need for health care reform? Get out your handkerchief.

How afraid are you of suffering a heart attack? Or dying in an automobile accident? And how big of an overhaul does the American health care system really need?

Your answer to those questions may depend upon whether someone near you has recently sneezed.

A paper just published in the journal *Psychological Science* suggests minor, everyday events can have a major impact on our perception of risk — even influencing our attitude toward federal spending. Two studies conducted when swine flu fears were at their height found exposure to a sneeze was enough to shift people's views on a variety of health-related issues, including those only tangentially connected to communicable disease.

The studies, designed and carried out by a University of Michigan research team led by psychologists Spike W.S. Lee and Norbert Schwarz, were both conducted in May 2009, while the threat of a swine flu pandemic was receiving major media attention. In the first, 50 University of Michigan students completed a one-page questionnaire, in which they estimated the odds of an "average American" experiencing certain health risks. They also evaluated the U.S. health care system on a 1-to-7 scale, from "we need to completely rebuild it" to "only minor changes are necessary."

Half of those taking the survey had just walked by a peer who was sneezing and coughing. The others did not.

"Those who had just passed a sneezing confederate perceived the average American as more likely to contract a serious disease, to have a heart attack before age 50, and to die from a crime or accident," the researchers report. They also "reported a more negative view of the health care system."

In the second study, 47 pedestrians in Ann Arbor, Michigan took a survey asking whether they supported a proposed $1.3 billion federal investment in vaccine development. Was this a good idea, or should the money be used to create green jobs?

After a passerby agreed to participate, the survey taker either did or did not feign a slight illness. With every second person, she "coughed and sneezed once while covering her mouth with her left forearm before handing the questionnaire to participants" with her right hand.

Perhaps unsurprisingly, people taking the survey under those conditions "were more likely than those in the control condition to favor federal spending on the production of flu vaccines," the paper states.

The effects of sneezing were of "a moderate to large magnitude," the scholars report, and the participants were entirely unconscious of their impact: "Debriefing suggested that people have no insight into these processes; they assume that exposure to a sneeze may influence their perception of flu risk, but not their perception of unrelated risks."

This could be useful information to lawmakers who fear further confrontations with constituents over health care reform. If appeals to logic, reason and empathy don't work at your next town hall meeting, simply start sneezing. You may change some minds.

http://www.miller-mccune.com/health/sneezing-is-a-game-changer-7421/

Earth to Stand on — Conservation Easements

By: Judith Stock | January 18, 2010 | 05:00 AM (PDT) |

This legal device shows that profit and protection of natural resources can go hand in hand.

In an area where much of the surrounding property is being converted to urban use, Sally Brown's parcel of land will forever be farm and forest no matter who owns it in the future.

With a conservation easement in place, Brown can sleep in peace with the knowledge that her role as steward of the land passed down by her grandparents will be protected for future generations.

"Our DNA is literally in this soil with five generations of my family," says Brown, art illustrator, in O'Fallon, Ill., a small town 30 miles east of St. Louis. "We were raised to have a relationship with this piece of land and to see ourselves as stewards. We can no more own the land than own the breezes that blow across it."

Her story provides a window into the workings of an increasingly popular method of preserving natural open space in the United States: "conservation easements." This legal device makes good use of the dictum that says you have to give something to get something — in return for losing potential profit by preserving natural features, the landowner gets a tax break.

These easements are usually between a private landowner and a public or government agency that restricts the amount and type of development and protects the property's natural resources in perpetuity.

It's not a new concept. Thomas Tyner, regional counsel for the Northwest and Rocky Mountain region of the Trust for Public Land in Seattle, says the first conservation easement occurred in New England around the mid- to late 1800s.

But in the 1960s and '70s, interest in conservation easements grew due to increased concern with saving our natural resources, the growth in land trust organizations and tax incentives.

According Sylvia Bates, director of standards and research for the Land Trust Alliance in Canterbury, N.H., an increasing number of acres are being conserved by nonprofit land trusts (and by public agencies and state, local and national organizations) across the U.S. Between 2000 and 2005, the number of land trusts has increased 32 percent to 1,667, with the West the fastest-growing area for both acres conserved and new land trusts.

In the last five years, total acreage conserved by local, state and national land trusts doubled to 37 million acres – 16.5 times the size of Yellowstone National Park. The Conservation Biology Institute in Corvallis, Ore., hosts a national conservation easement database, and some regional efforts — like the Colorado Ownership Management and Protection Map create broader maps of all forms of land protection.

Not every property qualifies to have an easement. Land trusts look for property that holds a specific conservation benefit to society, such as a wildlife habitat, water resources, or even a scenic view or trail through the woods.

Some easements allow limited public access to the land under their control. For example, a wooded area could have a public hiking trail through it, or a farm might allow visitors to watch cows being milked or cheese being made.

In Brown's case, the natural resources being protected include the North American flyway for bird migration, upland hardwood forests, animal habitat, riparian area to the small tributaries in the Engle Creek system including wetlands for frog, reptile and amphibian habitat plus a large man-made pond that provides an essential water supply to the native wildlife.

Nuts and Bolts

After doing her homework, Brown contacted Southwestern Illinois Resource Conservation & Development, which works to preserve natural resources — like open space — and create sustainable communities in seven counties. Brown consequently placed 188 acres of the Brown family's original 380 acres into a conservation easement.

"Sally Brown was the impetus for us doing conservation easements today," says Stephen Black, land conservancy coordinator for Southwestern Illinois RC&D, Inc., in Mascoutah, Ill. "Our responsibility is that we monitor the easement forever. Each year we visit the property to make sure the restrictions Brown put in the original easement remain in place."

If there is a violation to the easement, Black's organization will take legal action to make certain the provisions are carried out. As Black puts it, "Problems don't usually happen until you have subsequent owners as the original owners are committed to the deed of trust."

His group charges a minimum of $5,000 to set an endowment fund to pay for annual monitoring plus any legal fees incurred.

The formula for a stewardship endowment is the higher the value, the higher the contribution to the fund. Landowners need to be sure they have their own legal and financial advice before they enter into any conservation easement.

Given the set-up fees that include a stewardship endowment fund, legal costs to review the easement, an appraisal, a land survey and a title search, most people won't spend money on a small piece of land since the bigger tax break goes to larger easement owners.

If your property is worth, say $1 million in today's market, once the easement is on the property, your property value has decreased. "What you've done with the easement in place is effectively given away $500,000," says Tyner.

"Any deduction that you claim as a landowner has to be verified and confirmed by an independent real estate appraiser. The conservation easement has to be granted to a 501(c) 3 nonprofit conservation group." With all the criteria met, then the value of the conservation easement is a charitable deduction.

Traditionally, only the federal government offered easement tax credits, but 16 states now offer some sort of tax benefit.

"Most people don't put land in an easement because of tax incentives anyway," Black says. "There's a desire to protect their property forever."

A conservation easement isn't an all-or-nothing arrangement. A parcel of land can be held out. Use of the property continues, but activities such as mining, logging and residential development are banned from the area in the easement.

And not all land conservation programs are forever. In California, a law known as the Williamson Act lets local governments work with agricultural landowners to restrict their property to agricultural use — usually for a rolling period of 10 years — in return for a break on their property taxes. The state reimburses the local governments some of their tax money they lose, but the state of California's huge budget shortfalls this year so reduced those repayments, it effectively suspended the 35-year-old program.

With the Williamson Act, the conservation period is designed to expire. That's not the case with most easements, but Tyner cautions, "There is a small potential to break the easement depending on what happens to the property over time. If the purpose of the easement changes, there's no longer any reason for the easement."

Perhaps the property contains a bird rookery but that species becomes extinct, and all the trees are destroyed. Then, there is no reason for the easement.

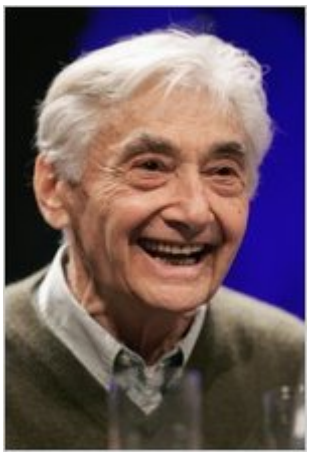
"Conservation easements have been very successful in protecting private land," says Dave Theobald, associate professor in the College of Natural Resources at Colorado State University at Fort Collins. "And, they will be fairly successful in the future although the economy has decreased the amount of money available. But the public wants this type of legal arrangements to have more accountability and more transparency. Just what value is a conservation easement protecting?"

And, Theobald says, they are not the only tools in the arsenal to save the natural land. "We need to be working in concert with other groups, organizations and thinking up new methods."

http://www.miller-mccune.com/legal-affairs/earth-to-stand-on-conservation-easements-6358/

We the People: Considering Howard Zinn's Approach to History

By DINAH MACK AND HOLLY EPSTEIN OJALVO



U.S. History

Overview | What was Howard Zinn's approach to history, and what values are inherent in it? What issues does his work raise about the purpose and significance of studying history? What are the benefits and drawbacks of his method? In this lesson, students examine Zinn's work by comparing his writing to a typical American history textbook. They then write a reflection and/or select a document from American history to perform.

Materials | Student journals, projection equipment or handouts, copies of relevant portions of "A People's History of the United States" and a history textbook

Warm-up | Provide the following two questions for students to respond to in their journals: In writing history, what do you think should be a historian's goal(s)? Why do you think people should study history?

When students are finished writing, invite them to share their ideas and record them on the board.

Next, hand out, project and/or read aloud the following quotation from Howard Zinn's "A People's History of the United States":

I don't want to invent victories for people's movements. But to think that history-writing must aim simply to recapitulate the failures that dominate the past is to make historians collaborators in an endless cycle of defeat. If history is to be creative, to anticipate a possible future without denying the past, it should, I believe, emphasize new possibilities by disclosing those hidden episodes of the past, when, even if in brief flashes, people showed their ability to resist, to join together, occasionally to win. I am supposing, or perhaps only hoping, that our future may be found in the past's fugitive moments of compassion rather than in its solid centuries of warfare. That, being as blunt as I can, is my approach to the history of the United States. The reader may as well know the before going on.

Ask: How would you paraphrase this historian's approach to U.S. history? What does he seem to value and why? What does he seem to think the purpose and function of history is? How does this approach seem similar to and different from how you have studied history in school? What are the connections between what you wrote earlier in your journals and these ideas?

Tell students the source of the quotation and that they will take a closer look at the work and philosophy of this historian, Howard Zinn, and the controversy over his approach.

Related | In the obituary "Howard Zinn, Historian, Is Dead at 87," Michael Powell notes that Zinn's book "A People's History of the United States was a "best-seller that inspired a generation of high school and college students to rethink American history":

Almost an oddity at first, with a printing of just 4,000 in 1980, "A People's History of the United States" has sold nearly two million copies. To describe it as a revisionist account is to risk understatement. A conventional historical account held no allure; he concentrated on what he saw as the genocidal depredations of Christopher Columbus, the blood lust of Theodore Roosevelt and the racial failings of Abraham Lincoln. He also shined an insistent light on the revolutionary struggles of impoverished farmers, feminists, laborers and resisters of slavery and war.

Such stories are more often recounted in textbooks today; they were not at the time.

Questions | For discussion and reading comprehension:

1. What does it mean that Howard Zinn "delighted … in lancing what he considered platitudes, not the least that American history was a heroic march toward democracy"?
2. Why did the book meet with some skepticism and opposition? How did Zinn respond to critics?
3. How has Zinn and his work penetrated popular culture? Why do you think that is?
4. How do you think Zinn's life might have contributed to his world view and historical approach and vice-versa? Why?
5. What "personal philosophy" do you think is expressed in the title of Zinn's memoir, "You Can't Be Neutral on a Moving Train"?
6. How do you think the way you study history is different from how it was taught to your parents and grandparents?

RELATED RESOURCES

From The Learning Network

- Lesson: I Cannot Tell a Lie
- Lesson: 'Whitewashing' History
- Lesson: From Concrete to Memory: Scrapbooking the Berlin Wall

From NYTimes.com

- Times Topics: Howard Zinn
- Times Topics: History
- Op-Ed Column: "A Radical Treasure"

Around the Web

- History Matters
- America's Social History Project
- Howard Zinn.org

Activity | Explain that students will now examine Howard Zinn's approach to history-writing by comparing a subject in a typical American history textbook to Zinn's portrayal of the same event in his book "A People's History of the United States."

You could use any topic for this lesson, depending on your current curriculum, by simply looking through the index of "A People's History of the United States." The example here is about Shays' Rebellion.

To begin, hand out the following textbook account of Shays' Rebellion, from the middle school-level U.S. history textbook "The American Nation," by James West Davidson and John E. Batchelor, Prentice Hall, 1986, and read it out loud with the class:

While Congress dealt successfully with the Northwest Territory, it failed to solve other problems. Among the most serious were the problems of farmers.

During the Revolution, the demand for farm products was high. Farmers borrowed money for land, seed, animals and tools. But after the war, the nation suffered an economic depression. An economic depression is a period when business activity slows, prices and wages fall, and unemployment rises. When prices for farm goods fell, farmers could not repay their loans.

Farmers in western Massachusetts were hard hit by falling farm prices. To make matters worse, Massachusetts raised taxes. The courts threatened to seize the farms of people who did not pay their loans and taxes.

Captain Daniel Shays was a Massachusetts farmer who had fought in the Revolution. In 1786, Shays gathered a force of about 1,000 angry farmers. They attacked courthouses and tried to take a warehouse full of rifles and gunpowder. Massachusetts quickly raised an army and ended the rebellion.

Shays' Rebellion worried many Americans. It was a sign that the Articles of Confederation were not working. Leaders of several states called for a convention to discuss ways of reforming the Articles. They decided to meet in Philadelphia in May 1787. When they met, however, they took more drastic action.

After they read this account, ask students to read the same subject from a history Web site, such as this one or this one.

After reading these two sources, students work individually or in pairs to write a short summary of what happened during Shays' Rebellion. Invite a few students or pairs to share their summary with the class.

Next, hand out Zinn's account of Shays' Rebellion, from "A People's History of the United States," and read it out loud with the class. (It is available online here, but this version may contain some typos, as the site's disclaimer notes; you may wish to use a print copy of the book with your class.)

After the class finishes reading both accounts, ask pairs to compare and contrast Zinn's account with the textbook versions. Questions for consideration include these:

- What are similarities and differences between the passages? What do you make of these differences?
- What characters does Zinn introduce that the textbook and summaries do not mention?
- What significant perspectives or information may have been left out of each passage? Do you feel that either of the passages offered a more adequate retelling of this event? If so, which one?
- Explain how reading historical accounts influences your understanding. What did you take away from the textbook passage? What did you take away from Zinn's account? When would a simple textbook passage be most helpful? When would it be more useful to read an account like those in "A People's History"?
- In what ways does Zinn's account of Shays' Rebellion relate to the quotation about his approach to writing history that we read at the beginning of class?
- Why do you think an account like Zinn's could make some historians and readers dismiss him?
- Why do you think that the way Zinn approaches history led to some historians to dismiss him and brand him a "radical"?

To take this further, you might share one or both of the following:

- A transcript of an interview with Howard Zinn from WBUR in which he connects the story of Shays' rebellion to present-day America: "We could learn from that history, because people are being foreclosed, they're losing their homes. Instead of waiting for the president and Congress to act, who are very slow to act and who are not going to really represent the interests of these poor people or even middle class people who are evicted from homes. People should be organizing, doing what citizens have done, doing what democracy requires to prevent these evictions from taking place." Invite students to consider that comparison further for similarities and differences in circumstance, context and so on.
- Bob Herbert's Op-Ed column "A Radical Treasure," in which he questions why Zinn was often characterized as a radical, and why he considered himself one. Discuss with students what the term "radical" means and how and why it might, and might not, apply to Zinn. They might also read some more of Herbert's columns to compare and contrast Herbert's and Zinn's work and approach to documenting the people and events of the United States. Can you find any evidence in Herbert's columns of Zinn's philosophy? Would you call Herbert a radical? Why or why not?

Going further | Students revisit their warm-up writing and discussion by re-exploring the question of how history should be "told" in a written piece that explores some of the following questions: What power and responsibility does a historian have in telling a story? Is there a way to write history completely objectively? Or, do historians always add some form of personal bias? How does a concentration on "the people" make Zinn's version of history different than an emphasis on, say, politics, economics or foreign relations? Do you think a voice like Zinn's is an essential part of the historical record? Is it important, in your opinion, that historians use primary sources in their exploration of history? Why or why not? How do you most like to learn about history? Why?

Alternatively or additionally, students watch some of "The People Speak" and read the corresponding texts. They then create their own video or performance piece on the document of their choice from American history. Hold a classroom "People Speak" contest, in which students enter video, animated projects, raps, theater pieces, etc. Perform and share the pieces at a community event or for other classrooms in the school. They then reflect on how this experience brought the texts "to life" for them in a new way.

http://learning.blogs.nytimes.com/2010/02/02/we-the-people-considering-howard-zinns-approach-to-history/?nl=learning&emc=a1

The strangest liquid: Why water is so weird

- 03 February 2010 by **Edwin Cartlidge**
- Magazine issue 2746. **Subscribe** and get 4 free issues.

Quite an oddity (Image: Shinichi Maruyama

We are confronted by many mysteries, from the nature of dark matter and the origin of the universe to the quest for a theory of everything. These are all puzzles on the grand scale, but you can observe another enduring mystery of the physical world - equally perplexing, if not quite so grand - from the comfort of your kitchen. Simply fill a tall glass with chilled water, throw in an ice cube and leave it to stand.

The fact that the ice cube floats is the first oddity. And the mystery deepens if you take a thermometer and measure the temperature of the water at various depths. At the top, near the ice cube, you'll find it to be around 0 °C, but at the bottom it should be about 4 °C. That's because water is denser at 4°C than it is at any other temperature - another strange trait that sets it apart from other liquids.

Water's odd properties don't stop there (see "Water's mysteries"), and some are vital to life. Because ice is less dense than water, and water is less dense at its freezing point than when it is slightly warmer, it freezes from the top down rather than the bottom up. So even during the ice ages, life continued to thrive on lake floors and in the deep ocean. Water also has an extraordinary capacity to mop up heat, and this helps smooth out climatic changes that could otherwise devastate ecosystems.

Yet despite water's overwhelming importance to life, no single theory had been able to satisfactorily explain its mysterious properties - until now. If we can believe physicists Anders Nilsson at Stanford University, California, and Lars Pettersson of Stockholm University, Sweden, and their colleagues, we could at last be getting to the bottom of many of these anomalies.

Their controversial ideas expand on a theory proposed more than a century ago by Wilhelm Roentgen, the discoverer of X-rays, who claimed that the molecules in liquid water pack together not in just one way, as today's textbooks would have it, but in two fundamentally different ways.

Key to the understanding of water's mysteries is the way its molecules - made up of two hydrogen atoms and one oxygen atom - interact with one another. The oxygen atom has a slight negative charge while the hydrogen atoms share a compensating positive charge. As such, the hydrogen and oxygen atoms of neighbouring molecules are attracted to one another, forming a link called a hydrogen bond.

Hydrogen bonds are far weaker than the bonds that link the atoms within molecules together, and so are continually breaking and reforming, but they are at their strongest when molecules are arranged so that each hydrogen bond lines up with a molecular bond (see diagram). The shape of a water molecule is such that each H_2O molecule is surrounded by four neighbours arranged in the shape of a triangular pyramid - better known as a tetrahedron.

At least, that's the way the molecules arrange themselves in ice. According to the conventional view, liquid water has a similar, albeit less rigid, structure, in which extra molecules can pack into some of the open gaps in the tetrahedral arrangement. That explains why liquid water is denser than ice - and it seems to fit the results of various experiments in which beams of X-rays, infrared light and neutrons are bounced off samples of water.

True, some physicists had claimed that water placed under certain extreme conditions may separate into two different structures (see "Extreme water"), but most had assumed it resumes a single structure under normal conditions.

Then, 10 years ago, a chance discovery by Pettersson and Nilsson called this picture into question. They were using X-ray absorption spectroscopy to investigate the amino acid glycine. The peaks in the X-ray absorption spectrum can shed light on the precise nature of the target substance's chemical bonds, and hence on its structure. Importantly, the researchers had got hold of a new, high-power X-ray source with which they were able to make more sensitive and accurate measurements than had ever been possible. They soon realised that the water containing their glycine sample was producing a far more interesting spectrum than the amino acid. "What we saw there was sensational," Nilsson recalls, "so we had to get to the bottom of it."

What we saw in the water was sensational, so we had to get to the bottom of it

Dramatic implications

The feature that sparked their interest was a peak in the absorption spectrum that is not predicted by the traditional model of liquid water. In fact, in a paper published in 2004 they concluded that at any given moment 85 per cent of the hydrogen bonds in water must be weakened or broken, far more than the 10 per cent predicted by the textbook model (*Science*, vol 304, p 995).

The implications of this finding are dramatic: it suggests that a total rethink of the structure of water is needed. So Nilsson and Pettersson turned to other X-ray experiments to confirm their claims. Their first move was to enlist the help of Shik Shin of the University of Tokyo, Japan, who specialises in a technique called X-ray emission spectroscopy. The key thing about these spectra is that the shorter the wavelength of the X-rays in a substance's emission spectrum are, the looser the hydrogen bonding must be.

The team struck gold: the spectrum of emitted X-rays included two peaks that might correspond to two separate structures. The spike of the longer-wavelength X-rays, the researchers argued, indicates the proportion of tetrahedrally arranged molecules, while the shorter-wavelength peak reflects the proportion of disordered molecules.

Importantly, the shorter-wavelength peak in the X-ray emissions was the more intense of the two, suggesting that the loosely bound molecules must be more prevalent within the sample - an assertion that fitted the team's previous models. What's more, they also found that this peak shifts to an even shorter wavelength as the water is heated, while the other peak remains more or less fixed (*Chemical Physics Letters*, vol 460, p 387).

That suggests that the hydrogen bonds connecting molecules arranged in a disordered way are more likely to loosen upon heating than those linking the more regularly arranged molecules - which again is what the

team had predicted. They then reanalysed older experimental data that had seemed to support the traditional picture of water - and now argue that these results, too, are consistent with the new model.

If the team is right, another question arises: how large are the different structures within the liquid? To find out, they turned to the high-power X-rays generated at the Stanford Synchrotron Radiation Lightsource in California, this time measuring how water scatters rays arriving from various angles. The results, they say, reveal that water is dotted with small regions of tetrahedrally arranged molecules, each region being 1 to 2 nanometres across (*Proceedings of the National Academy of Sciences*, vol 106, p 15214).

Combined with further measurements carried out by Uwe Bergmann at Stanford University, they concluded that the ordered structures consisted of roughly 50 to 100 molecules, on average, surrounded by a sea of the more loosely bound molecules. These regions are not fixed, however. In less than a trillionth of a second, water molecules are thought to fluctuate between the two states as the hydrogen bonds break and reform.

Explaining the inexplicable

The changing balance between Nilsson and Pettersson's two types of water provides an explanation for the way water's density peaks at 4 °C. In the disordered regions, water molecules are more closely packed, making them denser than regions where the molecules are arranged in a tetrahedral structure. At 0 °C these disordered regions should be relatively uncommon, but as the water is warmed the extra heat energy tends to shake the more ordered structure apart, so molecules spend less time in the tetrahedral structure and more time in the disordered regions, making it more dense on average.

Counterbalancing this, the loosely bound molecules will move around more vigorously as the temperature rises, gradually forcing them further apart from each other. Once enough of the molecules become loosely bound - at 4 °C - this expansion effect will dominate, and the density will fall with increasing temperatures.

According to Pettersson, the theory offers equally tidy explanations for many of water's other previously inexplicable anomalies - something they say that no other theory can yet achieve (see "Water's mysteries"). Martin Chaplin, a chemist at London South Bank University, agrees. Explanations based on the conventional one-component system have to "go round the houses" to try to accommodate the maxima and minima in various properties as the temperature of water changes, he says. "The dual-structure idea is strongly supported by experiment and can explain water's anomalies far more readily than the conventional picture," Chaplin says.

Nilsson and Pettersson's 2004 paper in *Science* has now been cited over 350 times by other researchers. Yet many remain sceptical. One criticism is that the team's explanation of their X-ray spectroscopy results is based on simulations of at least 50 interacting water molecules - an immensely complex model that can only be resolved approximately. "We need a much more accurate theory in order to make such drastic claims," says Richard Saykally at the University of California, Berkeley. He claims that minor adjustments to the arrangement of the hydrogen bonds in the conventional structure are enough to explain Nilsson and Pettersson's X-ray results. One member of their group, Michael Odelius of Stockholm University, even left the collaboration because he disagreed with their interpretation of the X-ray emission data.

One detail that alienated many sceptics was an assertion in the 2004 paper that the more loosely bound molecules form rings and chains - and indeed Nilsson and his colleagues are now less specific about the structure of the disordered molecules. Eugene Stanley of Boston University, however, does not believe that this fatally damages the team's case. "I don't think they should be condemned forever," he says. Though their argument is not yet watertight, the X-ray scattering results provide "one more piece of supporting evidence", he says.

There is no doubt that Nilsson and Pettersson still face stiff opposition, but the rewards of a comprehensive understanding of the structure of liquid water could be considerable. It could lead to a better understanding of how drugs and proteins interact with water molecules within the body, for example, and so provide more effective medicines. And by giving us a better idea of how water behaves around narrow pores, it might improve water desalination attempts and so increase access to clean water.

"Our understanding of water is an evolving picture," Pettersson says. "Further research by many different groups is needed before this exciting and important journey can end." With so much to gain, who could disagree?

Extreme water

The dual structure of water proposed by Anders Nilsson of Stanford University, California, and Lars Pettersson of Stockholm University in Sweden may be a ghostly echo of the strange properties of "supercool" water - water that has been cooled to below 0 °C without freezing.

Eugene Stanley of Boston University and his colleagues have long claimed that at temperatures below about -50 °C and pressures of more than 1000 times atmospheric pressure, distinct high and low-density forms of supercool water should exist. Several research groups claim they have found evidence for these two structures.

Stanley, however, believes there should be small but discernible traces of this behaviour at higher temperatures too - seen as fluctuations in water's density. Sure enough, the size of the fleeting high and low-density regions seen in Nilsson and Pettersson's X-ray scattering experiments are consistent with his theory's predictions.

However, physicist Alan Soper at the Rutherford Appleton Laboratory in Oxfordshire in the UK is not convinced that these density differences are anything other than the density fluctuations that can occur in any liquid.

The crux of this dispute concerns the precise statistical distribution of regions of different density. According to Nilsson and Pettersson's model, there should be two peaks at two distinctly different densities, but Soper believes only one continuous distribution is possible.

Edwin Cartlidge is a journalist based in Rome, Italy. To enjoy more stunning images of water in motion by Shinichi Maruyama, visit his website: www.shinichimaruyama.com

http://www.newscientist.com/article/mg20527466.200-the-strangest-liquid-why-water-is-so-weird.html?full=true&print=true

Crystal twins hint at hydrogen storage breakthrough

- 15:34 04 February 2010 by **Colin Barras**

Even apparently identical twins can differ in their appetite. The discovery of two crystals identical in appearance and chemical formula – and even with the same crystal symmetry – turn out to differ wildly in their capacity for storing hydrogen, much to the surprise of the chemists who made them.The finding hints that there may be a previously unknown class of crystals that would be useful for gas storage or catalysis.Hong-Cai Zhou at Texas A&M University in College Station and colleagues discovered the new crystal forms as part of their search for materials that will hold large quantities of hydrogen or methane to act as future fuel tanks. Like rival teams, they are concentrating on a family of crystalline compounds of metal ions and organic molecules called metal organic frameworks.

Surprise twin

Theoretical predictions suggested that crystals made up of a combination of the organic molecule tetracarboxylate and copper nitrate could exist in two forms. When they baked the ingredients at either 65 °C or 75 °C with organic solvents, dark blue crystals began to appear.

"It's difficult to tell them apart," says Zhou, even under a microscope. "In nature there are 230 types of crystal symmetry and these two isomers belong to the same group," he says. "Normally you might expect some resemblance, but these are identical and that's very rare."But testing the doppelgängers' ability to suck up hydrogen provided "unexpected" and "very surprising" results, says Zhou. While the "alpha" form could hold 5.1 per cent of its weight in hydrogen under pressure, the "beta" form could hold only 2.9 per cent.

The chemists had to dig deeper to work out how the identical compounds could assemble differently to produce the "alpha" and "beta" twins. They used X-ray analysis to reveal subtle structural differences: the crystal's copper-containing molecules can bind to either the short or long sides of the rectangular tetracarboxylate molecules, producing two alternate building blocks from which to build a crystal.

Non-identical twins

Crystals built from either of the two blocks are chemically identical and have the same symmetry, but have different-sized pores inside. Only the alpha version has pores just the right size for gas adsorption.This subtle form of isomerism has never been reported before, says Zhou, and is "easily missed". But he thinks it could in fact be common in a range of similar materials – for example in the zeolite minerals widely used as industrial catalysts."It will have an impact on any future applications where pore size or surface area plays a major role," he says. It may be that materials already prized for their porosity have hidden twins that are even more porous.

Flexible frameworks

Andy Cooper at the University of Liverpool, UK, says the work confirms that "in principle there is scope to discover flexible frameworks with more extreme changes in porosity". For example, materials might exist that can have their pores opened and closed on demand."In the case of porous organic molecules as opposed to [framework materials], the scope for this type of reorganisation is even greater," Cooper says. His team is exploring this idea, which they hope might eventually lead to new materials such as porous liquids.

Journal reference: *Chemical Communications*, DOI: 10.1039/b920995f

http://www.newscientist.com/article/dn18480-crystal-twins-hint-at-hydrogen-storage-breakthrough.html

Synthetic cobwebs could boost chemical reactions

- 04 February 2010
- Magazine issue 2746.

Chemical catalysts (Image: Bernard Castelein/Nature Picture Library/Rex Features)

TIME to ditch the notion that cobwebs are a sign of disuse. They should signify activity instead, say Chinese chemists, who think the presence of synthetic webs could speed up some chemical reactions.

Dew-covered spiderwebs inspired Lei Jiang and Yong Zhao at the Chinese Academy of Sciences in Beijing and colleagues to explore spider silk's water-collecting properties. They took silk from a native orb-web spider. Under an electron microscope, it looked like a necklace of fluffy beads separated by narrow strings of compact silk.

Once placed in a misty location, the fluffy beads quickly collapse into thick clumps the team dubbed "spindle-knots", which then collected large water droplets.

Once placed in a misty location, the fluffy beads collapse into thick clumps called spindle-knots

The thread is constructed from silk fibrils, which are aligned along the strings but randomly arranged at the spindle-knots, says Jiang. The knots have a large surface area to bond with water droplets, making them more hydrophilic than the strings (*Nature*, DOI: 10.1038/nature08729).

The researchers next produced artificial silk with the same properties. They dipped nylon thread into a polymer solution, which when dry mimicked the spindle-knots and collected water in the same way. Jiang says the synthetic silk could be used to "promote faster and more efficient chemical reactions" by acting as miniature reaction centres that bring together reagents in humid environments.

http://www.newscientist.com/article/mg20527465.200-synthetic-cobwebs-could-boost-chemical-reactions.html

Dying stars eat comets for their last supper

- 04 February 2010

Magazine issue 2746.

Snacking on comets (Image: HST/NASA)

WHEN the sun dies, it's not just Earth that will be doomed - the destruction will reach as far as the comets in the outer solar system. That's according to a new explanation of the behaviour of planetary nebulae - bubbles of gas sloughed off by dying stars (pictured).

There are two methods for calculating the abundance of elements in planetary nebulae: looking at light emitted when electrons and ionised atoms recombine, or looking at the energy emitted by atoms excited by collisions. Yet they yield very different results, a discrepancy that has baffled astronomers for decades.

Now William Henney of the National Autonomous University of Mexico in Mexico City and Grazyna Stasinska of the Paris Observatory in France suggest that material from vaporised comets could be skewing the recombination method's result. This is because pockets of gas rich in heavy elements would be created ifa comet in the outer regions of a solar system got vaporised by a dying star in its red giant phase or by the expanding planetary nebula that follows it (arxiv.org/abs/1001.4513).

http://www.newscientist.com/article/mg20527465.100-dying-stars-eat-comets-for-their-last-supper.html?full=true&print=true

Nature's hot green quantum computers revealed

- 03 February 2010 by **Kate McAlpine**

Magazine issue 2746.

Super-efficient, naturally (Image: Amanna Images/Alamy)

WHILE physicists struggle to get quantum computers to function at cryogenic temperatures, other researchers are saying that humble algae and bacteria may have been performing quantum calculations at life-friendly temperatures for billions of years.

The evidence comes from a study of how energy travels across the light-harvesting molecules involved in photosynthesis. The work has culminated this week in the extraordinary announcement that these molecules in a marine alga may exploit quantum processes at room temperature to transfer energy without loss. Physicists had previously ruled out quantum processes, arguing that they could not persist for long enough at such temperatures to achieve anything useful.

Photosynthesis starts when large light-harvesting structures called antennas capture photons. In the alga called *Chroomonas CCMP270*, these antennas have eight pigment molecules woven into a larger protein structure, with different pigments absorbing light from different parts of the spectrum. The energy of the photons then travels across the antenna to a part of the cell where it is used to make chemical fuel.

The route the energy takes as it jumps across these large molecules is important because longer journeys could lead to losses. In classical physics, the energy can only work its way across the molecules randomly. "Normal energy transfer theory tells us that energy hops from molecule to molecule in a random walk, like the path taken home from the bar by a drunken sailor," says Gregory Scholes at the University of Toronto, Canada, one of the co-authors of the paper published in *Nature* this week (DOI: 10.1038/nature08811).

But Scholes and his colleagues have found that the energy-routeing mechanism may actually be highly efficient. The evidence comes from the behaviour of pigment molecules at the centre of the *Chroomonas* antenna. The team first excited two of these molecules with a brief laser pulse, causing electrons in the pigment molecules to jump into a quantum superposition of excited states. When this superposition collapses, it emits photons of slightly different wavelengths which combine to form an interference pattern. By studying this pattern in the emitted light, the team can work out the details of the quantum superposition that created it.

This is going to change the way we think about photosynthesis and quantum computing

The results are a surprise. Not only are the two pigment molecules at the centre of the antenna involved in the superposition; so are the other six pigment molecules. This "quantum coherence" binds them together for a fleeting 400 femtoseconds (4×10^{-13} seconds). But this is long enough for the energy from the absorbed photon to simultaneously "try out" all possible paths across the antenna. When the shared coherence ends, the energy settles on one path, allowing it to make the journey without loss.

The discovery overturns some long-held beliefs about quantum mechanics, which held that quantum coherence cannot occur at anything other than cryogenic temperatures because a hot environment would destroy the effect. However, the *Chroomonas* algae perform their work at 21 °C.

"Scholes's work is fantastic," says Gregory Engel at the University of Chicago. "The difficulty of this experiment is extraordinary." Engel demonstrated the same principle in 2007 at the University of California, Berkeley, though at a frigid -196 °C. His team examined a bacteriochlorophyll complex found in green sulphur bacteria and discovered that the pigment molecules were similarly wired together in a quantum mechanical network. His experiment showed that the quantum superposition allows the energy to explore all possible routes and settle on the most efficient one (DOI: 10.1038/nature05678). In a sense, he says, the antenna performs a quantum computation to determine the best way to transfer energy.

Engel and his group at Chicago have just repeated the experiment at a more life-friendly 4 °C. They found the duration of the coherence to be about 300 femtoseconds (arxiv.org/abs/1001.5108v1).

Exactly how these molecules remain coherent for so long, at such high temperatures and with relatively large gaps between them, is a mystery, says Alexandra Olaya-Castro of University College London, who has been collaborating with Scholes to understand the underlying mechanisms and apply them elsewhere. She believes that the antenna's protein structure plays a crucial role. "Coherence would not survive without it," she says.

The hope is that quantum coherence could be used to make solar cells more efficient. The work is going to change the way we think about photosynthesis and quantum computing, Engel says. "It's an enormous result."

http://www.newscientist.com/article/mg20527464.000-natures-hot-green-quantum-computers-revealed.html

Water vapour worse climate change villain than thought

- 11:11 02 February 2010 by **Shanta Barley**
- Magazine issue 2746.

A rise in water vapour in the atmosphere fuelled 30 per cent of the global warming that took place during the 1990s. This discovery suggests that the potent greenhouse gas plays a bigger role in climate change that we previously imagined.

Susan Solomon and colleagues at the US National Oceanic and Atmospheric Administration combined satellite measurements and weather balloon data to track changes in the concentration of water vapour 16 kilometres up in the stratosphere, between the 1980s and today.

Water vapour levels in the stratosphere increased in the 1990s but dropped by 10 per cent in 2001. After feeding their measurements into a climate model, the team suggests that vapour was to blame for almost a third of the warming that happened in the 1990s.

The model also suggests that the decline in water vapour concentrations that occurred in 2001 slowed down the rate of global warming in the last decade by 25 per cent.

"This research does not change the consensus view that human emissions drive climate change," says Fortunat Joos, a climate modeller at the University of Bern, Switzerland.

Journal reference: *Science* DOI: 10.1126/science.1182488

http://www.newscientist.com/article/dn18457-water-vapour-worse-climate-change-villain-than-thought.html

'Quantum spread' threat to Hawking's bet

- 01 February 2010 by **Anil Ananthaswamy**

Magazine issue 2745.

You bet (Image: Frederick M. Brown/Getty)

1 more image

STEPHEN HAWKING is something of a gambler when it comes to physics, placing bets on everything from the action of black holes to the discovery of gravitational waves. The bad news for Hawking is that a touch of "quantum smearing" could significantly lower his chances of winning his latest wager.

In 2002, Hawking bet his University of Cambridge colleague Neil Turok that cosmologists would soon discover primordial gravitational waves and so verify the theory of inflation. Our universe is thought to have undergone inflation - a period of exponential expansion - a fraction of a second after the big bang, generating ripples in the fabric of space-time called gravitational waves.

NASA's Wilkinson Microwave Anisotropy Probe found inflation's footprints in the cosmic microwave background, radiation emitted about 370,000 years after the big bang. But WMAP was not sensitive enough to spot signs of gravitational waves. The Planck satellite was launched in May 2009 to get a much more detailed picture of the CMB. It is looking for the imprint of such waves by studying the tiny variations in temperature of the CMB from point to point in the sky. Hawking is betting that the strength of the waves will be above a certain value. If he is right, Planck should spot them.

However, the chances of Planck seeing signs of gravitational waves depend on exactly what happened during inflation, according to Qaisar Shafi of the University of Delaware in Newark. "There is a chance that Planck may miss it," says Shafi.

Inflation was triggered by a field in the early universe called the inflaton, whose energy density fell slowly, like a ball rolling down a gentle slope. According to Einstein's equations of general relativity space-time expanded exponentially, the process only stopping when the inflaton reaches the bottom of the slope. The simplest models assume that the slope - also called the inflaton potential - resembles a very shallow parabola.

Now Shafi is arguing that the inflaton potential should be modelled on another field that physicists think exists in nature: the Higgs field, which gives all elementary particles their mass. The Higgs potential is shaped like a Mexican hat (see diagram).

"If nature chose it for the Higgs field, then maybe it also chose it for the inflaton," says Shafi. He modelled inflation using the Higgs potential, and also added one more variable, which dictates just how much the inflaton interacts quantum mechanically with other fields when inflation ends. This "coupling" would have transferred energy and created the radiation that led to the formation of matter, argues Shafi.

The calculations show that the higher the degree of coupling, the lower the strength of the gravitational waves generated by inflation. Also, the possible values for the strength of gravitational waves will be spread out over a much wider range than predicted in simpler models. That may mean that their actual strength may turn out to be below the threshold that the Planck satellite is capable of detecting. "The quantum [couplings] smear the predictions," says Shafi, who will present his work at the Dark Matter 2010 conference at the University of California, Los Angeles, in February.

Hawking, however, remains optimistic. In August 2009 at a meeting in Cambridge he reiterated his prediction that gravitational waves will be observed at strengths Planck can observe. Hawking has yet to name his stake though. "So far, Stephen hasn't named an amount," says Turok, now at the Perimeter Institute in Waterloo, Ontario, Canada. "I was willing to take it at even odds for any amount."

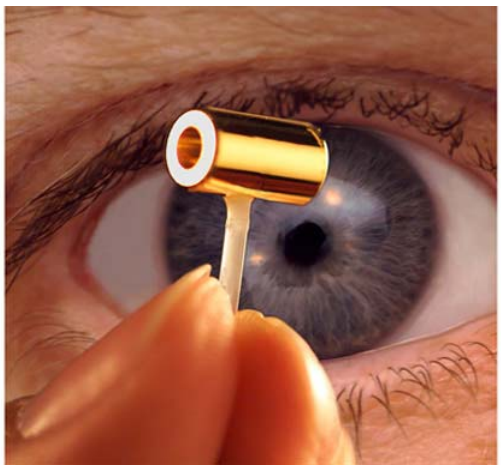
Hawking's wagers

- In 1975, Stephen Hawking bet Kip Thorne that the X-ray source Cygnus X-1 does not harbour a black hole. Thorne was to get a subscription to *Penthouse* if he won, while Hawking asked for a subscription to British satirical magazine *Private Eye* if he won. Hawking lost the bet.
- Hawking and Thorne bet John Preskill in 1997 that black holes destroy everything that falls into them, and that no information can escape black holes. Hawking conceded he was wrong in 2004, giving Preskill a baseball encyclopaedia. Thorne has not admitted defeat.
- In 2000, Hawking bet Gordon Kane $100 that the Higgs boson will not be discovered by the Tevatron collider at Fermilab in Batavia, Illinois. The collider is still searching.

http://www.newscientist.com/article/mg20527453.700-quantum-spread-threat-to-hawkings-bet.html

Giant laser reaches key milestone for fusion

- 20:59 28 January 2010 by **Jeff Hecht, Livermore**



Fusion experiments at the National Ignition Facilty use a two-stage process called inertial confinement. First, clusters of laser beams are fired into opposite ends of a metal cylinder called a hohlraum (pictured), which contains a fusion fuel pellet. In about 15 nanoseconds, the hohlraum reaches about 3.3 million °C, yielding an intense burst of X rays. This burst implodes the target, compressing its core to the density needed for fusion (Illustration: Lawrence Livermore National Security, LLC/Lawrence Livermore National Laboratory/Department of Energy)

The world's largest laser is approaching the long-sought goal of igniting a fusion reaction that produces more energy than the laser delivers.

Lasers are intended to do this by super-heating a fusion fuel pellet until it implodes, heating and compressing its central core to the temperatures and pressures needed for nuclear fusion.

Past experiments have been plagued by irregular implosions that wasted most of the input energy. But now, researchers led by Brian MacGowan of the Lawrence Livermore National Laboratory in California have managed to squeeze targets of material into spheres rather than pancakes or more lopsided shapes, paving the way for future attempts at fusion.The work was performed at Livermore's 192-laser beam National Ignition Facility (NIF), which began operating in 2009.

The team used targets that did not contain the key ingredients for fusion – two isotopes of hydrogen known as deuterium and tritium. But the symmetrical implosion of the targets suggests that NIF should be able to ignite fusion with laser pulses of 1.2 to 1.3 megajoules – well below its full 1.8-megajoule capacity."From everything we can see, we're on the right path here," Jeff Wisoff, a top NIF manager told *New Scientist*.

Researchers spent last year slowly cranking up the output of the laser, ultimately reaching a total energy of more than 1 megajoules. Now they're pausing to mount new instruments on the 10-centimetre-thick aluminium target chamber and to install giant concrete doors to contain neutrons they expect to produce in future fusion experiments.

In a few months, they will begin testing a series of new targets designed to assess beam interactions and compression. If all goes well, they could try for fusion ignition by the end of the year.

http://www.newscientist.com/article/dn18446-giant-laser-reaches-key-milestone-for-fusion.html

First breath: Earth's billion-year struggle for oxygen

- 05 February 2010 by **Nick Lane**

Magazine issue 2746.

The complex story of oxygen's rise (Image: Reso/Rex Features)

OXYGEN is life. That's true not just for us: all animals and plants need oxygen to unleash the energy they scavenge from their environment. Take away oxygen and organisms cannot produce enough energy to support an active lifestyle, or even make them worth eating. Predation, an essential driver of evolutionary change, becomes impossible.

It is easy to picture a planet without oxygen. It looks like Mars. Our nearest planetary neighbour was probably once a water world too, primed for life to evolve. But it lacked a vital ingredient: a protective shield of ozone derived from oxygen. Without an ozone layer, the sun's rays slowly atomised the Martian water. The hydrogen floated off into space while the oxygen oxidised the iron-rich Martian topsoil, turning it rust-red. Perhaps there is - or was - life on Mars. But if so it never progressed beyond the bacterial stage.

So how did Earth get lucky? Ten years ago, when I was writing my book *Oxygen*, it didn't seem too big a deal. Photosynthesising bacteria were the magic ingredient. These tiny organisms popped up in Earth's oceans early on, sometime between 4 and 3 billion years ago. In the couple of billion years that followed, their oxygenic exhaust fumes slowly did the job. By 600 million years ago, the air was primed for complex animal and plant life.

Now this cosy story has collapsed. We are no longer so sure how Earth's atmosphere got - and retained - its oxygen-rich atmosphere. "Photosynthesis by itself was not enough," says Graham Shields, a geochemist at University College London. "It was a complex dance between geology and biology."

Uncovering life's earliest origins is never an easy task. There are no large animal or plant fossils to draw on: these only make an appearance starting around 600 million years ago. Yet perhaps remarkably, hints

of life's humble beginnings do survive in ancient rocks, crushed by the weight of sediment and time. With ardour, patience and skill, they can be marshalled into a convincing story.

William Schopf had those qualities. Two decades ago he thought he had the story, too. A palaeontologist at the University of California, Los Angeles, he was investigating the Apex cherts of Western Australia, 3.5-billion-year-old rocks that are among the oldest on Earth. In 1993, he announced that they contained 11 different types of "microfossil" that looked for all the world like modern photosynthesising cyanobacteria (*Science*, vol 260, p 640).

The finding fitted a global pattern. Other 3.5-billion-year-old Australian rocks contained rippling structures that looked like fossil stromatolites. A few examples of these structures, domed edifices up to a metre high built by cyanobacteria, still eke out a marginal existence in salty lagoons on the coast of Western Australia and elsewhere. Meanwhile, 3.8-billion-year-old rocks from Greenland had reduced levels of one of the two stable carbon isotopes, carbon-13, compared with the other, carbon-12 - a chemical signature of photosynthesis. It seemed that life had come early to Earth: astonishingly soon after our planet formed some 4.6 billion years ago, photosynthesising bacteria were widespread.

This emerging consensus lasted only until 2002, when palaeontologist Martin Brasier of the University of Oxford unleashed a barrage of criticisms. The Apex cherts, he claimed, were far from being the tranquil sedimentary basin evoked by Schopf. In fact, they were shot through with hydrothermal veins that were no setting for cyanobacteria. Other evidence that the rocks had undergone convulsions in the past made the rippling stromatolites no more biological in origin than ripples on a sandy beach. As for the microfossils Schopf had identified, they ranged from the "almost plausible to the completely ridiculous".

This very public spat produced no clear outcome, but since then new evidence has been emerging. In 2006, Thomas McCollom of the University of Colorado in Boulder and Jeffrey Seewald of the Woods Hole Oceanographic Institution in Massachusetts found that reactions known as Fischer-Tropsch syntheses can occur in hydrothermal vents, leaving a carbon isotope signature that mimics photosynthesis with no need for a biological explanation. The mere possibility that hot water might have massaged the evidence in Australia and elsewhere was damning enough for the duo. "The possibility must be entertained that complex life was not present on Earth, or at least not widespread, until a much later date," they wrote (*Earth and Planetary Science Letters*, vol 243, p 74).

That conclusion was supported by a reanalysis of "biomarkers" found in 2.7-billion-year-old Australian shales. These organic molecules had been thought to indicate the presence of cyanobacteria, but in 2008 an Australian team concluded that the shales had been contaminated by ancient oil that had filtered down into the sediments some time after the rocks first formed (*Nature*, vol 455, p 1101). Even more damningly, in September 2009 a French team discovered living bacteria buried deep down in ancient rocks of a similar age (*PLoS One*, vol 4, p e5298).

Crumbling edifice

Perhaps the decisive blow came in August last year, when Daniele Pinti of the University of Quebec in Montreal, Canada, and his colleagues announced results from a survey of the Apex cherts using advanced microscopy techniques. They concluded that the rocks had formed in a hydrothermal vent at a searing 250 °C or more - way too hot for cyanobacteria. The "microfossils", they said, were mostly deposits of iron oxides and clay minerals (*Nature Geoscience*, vol 2, p 640).

These new lines of evidence mean that the oldest undisputed signs of cyanobacteria are now fossils found in rocks from the Belcher Islands in northern Canada dating from just 2.1 billion years ago. So where does that leave our ideas about how life evolved, and the part oxygen played in that evolution?

In one sense it is no bad thing: it removes an embarrassing billion-plus year delay between cyanobacteria arising and oxygen levels in the air first taking a significant upwards turn. In this "great oxygenation

event" of around 2.4 billion years ago, levels rose from around 1 per cent of today's levels to perhaps 10 per cent.

Our best guess is still that cyanobacteria were around some time before this event. Persuasive evidence is converging on a date around 2.7 billion years ago (see diagram). Research from Linda Godfrey and Paul Falkowski of Rutgers University in New Brunswick, New Jersey, indicates that the modern nitrogen cycle kicked off around this time. This requires free oxygen to form nitrogen oxides, suggesting that a first whiff of oxygen - not even 1 per cent of today's levels - had just appeared (*Nature Geoscience*, vol 2, p 725).

That squares with evidence from Robert Frei of the University of Copenhagen, Denmark, and his colleagues that the oxidative weathering of rocks kicked off around this time too. They measured levels of chromium in ancient marine rock layers known as banded iron formations. Exposed to oxygen in the air, the metal is weathered from rocks and washed out to sea, where it reacts immediately with iron, settles to the ocean bottom and forms these layers. The chromium signature in them suggests there was essentially no oxidative weathering before 2.7 billion years ago, after which chromium became significantly more mobile (*Nature*, vol 461, p 250).

If these coordinated changes are the calling cards of the first photosynthesising bacteria, there is still a mysterious hiatus of 300 million years before the great surge in oxygen 2.4 billion years ago. The gap is less embarrassing than a billion years, but still needs explaining (see "Mind the gap"). Yet this puzzle masks a more fundamental new twist to the tale.

It is that the great oxygenation event was perhaps not as decisive an event as we thought. It certainly happened - a suite of geochemical evidence leaves little room for doubt on that score - and it was traumatic, too. Evidence of a sudden drop in ultraviolet radiation penetrating to Earth's surface 2.4 billion years ago indicates it was enough to create the ozone layer - a pivotal event that ensured our planet's history diverged from that of Mars.

It also seems to have been the forerunner to a "snowball Earth". If Joe Kirschvink of the California Institute of Technology in Pasadena and many others are correct, the oxygen produced by cyanobacteria oxidised the potent greenhouse gas methane, precipitating a global freeze. "That raises the spectre of one mutant organism being able to destroy an entire planetary ecosystem - the first biogenic climate disaster," says Kirschvink.

And yet the great oxygenation was impermanent. The same chromium record that provides evidence for a first whiff of oxygen 300 million years before this event shows that, by 1.9 billion years ago, levels of breathable oxygen in Earth's atmosphere were back down to the merest trace.

We don't know why. It might have been a knock-on effect from a big freeze: if Earth did indeed enter a snowball phase, glaciers would have scoured huge amounts of nutrients from the underlying rock. When the ice eventually retreated, melted by the build-up of volcanic greenhouse gases in the atmosphere, those nutrients would have found their way into the oceans. One idea is that they nourished a huge transient bloom of cyanobacteria that quickly died and rotted, in the process consuming all the oxygen they had once produced.

Stinking oceans

Oxygen levels in the atmosphere soon recovered again as rates of photosynthesis and weathering established a new equilibrium, at about 10 per cent of present-day levels. But this was no fresh dawn of a high-octane world: quite the reverse. This time, the oxidative weathering of sulphides on land filled the oceans with sulphate. That in turn fuelled a hardy group of bacteria that filled the oceans with sewer gas - hydrogen sulphide - turning them into stinking, stagnant waters almost entirely devoid of oxygen, rather

like the deeper levels of the Black Sea today. It was the herald of an extraordinary stasis in Earth's environment lasting nearly a quarter of its history - a period dubbed the "boring billion".

But hang on: what happened to the oxygenic utopia in which life supposedly grew and prospered, evolving the complex cells that went on to make up animal and plant life? The answer is that it probably never existed. If cyanobacteria did produce the first oxygen in Earth's atmosphere, all the evidence is they lacked the oomph to push levels much above 10 per cent of present levels in the long term.

That has led William Martin, an expert in cell evolution at the University of Düsseldorf in Germany, and others, to come up with a controversial theory: that the boring billion was anything but boring. In fact, the stinking oceans were the true cradle of life. Evidence behind this idea includes the fact that mitochondria, the powerhouses of all complex, oxygen-respiring "eukaryotic" cells today, were once far more varied, sometimes "breathing" sulphur or nitrogen instead of oxygen, or even emitting hydrogen gas. It seems that these mitochondria originated in the stinking oceans of the boring billion, which were full of the chemical imbalances that power life today in places like deep-sea hydrothermal vents.

Earth's anoxic stasis was broken in the end by a dramatic series of snowball Earths, indicating bursts of oxygen, beginning about 750 million years ago and recurring over the following 100 million years. They broke the eternal loop: soon afterwards, oxygen levels shot up and never looked back. Animal life soon exploded onto the scene.

What made the difference this time? One intriguing possibility is that it was down to the organisms that had evolved in a leisurely way during the boring billion: terrestrial red and green algae and the first lichens. "I suspect the final big rise in oxygen was caused by the greening of the continents from around 800 million years ago," says Shields. Terrestrial algae and lichens get their nourishment in part by breaking down the rocks on which they live. These nutrients flooded into the oceans, stimulating more and more photosynthesis by both cyanobacteria and the more advanced algae that had evolved in the meantime.

It did not all end in a "bloom and a bust" this time because lichens kept right on eating away at the rocks. They sustained a higher rate of erosion, and constant flow of nutrients into the ocean, even after the scouring glaciers of various snowball Earth phases had melted.

Life's story on Earth is a complex one, perhaps more complex that we ever imagined. After many false starts, a singular combination of chemistry, biology and geology finally came together to unleash the oxygen we breathe. Even then, many ups and downs were to come. To get as far as it has, life on Earth was even luckier than we thought.

With all of oxygen's ups and downs, life on Earth was even luckier than we thought to get as far as it has

Mind the gap

If, as seems increasingly likely, photosynthesising cyanobacteria first made an appearance in Earth's oceans around 2.7 billion years ago, why did they take so long to make a difference to Earth's air?

One possibility is that the oxygen's first chemical mission was to oxidise all the iron and compounds like hydrogen sulphide in the oceans. Only after it had done that was it free to escape into the atmosphere.

Perhaps the most persuasive answer, though, is purely geological. It comes from veteran geologist Heinrich Holland of Harvard University. He points the finger at gases such as methane and hydrogen sulphide that are constantly spouted out by volcanoes. They would have reacted with the first free oxygen to form carbon dioxide and sulphur dioxides, effectively removing the oxygen from circulation (*Geochimica et Cosmochimica Acta*, vol 73, p 5241).

Holland proposed that two processes took place over geological time. First, the supply of radioactive fuels in Earth's interior gradually dwindled, reducing its internal temperature. That in turn damped down the rate of volcanic emissions, and the rate at which oxygen-consuming gases entered the atmosphere gradually fell too.

Second, the volcanic gases themselves contained more oxygen. Oxygen produced by the first cyanobacteria would have steadily oxidised surface rocks. As those rocks cycle through the Earth's mantle through the standard processes of subduction and convection, rocks with an extra load of oxygen gradually fed through to the gases emitted by volcanoes.

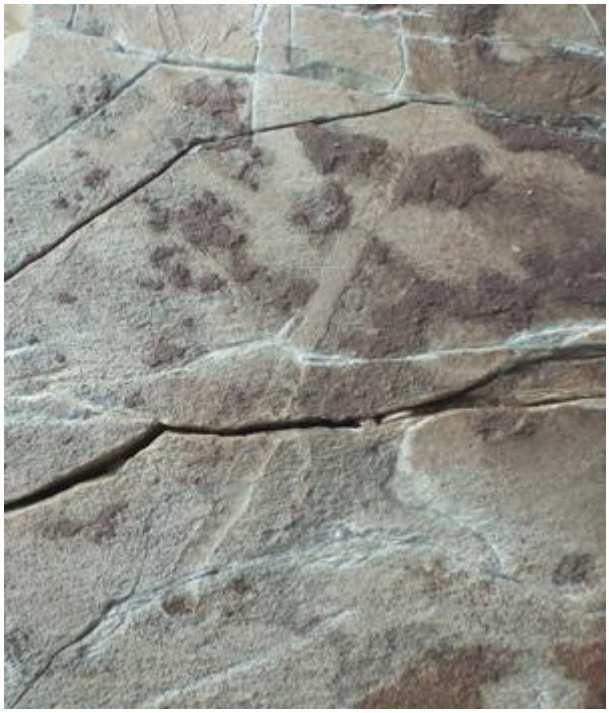
As cyanobacteria continued to pump out oxygen, there came a point where the balance tipped inexorably towards oxygen, and the excess finally accumulated in the air. Perhaps it took the 300 million years leading up to the great oxygenation event to get to that tipping point.

Nick Lane is the first Provost's Venture Research Fellow at University College London, and author of Life Ascending: The ten great inventions of evolution (Profile, 2009)

http://www.newscientist.com/article/mg20527461.100-first-breath-earths-billionyear-struggle-for-oxygen.html

Found: The first ever animal trails

- 15:50 04 February 2010 by **James O'Donoghue**



Smears in 565 million year old rocks are the first signs of mobile life forms that have been found; they are up to 13 millimetres wide (Image: Oxford University)

2 more images

More like a slug-trail than footsteps, the tracks smear through the 565-million-year-old rock overlooking the Atlantic Ocean. They were left by what may have been the first mobile organism to live on Earth.

Alex Liu of the University of Oxford, UK and his colleagues discovered them etched in the rock at Mistaken Point in Newfoundland, Canada.

The site is famous among palaeontologists for harbouring the remains of the first large complex life forms to evolve, known as Ediacarans.

"This is the earliest evidence for controlled locomotion by animals in the fossil record," says Liu.

First steps

He estimates that the animals that made the trail, which have not been preserved, were up to 13 millimetres wide. They left behind 70 trails, each between 5 and 17 centimetres long (see picture, right).

"The markings we've found clearly indicate that these organisms could exert some sort of muscular control during locomotion," says Liu. "It is the first evidence that creatures from this early period of Earth's history had muscles to allow them to move around, enabling them to hunt for food or escape adverse local conditions and, importantly, indicating that they were probably animals."

The researchers compared the fossil tracks to those left by sea urchins, sea anemones, marine snails and marine worms, and found they were similar to tracks left by sea anemones. They say the early movers may have also had a muscular disc-shaped foot, as sea anemones do.

Early feet

The tracks are etched in rocks 565 million years old. This means they date from some 20 million years before the Cambrian explosion, when a huge diversity of animal life suddenly evolved.

At the time, Mistaken Point was at the bottom of the ocean, and the trace fossils are unlike anything found in the region from that time. In particular, the Ediacarans generally had fern-like or disc-shaped bodies, which were anchored to the seabed.

However, the trace fossils are similar to tracks seen in shallow waters early in the Cambrian period – which were previously thought to be the world's oldest tracks.

Liu suggests that the animals may have been displaced from shallower waters by submarine landslides, which are known to have happened frequently.

Locomotion is more likely to have evolved in shallow seas, where sunlight fostered more life and therefore more competition for resources. The finding suggests that life before the Cambrian explosion may have been more diverse than previously thought.

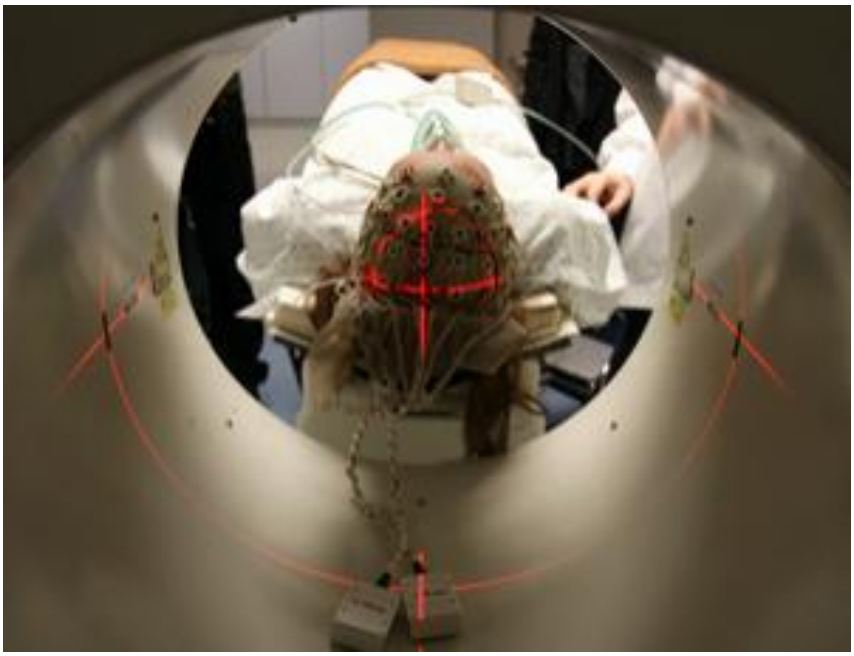
Journal reference: *Geology*, DOI: 10.1130/G30368.1 (in press)

http://www.newscientist.com/article/dn18479-found-the-first-ever-animal-trails.html

Giving the 'unconscious' a voice

- 03 February 2010 by **Celeste Biever**

Magazine issue 2746.



A way into a sealed off mind (Image: Yves Logghe/AP/PA)

THE inner voice of people who appear unconscious can now be heard. For the first time, researchers have struck up a conversation with a man diagnosed as being in a vegetative state. All they had to do was monitor how his brain responded to specific questions. This means that it may now be possible to give some individuals in the same state a degree of autonomy.

"They can now have some involvement in their destiny," says Adrian Owen of the University of Cambridge, who led the team doing the work.

In an earlier experiment, published in 2006, Owen's team asked a woman previously diagnosed as being in a vegetative state (VS) to picture herself carrying out one of two different activities. The resulting brain activity suggested she understood the commands and was therefore conscious.

Now Owen's team has taken the idea a step further. A man also diagnosed with VS was able to answer yes and no to specific questions by imagining himself engaging in the same activities.

The results suggest that it is possible to give a degree of choice to some people who have no other way of communicating with the outside world. "We are not just showing they are conscious, we are giving them a voice and a way to communicate," says neurologist Steven Laureys of the University of Liège in Belgium, Owen's collaborator.

We are not just showing that people are conscious - we are giving them way of communicating

When someone is in a VS, they can breathe unaided, have intact reflexes but seem completely unaware. But it is becoming clear that some people who appear to be vegetative are in fact minimally conscious. They are in a kind of twilight state in which they may feel some pain, experience emotion and

communicate to a limited extent. These two states can be distinguished from each other via bedside behavioural tests - but these tests are not perfect and can miss patients who are aware but unable to move. So researchers are looking for ways to detect consciousness with brain imaging.

In their original experiment, Owen and his colleagues used functional MRI to detect whether a woman could respond to two spoken commands, which were expected to activate different brain areas. On behavioural tests alone her diagnosis was VS but the brain scan results were astounding. When asked to imagine playing tennis, the woman's supplementary motor area (SMA), which is concerned with complex sequences of movements, lit up. When asked to imagine moving around her house, it was the turn of the parahippocampal gyrus, which represents spatial locations. Because the correct brain areas lit up at the correct time, the team concluded that the woman was modulating her brain activity to cooperate with the experiment and must have had a degree of consciousness (*Science*, DOI: 10.1126/science.1130197).

In the intervening years, Owen, Laureys and their team repeated the experiment on 23 people in Belgium and the UK diagnosed as being in a VS. Four responded positively and were deemed to possess a degree of consciousness.

To find out whether a simple conversation was possible, the researchers selected one of the four - a 29-year-old man who had been in a car crash. They asked him to imagine playing tennis if he wanted to answer yes to questions such as: Do you have any sisters? Is your father's name Thomas? Is your father's name Alexander? And if the answer to a question was no, he had to imagine moving round his home.

The man was asked to think of the activity that represented his answer, in 10-second bursts for up to 5 minutes, so that a strong enough signal could be detected by the scanner. His family came up with the questions to ensure that the researchers did not know the answers in advance. What's more, the brain scans were analysed by a team that had never come into contact with the patient or his family.

The team found that either the SMA or the parahippocampal gyrus lit up in response to five of the six questions (see diagram). When the team ran these answers by his family, they were all correct, indicating that the man had understood the task and was able to form an answer (*The New England Journal of Medicine*, DOI: 10.1056/nejmoa0905370). The group also asked healthy volunteers similar questions relating to their own families and found that their brains responded in the same way.

"I think we can be pretty confident that he is entirely conscious," says Owen. "He has to understand instructions, comprehend speech, remember what tennis is and how you do it. So many of his cognitive faculties have to have been intact."

That someone can be capable of all this while appearing completely unaware confounds existing medical definitions of consciousness, Laureys says. "We don't know what to call this; he just doesn't fit a definition."

Doctors traditionally base these diagnoses on how someone behaves: if for example, whether or not they can glance in different directions in response to questions. The new results show that you don't need behavioural indications to identify awareness and even a degree of cognitive proficiency. All you need to do is tap into brain activity directly.

The work "changes everything", says Nicholas Schiff, a neurologist at Weill Cornell Medical College in New York, who is carrying out similar work on patients with consciousness disorders. "Knowing that someone could persist in a state like this and not show evidence of the fact that they can answer yes/no questions should be extremely disturbing to our clinical practice."

One of the most difficult questions you might want to ask someone is whether they want to carry on living. But as Owen and Laureys point out, the scientific, legal and ethical challenges for doctors asking

such questions are formidable. "In purely practical terms, yes, it is possible," says Owen. "But it is a bigger step than one might immediately think."

One of the most difficult questions you might want to ask someone is whether they want to go on living

One problem is that while the brain scans do seem to establish consciousness, there is a lot they don't tell us. "Just because they can answer a yes/no question does not mean they have the capacity to make complex decisions," Owen says.

Even assuming there is a subset of people who cannot move but have enough cognition to answer tough questions, you would still have to convince a court that this is so. "There are many ethical and legal frameworks that would need to be revised before fMRI could be used in this context," says Owen.

There are many challenges. For example, someone in this state can only to respond to specific questions; they can't yet start a conversation of their own. There is also the prospect of developing smaller devices to make conversation more frequent, since MRI scans are expensive and take many hours to analyse.

In the meantime, you can ask someone whether they are in pain or would like to try new drugs that are being tested for their ability to bring patients out of a vegetative state. "For the minority of patients that this will work for, just for them to exercise some autonomy is a massive step forward - it doesn't have to be at the life or death level," Owen says.

http://www.newscientist.com/article/mg20527463.500-giving-the-unconscious-a-voice.html

Survival of the fittest theory: Darwinism's limits

- 03 February 2010 by **Jerry Fodor** and **Massimo Piattelli-Palmarini**

Magazine issue 2746.

If Darwin had known what we know now, he might have come to different conclusions (Image: Anna Gowthrope/PA Wire/AP)

READERS in search of literature about Darwin or Darwinism will have no trouble finding it. Recent milestone anniversaries of Darwin's birth and of the publication of *On the Origin of Species* have prompted a plethora of material, so authors thinking of adding another volume had better have a good excuse for it. We have written another book about Darwinism, and we urge you to take it to heart. Our excuse is in the title: *What Darwin Got Wrong*.

Much of the vast neo-Darwinian literature is distressingly uncritical. The possibility that anything is seriously amiss with Darwin's account of evolution is hardly considered. Such dissent as there is often relies on theistic premises which Darwinists rightly say have no place in the evaluation of scientific theories. So onlookers are left with the impression that there is little or nothing about Darwin's theory to which a scientific naturalist could reasonably object. The methodological scepticism that characterises most areas of scientific discourse seems strikingly absent when Darwinism is the topic.

Much of the vast neo-Darwinian literature is distressingly uncritical

Try these descriptions of natural selection, typical of the laudatory epithets which abound in the literature: "The universal acid" (philosopher Daniel Dennett in *Darwin's Dangerous Idea*, 1995); "a mechanism of staggering simplicity and beauty... [it] has been called the greatest idea that anyone ever had... it also happens to be true" (biologist Jerry Coyne in *Why Evolution is True*, 2009); "the only workable theory ever proposed that is capable of explaining life we have" (biologist and ethologist Richard Dawkins, variously). And as Dennett continues in *Darwin's Dangerous Idea*: "In a single stroke, the idea of evolution by natural selection unifies the realm of life, meaning, and purpose with the realm of space and time, cause and effect, mechanism and physical law."

Golly! Could Darwinism really be that good?

Darwin's theory of evolution has two connected parts: connected, but not inseparable. First, there is an explanation of the taxonomy of species. It is an ancient observation that if you sort species by similarities among their phenotypes (a phenotype being a particular creature's collection of overt, heritable biological properties) they form the hierarchy known as a "taxonomic tree".

This is why most vertebrate species are more similar to one another than they are to any invertebrate species, most species of mammals are more similar to one another than they are to any species of reptiles, and so forth. Why is this? It is quite conceivable that every species might be equally different from every other. What explains why they aren't?

Darwin suggested a genealogical hypothesis: when species are relatively similar, it's because they are descended from a relatively recent common ancestor. In some ways, chimps seem a lot like people. This is not because God created them to poke fun at us, or vice versa; it is because humans and chimps are descended from the same relatively recent primitive ape.

The current consensus is that Darwin was almost certainly right about this. There are plausible exceptions, notably similarities that arise from evolutionary convergence, but evidence from a number of disciplines, including genetics, evolutionary developmental biology and palaeontology argues decisively for Darwin's historical account of the taxonomy of species. We agree that this really was as brilliant an idea as it is generally said to be.

But that cannot be the whole story, since it is not self-evident why species that have a recent common ancestor - as opposed, say, to species that share an ecology - are generally phenotypically similar. Darwin's theory of natural selection is intended to answer this question. Darwinists often say that natural selection provides the mechanism of evolution by offering an account of the transmission of phenotypic traits from generation to generation which, if correct, explains the connection between phenotypic similarity and common ancestry.

Moreover, it is perfectly general: it applies to any species, independent of what its phenotype may happen to be. And it is remarkably simple. In effect, the mechanism of trait transmission it postulates consists of a random generator of genotypic variants that produce the corresponding random phenotypic variations, and an environmental filter that selects among the latter according to their relative fitness. And that's all. Remarkable if true.

Compelling evidence

But we don't think it is true. A variety of different considerations suggesting that it is not are mounting up. We feel it is high time that Darwinists take this evidence seriously, or offer some reason why it should be discounted. Our book about what Darwin got wrong reviews in detail some of these objections to natural selection and the evidence for them; this article is a brief summary.

Here's how natural selection is supposed to work. Each generation contributes an imperfect copy of its genotype - and thereby of its phenotype - to its successor. Neo-Darwinism suggests that such imperfections arise primarily from mutations in the genomes of members of the species in question.

What matters is that the alterations of phenotypes that the mechanisms of trait transmission produce are random. Suppose, for example, that a characteristic coloration is part of the phenotype of a particular species, and that the modal members of the *i*th generation of that species are reddish brown. Suppose, also, that the mechanisms that copy phenotypes from each generation to the next are "imperfect" in the sense given above. Then, all else being equal, the coloration of the $i + 1$th generation will form a random distribution around the mean coloration of the parent generation: most of the offspring will match their parents more or less, but some will be more red than brown, and some will be more brown than red.

This assumption explains the random variation of phenotypic traits over time, but it doesn't explain why phenotypic traits evolve. So let's further assume that, in the environment that the species inhabits, the members with brownish coloration are more "fit" than the ones with reddish coloration, all else being equal. It doesn't much matter exactly how fitness is defined; for convenience, we'll follow the current consensus according to which an individual's relative fitness co-varies with the probability that it will contribute its phenotypic traits to its offspring.

Given a certain amount of conceptual and mathematical tinkering, it follows that, all else again being equal, the fitness of the species's phenotype will generally increase over time, and that the phenotypes of each generation will resemble the phenotype of its recent ancestors more than they resemble the phenotypes of its remote ancestors.

That, to a first approximation, is the neo-Darwinian account of how phenotypes evolve. To be sure, some caveats are required. For example, even orthodox Darwinists have always recognised that there are plenty of cases where fitness doesn't increase over time. So, for example, fitness may decrease when a population becomes unduly numerous (that's density-dependent selection at work), or when a species having once attained a "fitness plateau" then gets stuck there, or, of course, when the species becomes extinct.

Such cases do not show that neo-Darwinism is false; they only show that the "all else being equal" clauses must be taken seriously. Change the climate enough and the next generation of dinosaurs won't be more fit than its parents. Hit enough dinosaurs with meteors, and there won't be a next generation. But that does not argue against Darwinian selection, as this claims only to say what happens when the ecology doesn't change, or only changes very gradually, which manifestly does not apply in the case of the dinosaurs and the meteorite strikes.

So much for the theory, now for the objections. Natural selection is a radically environmentalist theory. There are, therefore, analogies between what Darwin said about the process of evolution of phenotypes and what the psychologist B. F. Skinner said about the learning of what he called "operant behaviour" - the whole network of events and factors involved in the behaviour of humans and non-human animals.

Driven from within

These analogies are telling. Skinner's theory, though once fashionable, is now widely agreed to be unsustainable, largely because Skinner very much overestimated the contribution that the structure of a creature's environment plays in determining what it learns, and correspondingly very much underestimated the contribution of the internal or "endogenous" variables - including, in particular, innate cognitive structure.

In our book, we argue in some detail that much the same is true of Darwin's treatment of evolution: it overestimates the contribution the environment makes in shaping the phenotype of a species and correspondingly underestimates the effects of endogenous variables. For Darwin, the only thing that organisms contribute to determining how next-generation phenotypes differ from parent-generation phenotypes is random variation. All the non-random variables come from the environment.

Suppose, however, that Darwin got this wrong and various internal factors account for the data. If that is so, there is inevitably less for environmental filtering to do.

The consensus view among neo-Darwinians continues to be that evolution is random variation plus structured environmental filtering, but it seems the consensus may be shifting. In our book we review a large and varied selection of non-environmental constraints on trait transmission. They include constraints imposed "from below" by physics and chemistry, that is, from molecular interactions upwards, through genes, chromosomes, cells, tissues and organisms. And constraints imposed "from above" by universal

principles of phenotypic form and self-organisation - that is, through the minimum energy expenditure, shortest paths, optimal packing and so on, down to the morphology and structure of organisms.

Over the aeons of evolutionary time, the interaction of these multiple constraints has produced many viable phenotypes, all compatible with survival and reproduction. Crucially, however, the evolutionary process in such cases is not driven by a struggle for survival and/or for reproduction. Pigs don't have wings, but that's not because winged pigs once lost out to wingless ones. And it's not because the pigs that lacked wings were more fertile than the pigs that had them. There never were any winged pigs because there's no place on pigs for the wings to go. This isn't environmental filtering, it's just physiological and developmental mechanics.

So, how many constraints on the evolution of phenotypes are there other than those that environmental filtering imposes? Nobody knows, but the picture now emerging is of many, many of them operating in many, many different ways and at many, many different levels. That's what the evolutionary developmental school of biology and the theory that gene regulatory networks control our underlying development both suggest. And it strikes us as entirely plausible.

It seems to us to be no coincidence that neo-Darwinian rhetoric in the literature of experimental biology has cooled detectably in recent years. In its place, we find evolutionary biologist Leonid Kruglyak being quoted in *Nature* in November 2008 (vol 456, p 18) thus: "It's a possibility that there's something [about the contributions of genomic structure to the evolution of complex phenotypes] we just don't fundamentally understand... That it's so different from what we're thinking about that we're not thinking about it yet."

And then there is this in March 2009 from molecular biologist Eugene Koonin, writing in *Nucleic Acids Research* (vol 37, p 1011): "Evolutionary-genomic studies show that natural selection is only one of the forces that shape genome evolution and is not quantitatively dominant, whereas non-adaptive processes are much more prominent than previously suspected." There's quite a lot of this sort of thing around these days, and we confidently predict a lot more in the near future.

Darwinists say that evolution is explained by the selection of phenotypic traits by environmental filters. But the effects of endogenous structure can wreak havoc with this theory. Consider the following case: traits t_1 and t_2 are endogenously linked in such a way that if a creature has one, it has both. Now the core of natural selection is the claim that phenotypic traits are selected for their adaptivity, that is, for their effect on fitness. But it is perfectly possible that one of two linked traits is adaptive but the other isn't; having one of them affects fitness but having the other one doesn't. So one is selected for and the other "free-rides" on it.

We should stress that every such case (and we argue in our book that free-riding is ubiquitous) is a counter-example to natural selection. Free-riding shows that the general claim that phenotypic traits are selected for their effects on fitness isn't true. The most that natural selection can actually claim is that some phenotypic traits are selected for their effects on fitness; the rest are selected for... well, some other reason entirely, or perhaps for no reason at all.

Every case of free-riding is a counter-example to natural selection

It's a main claim of our book that, when phenotypic traits are endogenously linked, there is no way that selection can distinguish among them: selection for one selects the others, regardless of their effects on fitness. That is a great deal less than the general theory of the mechanics of evolution that the Darwinists suppose that natural selection provides. Worse still, there isn't the slightest reason to suppose that free-riding exhausts the kinds of exceptions to natural selection that endogenous structures can produce.

"All right," you may say, "but why should anybody care?" Nobody sensible doubts that evolution occurs - we certainly don't. Isn't this a parochial issue for professional biologists, with nothing cosmic turning on it? Here's why we think that is not so.

Natural selection has shown insidious imperialistic tendencies. The offering of post-hoc explanations of phenotypic traits by reference to their hypothetical effects on fitness in their hypothetical environments of selection has spread from evolutionary theory to a host of other traditional disciplines: philosophy, psychology, anthropology, sociology, and even to aesthetics and theology. Some people really do seem to think that natural selection is a universal acid, and that nothing can resist its powers of dissolution.

However, the internal evidence to back this imperialistic selectionism strikes us as very thin. Its credibility depends largely on the reflected glamour of natural selection which biology proper is said to legitimise. Accordingly, if natural selection disappears from biology, its offshoots in other fields seem likely to disappear as well. This is an outcome much to be desired since, more often than not, these offshoots have proved to be not just post hoc but ad hoc, crude, reductionist, scientistic rather than scientific, shamelessly self-congratulatory, and so wanting in detail that they are bound to accommodate the data, however that data may turn out. So it really does matter whether natural selection is true.

That's why we wrote our book.

Profile

Jerry Fodor is a philosopher and cognitive scientist at Rutgers University, New Jersey. Massimo Piattelli-Palmarini is a cognitive scientist at the University of Arizona, Tucson. This essay draws on material from their new book, *What Darwin Got Wrong*, published in the US by Farrar, Straus, and Giroux, and in the UK by Profile

http://www.newscientist.com/article/mg20527466.100-survival-of-the-fittest-theory-darwinisms-limits.html

'Imaginary rabbit' breaks out of the body

- 17:22 03 February 2010 by **Ewen Callaway**

Out of body rabbit experience (Image: William Koechling/Getty)

In a new twist on an old illusion, people have been made to feel an "imaginary rabbit" hopping along a stick resting between their fingers.

The trick is a variation on a tactile illusion called the cutaneous rabbit in which a series of discrete taps to two areas of skin are perceived as movement between those two areas. For instance, two taps to the elbow followed by a single tap to the wrist will feel as if a "rabbit" is hopping towards the wrist.

Makoto Miyazaki, a cognitive neuroscientist at Kochi University of Technology in Japan, was using this decades-old trick to test perception when he realised that the effect seemed to jump from his body onto the object he was holding at the time.

To investigate further, Miyazaki used an electrically operated device to administer taps to eight volunteers while they held a 10-centimetre aluminium rod between two fingers. The volunteers were then asked to describe where they felt the taps.

Finger tapping

The device delivered two taps to the first finger, 800 milliseconds apart, then tapped the second finger 50 or 80 milliseconds later.

As with the classical version of the illusion, volunteers did not sense discrete taps to one finger and then the other. Instead, they felt the taps move up or down the stick, depending on the order in which they were delivered.

The participants sensed the first tap as being on their finger, the second tap (which was actually on the same finger) as being halfway down the rod, and the third tap on the second finger, which is where it actually was.

In control experiments, volunteers not holding the rod who were given the same sequence of taps reported no sensation passing between their fingers.

"It is a bit astonishing," says Felix Blankenburg, a neuroscientist at the Bernstein Center for Computational Neuroscience in Berlin, Germany, who in a separate experiment scanned the brains of people experiencing the cutaneous rabbit illusion.

Body map

Blankenburg's study pinpointed activity in a part of the brain called the somatosensory cortex, an area that maintains an internal body map.

"According to common-sense physiology, this stick should not be included in the body map," Miyazaki says. To feel the "rabbit" hop onto the stick, so to speak, could mean that the body map is more changeable than previously thought, he says.

He plans to run experiments which scan brain activity during the illusion, in the hope that this will pinpoint the exact mechanisms responsible.

Journal reference: *The Journal of Neuroscience*, DOI: 10.1523/jneurosci.3887-09-2010

http://www.newscientist.com/article/dn18472-imaginary-rabbit-breaks-out-of-the-body.html

'Living beach ball' is giant single cell

- 11:56 03 February 2010 by **Michael Marshall**

Single-celled wonder (Image: Andy Gooday)

Zoologger *is our weekly column highlighting extraordinary animals – and occasionally other organisms – from around the world.*

Species name: *Syringammina fragilissima*

Habitat: The sea floor around Europe and north Africa.

In the late summer of 1882, a ship called the Triton cruised the chilly seas north of Scotland. As it went, it dredged the sea bed for specimens of unknown creatures, under the guidance of the oceanographer John Murray.

Two of the specimens were strange enough that Murray sent them to his colleague Henry Brady for examination. They were chunks of sand a few centimetres across, lightly cemented together and filled with a network of hollow branching tubes.

The samples were fragile and had been badly broken, but Brady was able to identify them as a new species, which he called *Syringammina fragilissima*: "very fragile sand pipe". A better name would have been very fragile sand beach ball, but Brady didn't see the organism underwater.

It turns out that Murray and Brady had discovered the first specimen of an entirely new group of organisms, the single-celled xenophyophores. Shunning the convention that single cells are microscopic, *Syringammina* is a brute, growing to a width of 10 centimetres – and sometimes even twice that.

Crusty and slimy

The cell branches and splits into hundreds of tubes, which ramify and interconnect in a hugely complex network. It also bends the single-cell convention of having only a single nucleus: *Syringammina* has many, scattered throughout the tubes.

As the cell proliferates, it builds up a crusty structure around itself, called the test – this is what Murray's expedition found. To build it, the cell secretes a slimy organic cement, which it uses to stick together tiny particles of sediment.

The tests made by *Syringammina* are by far the largest structures created by any single cell. The actual cell may not be as big – as the test gets ever larger, the cell will abandon parts of it, which may be taken over by a range of tiny animals, such as nematodes.

A study of a similar species, which was observed through a time-lapse camera for eight months, showed that the creature built itself up in fits and starts: it would grow for a few days, then remain the same size for a few months, then have another growth spurt. *Syringammina* may do the same thing; we don't know.

Known unknowns

In fact, there is very little about the monstrous beach ball cell that we do know.

Let us count the ways. We do not know how it reproduces. The group it belongs to, the xenophyophores, is part of a much larger group called the foraminiferans, and these often switch between sexual and asexual reproduction. *Syringammina* may well do the same thing.

We do not know how it feeds. It may be a suspension feeder, pumping water through its body and sifting out tiny particles of food, or it may poke out a "limb" to pick up food from the sea bed.

Farm animal

Another possibility has been put forward by Ole Tendal of the Zoological Museum of the University of Copenhagen, Denmark: *Syringammina* may farm bacteria.

Within the tubes of the test, *Syringammina* accumulates particles of waste, which it stitches together into long strings. *Syringammina* might use these strings to cultivate bacteria. The waste pellets would provide food for the bacteria, which the *Syringammina* could then eat.

There is some tentative evidence to support this. A 2004 study found that *Syringammina* contains unusually high levels of certain fatty acids that are characteristic of bacteria.

One more mystery. Scattered throughout the *Syringammina* cell – and indeed through the cells of all xenophyophores – are tiny crystals of barium sulphate. They could be a waste product, or ballast, or something altogether different. We have no idea.

http://www.newscientist.com/article/dn18468-zoologger-living-beach-ball-is-giant-single-cell.html

Draw! The neuroscience behind Hollywood shoot-outs

- 00:01 03 February 2010 by **Debora MacKenzie**

Magazine issue 2746.

First on the draw loses (Image: TVE/Canal+ Espana/The Kobal Collection)

Niels Bohr once had a theory on why the good guy always won shoot-outs in Hollywood westerns. It was simple: the bad guy always drew first. That left the good guy to react unthinkingly – and therefore faster. When Bohr tested his hypothesis with toy pistols and colleagues who drew first, he always won.

Andrew Welchman of the University of Birmingham, UK, has now taken this a step further. Bohr may have won a Nobel prize for his work on quantum mechanics, but it turns out the answer to this puzzle is more complicated than he thought.

Welchman pitted pairs of people against each other. The task? Lift your hand off a button, push two other buttons, then return to the first. There was no start bell. "Eventually one decides it's time to move," Welchman says. "The other player will then try to move as fast as possible."

The reacting players took 21 milliseconds less time to move, on average, than the first ones. Welchman thinks reaction movement involves a faster brain pathway than intentional movement. So Bohr was right? Not quite.

There was also a "reaction time", a delay of 200 milliseconds before the players started to respond to their opponent's actions. So although they moved faster, they never won.

Hotheaded villains

Is there any truth to the Hollywood version of the gunfight, where the last guy to draw is the winner? If there is, a gunslinger would merely have to wait for the hotheaded villain to move first. But that couldn't have worked when two clued-up cowboys faced each other.

Now Welchman says neuroscience doesn't support Hollywood's portrayal either. The only way the last guy to draw could win is if the reactive part of the brain makes him move so fast that the time it takes him to draw, plus his reaction time, is less than the time it takes the first guy just to draw.

"It would be hard to get fast enough to recover the time it takes to react to your opponent," says Welchman. He thinks fast reactions evolved for avoiding unexpected danger, or for confrontations in which animals are in a face-off, and the second to move needs speed.

Fast but loose

"Voluntary and reactive movements differ in basic ways," says Florian Waszak, who studies movement at the University of Paris Descartes, France. The system has evolved so that reactions may be very fast but perhaps less accurate, Wasnak speculates.

Indeed, Welchman's "reactive" players hit the buttons less accurately than the "intentional" players, another reason fast reactions may not win gunfights.

So it was all Hollywood legend. "I've found little evidence for face-to-face duels on the streets of Dodge," Welchman says. And Bohr? "Maybe he was just a good shot." Or maybe everyone just expected the great Niels Bohr to win.

Journal reference: *Proceedings of the Royal Society B*, DOI: 10.1098/rspb.2009.2123

http://www.newscientist.com/article/dn18463-draw-the-neuroscience-behind-hollywood-shootouts.html

Tiny dinos perished in footprint death pits

- 02 February 2010 by **Jeff Hecht**

Magazine issue 2745.

The downfall for some dinosaurs (Image: Travel Ink/Getty)

FOLLOWING in someone's footsteps was a bad idea for a few unlucky dinosaurs. A rare fossil haul of feathered dinosaurs suggests they perished after falling into the deep muddy footprints of larger beasts.

David Eberth of the Royal Tyrrell Museum in Drumheller, Alberta, Canada, found partial skeletons of 18 small two-legged dinosaurs in the 160-million-year-old sediments from an ancient marsh in China. They were stacked on top of each other, apparently after becoming trapped in roughly circular swampy pits.

The pits contain distinctive red fragments of crust mixed into the mud. The palaeontologists reckon this is the result of large, heavy sauropod feet breaking through a crusty surface layer to watery mud beneath. A thin crust would have formed hiding the trap from an unsuspecting small dinosaur but unable support its weight.

The thin crust would have hidden the trap from an unsuspecting small dinosaur

Fifteen of the fossils were *Limusaurus inextricabilis*, an odd bipedal dinosaur with short arms and a beak. It appears to have eaten plants, although it belonged to a group of predators.

The victims were less than 1 metre tall and 1 to 3 metres long, says Eberth, so they would have been too short to push against the bottom, which was 1 or 2 metres beneath the surface of the watery mud. Their arms would have been covered with mud-slicked feathers and too small to pull them out of the hole (*PALAIOS*, DOI: 10.2110/palo.2009.p09-028r). "Finding any fossil remains like these, whose presence depends on the behaviour of other dinosaurs is bizarre," Eberth says.

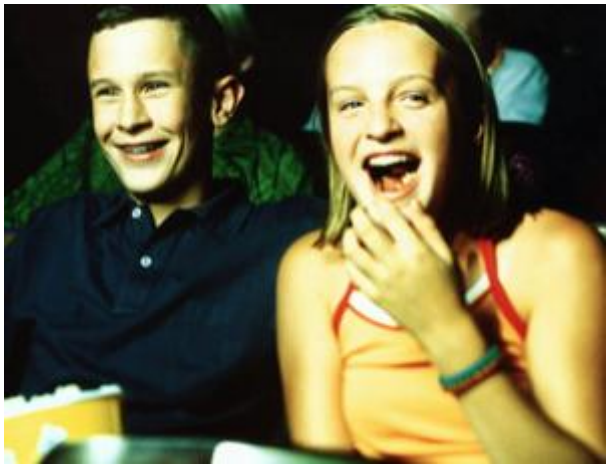
There are few small dinosaur fossils from the period. "It's a really interesting find," and expands the known behaviours of two-legged dinosaurs, says David Fastovsky of the University of Rhode Island, Kingston.

http://www.newscientist.com/article/mg20527454.100-tiny-dinos-perished-in-footprint-death-pits.html

The comedy circuit: When your brain gets the joke

- 01 February 2010 by **Daniel Elkan**

Magazine issue 2745.



Humour is a universal human characteristic; it may even define us (Image: Bill Truslow/Stone/Getty)

TWO polar bears are perched on a block of floating ice. One says to the other: "Do you know, I keep thinking it's Thursday..."

To some, this kind of surreal humour is side-splitting. Others are baffled by it and can't even raise a smile. Yet despite the importance of humour to human psychology, it is only the advances in brain imaging during the past decade that have enabled neuroscientists to pin down how the brain reacts when a joke tickles us. Armed with this knowledge, they are now solving the puzzle of why some jokes are funny to some people but leave others cold.

So what is a joke, exactly? Most theories agree that one condition is essential: there must be some kind of incongruity between two elements within the joke, which can be resolved in a playful or unexpected way.

Take the following exchange from the classic British sitcom *Only Fools and Horses*, when an anxious "Del Boy" Trotter visits his doctor for a heart check-up. "Do you smoke, Mr Trotter?" asks the doctor. "Not right now, thank you doctor," he responds.

The joke's incongruity, of course, lies in the unlikely offer of a cigarette by a doctor to a patient concerned about his heart. It is only once we understand the mismatch that we get the joke. "Humour seems to be a product of humans' ability to make rapid, intuitive judgements" about a situation, followed by "slower, deliberative assessments" which resolve incongruities, says Karli Watson of Duke University in Durham, North Carolina.

But which parts of the brain carry out these processes? To find out, Joseph Moran, then at Dartmouth College in Hanover, New Hampshire, used functional MRI to scan the brains of volunteers while they watched popular TV sitcoms. The experiments revealed a distinct pattern of neural activity that occurs in response to a funny joke, with the left posterior temporal gyrus and left inferior frontal gyrus seeing the most activity. These regions are normally linked to language comprehension and the ability to adjust the focus of our attention, which would seem to correspond to the process of incongruity-resolution at the heart of a good joke (*NeuroImage*, vol 21, p 1055).

Further research, conducted by Dean Mobbs, then at Stanford University in California, uncovered a second spike of activity in the brain's limbic system - associated with dopamine release and reward processing - which may explain the pleasure felt once you "get" the joke (*Neuron*, vol 40, p 1041).

Examining one particular part of the limbic system - the ventral striatum - was especially revealing, as its level of activity corresponded with the perceived funniness of a joke. "It's the same region that is involved in many different types of reward, from drugs, to sex and our favourite music," says Mobbs, now at the MRC Cognition and Brain Sciences Unit in Cambridge, UK. "Humour thus taps into basic rewards systems that are important to our survival."

Yet humour is a far more complex process than primeval pleasures like sex or food. In addition to the two core processes of getting the joke and feeling good about it, jokes also activate regions of the frontal and cingulate cortex, which are linked with association formation, learning and decision-making (*Cerebral Cortex*, vol 17, p314). The team also found heightened activity in the anterior cingulate cortex and the frontoinsular cortex - regions that are only present in humans and, in a less developed form, great apes. Indeed, the fact that these regions are involved suggests that humour is an advanced ability which may have only evolved in early humans, says Watson, who conducted the research.

Humour is a far more complex process than primeval pleasures like sex or food

No two brains are the same, however, and how these differences are reflected in our sense of humour is the subject of much research. Men and women, for example, seem to process jokes slightly differently. Although both sexes laugh at roughly the same number of jokes, women show greater activity in the left prefrontal cortex than men (*Proceedings of the National Academy of Sciences*, vol 102, p 16496). "This suggests a greater degree of executive processing and language-based decoding," says Mobbs. As a result, women take significantly longer than men to decide whether they find something funny, though that doesn't seem to spoil their enjoyment of the joke. Indeed, women show a greater response in the limbic system than men, suggesting they feel a greater sense of reward.

Women take significantly longer than men to decide whether or not they find something funny

Perhaps unsurprisingly, personality also appears to play a key role in humour. Mobbs has shown that people who are classed as extrovert and emotionally stable have increased activity in reward areas of the brain during exposure to funny stimuli. Neurotic people, in contrast, have less of a reward response compared with the average person (*Proceedings of the National Academy of Sciences*, vol 102, p 16502). "This suggests that personality style may be important in how we process humour," Mobbs says.

Twisted logic

Whether our neural circuitry can explain specific preferences for certain types of humour remains an open question. To investigate, Andrea Samson at the University of Fribourg in Switzerland used MRI to scan volunteers' brains while they looked at 90 different non-verbal cartoons reflecting various styles of humour. As a control, the volunteers also viewed pictures that could not be interpreted in any meaningful or funny way.

Surprising results emerged from that experiment. Although you might expect the subject matter - music or politics, for example - to determine joke preference, Samson found that it is the way a joke is solved that is most important. "The logic by which the incongruity is resolved matters most, in terms of what kind of person a joke appeals to," she says (see "What your sense of humour says about you").

There is a serious note to this work. The researchers hope that pinning down the brain processes involved in understanding jokes could shed light on a number of medical conditions. Mobbs, for example, hopes that studying humour will provide insights into depression. "It is believed that the reward system is

disrupted in depression and it would be interesting to see if this deficit extends to more complex social processes such as humour," he says.

Samson, meanwhile, hopes it could contribute to our understanding of autism. Previous research has suggested that people with autism have difficulty understanding comedy, but her work shows that they can understand and appreciate certain types of jokes as well as anyone (see "The mechanics of a joke"). This could change the way we interact with autistic children, she says.

More than anything, the recent research confirms the fact that humour, an oft-neglected trait when considering our cognitive skills, requires a tremendous amount of brain power. "Getting a joke would seem - on the surface - to be a very trivial, intuitive process. But brain imaging is showing us that there is more going on than we might think," says Samson.

What your sense of humour says about you

Most types of humour, including jokes and cartoons, rely on some kind of incongruity between two elements that needs a second's thought before it can be understood. The extent to which this mismatch can be resolved differs between jokes, however.

Some have a clean punchline that ties up all the loose ends, while in "nonsense" humour the incongruity can only be partially resolved, leaving a gap in the person's understanding. The cartoons to the right should give some idea of the difference between the two styles of joke.

For years, nonsense jokes have been considered to be more sophisticated and philosophical than classic, resolvable humour (known technically as "incongruity-resolution humour") - consider the reputation of *Monty Python's Flying Circus* compared with that of *Friends*, for example. "It was previously thought that nonsense humour was more complex in terms of thought process," says psychologist Andrea Samson at the University of Fribourg, Switzerland.

Samson's recent work suggests otherwise. When comparing MRI scans of people as they viewed both straight and nonsense humour, she found that straight humour evoked significantly more brain activity than a surreal joke in most volunteers. "Making sense out of opposed scripts and integrating this information seems to be a more complex process than simply laughing about nonsense," she says.

The degree to which Samson's volunteers "got" the joke was reflected in one small region of the brain called the temporoparietal junction (TPJ), with the most activity occurring when the resolvable cartoons were viewed but no activity for the unfunny control images (*Neuropsychologia*, vol 47, p 1023). The surreal cartoons fell somewhere in between.

"Although the attempt to resolve the incongruity is present with nonsense humour, this effort does not lead to a complete resolution of the incongruity and therefore to less activation of the TPJ," says Samson. What's more, if someone failed to get the joke, the rostral cingulate zone of the brain became more active - a region thought to pick up on errors in the way we behave and monitor conflicts.

Experience Seekers

Not everyone reacted more strongly to resolvable humour, however; those with one particular personality type found the surreal cartoons more rewarding. These people, dubbed "experience seekers", are defined by a desire to pursue novel sensations, stimulation and experiences, whether it's through art, travel, music or an unconventional living style.

When processing any type of funny cartoon, experience seekers showed greater activity in the TPJ, hippocampus and prefrontal areas of the brain than their fellow subjects, which might reflect their adventurous mindset, says Samson.

"The hippocampus is an area known to process novel stimuli," she says. "It could be that humorous stimuli give experience seekers an opportunity for mental exploration of novelty, and this 'lights up' the hippocampus."

Indeed, a previous study at the University of Kentucky in Lexington found that experience seekers have greater hippocampal volume, which would seem to fit with this result (*Neuropsychologia*, vol 45, p 2874).

The difference was most marked when the experience seekers viewed the surreal cartoons. Importantly, unlike the other subjects, their brains responded most strongly to the nonsense humour rather than the incongruity-resolution humour.

Samson reckons that the nonsense humour may allow the experience seeker's inquisitive brains even more opportunity for exploration than the resolvable humour, which could explain their preference.

The mechanics of a joke

Most jokes can be divided into certain "logical mechanisms" that determine which cognitive process your mind goes through before it understands the humour.

Many cartoons, for example, rely on our understanding of other people, playing on the fact that one character doesn't understand what the other is thinking. To get the joke you need a "theory of mind", allowing you to understand the different state of mind of each character. Perhaps unsurprisingly, brain scans have shown that areas involved in social cognition are activated when viewing this kind of cartoon.

The degree to which we empathise with others has a profound impact on our appreciation of this kind of joke. Andrea Samson at the University of Fribourg, Switzerland, showed this when she compared the responses of people with two different personality types. It turned out that "empathisers", who identify emotions and thoughts in others and respond appropriately, found the theory-of-mind jokes much funnier than "systemisers", who prefer to think about things in logical, abstract terms.

At the far end of this scale are people with autism, who have an impaired ability to empathise with other people. Some previous studies had found that people with autism have trouble understanding jokes, but since these studies hadn't considered different styles of humour, it wasn't clear whether they were unable to understand all kinds of humour, or whether it was simply theory-of-mind style jokes that had them stumped.

Samson decided to investigate. She found that while volunteers with Asperger's syndrome had difficulty understanding and appreciating theory-of-mind-based cartoons, they enjoyed visual puns, which do not rely on empathy, to the same extent as a control group. "Visual puns are much more abstract than theory-of-mind cartoons," says Samson. "To understand the joke, you have to realise that one visual element refers simultaneously to two meanings."

Some researchers had suspected that an element of empathy is needed for all kinds of humour - not just theory-of-mind jokes. But the fact that people with Asperger's syndrome get these visual puns shows that they don't lack an overall sense of humour, says Samson, just that they are poorly equipped to "get" a certain type of joke.

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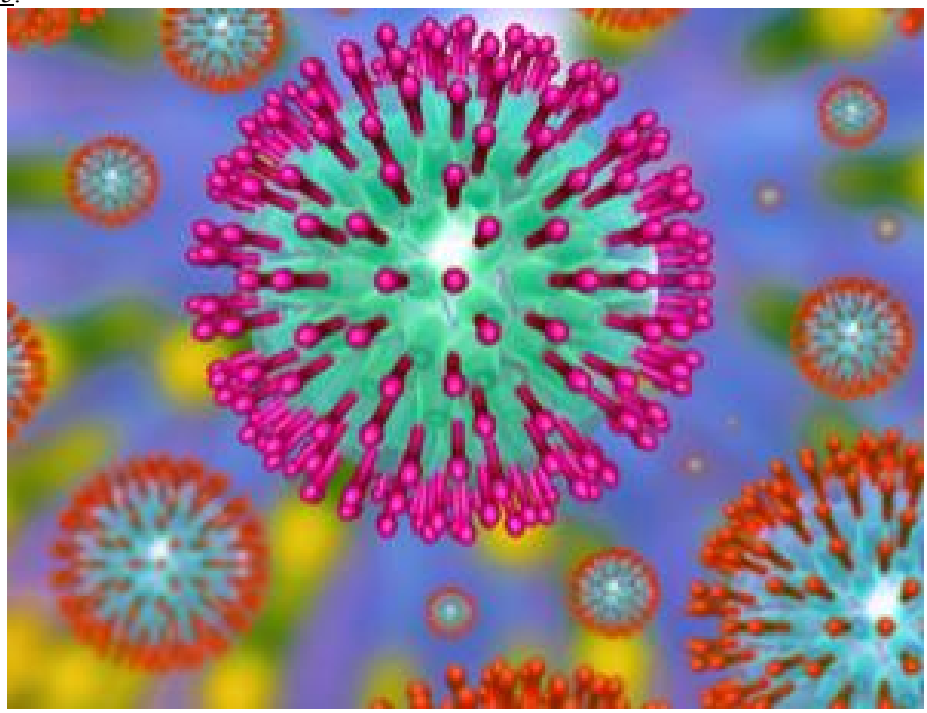
http://www.newscientist.com/article/mg20527451.400-the-comedy-circuit-when-your-brain-gets-the-joke.html

I, virus: Why you're only half human

- 29 January 2010 by **Frank Ryan**

Magazine issue 2745.



Part of our DNA (Image: Mehau Kulyk/SPL/Getty)

WHEN, in 2001, the human genome was sequenced for the first time, we were confronted by several surprises. One was the sheer lack of genes: where we had anticipated perhaps 100,000 there were actually as few as 20,000. A bigger surprise came from analysis of the genetic sequences, which revealed that these genes made up a mere 1.5 per cent of the genome. This is dwarfed by DNA deriving from viruses, which amounts to roughly 9 per cent.

On top of that, huge chunks of the genome are made up of mysterious virus-like entities called retrotransposons, pieces of selfish DNA that appear to serve no function other than to make copies of themselves. These account for no less than 34 per cent of our genome.

All in all, the virus-like components of the human genome amount to almost half of our DNA. This would once have been dismissed as mere "junk DNA", but we now know that some of it plays a critical role in our biology. As to the origins and function of the rest, we simply do not know.

The human genome therefore presents us with a paradox. How does this viral DNA come to be there? What role has it played in our evolution, and what is it doing to our physiology? To answer these questions we need to deconstruct the origins of the human genome - a story more fantastic than anything we previously imagined, with viruses playing a bigger part than you might care to believe.

Around 15 years ago, when I was researching my book *Virus X*, I came to the conclusion there was more to viruses than meets the eye. Viruses are often associated with plagues - epidemics accompanied by great mortality, such as smallpox, flu and AIDS. I proposed that plague viruses also interact with their hosts in a more subtle way, through symbiosis, with important implications for the evolution of their hosts. Today

we have growing evidence that this is true (*New Scientist*, 30 August 2008, p 38), and overwhelming evidence that viruses have significantly changed human evolution.

Symbiosis was defined by botanist Anton de Bary in 1878 as the living together of dissimilar organisms. The partners are known as symbionts and the sum of the partnership as the holobiont. Types of symbiotic relationships include parasitism, where one partner benefits at the expense of the other, commensalism, where one partner profits without harming the other, and mutualism, in which both partners benefit.

Symbiotic relationships have evolutionary implications for the holobiont. Although selection still operates on the symbionts at an individual level since they reproduce independently, it also operates at partnership level. This is most clearly seen in the pollination mutualisms involving hummingbirds and flowers, where the structure of flower and bill have co-evolved to accommodate each other and make a perfect fit. When symbiosis results in such evolutionary change it is known as symbiogenesis.

Viruses as partners

Symbiosis works at many different levels of biological organisation. At one end of the spectrum is the simple exchange of metabolites. Mycorrhizal partnerships between plant roots and fungi, which supply the plant with minerals and the fungus with sugars, are a good example. At the other end are behavioural symbioses typified by cleaning stations where marine predators line up to have their mouths cleared of parasites and debris by fish and shrimps.

Symbiosis can also operate at the genetic level, with partners sharing genes. A good example is the solar-powered sea slug *Elysia chlorotica*, which extracts chloroplasts from the alga it eats and transfers them to cells in its gut where they supply the slug with nutrients. The slug's genome also contains genes transferred from the alga, without which the chloroplasts could not function. The slug genome can therefore be seen as a holobiont of slug genes and algal genes.

This concept of genetic symbiosis is crucial to answering our question about the origin of the human genome, because it also applies to viruses and their hosts. Viruses are obligate parasites. They can only reproduce within the cells of their host, so their life cycle involves forming an intimate partnership. Thus, according to de Bary's definition, virus-host interactions are symbiotic.

Genetic symbiosis is crucial to understanding the origin of the human genome, because it also applies to viruses

For many viruses, such as influenza, this relationship is parasitic and temporary. But some cause persistent infections, with the virus never leaving the host. Such a long-term association changes the nature of the symbiosis, making the evolution of mutualism likely. This process often follows a recognisable progression I have termed "aggressive symbiosis".

An example of aggressive symbiosis is the myxomatosis epidemic in rabbits in Australia in the 1950s. The European rabbit was introduced into Australia in 1859 as a source of food. Lacking natural predators, the population exploded, leading to widespread destruction of agricultural grassland. In 1950, rabbits infected with myxoma virus were deliberately released into the wild. Within three months, 99.8 per cent of the rabbits of south-east Australia were dead.

In 1950, rabbits infected with myxoma virus were released into the wild. Within three months 99.8 per cent of rabbits in south-east Australia were dead

Although the myxomatosis epidemic was not planned as an evolutionary experiment, it had evolutionary consequences. The myxoma virus's natural host is the Brazilian rabbit, in which it is a persistant partner causing no more than minor skin blemishes. The same is now true of rabbits in Australia. Over the course of the epidemic the virus selected for rabbits with a minority genetic variant capable of surviving

infection. Plague culling was followed by co-evolution, and today rabbit and virus coexist in a largely non-pathogenic mutualism.

Now imagine a plague virus attacking an early human population in Africa. The epidemic would have followed a similar trajectory, with plague culling followed by a period in which survivors and virus co-evolved. There is evidence that this happened repeatedly during our evolution, though when, and through what infectious agents, is unknown (*Proceedings of the National Academy of Sciences*, vol 99, p 11748).

Even today viral diseases are changing the course of human evolution. Although the plague culling effect is mitigated by medical intervention in the AIDS pandemic, we nevertheless observe selection pressure on humans and virus alike. For example, the human gene *HLA-B* plays an important role in the response to HIV-1 infection, and different variants are strongly associated with the rate of AIDS progression. It is therefore likely that different *HLA-B* alleles impose selection pressure on HIV-1, while *HLA-B* gene frequencies in the population are likely to be influenced by HIV (*Nature*, vol 432, p 769). This is symbiogenesis in action.

How does that move us closer to understanding the composition of the human genome? HIV-1 is a retrovirus, a class of RNA virus that converts its RNA genome into DNA before implanting it into host chromosomes. This process, known as endogenisation, converts an infectious virus into a non-infectious endogenous retrovirus (ERV). In humans, ERVs are called HERVs.

Germline invaders

Endogenisation allows retroviruses to take genetic symbiosis to a new level. Usually it is an extension of the normal infectious process, when a retrovirus infects a blood cell, such as a lymphocyte. But if the virus happens to get incorporated in a chromosome in the host's germ line (sperm or egg), it can become part of the genome of future generations.

Such germ-line endogenisation has happened repeatedly in our own lineage - it is the source of all that viral DNA in our genome. The human genome contains thousands of HERVs from between 30 and 50 different families, believed to be the legacy of epidemics throughout our evolutionary history. We might pause to consider that we are the descendents of the survivors of a harrowing, if brutally creative, series of viral epidemics.

Endogenisation is happening right now in a retroviral epidemic that is spreading among koalas in Australia. The retrovirus, KoRv, appeared about 100 years ago and has already spread through 75 per cent of the koala's range, culling animals on a large scale and simultaneously invading the germ line of the survivors.

Retroviruses don't have a monopoly on endogenisation. Earlier this month researchers reported finding genes from a bornavirus in the genomes of several mammals, including humans, the first time a virus not in the retrovirus class has been identified in an animal genome. The virus appears to have entered the germ line of a mammalian ancestor around 40 million years ago (*Nature*, vol 463, p 84). Many more such discoveries are anticipated, perhaps explaining the origin of some of that mysterious half of the genome.

The ability of viruses to unite, genome-to-genome, with their hosts has clear evolutionary significance. For the host, it means new material for evolution. If a virus happens to introduce a useful gene, natural selection will act on it and, like a beneficial new mutation, it may spread through the population.

Could a viral gene really be useful to a mammal? Don't bet against it. Retroviruses have undergone a long co-evolutionary relationship with their hosts, during which they have evolved the ability to manipulate host defences for their own ends. So we might expect the genes of viruses infecting humans to be compatible with human biology.

This is also true of their regulatory DNA. A virus integrating itself into the germ line brings not just its own genes, but also regulatory regions that control those genes. Viral genomes are bookended by regions known as long terminal repeats (LTRs), which contain an array of sequences capable of controlling not just viral genes but host ones as well. Many LTRs contain attachment sites for host hormones, for example, which probably evolved to allow the virus to manipulate host defences.

Retroviruses will often endogenise repeatedly throughout the host genome, leading to a gradual accumulation of anything up to 1000 ERVs. Each integration offers the potential of symbiogenetic evolution.

Once an ERV is established in the genome, natural selection will act on it, weeding out viral genes or regulatory sequences that impair survival of the host, ignoring those that have no effect, and positively selecting the rare ones that enhance survival.

Most ERV integrations will be negative or have no effect. The human genome is littered with the decayed remnants of such integrations, often reduced to fragments, or even solitary LTRs. This may explain the origin of retrotransposons. These come in two types: long and short interspersed repetitive elements (LINEs and SINEs), and it now appears likely that they are heavily degraded fragments of ancient viruses.

As for positive selection, this can be readily confirmed by looking for viral genes or regulatory sequences that have been conserved and become an integral part of the human genome. We now know of many such sequences.

The first to be discovered is the remnant of a retrovirus that invaded the primate genome a little less than 40 million years ago and gave rise to what is known as the W family of ERVs. The human genome has roughly 650 such integrations. One of these, on chromosome 7, contains a gene called *syncytin-1*, which codes for a protein originally used in the virus's envelope but now critical to the functioning of the human placenta. Expression of *syncytin-1* is controlled by two LTRs, one derived from the original virus and another from a different retrovirus called MaLR. Thus we have a quintessential viral genetic unit fulfilling a vitally important role in human biology.

Virus genes

There are many more examples. Another gene producing a protein vital to the construction of the placenta, *syncytin-2*, is also derived from a virus, and at least six other viral genes contribute to normal placental function, although their precise roles are poorly understood.

There is also tentative evidence that HERVs play a significant role in embryonic development. The developing human embryo expresses genes and control sequences from two classes of HERV in large amounts, though their functions are not known (*Virology*, vol 297, p 220). What is more, disrupting the action of LINE retrotransposons by administration of the drug nevirapine causes an irreversible arrest in development in mouse embryos, suggesting that LINEs are somehow critical to early development in mammals (*Systems Biology in Reproductive Medicine*, vol 54, p 11).

It also appears that HERVs play important roles in normal cellular physiology. Analysis of gene expression in the brain suggests that many different families of HERV participate in normal brain function. *Syncytin-1* and *syncytin-2*, for example, are extensively expressed in the adult brain, though their functions there have yet to be explored.

Other research groups have found that 25 per cent of human regulatory sequences contain viral elements, prompting suggestions that HERVs make a major contribution to gene regulation (*Trends in Genetics*, vol 19, p 68). In support of that, HERV LTRs have been shown to be involved in the transcription of

important proteins. For example, the *beta-globin* gene, which codes for one of the protein components of haemoglobin, is partly under the control of an LTR derived from a retrovirus.

The answer to our paradox is now clear: the human genome has evolved as a holobiontic union of vertebrate and virus. It is hardly surprising that researchers who have made these discoveries are now calling for a full-scale project to assess the contribution of viruses to our biology (*BMC Genomics*, vol 9, p 354).

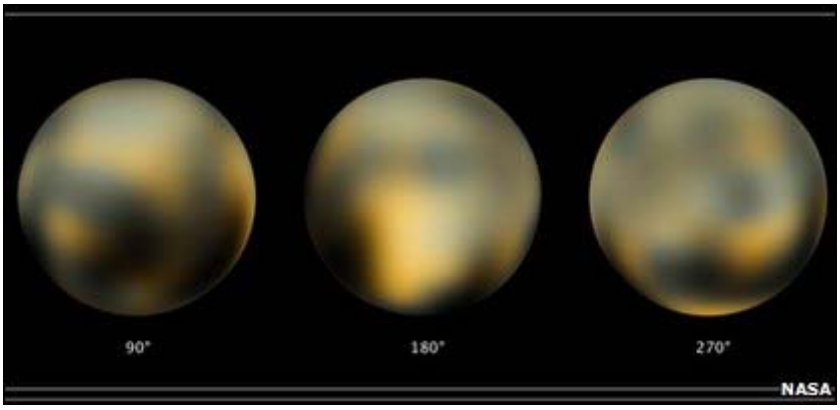
It is also probable that this "virolution" is continuing today. HIV belongs to a group of retroviruses called the lentiviruses. Until recently virologists thought that lentiviruses did not endogenise, but now we know that they have entered the germ lines of rabbits and the grey mouse lemur. That suggests that HIV-1 might have the potential to enter the human germ line (*Proceedings of the National Academy of Sciences*, vol 104, p 6261 and vol 105, p 20362), perhaps taking our evolution in new and unexpected directions. It's a plague to us - but it could be vital to the biology our descendants.

Frank Ryan is a writer, medical doctor and biologist based in Sheffield, UK. His book Virolution is published by HarperCollins. He is the author of a series of five review articles on the impact of viral symbiosis on medical genetics, published in the Journal of the Royal Society of Medicine (vol 102, p 272, p 324, p 415, p 474 and p 530)

http://www.newscientist.com/article/mg20527451.200-i-virus-why-youre-only-half-human.html

Hubble shows Pluto 'going redder'

Images taken by the Hubble Space Telescope have revealed some unusual and colourful changes to the surface of Pluto.



Nasa says the dwarf planet on the edge of our solar system is becoming increasingly red.

Its illuminated northern hemisphere is also getting brighter.

Nasa's scientists believe these are seasonal changes - as the planet heads into a new phase of its 248-year-long seasonal cycle.

"These changes are most likely consequences of surface ice melting on the sunlit pole and then re-freezing on the other pole," Nasa's Space Telescope Science Institute said in a statement.

The overall colour is probably a result of ultraviolet radiation from the distant Sun breaking up methane on Pluto's surface. This, scientists say, would leave behind a red carbon-rich residue.

But some astronomers have expressed shock at the changes.

"It's a little bit of a surprise to see these changes happening so big and so fast," said Marc Buie, of the Southwest Research Institute. "This is unprecedented."

In 2006, astronomers stripped Pluto of its status as a full planet, downgrading it to a dwarf planet.

Further away and considerably smaller than the eight other "traditional" planets in the solar system, Pluto - at just 2,360km (1,467 miles) across - is smaller even than some moons.

Nasa said: "The Hubble pictures underscore that Pluto is not simply a ball of ice and rock but a dynamic world that undergoes dramatic atmospheric changes."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8499660.stm

Published: 2010/02/05 11:44:26 GMT

Ancient Indian language dies out

By Alastair Lawson
BBC News

The last speaker of an ancient language in India's Andaman Islands has died at the age of about 85, a leading linguist has told the BBC.

Professor Anvita Abbi said that the death of Boa Sr was highly significant because one of the world's oldest languages - Bo - had come to an end.

She said that India had lost an irreplaceable part of its heritage.

Languages in the Andamans are thought to originate from Africa. Some may be 70,000 years old.

The islands are often called an "anthropologist's dream" and are one of the most linguistically diverse areas of the world.

'Infectious'

Professor Abbi - who runs the Vanishing Voices of the Great Andamanese (Voga) website - explained: "After the death of her parents, Boa was the last Bo speaker for 30 to 40 years.

"She was often very lonely and had to learn an Andamanese version of Hindi in order to communicate with people.

"But throughout her life she had a very good sense of humour and her smile and full-throated laughter were infectious."

She said that Boa Sr's death was a loss for intellectuals wanting to study more about the origins of ancient languages, because they had lost "a vital piece of the jigsaw".

"It is generally believed that all Andamanese languages might be the last representatives of those languages which go back to pre-Neolithic times," Professor Abbi said.

"The Andamanese are believed to be among our earliest ancestors."

Boa Sr's case has also been highlighted by the Survival International (SI) campaign group.

"The extinction of the Bo language means that a unique part of human society is now just a memory," SI Director Stephen Corry said.

'Imported illnesses'

She said that two languages in the Andamans had now died out over the last three months and that this was a major cause for concern.

Academics have divided Andamanese tribes into four major groups, the Great Andamanese, the Jarawa, the Onge and the Sentinelese.

Professor Abbi says that all apart from the Sentinelese have come into contact with "mainlanders" from India and have suffered from "imported illnesses".

She says that the Great Andamanese are about 50 in number - mostly children - and live in Strait Island, near the capital Port Blair.

Boa Sr was part of this community, which is made up of 10 "sub-tribes" speaking at least four different languages.

The Jarawa have about 250 members and live in the thick forests of the Middle Andaman. The Onge community is also believed to number only a few hundred.

"No human contact has been established with the Sentinelese and so far they resist all outside intervention," Professor Abbi said.

It is the fate of the Great Andamanese which most worries academics, because they depend largely on the Indian government for food and shelter - and abuse of alcohol is rife.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/south_asia/8498534.stm

Published: 2010/02/04 18:28:19 GMT

Artificial pancreas diabetes hope

Scientists in Cambridge have shown that an "artificial pancreas" can be used to regulate blood sugar in children with Type 1 diabetes.

A trial found that combining a "real time" sensor measuring glucose levels with a pump that delivers insulin can boost overnight blood sugar control.

The Lancet study showed the device significantly cut the risk of blood sugar levels dropping dangerously low.

Experts said the results were an important "step forward".

Type 1 diabetes is a chronic, life threatening condition, in which the pancreas does not produce insulin - the hormone that regulates blood sugar levels.

" **We need to redouble our efforts to move the artificial pancreas from a concept in the clinic to a reality in the home of children and adults with Type 1 diabetes** "
Karen Addington, Juvenile Diabetes Research Foundation

In total, 17 children and teenagers with Type 1 diabetes took part in the study over 54 nights in hospital.

Individually, the glucose monitoring system and the insulin pump used in the study are both already widely used and commercially available.

But in order to turn them into a "closed loop" system which monitors the patient's condition and delivers treatment accordingly, the researchers developed a sophisticated algorithm to calculate the appropriate amount of insulin to deliver based on the real-time glucose readings.

They then measured how well the artificial pancreas system controlled glucose levels compared with the children's regular continuous pump, which delivers insulin at preselected rates.

Low blood sugar

Testing was done in different circumstances - for example on nights when the children went to bed after eating a large evening meal, which can lead to 'insulin stacking' or having done early evening exercise -

both of which can increase the risk of low blood sugar episodes known as hypoglycaemic attacks or "hypos".

- 1 - Continuous glucose sensor monitors blood sugar level
- 2 - Data transmitted for the computer programme to work out insulin dose
- 3 - Insulin pump delivers the dose

Overall, the results showed the artificial pancreas kept blood glucose levels in the normal range for 60% of the time, compared with 40% for the continuous pump.

And the artificial pancreas halved the time that blood glucose levels fell below 3.9mmol/l - the level considered as mild hypoglycaemia.

It also prevented blood glucose falling below 3.0mmol/l, which is defined as significant hypoglycaemia, compared with nine hypoglycaemia events in the control groups.

Study leader Dr Roman Hovorka said: "This is the first randomised study showing the potential benefit of the artificial pancreas system overnight using commercially-available sensors and pumps.

"Our study provides a stepping stone for testing the system at home."

Karen Addington, chief executive of Juvenile Diabetes Research Foundation, who funded the research said the study provided "proof of principle" of an artificial pancreas.

"We need to redouble our efforts to move the artificial pancreas from a concept in the clinic to a reality in the home of children and adults with type 1 diabetes."

Dr Victoria King, research manager at leading health charity Diabetes UK, said: "This is an important step forward in managing overnight blood glucose levels as well as in the eventual development of a full 'artificial pancreas' which could vastly improve the quality of life for people with type 1 diabetes and reduce the risk of the associated complications."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8498993.stm

Published: 2010/02/05 00:06:26 GMT

Secret of sperm sprint uncovered

A mechanism which starts sperm swimming when they get near the egg could one day lead to new forms of male contraception, scientists have said.

Tiny pores on the sperm's surface allow it to change its internal pH, which in turn starts its tail movements.

Researchers from the University of California in San Francisco said the study might also explain why marijuana makes men infertile.

A UK expert said it could have a big effect on men's fertility.

Limited resources

Sperm do not start swimming from the moment of ejaculation - they have only limited resources, and to stand much chance of reaching the egg, need to delay their frantic dash until they are closer to the egg.

" **It could lead us to either develop a novel contraceptive for men, or perhaps find a way to improve the sperm motility for men whose sperm don't swim as well as they should** "
Dr Allan Pacey, University of Sheffield

Scientists have long known that a sperm's level of activity is governed by internal pH - how acid or alkaline its contents are - but the method which alters this at the right moment has proved elusive.

In order to increase its pH and become more alkaline, the sperm needs to jettison protons, and the US scientists have found pores on its surface which allow it to do precisely that.

Dr Yuriy Kirichok, who led the research, said: "The concentration of protons inside the sperm cell is 1,000 times higher than outside.

"If you just open a pore, protons will go outside - we identify the molecule that lets them out."

These pores, or Hv1 proton channels, as they have been termed, seem to be primed to open at precisely the right moment.

They respond to a substance called anandamide, which is present in the female reproductive tract, and in particularly high levels near the egg.

Cannabis theory

Anandamide is an "endocannabinoid", a natural substance which can affect neurons, but it is possible that the cannabinoids found in marijuana may mimic some of its effects - which could explain why cannabis use has been associated with subfertility in men.

Dr Kirichok said: "Marijuana likely activates sperm prematurely, leaving them burnt out in a matter of hours."

He said that it was possible that the newly discovered channel could be exploited by a drug which hampered the proton release, leaving sperm stranded.

He said: "All of these events are essential to fertilisation - you can imagine now that we know the molecule responsible we could block it to prevent activation and fertilisation as a kind of male contraception."

Dr Allan Pacey, senior lecturer in andrology at the University of Sheffield, said: "Although it seems obvious that sperm have to swim in order to find and fertilise an egg inside the female body, or in the dish during IVF, we are only just uncovering some of the molecular details that the sperm use when swimming"

"Now that we know what this ion channel is, then it could lead us to either develop a novel contraceptive for men, or perhaps find a way to improve the sperm motility for men whose sperm don't swim as well as they should"

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8498362.stm

Published: 2010/02/05 00:08:37 GMT

Is This Headline Clear? Learning About Ambiguity and Clarity From Headlines

By AMANDA CHRISTY BROWN AND HOLLY EPSTEIN OJALVO

Happycentro

Overview | What are the purposes of headlines? What factors sometimes render them ambiguous, confusing or misleading? What role does grammar play in clarity? In this lesson, students review and revise ambiguous headlines to make them clearer, consider what makes headlines effective and generate their own tips and guidelines. Various related activities are provided for journalism, English language arts and English language learning.

Materials | Computers with Internet access (optional), handouts

Warm-up | Distribute Headline Headaches! (PDF), which offers a list of ambiguously written (and humorous) headlines, and tell them to work in pairs to parse each one according to the directions. Then discuss each headline, the errors and resulting humor, as well as their suggested fixes. Ask: Why do you think these sorts of miscommunications happen often in headlines? Jot down ideas on the board, and then explain that they will now read more about the reasons why ambiguities frequently crop up in headlines.

Related | In "Crash Blossoms," Ben Zimmer discusses the humor that can result from ambiguous headlines and the coinage of the phrase "crash blossoms" to describe them:

In their quest for concision, writers of newspaper headlines are, like Robert Browning, inveterate sweepers away of little words, and the dust they kick up can lead to some amusing ambiguities. Legendary headlines from years past (some of which verge on the mythical) include "Giant Waves Down Queen Mary's Funnel," "MacArthur Flies Back to Front" and "Eighth Army Push Bottles Up Germans." The Columbia Journalism Review even published two anthologies of ambiguous headlinese in the 1980s, with the classic titles "Squad Helps Dog Bite Victim" and "Red Tape Holds Up New Bridge."

For years, there was no good name for these double-take headlines. Last August, however, one emerged in the Testy Copy Editors online discussion forum. Mike O'Connell, an American editor based in Sapporo, Japan, spotted the headline "Violinist Linked to JAL Crash Blossoms" and wondered, "What's a crash blossom?" (The article, from the newspaper Japan Today, described the successful musical career of Diana Yukawa, whose father died in a 1985 Japan Airlines plane crash.) Another participant in the forum, Dan Bloom, suggested that "crash blossoms" could be used as a label for such infelicitous headlines that encourage alternate readings, and news of the neologism quickly spread.

Read the column with your class, using the questions below.

Questions | For discussion and reading comprehension:

1. What about headline writing conventions (and other "compressed" forms, like telegrams, texts and tweets) makes it likely that headlines include phrases that can be read different ways?
2. What is a neologism?
3. What is the "garden-path phenomenon"? Have you experienced it while reading?
4. How and why is the English language "especially prone to such ambiguities"?
5. What words in this column are unfamiliar to you? How can you use context clues to help you figure out their meanings?

RELATED RESOURCES

From The Learning Network

- Lesson: Teaching and Learning About Journalism
- Lesson: Today's News, Tomorrow's History
- Lesson: Slanted Sentences

From NYTimes.com

- Times Topics: English Language
- Magazine: On Language Columns
- Blog: Schott's Vocab

Around the Web

- Poynter Online
- No Train No Gain: Copy Desk Resources
- HighSchoolJournalism.org: Headline Writing Is Hard!

Activity | Delve further into headlines and their purpose and function. Ask: What are the purposes of headlines? What can we learn from them? How do they convey information? Why is clarity important?

Prompt students to consider such elements as verb tense (use of present tense to convey a recent event and past tense to convey something that happened longer ago), word omission, capitalization, punctuation, active voice and so on. They should also discuss the differences in tone and style between news and opinion headlines and between print and online headlines.

To punctuate this discussion with real-world examples, consult the Poynter Online blog post "1,000 Headlines in 460 Days" and the headline resources provided, including an archive of Poynter's Headline of the Day feature. In addition, many school newspapers are found here. And for fun, you might throw in some examples from The Onion.

Following this discussion, choose among the following activities, depending on your discipline, curriculum and students' learning needs:

Journalism: Read, print out, or project the Caucus blog post on various headlines about the Henry Louis Gates arrest and resulting controversy. Invite students to compare the headlines Peter Baker compiled. Ask: What effect is each of these publications striving for in their selected headlines? What does their use of humor suggest about the story? Is humor appropriate, given the situation? What might you write?

For another, more thorough comparison of headlines from a single story, check out "So Many Headlines, So Few Zingers."

Tell students they will be comparing headlines in different publications of the same basic news story, using the Newseum's Front Pages. Prior to class, choose a major news story, represented in a good number of newspapers. Ask students find and list five different headlines for the story. In small groups, ask students to discuss whether or not each headline is effective and why or why not. Then, reconvene as a class to debrief.

Alternatively, have students look at today's New York Times front page or at the home page of NYTimes.com – or both – and discuss which headlines "work" and which don't, and why.

If you haven't already, look together at tips and guidelines about effective headline writing from Poynter Online, the American Copy Editors Society and/or No Train No Gain.

Finally, drawing on class discussion and the resources above, engage students in creating a list of characteristics of effective headlines to close class.

English Language Arts: Remind students of the role of grammar in creating clear headlines and sentences. Return to their answers on the handout Headline Headaches! and work together to generate a list of specific grammatical and other reasons why ambiguities often appear in headlines.

The list might include, for example, structure and word sequence ("Killer Sentenced to Die for Second Time in 10 Years"), multiple meanings and connotation ("Puerto Rican teen named mistress of the universe"), grammar errors ("State: Don't need to write that good") and more.

Provide students with headlines, using the resources listed above, for finding examples of the errors they come up with, and to find errors to generate more items for their list. They might also generate some tips on how to avoid such errors.

Post the list in the classroom and have students find more examples of such errors from newspapers and magazines, as well as from classroom texts and even perhaps their own writing drafts, to add to the board.

English Language Learning/English as a Second Language: Use the front page of The New York Times either online, or in print, to have students try any of the following:

- Cut out five headlines and the first paragraph of each article and mix them separately in an envelope. Students try to match the headline to the correct first paragraph and explain their choices.
- Students work in pairs to choose their own headline from The Times and, without reading the article, explain what they think it means. Which headlines on the front page were clearest? Why? Which were confusing, or might be confusing to someone just learning English (In general, Times news headlines are more straightforward than the often-playful headlines on feature stories, and the front page features a mixture of both.) Have them choose one headline that was difficult for them and rewrite it using simpler or more direct wording.
- Students cut out and recombine words from individual Times headlines to create their own new, grammatically correct headline for an imaginary news story. For example, from the front page of February 4, 2010, students could use "Toyota Says Prius Brakes Had Design Problems, "Rebuilding Effort in Haiti Turns Away From Tents," "For Scots, a Scourge Unleashed by a Bottle", and "Pakistani Scientist Found Guilty of Shootings," to create "Scientist Says Scourge Found in Tents."

Going further | Here are ways to take this activity further, depending on your curriculum:

Journalism: Students use their newfound knowledge of what makes for effective headlines to write or revise headlines for their own publication.

ELA: Students work in pairs or groups to create their own grammatically unambiguous headlines. These headlines might be about a book the class is reading (for example, they write one headline for each scene in a Shakespeare play), or about a community or school event. For a further challenge, students might write two versions of each original headline, one that is clear and elegant, and another which is in some way ambiguous or misleading.

To continue this discussion and the effects that technology is having on grammar and written expression, share the Times article "Language as a Blunt Tool of the Digital Age."

Alternatively, students read the neologisms on the Schott's Vocab blog, such as "Goldilocks devices," "publicy," and "wocial." (They can also read the archives of a long-running neologism contest run by Washington Post columnist Bob Levey.) Using these blog entries as models, they create their own neologisms.

ELL/ESOL: Students bring in any print or online headlines that confuse them and work as a class to parse the headlines and rewrite them for greater clarity and simplicity.

Standards | From McREL, for grades 6-12:

Language Arts
1. Uses the general skills and strategies of the writing process
5. Uses the general skills and strategies of the reading process
7. Uses the general skills and strategies to understand a variety of informational texts
8. Uses listening and speaking strategies for different purposes
10. Understands the characteristics and components of the media

Life Skills: Working With Others
1. Contributes to the overall effort of a group
4. Displays effective interpersonal communication skills

Life Skills: Thinking and Reasoning
3. Effectively uses mental processes that are based on identifying similarities and differences

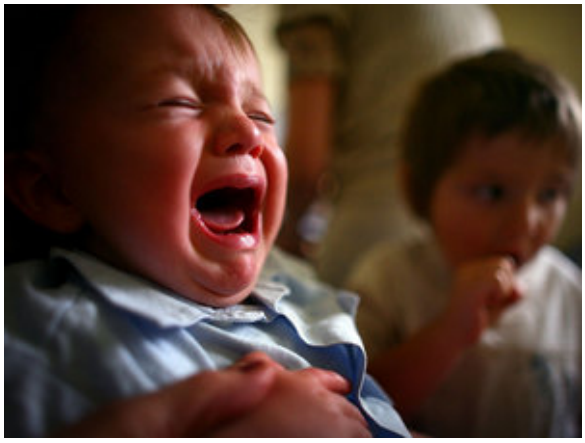
Arts and Communication
1. Understands the principles, processes, and products associated with arts and communication media
2. Knows and applies appropriate criteria to arts and communication products
3. Uses critical and creative thinking in various arts and communication settings
4. Understands ways in which the human experience is transmitted and reflected in the arts and communication

http://learning.blogs.nytimes.com/2010/02/04/is-this-headline-clear-learning-about-ambiguity-and-clarity-from-headlines/?nl=learning&emc=a1

Vaccines' Benefits Trump Concerns, Experts Say

by Joanne Silberner

February 8, 2010



Jeff J Mitchell/Getty Images

A young boy reacts to receiving a prick from a vaccine. Children can receive up to 13 immunizations by age 2, and many parents worry about possible side effects. But experts say that vaccines are safer and cleaner than before.

February 8, 2010

In 1960, health authorities recommended that young children get five vaccines — smallpox, diphtheria, tetanus, whooping cough and polio. In 2009, there are vaccines against 13 diseases for children under the age of 2. That's excluding flu. This increase is worrisome to many parents.

"The extent of concern about immunization is enormous, and it's growing," says Edgar Marcuse, a professor of pediatrics at the University of Washington and coauthor of a paper in the journal Pediatrics that addresses parental concerns.

One of the chief concerns is that babies' immune systems aren't developed enough to handle the onslaught of vaccines. But studies of DPT (a vaccine against diphtheria, pertussis [whooping cough] and tetanus), hepatitis B, Hib (a vaccine against meningitis), and polio vaccines have shown that 90 percent of babies produce an active, protective response to these vaccines.

Marcuse and his colleagues have done some calculations by looking at how many antibodies are needed to respond to an average infection, how many antibodies babies produce after getting vaccinated and how long it takes babies to make enough antibodies to be protective. They predict that if babies received 11 vaccines at the same time, it would use up 0.1 percent of the cells involved in the immune response, which would quickly regenerate.

Today's Vaccines Contain Less Of The Disease

Some parents ask their pediatricians to space out the vaccines. But that's a bad idea, says Marcuse. "When you space out the vaccines, you leave your infant susceptible to diseases you could otherwise have prevented, particularly in the first six to eight months of life," he says. Babies can get diseases such as whooping cough or meningitis, and these can be tough on them.

Babies are going to be exposed to bacteria and viruses in one way or another — either during an outright infection, or in the vaccines, says Saad Omer, a vaccine expert at Emory University.

In the vaccines, he says, babies are only seeing bits and pieces of the viruses or bacteria, and vaccines are much "cleaner" now than they used to be. "A lot of people say that the number of vaccines has gone up," he says. But, in reality, the number of antigens — the molecules in the viruses and bacteria that spark the immune response — hasn't gone up, it's gone down, he says.

The biggest change has been in the pertussis vaccine, which used to contain about 3,000 antigens from the whole pertussis bacterium. Now, vaccinologists have plucked out the five molecules that by themselves can set off an immune response.

Mercury Worries

Some parents worry that thimerosal, a mercury-containing preservative, can hurt the immune system. It's a big issue for parents concerned about vaccines and autism. But mercury is out of virtually all childhood vaccines or present in lower amounts than can be found in a can of tuna.

Omer says parents need to remember that for every type of vaccination, the disease is a bigger challenge to the baby than the vaccine. That's easy to forget today, when few can remember what polio and whooping cough and even measles look like.

"After effective control of these diseases, there's a shift in the mental calculus of parents," Omer says. They stop worrying about the disease, and start worrying about the vaccine. But the measles vaccine causes brain damage in 1 in 1 million recipients. The disease itself, which used to hit the majority of kids, killed 1 in 500 people who got it, and caused brain damage in 1 in 1,000.

Vaccines do have side effects. The immune system sometimes overreacts, and babies can get fevers, soreness and rashes from some vaccines. In those cases, doctors recommend being careful about subsequent vaccinations. But in rare instances — that 1 in 1 million chance with measles vaccines, for example — there can be neurological side effects.

The suggestion from vaccine experts is that babies who already have some sort of infection not get vaccinated until the infection clears up. Otherwise, it's difficult to determine whether the baby is having a side effect from the vaccination, or is suffering from the already existing infection. And the decision about whether babies should get second shots where the first one caused a problem is best made individually, by parents and physicians.

http://www.npr.org/templates/story/story.php?storyId=123369940&sc=nl&cc=hh-20100208

Vaccine Scare Shows How Emotions Can Trump Facts
February 3, 2010

By Nadja Popovich

Yesterday, the medical journal the *Lancet* retracted a 12-year-old paper by Dr. Andrew Wakefield, which helped fan a scare about vaccines and autism.

Now discredited, the report looked at just a dozen children who developed behavioral and intestinal problems. Eight of them had been recently vaccinated against measles, mumps and rubella.

So we turned to David Ropeik, a risk consultant and author of *How Risky Is It Really? Why Our Fears Don't Always Match The Facts*, for some insight.

Ropeik says that the Wakefield episode is a prime example of our potential to misjudge a situation based on false perceptions of risk. In emotional circumstances, where we lack an understanding and control of the situation, our emotional instincts to react may overwhelm our more logical side, he says.

Here are edited highlights from our conversation:

How do you view Wakefield's paper as an example of risk perception gone awry?
The Wakefield paper is interesting. Its key phrase specifically says "we did not prove an association between the MMR vaccine and the syndrome described." So, there's unequivocally no link. But Wakefield hinted at one in the news conference. And the parents of the kids who had autism jumped on that. Because what parent of a sick kid wouldn't want an answer that might lead to a cure? But their reaction, as understandable as it was, was emotional, not factual. So, everything that followed, to me, is a huge lesson to society that our risk perception system can make choices that feel right but get us into trouble. In this case, the trouble is the recurrence of measles in many places in the world -- in some cases killing children, a worry about other vaccines, and a shaken faith in science overall.

How much do you think the Wakefield case really shook up people's faith in science?
Wakefield's study came in the context of many other issues -- things that had shaken trust in science and public health institutions in the UK already. Mad cow disease, for instance, was poorly handled by the British government in the first place. There was controversy over genetically modified food too. All of

this had contributed -- perhaps rightly-- to the mistrust of public health organizations. With vaccination, generally, you have a small number of people who don't like being told they have to do it -- it's a government imposition. Well, Wakefield hinted that this government imposition might be causing kids sickness. In my opinion, that latched on to the existing undercurrent of resistance to government imposed vaccination.

How is a lay person supposed to make sense of issues like this -- when there's so much complicated or conflicting information?
That's the question. The problem for lay people, like myself, is that we don't have scientific expertise but we want our children and ourselves to survive. So we have a host of largely subconscious and instinctive ways of sensing danger. For example, if there's something we can't understand or control, evidence that it might be risky will make us more afraid. This is very natural, and we all do it. But we also have to realize that we get things wrong in ways that make things worse.

We have to recognize the potential dangers in our own perception and factor that into our thinking as well. 'Am I getting this wrong in a way that could make things worse?' is a pretty good way to check your thinking about any risk.

But if you're already lacking understanding, how can you really check for yourself?
Examples like the Wakefield case are good teaching moments. This won't be the last time a complicated issue, fraught with many emotions comes along and we have to decide [how to react]. We're smart enough to learn from the past. And this episode is a grand teaching moment for all of us to not leap to conclusions to recognize how powerful our feelings are in our interpretations of the facts. That's all I think is realistic. It's up to people to make up their own minds.

Doesn't the general public trust experts to explain though?
We only look to those we trust - in part because they're saying what we want to here. I mean, Wakefield gave parents of autistic kids hope. The other par of it is that those experts have demonstrated their competence. What matters a lot besides the science that's factual is the experts' reputation and point of view. And that's subjective -- it depends on our own points of view. Expertise is in the eye of the beholder. It's not just how many degrees you have.

What impact do you see coming from the Lancet's official retraction?
What's happening here is a continued movement away from Wakefield and the whole controversy for the Lancet. It's about Wakefield and saving-face. Despite all of the quibbles with his methodology -- which is why they say they are retracting it -- his paper says "we did not prove an association." They're distancing themselves away from the guy and the controversy, in my opinion.

The problem is that [being in the news] may make him more of a hero to those who want to believe what he says. See, its not just expertise, its emotions too. Which, again, is entirely understandable and valid, even when it causes people to not pay full and fair attention to the facts.

Where's the action now? What's the burning risk question that's causing controversy?
Oh my gracious, where to begin? Cell phones and radiation. Plastics. Mercury in seafood. Climate change. Obesity. They all are bigger or smaller risks where the emotional nature of them is leading to responses that don't seem commensurate to the risk. We're not responding to climate change nearly as dramatically as we need to -- or obesity. And we're probably reacting more fearfully about mercury in seafood than the actual threat warrants. At our peril. That's what matters -- it's the critical phrase here. I'm not just observing that people are being irrational. But if we're too afraid or not afraid enough, it can lead to choices that raise our risks.

http://www.npr.org/blogs/health/2010/02/risky_business_reactions_to_th.html?ps=rs

Is Vaccine Refusal Worth The Risk?

by Patti Neighmond

May 26, 2009

Over the past 10 years, a highly contagious and sometimes fatal bacterial disease once thought to have been eradicated from the U.S. has re-emerged, threatening the youngest and weakest. Pertussis is a bacterial infection of the lungs and spreads from person to person through moisture droplets in the air, probably from coughs or sneezes. A person with pertussis develops a severe cough that usually lasts four to six weeks or longer.

Health officials cite an increase in the incidence of pertussis, particularly among infants and teenagers. In 1976, there were just over 1,000 reported cases of pertussis in the United States; by 2004, it had climbed to nearly 26,000 cases; and between 2000 and 2005, there were 140 deaths resulting from pertussis in the U.S.

At the same time, studies and anecdotal reports from doctors nationwide report an increase in the number of parents refusing to vaccinate their children against childhood diseases.

Much of this refusal has to do with perceived vaccine safety issues, such as purported associations between vaccines and autism, attention deficit disorder, seizures and epilepsy. None of these concerns have been upheld in research. In fact, all scientific studies show vaccines to be highly effective and safe, with only rare, moderate, adverse side effects.

Results of a new study, published in the June issue of the journal *Pediatrics,* show that the biggest risk among children who are not vaccinated is the disease itself, as well as the risk of spreading it to more vulnerable populations who, for age or medical reasons, are unable to get vaccinated.

In pertussis, coughing occurs in sudden uncontrollable bursts, where one cough follows the next without a break for breath. Many people make a high-pitched whooping sound when breathing in after a coughing episode, hence the nickname "whooping cough." Coughing can be so severe, patients can vomit or break ribs.

A patient's face or lips may look blue from lack of oxygen, and the cough is often worse at night. Between coughing spells, the person seems well, but the illness is exhausting over time. Coughing episodes gradually become less frequent, but may continue for several weeks or even months until the lungs heal.

People of any age can get pertussis. Older children and adults usually have a less severe illness, but they can still spread the disease to infants and young children.

Pertussis in infants is often severe, and infants are more likely than older children or adults to develop complications, the most common of which is bacterial pneumonia. Rare complications include seizures, inflammation of the brain and death.

In the study published in *Pediatrics,* researchers from Kaiser Permanente Colorado's Institute for Health Research used electronic health records to look for immunization refusal and possible pertussis infections.

Specifically, researchers examined the medical records of children 2 months old to 18 years old who were members of Kaiser Permanente Colorado between 1996 and 2007. First, investigators confirmed which children had pertussis infections. Next, they verified whether parents had refused some or all vaccines for their children.

Researchers found that children of parents who refused the vaccine were 23 times more likely to get whooping cough compared to fully immunized children. "A 23-fold increase is huge," says Jason Glanz, a senior scientist at Kaiser Permanente's Institute for Health Research who headed the study.

Glanz says the findings should help "dispel one of the commonly held beliefs among vaccine-refusing parents: that their children are not at risk for vaccine preventable diseases."

And from a larger perspective, Glanz says the findings also show "that the decision to refuse immunizations could have important ramifications for the health of the entire community. Based on our analysis, we found that 1 in 10 additional whooping cough infections could have been prevented by immunization."

Glanz, a father of young children himself, says vaccines "can pose confusing and difficult choices." The purpose of the study was to give parents more information to weigh the benefits and risks, he says, as well as to provide pediatricians with more information to help them participate in the discussion.

For the physician, "it's an uphill battle", says Glanz, since most pediatricians today have so little time to spend with parents, and it's difficult to discuss the risks and benefits of vaccines with parents who have lots of questions and want thorough answers.

On top of that, physicians are battling a lot of misinformation, says Glanz. The Internet, for example, is easily accessible and often misleading, with numerous scary descriptions of devastating diseases purported to result from vaccines.

All of this adds up to a critical need for the public health community to develop effective "risk communications messages" that "resonate with parents" in order to help them make truly informed decisions about vaccinating children, he says.

Doctors need simple targeted information about the actual risks of having the vaccine and the risks of not having it. They need to know, says Glanz, that their child could actually become infected by the pertussis bacteria.

In addition, Glanz says, it should be very clear among parents "that by keeping immunization rates high, we protect everyone, including the most vulnerable populations."

There are a number of individuals for whom vaccination against pertussis is not possible. The vaccination is not effective for babies younger than 2 months old because their immune system is not yet fully developed and capable of responding.

Then, there are older children who suffer other medical conditions that compromise their immune system and also make pertussis vaccination ineffective. When parents protect their own child, says Glanz, they "also protect this most vulnerable population."

Dr. Randy Bergen, a pediatrician who specializes in infectious diseases, says some of the most compelling data he's seen comes from California, which reports that between 2001 and 2006, there were 24 deaths from pertussis. All of those deaths occurred in infants younger than 2 months of age.

The only way to protect these infants, says Bergen, is by "cocooning, where we immunize and protect those around the infants. And that's where the real concern is, especially when it comes to pertussis; that by not vaccinating school-age children, adolescents and young adults, we're leaving these infants unprotected."

Bergen suggests that, ironically, vaccines are almost victims of their own success. "Unfortunately, vaccines have been so successful in reducing diseases that not only are parents unaware of the potential severity of these diseases, but many pediatricians have rarely seen them and don't know the potential severity of these diseases either."

The recent number of infant deaths from pertussis should certainly serve as a wake-up call. As for vaccine safety, Bergen says there have been a large number of studies that have looked at safety over the past 10 years: "None of these studies have proved any association between a vaccine, a preservative in a vaccine or a combination of vaccines, and significant adverse problems." Vaccines in this country are safe, he adds; they "prevent diseases that can maim and kill."

The childhood vaccine known as DTaP protects against diptheria, pertussis and tetanus. It is given in a series to children at 2 months, 4 months, 6 months and 15-18 months of age; a booster is given before kindergarten. The DTaP vaccine, like other routine childhood immunizations, has been shown to be more than 98 percent effective.

Recent outbreaks of pertussis among teenagers have led to investigations into the long-term efficacy of the vaccine. They conclude that potency wanes as children get older. Today, federal health officials recommend children get another booster shot at around 11-13 years of age.

http://www.npr.org/templates/story/story.php?storyId=104523437&ps=rs

A Touch of Evil
By WILL BLYTHE

MONSIEUR PAIN

By Roberto Bolaño. Translated by Chris Andrews

134 pp. New Directions. $22.95

The beauty of Roberto Bolaño's slender mystery novel "Monsieur Pain," originally published in 1999 and now translated from the Spanish by the estimable Chris Andrews, is that it doesn't behave much like a mystery novel. By the end of the book, which Bolaño wrote in either 1981 or 1982, the mysteries remain unsolved, the ostensible victim may or may not have suffered from foul play and the protagonist intent on figuring out who done it (if anyone did anything at all) appears incapable of doing so.

That would be Monsieur Pierre Pain, a middle-aged veteran of the First World War, his lungs seared at Verdun, now scratching out a threadbare existence in Paris by virtue of a modest government pension. In a bachelor's dusty, jumbled room, he occupies himself by studying the occult. He has gained a minor reputation for the exotic practices of acupuncture and mesmerism, the art of hypnosis.

In April 1938, a beautiful widow with whom Pain is shyly in love comes to him with an urgent request. Her friend's husband, a Peruvian poet named Vallejo, appears on the verge of hiccuping himself to death from an undiagnosed illness. This, of course, is the same César Vallejo who will one day be famous as perhaps the greatest Latin American poet, but here he is merely one of the first of the failed revolutionary writer-heroes — anonymous, exiled and suffering — who will become the prime movers of Bolaño's later fiction. The mystique of the down-at-the-heels author always quickens Bolaño's imagination. What novelist has ever shown more love for writers as characters?

Pain accompanies the widow to the hospital, where his initial attempt to resurrect Vallejo is scoffed at by a French doctor: "I've never had much time for charlatans, personally." Embarrassed in front of the object of his affections, Monsieur Pain retreats. That night, two enigmatic Spaniards who have been shadowing him all day offer him an envelope of cash if he will refuse to treat Vallejo. Pain's services having already been refused, he sees no harm in accepting the bribe.

Of course, he is summoned again to Vallejo's bedside, where he attempts to mesmerize the dying poet. At this point, the narrative, already a surrealist's attic of unlikely juxtapositions, turns even more dreamlike. The expectations of a conventional mystery are thwarted at every turn. Confrontations between principals fizzle. Ominous, possibly gratuitous, figures pop up in stairwells, bars, cafes, movie houses, only to

vanish until their obituaries appear at the story's end in a style that foreshadows Bolaño's novel "Nazi Literature in the Americas." Gestures are ambiguous. Unease rules. Trails go cold. Inertia often seems the only course.

At what may or may not be a climactic moment, Pain observes a courtyard drama from a hospital window, then finds a bed and falls asleep. He can't decipher anything. The world stuns him with its illegibility. This is the novel as Max Ernst or de Chirico might have written it.

The prevailing architecture of "Monsieur Pain" is the labyrinth — the hospital, city streets, a nightclub connected to a warehouse all imprison the protagonist in mazes through which he frantically rushes, only to end up face to face with no monster greater than himself.

Or maybe not. There are genuinely bad guys at large in this novel, villains of exquisite sensibility, as interested in the esoteric as Monsieur Pain. In Bolaño's fiction, the poets, victims of coups and revolutions, are obsessed with power, naturally enough; and the powerful, more oddly, are obsessed with poetry. In one novel, a priest who doubles as a critic is called upon to discuss literature with Pinochet. In another, an air force pilot who tortures dissidents also sky-writes poetry ("Death is love") over Chile after the 1973 coup.

Monsieur Pain has reason to suspect that agents loyal to Franco in the Spanish Civil War are trying to assassinate Vallejo, a supporter of the Republican cause. He trails a Spaniard on a serpentine jaunt through Paris. They end up in a movie theater, where, much to Pain's surprise, the Spaniard leads him to a certain Monsieur Pleumeur-Bodou, fellow mesmerist and former colleague. The men retire to a bar. They argue. Pleumeur-Bodou reveals that he works for Franco, using hypnosis to interrogate prisoners. Angered, Pain claims that he has a gun. "Fire then, you dog," his rival taunts him. Pain flees into the rain. He returns to the hospital, only to discover that Vallejo is gone.

Bolaño aspired to be a writer of the fantastic, like Philip K. Dick, because he believed the fantastic to be more realistic than realism. It is instructive to compare his work in this respect with that of García Márquez, the colossus who had already spread his enormous wings over Latin American literature as Bolaño's generation came of age. The jungle fecundity of García Márquez's imagination is so grand that it devours the reality of his generals and patriarchs, mythologizing their brutality so that they come to seem mere specimens of the marvelous, as safely removed in time as Babylonian tyrants, their menace as antique as the cuneiform on clay tablets.

By contrast, the evil in "Monsieur Pain" feels ominously real, despite the fact that Bolaño hardly enunciates its presence. The novel melds existential anxiety to political terror in a measure peculiar to Bolaño — imagine the protagonist of Poe's "Tell-Tale Heart" if he were being interrogated by the secret police on suspicion of having hidden subversives behind his wall. Readers know, as the characters of "Monsieur Pain" do not, that Paris in 1938 is a city of sleepwalkers, that a darkness soon comes its way. It is Bolaño's great gift to make us feel the dimensions of this darkness even when we cannot see exactly what it hides.

Will Blythe is the author of "To Hate Like This Is to Be Happy Forever."

http://www.nytimes.com/2010/02/07/books/review/Blythe-t.html?nl=books&emc=booksupdateema3

Putting the Wrongs of History in Paint
By DOROTHY SPEARS

DURING a visit to New York late last fall, the Belgian painter Luc Tuymans sat on a couch in the dimly lighted lounge of the Bowery Hotel and recounted a disturbing childhood memory. One evening when he was 5, he said, his family was gathered around his paternal grandparents' dinner table. His mother's brother was leafing through a picture album when a photograph of one of his father's brothers — his own namesake, Luc — fell to the floor. The photo, Mr. Tuymans said, showed this uncle as an adolescent performing the Hitler salute.

"This was totally unexpected," said Mr. Tuymans, 51, explaining that his mother's family had been active in the Dutch resistance and in hiding refugees. For the first time, he said, his father admitted to her that two of his brothers had trained as Hitler Youth in Germany. After that, the artist said, the issue "was always looming" in his parents' home. The marriage was not a happy one, and with his mother more and more outspoken on the subject and his father increasingly introverted, Mr. Tuymans said, "I learned to eat very fast and get away from the table."

Perhaps not surprisingly, Mr. Tuymans — whose first major American retrospective opens this weekend at the San Francisco Museum of Modern Art, after an initial showing at the Wexner Center for the Arts in Columbus, Ohio — has become known for examining the visual residue of trauma and the collective desire to forget. Some of his best-known paintings deal with the Holocaust, the post-9/11 social and political climate in the United States and the legacy of the Belgian colonization of Congo — and with the ways such things linger, or don't, in the collective consciousness.

"Luc's paintings call us out on our relative amnesia around important issues," said Madeleine Grynsztejn, a co-organizer of "Luc Tuymans," as the current show of 75 works is called, and the director of the Museum of Contemporary Art in Chicago, where it is scheduled to arrive in October. "They shame you into looking."

Mr. Tuymans is particularly interested in how the contemporary experience of history — through Web sites, for example, or the media — often involves bits and pieces of the historical record presented out of context. Even as the widespread availability of information has made this "a time when we're re-evaluating moments of historical importance," he said, "I am quite distrustful toward 'evidence' as such." His art, he said, aims to "make people reconsider what they're seeing."

One way he tries to do this is by studying his chosen subjects in depth, even as he collects samples of fragmentary evidence in images culled from the Internet, television, films, photographs, old postcards and his own drawings.

"Luc embarks upon these huge, almost archival, research projects," said Helen Molesworth, the other co-organizer of the exhibition, who was recently named as the next chief curator at the Institute of Contemporary Art in Boston. "He knows massive, massive amounts about the subjects he paints." But once he has digested the research and settled on the assortment of images, she added, he paints each work in a single sitting. Referring to his renowned 1986 painting "Gas Chamber," based on a watercolor Mr. Tuymans made while visiting the former Nazi concentration camp at Dachau, she said, "It's almost as if he's compelled toward a traumatic site, then just as quickly repelled away from it."

Mr. Tuymans's paintings, rendered in a restrained palette with fleet brush strokes of wet paint on wet paint, can sometimes seem almost frustratingly detached from their themes, not only because of the evident speed of their production but also because of their oblique, even cryptic imagery. In 2001, for example, when he represented Belgium at the Venice Biennale, his installation "Mwana Kitoko (Beautiful White Man)" dealt with the end of the Belgian colonial presence in Congo using paintings of, among other things, Belgium's former King Baudoin, black cars cruising through thick green foliage and a leopard-skin rug.

To have a sense of Mr. Tuymans's take on the period — which had to do with Belgium's presumed complicity in the 1961 assassination of Patrice Lumumba, independent Congo's first democratically elected leader — it helps to know that the portrait of King Baudoin, whom the Congolese knew as "beautiful white boy," was based on footage of the king's first visit to the colony in 1955; that the mysterious black cars came from a documentary (broadcast on Belgian TV in the 1990s) that traced the hours before Lumumba's killing; and that the leopard skin referred to a Congolese tribal tradition reserving such rugs for the feet of chiefs, which the Belgians adapted in honor of King Baudoin's visit.

This mediation through obscure mass-culture imagery may make the work hard to interpret, but it packs a punch precisely "because we have seen the same images and glossed over them or just been indifferent to them," Ms. Molesworth argued. And in a context like the Biennale, Mr. Tuymans's coolly elliptical approach can be forceful enough to have an impact. Adding to a book and a movie about Lumumba's assassination that had both come out shortly before the Biennale, Mr. Tuymans's paintings helped produce a popular groundswell that led to an official apology from the Belgian government in 2002.

If the art addresses political issues with subtlety and indirection, the same can't be said of the artist. With his deep-set blue eyes, severely cropped hair and surly, irreverent humor, Mr. Tuymans comes off less as a diplomat and more as a cynic with a bone to pick. A compulsive cigarette smoker, he enjoys his Jack Daniel's, tossing back three whiskeys at our first interview and tapping his own dedicated bottle under the bar at the Wexner opening. He also loves mouthing off.

During a two-hour interview, the word fascist arose often in reference to President George W. Bush. Citing "homeland security, restrictions on travel, the lack of privacy and pre-emptive strikes" as examples of Mr. Bush's abuses of power, he pronounced Mr. Bush, Dick Cheney and Condoleezza Rice — whose face he immortalized in a scowling portrait from 2005 — "the true American fundamentalists."

And Mr. Tuymans's rants are not limited to politics. During the same interview he deemed the exhibition space of the Wexner "horrific," adding, "I hate the building; I cannot defend it," on account of a wide ramp running beside the galleries, which impeded the flow of the show. (By the time of a second interview, long after the Wexner show had a positive review in The New Yorker, his opinion had changed. "I was ultimately really happy with the installation," he said. "I was very afraid initially because of the difficulty of the building, but in retrospect it may end up the most beautiful installation of all.")

Born in the outskirts of Antwerp in 1958, Mr. Tuymans was “a very quiet kid,” he said, who learned early that making art was “a way to be accepted.” When his childhood propensity for drawing knights evolved into an interest in depicting landmarks like Antwerp’s domed railway station, zoological gardens and port, he also began to think of drawing “as a way of getting out of things.” On trips with his parents, he said: “I’d be drawing the whole time. I didn’t care what was going on around me. I was completely immersed.”

His enjoyment of drawing led to a keen interest in art history and an almost worshipful admiration for the 15th-century Flemish painter Jan van Eyck, whom he still considers “the most important painter ever, period,” and whom he credits with introducing realism — and the outside world — into an art form that was still under “the cloak of religious dogma.”

At 19 Mr. Tuymans encountered a series of El Greco paintings in Budapest while working as a guard for a European railway company. Having “always hated El Greco because I’d only seen him in a book,” he then became fascinated by El Greco’s use of warm and cool tones of color to create depth. He also admired the complexity found in El Greco’s shadows. “A gray tone is never just gray,” he said.

These early lessons, supplemented by an extensive training in art history and fine arts at universities and academies in Brussels and Antwerp — and by five years in the ’80s dedicated to making minimalist films — eventually gave Mr. Tuymans the formal skills and detachment to probe the political concerns that had been simmering in him since childhood.

His first show, in 1985 — a one-day event in the empty swimming pool of a decrepit Ostend spa — failed to attract any visitors. Several years later, he said, after a couple of shows and some networking, he approached Frank Demaegd, owner of a gallery in Antwerp, with 15 snapshots of new paintings and a list of 15 collectors who would buy them. “I told Frank, ‘The show’s going to be sold out,’ ” Mr. Tuymans recalled. “And of course it happened.”

In 1992, when his paintings were included in the prestigious Documenta IX art show in Kassel, Germany, Mr. Tuymans said he was wooed by a host of prominent dealers eager to exhibit his work. In addition to Mr. Demaegd, he agreed to show with the then-fledgling New York dealer David Zwirner. Since his first solo show with Mr. Zwirner, in 1994, his paintings have been granted shows at major institutions like the Tate Modern in London and the Museo Tamayo Arte Contemporáneo in Mexico City. They have also earned him what is arguably the most elusive honor of all: the admiration of fellow artists.

“Luc’s small paintings control big spaces, and his paint strokes all connect,” said the realist painter Alex Katz, a longtime fan. “They relate as much to each other as they do to the subject.”

Yet for Mr. Tuymans, subject is everything. “In my book,” he said, “art is not derived from art. Art is derived from reality.”

http://www.nytimes.com/2010/02/07/arts/design/07tuymans.html?ref=design

'Arts of Ancient Vietnam: From River Plain to Open Sea'
Ancient Sphere Where Cultures Mingled
By HOLLAND COTTER

In 1988 the art historian Nancy Tingley, then a curator at the Asian Art Museum in San Francisco, went to Vietnam to talk with museums about borrowing examples of the country's ancient art for the first major United States exhibition. It was a bold idea. To most Americans, Vietnam still meant little more than the memory of a nightmare war. And who knew it had a great art tradition, never mind museums that preserved it?

The show didn't happen. The diplomatic situation was volatile; negotiating loans proved impossible. The Asian Art Museum dropped out as a sponsor, and even after new ones signed on, the project remained in limbo. But Ms. Tingley stuck with her original plans, and her persistence, 20 years on, has paid off in "Arts of Ancient Vietnam: From River Plain to Open Sea" at the Asia Society Museum. Is the show worth the wait? It is. It's fabulous. Perfectly (meaning modestly) scaled, with the kind of Asian art loans — matchless in quality, straight from the source — that we rarely see here anymore.

From the moment you enter the galleries you're seeing things you won't find anywhere else and certainly not in this combination: a bronze drum as hefty as a hot tub; a wooden Buddha, tall, dark and Giacometti-thin. Avid-eyed Hindu deities keep company with contortionist dancers. A tiny serpent of beaten gold basks in a spotlight. Ceramic plates and bowls crowd a room just as they had once filled the hold of a ship that went down in the South China Sea.

Once you've made your way through the society's suave installation, you've seen treasures from 10 Vietnamese museums. You've time-traveled from the first millennium B.C. to the 17th century A.D. And you've style-traveled through dozens of cultures both inside and outside Vietnam itself.

Geographically Vietnam was made for trade. A narrow slice of land with a 2,000-mile coastline running from China to Cambodia, it was open to the world whether it wanted to be or not. Where nearby countries like Laos and Thailand are chunky and dense in shape, Vietnam measures at certain points less than 40 miles across. It has virtually no interior, no way to shut its doors and retreat.

As important as accessibility was its location at a nodal point where international shipping routes met. With countless natural harbors — its coastline might have been cut with pinking shears — Vietnam made an ideal layover for sea traffic. It also made a lucrative global marketplace and as such gave as good as it got.

It absorbed early formative influences from China, evident in metalwork (seen in the show's first gallery) from the prehistoric Dong Son culture that settled in northern Vietnam in the last half of the first millennium B.C. At the time Vietnam itself was valued for its creative vitality. The bronze ritual drums made by Dong Son artists were sought-after collector items, with examples, some weighing close to 400 pounds, turning up not only in China but across Southeast Asia as well.

With the rise of the pre-Angkor state of Fu Nan in the Mekong Delta in the first centuries A.D., Vietnam's cultural spheres expanded further. We still don't know much about Fu Nan — there's a lot of basic archaeological catch-up work to be done — though we do know that its people established harbor cities and experienced a wave of influence from India, which led to adopting Buddhism and Hinduism and their intertwined traditions of religious sculpture.

The tall wooden Buddha, its features time-smoothed almost to invisibility and its figure in profile like a parenthesis, reflects post-Gupta style conventions current on the subcontinent in the sixth century. But it was Hinduism that really caught on, first with the worship of Vishnu. We see him, with the breath-swelled body of a yogi and wearing a princely crown, in a stone figure on loan from the Ho Chi Minh City Fine Arts Museum.

Devotion to Shiva also became in vogue, and soon much of the rest of the Hindu pantheon found its way into Fu Nan and its art: Ganesha, with his elephant's head and pudgy body; Durga, a blank-faced warrior-goddess stripped down to her skirt for a fight; and Surya, the sun god, in his buttoned-up untropical attire of West Asian tunic and boots.

These immigrant divinities showered Fu Nan with prosperity until the mid-seventh century; then their largesse stopped. For reasons we can only surmise — maybe the appearance of overwhelming commercial competition — a vital state grew moribund and gradually dropped from sight.

One thing is certain: As Fu Nan headed toward oblivion, the Champa kingdom in central Vietnam was on the rise. The Cham people were ethnically distinct from the Vietnamese, and their "kingdom" was a scattering of separate, often rival principalities. What unified them was maritime trade, Indian-derived religions and — most important for us — the development of one of Asia's most piquant and undervalued sculptural styles.

Although based on South Asian prototypes, Cham sculptures had forms and moods entirely of their own, and they are the fire that warms the show. We first get a sense of them in a fifth-century bust-length carving of a haloed woman on loan from the Cham Museum in Da Nang. She could be a goddess or a princess; we don't know.

But her full, flat face and mesmerizing eyes — the pupils are literally popping out — project unconditional welcome but also what feels like an aggressive, proselytizing devotion.

Exuberance is the default expressive mode of Cham art. In a tympanum relief the dancing Shiva is surrounded by dozens of extra flailing arms, all his own, in a kind of zany flipbook-style image of physical exertion. And in a sculptural coup de théâtre, a monumentally scowling Buddhist guardian figure tramples a ferocious bull-demon, out of whose mouth pops a wasplike little warrior with a sword: fury on top of fury, then more fury.

In this populist-feeling dramatic art, strange is beautiful, freakish is normal. For a carving of an imaginary animal called a Gajasimha, features of an elephant and a lion have been mushed together to create a being as weird as the weirdest show dog but also as homely and compact as a Volkswagen. One of the show's grandest pieces, a stone pedestal probably used for temple offerings, has all of this eccentricity and more: gods, beasts, dancers and worshippers mingle with scary security guards and personified planets in a fizzy Olympian bash.

The pedestal as sculpture may have been a Cham invention, and it's an ingenious one, though it didn't impress colonial-era Europeans, who tended to disdain the art they found in Vietnam as a cartoon version of Indian classicalism. We're better able now to see that the achievement of Cham art lies precisely in the way it transforms the visual substance of another culture, or cultures, into a persuasive new idiom, one that comes across as an exultantly confident statement of religious and political power.

Almost a postscript, and set apart from the main show in a separate gallery on the same floor, is a trove of Vietnamese export ceramics salvaged in the 1990s from a 15th-century shipwreck.

There are superb things: the large stoneware vase painted with geese in landscapes is just out of this world. But what's really wondrous is the same thing that's wondrous in the older material too, the sheer variety of forms, techniques and styles that bring far-flung points of the globe together on a small slice of Southeast Asian soil to make something brand new.

The Asia Society Museum does itself proud with this show, a collaboration with the Museum of Fine Arts, Houston. And Ms. Tingley, aided in New York by Adriana Proser, an Asia Society curator, is to be commended not just for her scholarship, but also for keeping the faith in an art she believes in and clearly loves, and for delivering it to us, at last, so exquisitely packaged, so historically rich and so fresh with life.

"Arts of Ancient Vietnam: From River Plain to Open Sea" remains on view through May 2 at the Asia Society Museum, 725 Park Avenue, at 70th Street; (212) 288-6400; asiasociety.org.

http://www.nytimes.com/2010/02/05/arts/design/05viet.html?ref=design

Men Lag in Caring for Themselves

By: Frank Nelson | February 6, 2010 | 05:00 AM (PDT) |

A different kind of health care reform is needed in America — how men treat themselves.

By all sorts of measures — including the ultimate one of dying about five years earlier — men suffer compared with women in terms of their health.

Men have higher mortality rates for 14 of the 15 leading causes of death, according to Will Courtenay, director of Men's Health Consulting. (The exception is Alzheimer's.)

Courtenay, who started his Berkeley, Calif.-based company 16 years ago, also says men suffer 94 percent of workplace fatalities even though they account for only around half the labor force.

That same imbalance shows up in grim statistics relating to driving fatalities, drug and alcohol-related deaths, smoking and poor diet, depression, suicide and homicide.

For years, Courtenay and other researchers have been exploring this disparity and asking why men seem to have a built-in aversion to looking after themselves — why they don't visit the doctor, take preventative health measures or follow medical advice to the same extent women do. Women in the reproductive years, for example, spend 68 percent more money on health care in the U.S. than do men.

The reasons have physical, psychological, social and cultural roots. From birth, males are saddled with certain macho expectations which, combined with a misplaced sense of invincibility, ironically leaves them more vulnerable — they take big risks, are reluctant to ask for help, and won't easily admit pain or weakness.

While these factors continue to exact a heavy toll on men, women's health care has blossomed (admittedly from a low base), further widening the gender gap and sparking renewed efforts to correct a health system that is arguably under-serving half the population.

Demetrius Porche, professor of the School of Nursing at Louisiana State University's Health Sciences Center, in New Orleans, laments that the health education message is not reaching men.

One example: the way men and women are treated differently by doctors on issues of self-examination. He says women are routinely taught to look for signs of breast cancer, but men are rarely instructed on examining themselves for testicular cancer.

Courtenay agrees, quoting research showing 86 percent of doctors instruct on breast self-examination but only 29 percent teach testicular self-examination. There's a similar gender imbalance on issues like skin cancer, osteoporosis and, paradoxically, postpartum depression.

Courtenay is writing a book about postpartum depression … among men. Though the condition is widely associated with new moms, "Sad Dads" shows many men also suffer.

"Very few people realize that," he says.

Porche favors better training for doctors, nurses and other health professionals. He also edits the *American Journal of Men's Health*, which launched in March 2007. Another academic periodical, *The Journal of Men's Health & Gender*, launched in 2004.

Hoping to integrate men's health care into the core curriculum, Porche has drafted a funding proposal for a study that could provide the foundations for such a course.

As president of the American Assembly for Men in Nursing, he believes more male nurses would help but says that's not the complete answer. He points out that today's gender imbalance in health care exists despite doctors traditionally being mostly men.

However, Courtenay believes male nurses are more sensitive, attuned and "far more educated about men's health" than male physicians. "Doctors can be very stereotypically masculine," he says.

He has devised a six-point plan offering advice to doctors on how best to interact with male patients; he believes asking open-ended questions, providing information and counseling can be as important as clinical examinations and tests.

Courtenay also offers practical solutions to improve access to medical services for men, things like evening clinics that working men could more easily attend, or mobile clinics that visit workplaces.

In addition, he hosts several Web sites targeting men's health issues, some with online forums. He says it's a popular myth that men don't want to talk about health concerns; given this sort of supportive context, he says men willingly open up about deeply personal topics.

At government level, Courtenay thinks the U.S. is far behind countries like the United Kingdom and Australia in terms of national policies specifically aligned with men's health care needs.

A proposed Office of Men's Health within the Department of Health and Human Services — envisioned as complementary to offices on women's health and minority health — is "dead in the water at this point," he says.

The European Men's Health Forum, in a just-published review of policies in 11 countries, gives high marks to several governments but describes the situation for men's health in the U.S. as "dire."

But Scott Williams, vice president for professional relations and public policy with the Men's Health Network in Washington, D.C., is "cautiously optimistic" such an office will become a reality.

He sees this happening either as part of the current push toward health care reform or through specific legislation introduced in April and now before the House Energy and Commerce Committee.

Marsha Gelt, family planning training director at the Oakland, Calif., office of the Center for Health Training, sees the value of involving men and women in each other's health care.In the last 20 years, she says, people have come to realize that reproductive health care is not exclusively a women's issue. "It's everyone's issue, certainly the male partners. There's an effort now to remember there are two people in a relationship."

Gelt describes the inclusion of men as equal partners as a "paradigm shift" in reproductive health care and argues strongly in favor of women being more closely involved in men's health.The Men's Health Network is doing just that. "Engaging women in the men's health care debate has moved things forward," says Williams. "We want to tap into the passion and energy women have for health care and for the men in their lives."

In one campaign, Women Against Prostate Cancer, women talk about the impact the loss of a husband, father or other male can have emotionally, physically and financially on them and their families.

Joe Zoske, administrator of the social work program at Siena College, in Loudonville, N.Y., sees the need for a deep cultural shift if society is going to rethink men's health."We've never equated men's and women's well-being," he says, referencing the "women and children first" mentality of the Titanic and the way men are always the first to go off to war.

"We value men in lots of ways but not their physical well-being. We need to elevate men and make them feel more welcomed into health care, more than just penises and prostates."

After a national survey he conducted revealed very few professional men's health courses, Zoske created Gender Health, now an elective in the nursing program at Empire State College, State University of New York.

The author of *Men's Health & Wellness: 50 Health Promotion Ideas for Educators, Planners and Practitioners*, Zoske believes education should also include teaching young schoolboys to develop a more nurturing relationship with their bodies.

"Health care in lots of ways is very feminine," he says. "Women pay attention to their bodies. When they have a concern, they go to the doctor and get it resolved. Men don't do that. That's the opposite to the male way of thinking."To deliver its message where people "live, work, play and pray," the Men's Health Network presents workplace programs for men and women, while Healthy Sundays introduces a faith-based dimension to the health and wellness debate.

The network has also embraced the appeal of sports and entertainment, most famously holding free health screenings and information sessions inside the Washington Redskins' locker room.

The chance to tread the same turf as NFL players has proved a big draw, says Williams — during one five-hour clinic, health professionals saw more than 700 veterans and their families.The use of sports celebrities and major sporting venues is a model the network hopes to take on the road. "We've seen this work with the Redskins, and we know the interest is there," says Williams. "It depends on resources, but that's the dream."

http://www.miller-mccune.com/health/men-lag-in-caring-for-themselves-8342/?utm_source=Newsletter95&utm_medium=email&utm_content=0209&utm_campaign=newsletters

A Fatter Phobia

By: Erik Hayden | February 8, 2010 | 14:05 PM (PDT) |

Overweight is the new normal in America. So why do we still share an immediate, negative reaction toward the obese?

You're at the office, on a budget, it's almost lunch time and — you're starving.

You can't go to a grocery store because you have no time to cook (although if you did go, you'd notice that most of the healthier items cost more than the heavily marketed junk). On the way out of the office you walk past a gym and cringe (now you're likely to inadvertently increase your food consumption at lunch).

Finally you reach the outside of McDonald's, which represents the antithesis of your dieting goals. Secretly you'd like to gorge yourself on a Big Mac, but you stride into the restaurant with the intent of ordering off its "Healthy Choices" menu. Bad move. You'll most likely still order a Big Mac, but now it'll come with a side of guilt.

Let's recap: What if you had decided to go to a nicer, sit-down restaurant? You'd probably consume even more calories than you would have at a fast food chain. Wasn't walking (instead of driving) to McDonald's healthier? Yes, but then you walked past the gym, felt guilty about not exercising and then decided to gorge. Also, initially perceiving that you were unattractively overweight may have led to increased shame and the poor choice of the Big Mac.

Simply put, for (the hypothetical) you, and other Americans, the odds of staying thin are slimming.

That's why it's not shocking that new research, headed by Robert A. Carels at Bowling Green State University, reveals that individuals are very likely to form an immediate negative impression toward the obese. With 68 percent of Americans overweight, we are apparently becoming increasingly self-loathing about our "weighty" condition.

In the study, to be published in the academic journal *Body and Image*, 308 participants rated personality attributes for virtual male and female figures with a body mass index of 18.5 (normal), 25 (overweight), 30 (obese) and 40 (extremely obese). They completed multiple sets of ratings and agreed or disagreed with sample statements like, "People like this make me feel uncomfortable," "I'd like to be friends with someone like this," and "I'd like to socialize with someone like this," among other statements.

Researchers found a surprising number of participants disliked the obese and extremely obese figures. The correlation was especially strong among individuals who believed that body weight was "controllable" (meaning that, with discipline and time, a person can lose excess fat). This finding was in keeping with prior studies and, according to Bowling Green State University researchers, the results seem to indicate that Americans' well-documented "anti-fat" bias is coupled with a pervasive "pro-thin" mentality.

But we already knew that — if you were a participant in a lab setting, who would you rate more favorably: the fatter or fitter figurine?

The last thing the obese seem to need is more researchers acting shocked that Americans prefer thin people over fatter ones. Still, participants didn't merely exhibit a preference for thin figures and indifference to obese ones — they showed active dislike toward these theoretically obese. That finding, while regrettable, is enlightening.

"Generally speaking, we tend to ascribe positive traits to those people we find attractive, whether they are deserving of such praise or not," posited Carels. "We likewise often degrade those people we find unattractive, whether they are deserving of our ill feelings or not. Perhaps whatever is driving our love for thinness is also driving our contempt for fatness."

One silver lining in the study may be that participants disliked both the male and female obese figures rather equitably. Although we apparently have an "anti-fat" bias, we'll take pains to dislike all obese people equally — regardless of gender.

http://www.miller-mccune.com/health/a-fatter-phobia-8549/

Product Placement Links Celluloid and Cellulite

By: Tom Jacobs | February 8, 2010 | 16:43 PM (PDT) |

The first comprehensive analysis of its type finds food and beverage products appear in more than two-thirds of popular movies.

Ever since E.T. was enticed out of hiding by the otherworldly goodness of Reese's Pieces, sugary and salty snacks have played significant supporting roles in American cinema. A new study finds such products are pervasive in popular films and warns of potential health consequences.

"Movies provide an avenue through which companies are marketing foods of low nutritional value to consumers, including children and adolescents, who may not even be aware of the advertising," a research team led by Lisa Sutherland of Dartmouth Medical School reports in the journal *Pediatrics*. They examined the top 20 films (in terms of box office revenue) from 1996 through 2005 and found the experience not unlike strolling through a 7-Eleven.

The researchers found 1,180 "brand placements" in the 200 movies: 427 food brands, 425 beverage brands and 328 brands of food-related retail establishments such as restaurants or convenient stores. Sixty-nine percent of the films contained at least one such product placement, and in those movies, specific brands of foods or beverages were consumed, handled, shown or mentioned an average of 8.6 times.

"We found sugar-sweetened beverages composed the largest proportion of all the brands we recorded, accounting for one of every four brand placements that we identified," the researchers report. "This is substantially greater than the percentage of television ads devoted to sugar-sweetened beverages." (So much for the wisdom of popping a movie into the DVD player so the kids aren't exposed to commercials.)

Candy/confections were the most prevalent food brands, appearing in 26 percent of the films surveyed. They were followed by salty snacks at 22 percent, sweet snacks/desserts at 12 percent and condiments at 9 percent. "The overwhelming majority of the brand placement were for energy-dense, nutrient-poor products," the researchers note.

"On average," they add, "comedies had a high number of brand placements," presumably because marketers prefer to have their products associated with lightness and laughter. (Fava beans did not experience a measurable sales jump following their mention as a scrumptious side dish in *The Silence of the Lambs.)*

The more restrictive its rating, the more likely a film was to contain product placements of branded foods. They were found in 33 percent of G-rated films, compared to 58.5 percent of PG-rated, 73.2 percent of PG-13-rated and an amazing 80.8 percent of R-rated films.

That should provide some small comfort for parents. On the other hand, even one-third of G-rated films is a substantial number, and as Sutherland and her colleagues note, a global study of young adults found viewing specific brands in movies is "the best predictor of their trying a new product."

"Coca-Cola and PepsiCo (which together account for almost three-quarters of the beverage-brand placements) have long-standing commitments not to advertise their soft-drink products during children's television programming," the researchers write. "Yet sugar-sweetened beverage products from these companies regularly appeared in movies, especially those rated for children and adolescents."

So they get the reputation of being good corporate citizens while still reaching their young, impressionable target audience. Sweet! Talk about having your cola and drinking it, too.

http://www.miller-mccune.com/health/the-sprite-stuff-of-product-placement-8680/

To Feel Good, Reach for the Sky

By: Tom Jacobs | February 4, 2010 | 19:00 PM (PDT) |

New research finds upward physical movements inspire positive memories.

Recent studies have raised the alarming possibility that Botox may inhibit our emotional lives. Essentially, they warn that without the means to physically express certain feelings (as when cosmetic surgery makes it difficult to smile or raise an eyebrow), we may have trouble processing them. As Carl Zimmer wrote last year in *Discover* magazine, "by altering our faces we're tampering with the ancient lines of communication between face and brain that may change our minds in ways we don't yet understand."

But the link between motion and emotion goes beyond such straightforward signals of delight or disgust. That's the conclusion of a new study that finds an ostensibly meaningless physical activity — moving marbles upward — can cause people to think more positive thoughts.

Two researchers from the Netherlands — Daniel Casasanto of the Max Planck Institute for Psycholinguistics and Katinka Dijkstra of Erasmus University — conducted experiments to determine the power of a common mental metaphor: up is positive, down is negative. They note that "when people talk about emotions, they often use expressions that link positive valence with upward motion or position in space (her spirits soared) and negative valence with downward motion (she's feeling low)."

In one experiment, participants (24 undergraduates) were prompted to recount either positive or negative emotional memories. Specifically, they were asked to talk about a time when they felt proud of themselves, or a time when they felt ashamed of themselves. For half the trials, they spoke while moving marbles upward (from one tray to another directly above it); for the other half, they talked while moving the marbles down to the lower tray.

"The direction of marble movements influenced how efficiently participants produced their memories," the researchers report. Specifically, they began recalling positive memories more quickly when they were moving the marbles upward, and negative memories when they were moving the marbles downward.

In a second experiment, participants were given an emotionally neutral assignment, such as "Tell me something that happened yesterday." The researchers found they "produced positive memories more often after making upward movements, and negative memories after making downward movements."

The study provides intriguing (although not definitive) evidence of embodied cognition — the notion that emotional memories are, in some sense, stored in our bodies as well as our minds. (We discuss the theory's practical implications for health education and exercise here.) Analyzing previous studies as well as their own, the researchers report the relationship between motion and emotion is quite complex, with at least two other components besides the up-down variation they tested.

Still, the effect is clearly real, and its implications are intriguing. For one thing, it helps explain why abstract modern dance can be so emotionally expressive.

Perhaps great choreographers intuitively realize certain movements have specific emotional meanings. They understand that, when push comes to shove, the direction you're pushing in makes quite a difference.

http://www.miller-mccune.com/health/to-feel-good-reach-for-the-sky-8445/