Infoteca's E-Journal

An Electronic Compilation of Scientific and Cultural Inform
Sistema de Infotecas Centrales, Universidad Autónoma de Co

CONTENTS

A Cure for Child Abuse

Asked to investigate the roots of child abuse, a group of social engineers focused not on its causes but its prevention.

By Emily Badger

A family with all the signs of risk — but also all the strength of protective factors — has a strong chance of avoiding maltreatment. (BookMama/istockphoto)

No one wants to be anywhere near the phrase "child abuse." Parents flee from programs that would tar them as "high risk." Teachers and child care providers fear the mistrust that comes with any hint they might call Child Protective Services. Those services don't receive children until it's too late to prevent abuse. And the public numbs to PSAs with warnings like, "Every 10 seconds, another child is abused in America …" (which is, unfortunately, about right).

"What they hear is, 'It's so bad, there's nothing you can do about it, and we should just put those bad parents in jail,'" said Judy Langford, who directs the child abuse and neglect prevention program with the Center for the Study of Social Policy. "When you work with families, it's so depressing when you look at everything in that way."

Langford, however, is a remarkably optimistic woman. She visibly rises out of her seat describing innovative local programs and new studies, which tie back to a set of ideas that CSSP has been developing to substantially alter our thinking about child abuse prevention.

The center was contacted in 2001 with a daunting request: Could it help develop an entirely new approach to the field, a strategy that wouldn't be small-bore, lead-footed, depressing? The Doris Duke Charitable Foundation, which has long focused on preventing child abuse, wasn't satisfied with existing solutions to a problem inherently difficult to resolve.

"They wanted all this stuff that we thought was just impossible," Langford recalled. "They wanted a nationwide impact, they wanted to reach millions of children, and have it be long before abuse and neglect occurred — and not connected to the child welfare system. We're thinking, 'We can't really do that.'"

CSSP set out anyway and began by reviewing more than a hundred studies on child abuse prevention, examining all of the existing assumptions about what might reduce maltreatment. Eventually, CSSP began to approach the problem from an unconventional angle: Not what causes it, but what prevents it?

"Why is it some children, some families who have everything going against them survive and thrive and are successful in spite of all kinds of risk factors and other things that would say this child really doesn't have much of a chance?" Langford asked.

Those working with children probably are adept at identifying these so-called risk factors — a child has a single parent, comes from a low-income background, was born to a teenage mother. But no program on Earth can change any of that, Langford says, and in truth, risk factors aren't really predictive.

What programs can do, she now realizes, is help families build "protective factors." Their presence — or absence — actually can help predict good or bad outcomes. A family with all the signs of risk — but also all the strength of protective factors — has a strong chance of avoiding maltreatment.

And where better to start embedding these ideas — CSSP has identified five core factors — than the places where millions of children under 5 gather each day, in early child care centers, among child care workers who have never really thought of what they did as preventing child abuse.

Among the research key to this conclusion was a longitudinal study Arthur Reynolds has been running for 30 years in Chicago. He began following 1,000 children born in 1980 — children who lived in some of the poorest neighborhoods not just in the city, but the entire country. More than half of the families in this West Side area in the early '80s lived below the poverty line. Many parents hadn't graduated high school and didn't trust social services.

These children, however, were enrolled in innovative programming at the public school system's Chicago Child-Parent Centers. The program, for low-income children expected to enter into the regular school system, emphasized early reading skills and continuous development through preschool and kindergarten, as well as heavy parental involvement.

Reynolds, now a researcher with the University of Minnesota, wanted to track the long-term effects of the program on the children's later academic success and adult outcomes. When the cohort turned 21, he translated those results into economic return for society: For every dollar invested in one-and-a-half years of preschool, $7.10 returned to society through reduced dropout rates, fewer special education needs, less strain on the juvenile justice system and increased earnings capacity.

"You name it, we've looked at it," Reynolds said. He has examined behavioral problems, mental health, remedial education placement, grade retention, graduation rates, juvenile arrests, violent offenses, later job stability and projected tax revenues.

His study was also the only one, at the time, to ask the question about reduction in child maltreatment: Did such programs affect that, too? It did, and dramatically so.

Compared to a similar group not enrolled in the program, participation in the Child-Parent Centers was associated with a 51 percent reduction in the rate of substantiated child abuse and neglect by the time the children were 18.

"We weren't expecting originally that there would be big effects on the reduction of child maltreatment, but I guess it's not that surprising," Reynolds said. He suspects this has to do with the heavy parent involvement, and with the success of the school system in drawing isolated families into a support network.

That is one of the protective factors: social connections. Reviewing the other studies, CSSP settled on four others equally rooted in the Child-Parent Centers: parental resilience (the ability of parents to cope with stress); knowledge of parenting and child development (through access to resources beyond what parents learn on the job); concrete support in time of need (unemployment insurance, for example, when a parent loses a job); and children's social and emotional development (reflecting a child's ability to interact and communicate).

"What we've learned is that [child maltreatment] is a multi-level phenomenon," said Fred Wulczyn, a research fellow at the University of Chicago's Chapin Hall. To really understand it, we have to consider both risk and protective factors.

What social capital — for instance, a child care center up the street — do parents have access to? Is it enough, on some days, just to know that it's there? Does a child's own temperament cause stress for a family? How does it change the equation when a parent and a child have a bad day on the same day?

"That's what's complicated about all this, that's what's complicated about the assessment," Wulczyn said. "Is the stuff that's right about the situation enough to offset what's wrong about it?"

As Reynolds is now wondering, is what was right about the Chicago Child-Parent Centers enough to stave off abuse even in the next generation, as his 1980 children today have children of their own?

Langford and her colleagues eventually visited two dozen child care centers across the country that seemed to be having much the same success as the Chicago Child-Parent Centers. These centers integrated family outings, adult education and social services. Some actively worked to include fathers or to provide bilingual care. All viewed their missions as doing much more than simply occupying kids while their parents were at work.

Few of these model programs, however, explicitly thought of what they did as building the type of strong families that would be less likely to mistreat children. In their minds, their missions were more focused on the children in their care than the families they went home to. In a lengthy questionnaire, CSSP asked each of them what they did to prevent child abuse and neglect.

"Every single one of them answered, 'We're mandated reporters,'" Langford said, "even though they were doing all this other stuff, all the time. But in their minds, that was how they identified what it was that they were doing."

They were, in other words, legally required to report abuse (an obligation that doesn't actually have much to do with preventing abuse).

The primary contribution of "protective factors" has been to give these already strong programs a way to re-examine their impact on families, and to give weaker programs a framework for embedding tangible and cultural changes to prop up at-risk families. No one has to talk about preventing "child abuse"; the goal instead is "strengthening families."

"This isn't a brand new idea, but what CSSP did was really make it actionable," said Kathy Goetz Wolf, project director of Strengthening Families Illinois. Similar initiatives focused on the protective factors have sprung up in two dozen states.

Their idea isn't just a bookkeeping solution, a problem solved by renaming it. Rather, the protective factors are changing the dynamic between families and their child care providers, which CSSP hopes in turn will lead to fewer cases of maltreatment.

"That whole approach — you're not just taking care of my kids, you're assisting me in parenting my whole family — that's a shift in thinking which helps empower parents," said Dara Griffin, a mother of three in Chicago who now preaches the protective factors.

Langford smiles at the memory of a woman on the other side of that equation, a family resource director in Massachusetts who had a similar "Aha!" moment after one of her presentations on the protective factors.

"Finally," the woman said, "I can tell my board why I have to take 62 parents and kids apple-picking every fall! We knew it was important, but we didn't know how to talk about it."

http://www.miller-mccune.com/culture/a-cure-for-child-abuse-25882/

Climate pledges are 9 gigatonnes short

- 22:52 07 December 2010 by **Fred Pearce**, Cancún, Mexico

The US is not interested in more legally binding targets (Image: Thinkstock/Getty)

The "gigatonne gap" looms large as UN climate talks in Cancún, Mexico, enter their final days without new commitments from big polluters to cut their carbon dioxide emissions. A five to nine-gigatonne gap, to be precise. That is the gap between what has been pledged and what is needed to avoid dangerous global warming.

To keep the world on track to cap global warming at under 2 °C by mid-century, rising CO_2 emissions should be kept below 44 gigatonnes a year in 2020, more than a third higher than today. But the UN Environment Programme warned here today that current national pledges would leave 2020 emissions anywhere between 5 and 9 gigatonnes too high.

The 9-gigatonne gap will arise "if countries follow their lowest ambitions and [carbon] accounting rules are lax," according to the UNEP Emissions Gap report.

In either case, "the best science we have suggests that all chances of staying below 2 °C of warming would be gone," said UNEP director Achim Steiner. Two degrees is widely seen as a threshold for dangerous climate change.

Tallied pledges

The report analyses current pledges, as made by major nations in the Copenhagen Accord, agreed at abortive UN talks last year. They include a 20 per cent cut from the European Union by 2020, 17 per cent from the US and a 45 per cent improvement in the "carbon efficiency" of the Chinese economy.

In nine days of talks here, no nations have raised their offers, increasing fears that talks could collapse in acrimony either this year or – more likely – at next year's meeting in Durban, South Africa.

How might the gap be bridged? Developing countries are demanding higher emissions cuts by industrialised countries – they cite 40 to 50 per cent by 2020. The EU says it would go to 30 per cent if other nations made

similar promises.That would go a long way to bridging the gigatonne gap, according to the EU climate commissioner Connie Hedegaard.

Entrenched

But the omens are not good. Japan has joined in the US in saying that it is not interested in joining a second era of legally binding targets after the current Kyoto Protocol "compliance period" expires at the end of 2012. British environment secretary Chris Huhne is leading side-negotiations to agree ways of extending the Kyoto Protocol, but many see that outcome as increasingly unlikely.

Elliot Diringer the Pew Center for Global Climate Change, a US-based think tank, echoed a widely held view among US observers that governments are not going to raise their numbers beyond the promises made in Copenhagen – whatever the science says. "The numbers are not under negotiation," he said on Monday. He added that he did not expect a deal on any legally binding targets in Durban. "The politicians are not ready. If they try and set a new deadline, it will be Copenhagen all over again."

Methane

If governments will not sign up to greater cuts than they have already, could other measures bridge the emissions gap? The smart money is on new initiatives to curb emissions of greenhouse gases other than CO_2. They include methane, tropospheric ozone (a byproduct of vehicle emissions) and black carbon (from open fires). Plans to cut methane emissions are now being put together by the Methane Blue Ribbon Panel, a group of experts headed by the former chairman of the Intergovernmental Panel on Climate Change, Bob Watson.

The US is keen to pursue non-CO_2 options. In this, at least, they are joined by poorer states: in side events here, Micronesia, a nation of low-lying Pacific atolls threatened by sea level rise, argued that "addressing short-lived pollutants can reduce warming significantly and better protect the most vulnerable human populations".

Methane is a potent greenhouse gas, so emissions cuts could provide a "quick hit" against global warming. But the gas only stays in the atmosphere for around a decade before it degrades. They do not accumulate in the way that CO_2 does and so the benefits of curbing them are transitory. It would only delay the need for even tougher action on CO_2.

British climate ambassador John Ashton argued this week against being diverted by plan Bs. At the end of the day "there is no alternative to a global, legally binding agreement" on the main greenhouse gas, carbon dioxide.

http://www.newscientist.com/article/dn19826-climate-pledges-are-9-gigatonnes-short.html

New disease-resistant food crops in prospect

Biotechnology and Biological Sciences Research Council (BBSRC)

Researchers have uncovered the genetic basis of remarkable broad-spectrum resistance to a viral infection that, in some parts of the world, is the most important pathogen affecting leafy and arable brassica crops including broccoli, cauliflower, cabbage, kale, swede and oilseed rape. They have tested resistant plants against a range of different strains of the virus taken from all over the world and so far, no strain has been able to overcome the resistance.

The research on the so-called Turnip mosaic virus (TuMV), led by Dr John Walsh of the University of Warwick and funded under the BBSRC Crop Science Initiative, has been taken forward in a new partnership with Syngenta Seeds.

Dr Walsh said "TuMV causes really nasty-looking black necrotic spots on the plants it infects - 'a pox on your' vegetables! This can cause significant yield losses and often leaves an entire crop unfit for marketing. At best, a field of badly affected Brussels sprouts might provide some animal fodder, but these vegetables would not be appealing to most shoppers. The virus is particularly difficult to control because it is transmitted so rapidly to plants by the insect vectors"

Dr Walsh and his team identified the major gene involved in resistance to TuMV and discovered that the way in which it creates resistance is completely new. Using this knowledge, they found that it was possible to identify plants with an inherent resistance that could be used to speed up the breeding process and

develop commercial varieties that are resistant to TuMV.

The team from University of Warwick are now working with industry partner Syngenta Seeds to breed resistance into Chinese cabbage. They hope in future to do the same with other crops such as broccoli, cabbage and kale.

Peter van der Toorn, R&D Lead Leafy Crops, Syngenta Seeds Vegetables said "Working in partnership with academic researchers is very important for us. Through such collaborations it's possible to take an idea from pre-commercial research and turn it into a new variety that can benefit the consumer and boost our contribution to the UK economy. We are very excited to be working together with academics at the University of Warwick to breed varieties with improved resistance to Turnip mosaic virus."

Professor Douglas Kell, BBSRC Chief Executive said "Bioscience research in all its forms has always given rise to developments that have impacts in society - whether predicted or serendipitous. Such developments need a structure through which to realise their potential and a partnership such as this one between the University of Warwick researchers and Syngenta will be important to ensure that resistance to diseases is incorporated into commercial crop varieties. These new resistant varieties would then be available to contribute towards future food security."

For more information see:

http://www.bbsrc.ac.uk

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90107&CultureCode=en

Censorship in Shades of Black and Gray

John Kampfner, the head of the London-based Index on Censorship, discusses the threats to free expression in the world, from the dictator's muzzle to the playwright's pen.

By Michael Todd

The London-based Index on Censorship aspires to defend freedom of expression around the world.(Stefan_Redel/istockphoto)

The London-based Index on Censorship wanders the world in defense of freedom of expression, from repressive regimes where its contacts can't even name themselves publicly to courtrooms where Twittering wags face hard time. Founded to uphold basic freedom for writers being squashed by the then-Warsaw Pact nations, Index has evolved into a sprightly academic journal, a savvy website and a campaigner against abuses everywhere.

But John Kampfner, its chief executive since 2008, doesn't see these issues in the stark black and whites of so many campaigners for human rights, but more in grays, a monochromatic kaleidoscope in which there's no agreement whether free speech is a right at all, much less an inalienable one. He explained his approach and the good work on Index during a recent visit to *Miller-McCune*'s office in California.

Before joining the Index on Censorship, Kampfner edited Britain's premier political magazine, the New Statesman from 2005-08, and has worked as a foreign correspondent, commentator, documentarian and author. His 2009 book, *Freedom For Sale*, reviews the trade-offs societies make in exchange for security or prosperity, a theme inspired by his hometown of Singapore.

Miller-McCune.com: What exactly is Index on Censorship?

John Kampfner: Here is our mission statement: "Through our website, magazine, events and global projects, Index on Censorship is the principal place for intelligent, incisive work on free expression in the United Kingdom and worldwide."

So what that means in plain English is that we shine a light on all issues of censorship, and self-censorship, and free expression — and abuses and lack of free expression — wherever it occurs and in whatever form it occurs.

Breaking it down, I would put that very crudely into two categories. There is what I call black-and-white censorship or abuses of free expression, usually found in dictatorships or authoritarian countries or other countries where civil society is weak. That is the killing, or maiming, physical harming, false imprisonment or harassment of anyone seeking to hold truth to power. That could be a journalist, a blogger, an oppositionist, an activist, or an NGO, or a lawyer. Those are crude forms of intimidation or wrongful punishment or the like.

Then there's what I call the shades of gray areas, where modern society is struggling to cope with free expression and competing factors. And that could be anything around offense, around sensitivities such as race hate, religious hate, gender issues or that sort of thing. It could be issues of libel and defamation, it could be issues of privacy. It could be other dilemmas such as secrecy and national security and the integrity of the state, such as official secrets. It's all these issues, and it's also the issue of oxygen of publicity for extremist organizations or organizations that incite people to actions against minorities or anything else like that. These are the really difficult issues where there is no single opinion and where we seek to navigate and sometimes to mediate — but always with a presumption to free expression as an inalienable right.

M-M: Index was founded in 1972, during the Cold War. How has it changed, if it has changed, between then and 2010?

JK: Its core principles remain exactly the same — fighting censorship, fighting abuses — although the world that we inhabited in 1972, or that Index and similar organizations inhabited in 1972, was almost exclusively in the category of black-and-white issues of censorship as I described in my previous answer. There were countries that, to put it simply, promoted free speech, and countries that acted against it.

Where the modern version of Index has a new role, and I think a very challenging and difficult role, is in this new context, which I call the shades of gray. It pretty much did not exist back in 1972, when Index was founded mainly as an organization protesting against injustice in the Soviet space.

A lot of issues, such as the fatwa against *The Satanic Verses*, were defining issues of this current generation. That was almost the first such example of the new era. But in many ways, I feel it's a much tougher challenge, and it's a much more exciting challenge, one that makes us relevant to the lives of ordinary people in all societies where people are grappling with free expression issues.

For example, millions of people around the world were interested in the imprisonment of Aung San Suu Kyi, but they were not, unless you lived in Burma, affected by it. [But] issues about what you can say in a book, or in a theater, and what you can say in a phone-in chat show radio program, or what teenagers can or should say in a schoolyard, these are also free-expression issues. What rock bands or rappers can say in their lyrics, what comedians can and should say — these are all free-expression issues. And these are all shades of gray. And they're all very relevant to the here and now.

M-M: Would you argue that you or Index are extremists for free expression? Where would you place yourself on the spectrum?

JK: I certainly wouldn't argue that we're extremists in any shape or form. I would revile hugely from such a tag. We are passionate in the causes we espouse. We would not, however, even call ourselves free-speech fundamentalists, because once you accept that old cliché that you cannot shout fire in a crowded theater, then you are already navigating through difficult terrain. Now within our office, and among our stakeholders and our wider family, so to speak, there are different interpretations of how far the right to free expression trumps other concerns. I think everyone individually has their own different borderline — and those borderlines are constantly shifting.

For example, in the U.K., in the past couple of weeks, there have been two absolutely fascinating court and police cases around Twitter and two individuals who posted things on Twitter, one of whom was prosecuted and another who was arrested by the police. These were fascinating examples: Is a tweet actually a published item, should it therefore be regarded in exactly the same way as writing a book or writing a newspaper article? In both cases, these were really crass and stupid jokes which went wrong. But in our view, they were not relevant to the criminal justice system. But lawyers, journalists and ordinary members of the public would have different interpretations of these difficult issues.

I think that where your question was slightly leading was that in the United States, there is constitutionally, judicially and possibly societally a greater presumption toward free expression through the First Amendment than there is in the U.K. and most other societies. In the U.K., freedom of expression is one of competing rights, it is not an inalienable right. [Index] very much subscribes to the U.S.'s broad interpretation, through the First Amendment, that free expression is one of the most fundamental, inalienable rights.

M-M: You've said in the past that you don't "score" nations, but in that scoring sense, are you more concerned about nations with black-and-white abuses or about developed nations backsliding what they claim are their core beliefs?

JK: They are part of the same thing. They genuinely are. I'm not equating them, I'm not suggesting moral equivalence, but they are all part of the work that we do. One of the theses of my book was how we in the West, but also around the world, are increasingly willing to trade our liberties in return for either prosperity or security. We do so at our peril, but we do so increasingly casually. One of the things I was seeking to do was to differentiate between what I call 21st-century authoritarian state and 20th-century dictatorships. I would put Burma and North Korea very much in the category of old-fashioned, 20th-century dictatorships, where there is no subtlety. There are men in dark glasses on street corners and people get bundled away; it is a very old-fashioned rule by the barrel of a gun.

The more intriguing 21st-century authoritarian countries are seeking to trade certain liberties, what I call "private freedoms," which are distinctive from public freedoms. For example, if you live in Russia or China, as long as you don't "cause trouble," you have far greater private freedoms than you ever did during the Cold War: freedom to travel, to own property, to run your own business, to choose education for your children, to choose different forms of health care, whatever, freedoms that were previously denied. What is interesting is how those societies are navigating through an authoritarian mindset through free-expression issues.

For example, in China, there is a reasonable modicum of free expression around economic journalism and economic writing, and to a degree around cultural journalism and cultural writing. Where there is none, as you are completely aware, is on core political questions around the supremacy of the communist party or on exhortations to multi-party democracy, that sort of thing. The control of the international blogosphere in China is an authoritarian one, but it is not a complete one. So there is constant navigating, turning the tap on, turning the tap off. It's what I call the Singapore model, writ large.

Across the world, from the darkest dictatorial countries through to the authoritarian ones, all the way through Western countries, there are all manner of different approaches towards free expression. For example, Britain had among the world's worst dictatorial, draconian libel laws. However, we are less strict on issues of

privacy. If you look at France, they have quite draconian laws on privacy, and how you're not supposed to invade the privacy of public figures or individuals, but they have more relaxed defamation laws. In other countries, laws are stronger on outlawing race or racial offense through the written or spoken word than others. So, there isn't a one-size-fits-all template for any country, whatever its system.

M-M: If the world's population was given a straight up or down vote on the Singapore model, in your heart of hearts, do you think they would vote for that model?

JK: You've gone straight to the crux of the dilemma that I posit in my book. I would love to say to you that no, they wouldn't, but I'm not as confident of this as I might be.

M-M: I think in the United States, in the wake of 9/11, we would flock to the Singaporean model, although we'd have to have it renamed; someone would have to do a little marketing.

JK: Absolutely. What's been explained to me, and what I find fascinating about the Singapore model, [is how] Singapore academics and people who are extremely well educated and very, very well traveled, who have seen and lived through the many alternatives, proselytize for the model. Some of them argue, and I think completely speciously and erroneously, that there is a sort of genetic issues around paternalism and East Asian values, and all this stuff. I don't buy any of that for a minute. I think these issues are universal, and they are not regional specific or cultural or ethnic at all. Where I think it is interesting is in the level of comfort or stability that a country has previously experienced, which is the "freedom from" issue.

Now if you are in Rwanda or the Democratic Republic of Congo, would you rather have stability or free speech? It's absolutely clear you go for the former, because there is no liberty where there is no basic security. If you can't walk the streets for fear of being chopped down by a machete, then free-speech issues are secondary. It is quite legitimate to say that the first role of the state is to provide the basic rudiments of security, stability, order and civil society. From that, these other freedoms stem. But our standards are not particularly high for that, and once we have achieved those things — and most countries have — then there is no hiding behind the essential needs of the public. But unfortunately, that's not the way that many people see it.

M-M: Would you say that your views, or the views of Index, have created enemies?

JK: Any organization that speaks out, that sees injustices in its own terms and seeks to address them, produces critics or adversaries. I'm not sure I would say there are any sort of blood-thirsty enemies towards. Obviously, in certain countries, it's very difficult for us to operate, and sometimes we have to work below the radar. One of our main concerns in dictatorial states is not to implicate our partners on the ground and get them into trouble.

Now our campaign, which has been extraordinarily successful, almost a model of NGOs operating collaboratively, to change the English libel laws, which will have a major effect on the United States and on all countries, that made us enemies. There are claimant lawyers and law firms in the U.K. and around the world who would love to continue defending oligarchs and others seeking to chill free speech. They don't like NGOs or other people they consider to be upstarts to be dominating the airwaves persuading politicians to change the law. If that's the case, then we're quite happy to be defined by that.

M-M: Tell me more about the libel reform campaign.

JK: It's the single most important project we've done over the last 12 months. Basically, we and our colleagues at English PEN, the U.K. branch of international PEN, and a mall NGO that deals with the free speech of scientists called Sense about Science, we came together to launch the Libel Reform Coalition on

Nov. 10, 2009. Without sounding self-congratulatory, three NGOs have pretty much turned around one of the most hidebound bodies of law that exists in this country, and a body of law that has had pretty major international repercussions.

English libel law had some of the most restrictive law on what you could say, on defense of responsible journalism, the defense of fair comment. The cost regime was astronomical; if you were defending yourself, a claimant's law firm could basically string out the case for many years and basically destroy a small organization through cash flow. And even where you defended and you won, you would never recover full costs. So newspapers and magazines that absolutely were endorsed by the courts at the end of a long legal procedure often ended up nearly penniless out of pocket.

What tended to happen was two things. One, publishers — and not just publishers, it was individuals, bloggers, NGOs, soccer fan clubs, everybody — settled out of court. They apologized, even when they had nothing to apologize for, just because the cost of defending yourself would be prohibitive. So the vast majority of these cases never went to court.

At the same time, such was the reputation of English courts that the rich and the powerful around the world would use courts in London to sue other, third-country nationals in English courts. So you had bizarre cases. In one, a Ukrainian oligarch sued a Ukrainian blogger who wrote in Ukrainian in Ukraine. He was sued in an English court because the claimant happened to have a home in London and therefore he said he had a reputation to defend. "Libel tourism" was described by a U.K. parliamentary committee as a national humiliation. This pressure that we brought about we hope will mean England is no longer a laughingstock around the world.

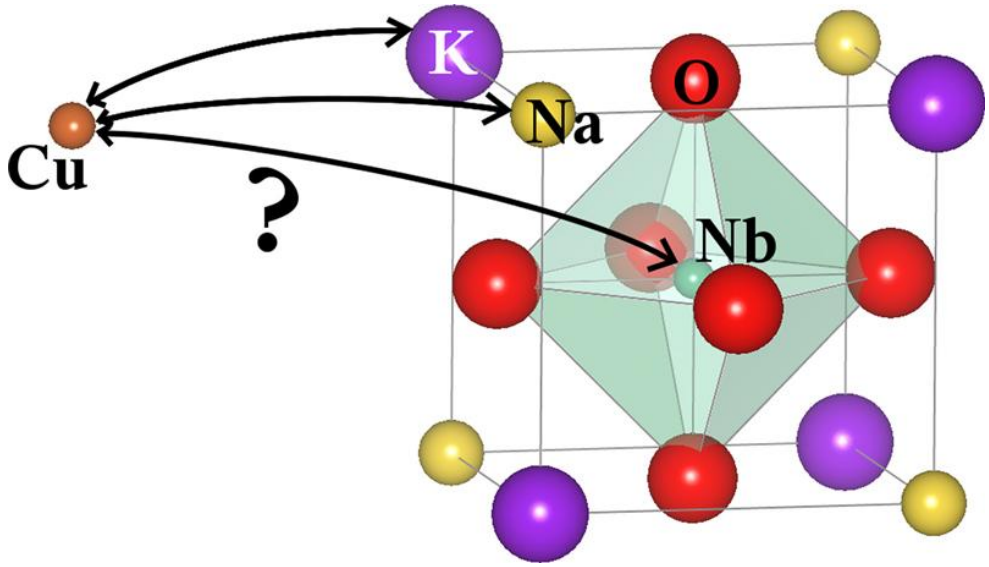
M-M: What would you identify as the newest threats to free expression?

JK: A fascinating threat which is relatively new is the issue of artistic censorship and free expression, especially around issues of racial and religious offense. I was doing a seminar … with theater directors, theater managers, visual arts companies, visual arts galleries, and they were telling me amazing stories of how they wouldn't show a particular piece of art, they would not commission a particular play, and in the case of a couple of plays in the U.K., they were actually taken off the stage in a few days because of public protests. In one case, the police actually ordered a play to be abandoned, citing public order issues. With local authorities here, and with police and public prosecutors around, [we're] trying to get some sort of modus operandi around how do you deal with these issues. If a local group complains it is being offended by a particular play, what tends to happen is that the local authority and the local police just act of their own volition. We want to set some sort of national standards to get some sense of accountability and transparency and consistency, again with a presumption toward free speech.

The other area that I would say is new is social networking. There are very clear and established laws, whether you like them or not, in most countries around old media. But pretty much every country's legal establishment struggles to cope with the Internet, and not just the Internet, but social networks. If you tweet something, or you put something up on your Facebook site, is it a published document in the same way a newspaper article is? And if it is, and currently courts seem to be interpreting it that way, will people realize that, and should that be the case?

http://www.miller-mccune.com/legal-affairs/censorship-in-shades-of-black-and-gray-25816/

On the way to lead-free technology



Fraunhofer-Gesellschaft

The change-over to lead-free products is in full progress. The problem is however that the environmentally friendly alternatives have to be as efficient as the lead-containing variants. One example is the injection system of diesel engines. Lead-free functional materials can be found faster by means of computer simulation methods.

Technical progress in the automobile industry is unbroken. But, the sector has still some hard nuts to crack: “Lead-free materials” is one of the challenges – hidden behind this challenge is a EU environmental directive which, based on a step-by-step plan, gradually bans all lead-containing materials and components from automotive vehicles – such as piezoelectric components. These elements are important for diesel engine injectors, for example, which control the supply of fuel to the combustion chamber.

The problem: Up to now lead-zirconate-titanate (PZT) is the material of choice when fast switchable piezoelectric applications in cars are concerned. To find alternatives without containing the heavy metal of lead is not an easy task, however, because in raw condition all alternatively used materials still do not have the desired properties. A simulation approach which the researchers of Fraunhofer Institute for Mechanics of Materials IWM have developed gets the search going now: “We have to chemically and physically modify the potential candidates in such a way that in the end the replacement materials behave similarly well as the PZT“, says Professor Dr. Christian Elsässer, group leader at the IWM. A candidate such as this is potassium-sodium-niobate (KNN). Like PZT it is a ferroelectric monocrystal, but as technical ceramics with uncontrolled atom vacancies and grain boundaries in the crystal lattice, KNN is initially useless as a material. “For this reason, we have to make a virtue of necessity and have to introduce the right doping, i.e. foreign atoms, in order to improve the properties of the ceramic KNN,” says Christian Elsässer.

Where and how these doping atoms have to be introduced is figured out by the researchers by means of computer simulation: Different ferroelectric properties are obtained depending at which position of the crystal lattice the foreign atoms – such as copper – are placed. “At one position, the copper donates electrons, at another position it prefers to accept them. Dipoles are formed or they are not formed depending on the lattice position,“ explains Christian Elsässer. These solid-state physical parameters and a number of others shall be determined in advance. Researchers do this with the help of “physics in the computer”. This is by no means a

trivial task because the quantum mechanical computations require complex atom model systems and big computer capacity. But on the other hand, a lot of time and money can be saved in the development of materials, because on the one hand fewer synthesis and analysis experiments in the laboratory are required. On the other hand computer simulation also produces important thermodynamic parameters for the sintering process, such as pressure and temperature ranges at which the components have to be manufactured. ”The engineers receive synthesis instructions for the material at the same time,” says the researcher.

In this way, the automobile industry can achieve the lead-free target faster. But not only this sector profits from Fraunhofer technology. Lead-containing materials are also present in frequency filters of mobile phone or in mechanical sensors and actuators. Ferroelectric capacitor components are competitive in the race for records when it comes to saving ever bigger data volumes on the smallest of space.

http://www.fraunhofer.de/en/press/research-news/2010/11/on-the-way-to-lead-free-technology.jsp

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90110&CultureCode=en

Immigrant Flow Shifts to Smaller Cities

While big cities have been the traditional gateways for America's waves of immigration, midsize cities are becoming the new destinations.

By Frank Nelson

An analysis of home-buying trends among immigrants shows a population flow away from gateway cities to midsize cities and urban areas.(sjlocke/istockphoto)

The Pew Hispanic Center has predicted that the U.S. population will grow by more than 100 million over the next 40 years solely as a result of immigration — legal and illegal — and the children born to immigrants already here.

Those numbers are in line with several other forecasts based on Census Bureau data, and certainly sound right to associate professor Gary Painter, director of research at the University of Southern California Lusk Center for Real Estate.

Where will all those people live? Painter, a specialist in urban economics, homeownership and housing markets, has a pretty good idea.

In a study published in the *International Migration Review*, Painter and co-author Zhou Yu, an assistant professor at the University of Utah, have been looking at links between geographic location and home-buying trends among immigrants.

The focus of their research has been the steady drift of new immigrants away from the major gateway cities — New York, Los Angeles, Miami, San Francisco, Chicago and San Diego — and toward midsize cities and urban areas.

Among places attracting immigrants while major gateways are losing them are Las Vegas, Atlanta, Boston, Seattle, Dallas-Fort Worth, Detroit, Minneapolis, Nashville, Tenn., Colorado Springs, Colo., El Paso, Texas, Sarasota, Fla., Orlando, Fla., and Sacramento, Calif.

"Our data suggest that immigrants are attracted to homes near active support networks of fellow immigrants and in places with lower rates of immigrant growth resulting in less competition for entry-level jobs," Painter said.

"The anticipated rapid growth of U.S. immigrant populations in the coming decades, coupled with their movement into midsize metro areas, has the potential to transform communities."

Given the huge numbers predicted, Painter suggests local governments could seize the opportunity to be proactive by encouraging provision of the necessary housing, public transport and social services.

They might achieve this by partnering with home builders or by trying to ensure enough people are available with the language and cultural skills to assist the new residents, especially in areas like real estate and lending.

While immigrants arrive from all over the world, Painter says Hispanic and Chinese are the most broadly represented. But there are concentrated pockets of others, such as Ukrainians in Sacramento.

Painter says good communication skills are vital in situations where smaller metro areas prepare to absorb an influx of recently arrived immigrants. "Language is key to helping communities become more hospitable to immigrants," who are then more likely to buy homes and stay there, he added.

In areas where communities succeed in offering a warm welcome, along with employment and housing opportunities, Painter says first-time immigrant home buyers can help stabilize previously declining home values.

http://www.miller-mccune.com/business-economics/immigrant-flow-shifts-to-smaller-cities-25710/

Bioscience researchers defeating potato blight

Biotechnology and Biological Sciences Research Council (BBSRC)

Researchers funded by the BBSRC Crop Science Initiative have made a discovery that could instigate a paradigm shift in breeding resistance to late blight - a devastating disease of potatoes and tomatoes costing the industry £5-6 billion a year worldwide. They will share this research with industry at an event in London later today (18 November).

Professor Paul Birch of the University of Dundee and his team at the Scottish Crop Research Institute (SCRI), the University of Dundee, and the University of Aberdeen have developed a new approach to breeding resistance to the mould-like organism Phytophthora infestans (P. infestans) that causes late blight.

Through their work on the interactions between potato plants and P.infestans Professor Birch and his team have come up with a completely new approach to breeding resistance to late blight in potatoes. This approach will be taken forward in a new project working with colleagues at The Sainsbury Laboratory in Norwich to identify resistance in potato plants that could then be used for breeding new resistant varieties. It is also hoped that it will be possible to combine resistance to late blight with resistance to nematodes (another serious problem for potato farming in the UK) in a single GM variety.

Professor Birch said "In the past we have tried to breed resistance to late blight by identifying plants that survive a period infection and could, in future generations, potentially give rise to resistant varieties. This approach is slow, resource intensive and requires a degree of luck that the resistance will last for any prolonged period. So far, all such resistances have been defeated because of the broad extent of variation in the population of P.infestans in the environment. With our discovery, we can use genetic analysis to identify plants for breeding that are inherently resistant to infection. When introduced into cultivated varieties, such disease resistance should be far more durable."

By studying the interactions between P. infestans and potato plants the team has identified proteins that are secreted by the invading pathogen and are essential for infection.

Professor Birch continued "We now know a lot more about how P.infestans gets round the potato plant's natural defences and therefore what it takes for the plant to resist infection. We can actually look at a potato plant's genetic makeup and say whether it will be sustainably resistant to late blight, which is a huge step forward. Whilst our approaches are suitable for breeding, in future we also hope to use a GM approach to produce a variety that is resistant to both blight and potato cyst nematode."

Dr Mike Storey, Head of Research and Development, AHDB - Potato Council said "Blight is a serious problem for the potato industry in the UK. We are working hard to raise grower awareness and ensure best practice to control the disease but we have the challenge of a continually changing pathogen population. What we need now is the application of this new research to improve variety resistance and identify new crop protection targets and integrate these approaches for sustainable control and to reduce the impact when blight does occur. This will be of great benefit to UK farmers and the economy."

Professor Janet Allen, BBSRC Director of Research and chair of the Global Food Security programme development board said "We know that high quality bioscience research is required if we are to have a sustainable supply of safe, affordable, healthy food to feed a growing world population. Late blight is a significant problem in the UK and elsewhere and so it is particularly good news that the fundamental research carried out under BBSRC's crop science initiative is providing opportunities to move towards application in new varieties."

For more information see:

http://www.bbsrc.ac.uk

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90104&CultureCode=en

Crop science projects drive benefits for farming, food security and UK economy

Biotechnology and Biological Sciences Research Council (BBSRC)

Researchers have uncovered the genetic basis of remarkable broad-spectrum resistance to a viral infection that, in some parts of the world, is the most important pathogen affecting leafy and arable brassica crops including broccoli, cauliflower, cabbage, kale, swede and oilseed rape. They have tested resistant plants against a range of different strains of the virus taken from all over the world and so far, no strain has been able to overcome the resistance.

The research on the so-called Turnip mosaic virus (TuMV), led by Dr John Walsh of the University of Warwick and funded under the BBSRC Crop Science Initiative, has been taken forward in a new partnership with Syngenta Seeds.

Dr Walsh said "TuMV causes really nasty-looking black necrotic spots on the plants it infects - 'a pox on your' vegetables! This can cause significant yield losses and often leaves an entire crop unfit for marketing. At best, a field of badly affected Brussels sprouts might provide some animal fodder, but these vegetables would not be appealing to most shoppers. The virus is particularly difficult to control because it is transmitted so rapidly to plants by the insect vectors"

Dr Walsh and his team identified the major gene involved in resistance to TuMV and discovered that the way in which it creates resistance is completely new. Using this knowledge, they found that it was possible to identify plants with an inherent resistance that could be used to speed up the breeding process and develop commercial varieties that are resistant to TuMV.

The team from University of Warwick are now working with industry partner Syngenta Seeds to breed resistance into Chinese cabbage. They hope in future to do the same with other crops such as broccoli, cabbage and kale.

Peter van der Toorn, R&D Lead Leafy Crops, Syngenta Seeds Vegetables said "Working in partnership with academic researchers is very important for us. Through such collaborations it's possible to take an idea from pre-commercial

research and turn it into a new variety that can benefit the consumer and boost our contribution to the UK economy. We are very excited to be working together with academics at the University of Warwick to breed varieties with improved resistance to Turnip mosaic virus."

Professor Douglas Kell, BBSRC Chief Executive said "Bioscience research in all its forms has always given rise to developments that have impacts in society - whether predicted or serendipitous. Such developments need a structure through which to realise their potential and a partnership such as this one between the University of Warwick researchers and Syngenta will be important to ensure that resistance to diseases is incorporated into commercial crop varieties. These new resistant varieties would then be available to contribute towards future food security."

http://www.bbsrc.ac.uk

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90101&CultureCode=en

All known species of tuna in the Mediterranean breed at Balearic Sea

IEO Instituto Español de Oceanografía

A study led by the IEO revealed the factors that make the waters of the Balearic Islands the favorite place for bluefin tuna to spawn

Scientists at the Spanish Institute of Oceanography (IEO) have recently published in the journal *Progress in Oceanography* the results of an ambitious project that began in 2001 and it has unveiled what are the reasons that lead bluefin tuna, and others top predators, to breed in Balearic Sea as their favourite place.

For nearly 10 years a team of researchers from the Spanish Institute of Oceanography (IEO), led by Francisco Alemany, has undertaken a project to characterize the spawning habitat for bluefin tuna and other tuna in waters off the Balearic Islands and have recently published an initial summary of findings in the journal *Progress in Oceanography*.

This work is the result of the analysis of information obtained during five cruises, carried out during the spawning season of this iconic and threatened species in waters of the Balearic Sea. In each of these cruise were covered over 200 sampling stations distributed regularly around the Balearic Sea, performing in all hydrographic profiles, water sampling for the determination of physicochemical parameters at different depths and various plankton hauls, some of them led to the sampling of the smaller fractions (micro and mesozooplankton) and others aimed at the capture of tuna larvae.

The vast amount of data available, both on environmental and biological parameter, such as those resulted of the laborious process of analysis of these planktonic samples, confirm that the Balearic Sea is one of the main

spawning areas for bluefin tuna and for other top predator fishes inhabiting the Mediterranean Sea, and it allows to know the factors that determine the spatial distribution of specific spawning areas.

During the cruises the researchers have found larvae of all tuna species recorded in the Mediterranean: bluefin tuna (*Thunnus thynnus*), albacore (*Thunnus alalunga*), bullet tuna (*Auxis rochei*), little tunny (*Euthynnus alletteratus*), atlantic bonito (*Sarda sarda*) and even the tropical skipjack tuna (*Katsuwonus pelamys*).

By analyzing the spatial distribution of bluefin larvae in relation to the hydrographic yearly prevalent conditions, it was observed that tuna larvae were mainly concentrated in areas of water convergence of less saline surface masses of recent Atlantic origin, which reaches the Balearic Islands from the Alboran Sea, and Mediterranean resident surface water masses. Thus, the areas of interaction between Mediterranean and Atlantic waters in the Balearic Sea, seems to meet the most suitable environmental conditions for a successful larval development.

The analysis of the ratio of DNA and RNA and the daily growth of larvae showed a better condition and higher growth rates during the warmest year in the series. This could be the ultimate cause of the relationship between warm periods and greater abundance of the Atlantic bluefin stock reported by various authors.

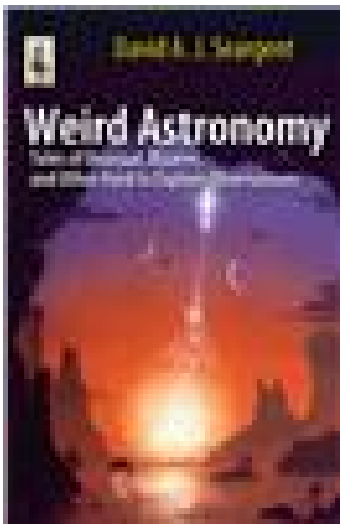
With this basic information the IEO research teams are proceeding to develop various models that will allow to know, in near real time, the most probable distribution of spawning areas based on the yearly hydrographic scenario and to estimate the survival of successive annual cohorts, trends in spawning stock and even predict the possible evolution in hypothetical future climate scenarios. For this new phase of the project the IEO researchers are collaborating with experts from other institutions like the University of Bergen (Norway), the National Oceanic and Atmospheric Administration (USA), various universities from this country and others Spanish institutions as CSIC.

The Spanish Institute of Oceanography (IEO) is a public research organization, from the Spanish Ministry of Science and Innovation, dedicated to research in marine science; especially in relation to scientific knowledge of oceans, sustainability of fisheries resources and marine environment. The IEO represents Spain in most of the international science and technology forums related to the sea and its resources. IEO has nine coastal oceanographic centres, five experimental aquaculture plants, twelve tide gauge stations, one receiving station for satellite images and a fleet of six research vessels.

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90086&CultureCode=en

Weird Astronomy: Tales of Unusual, Bizarre and Other Hard to Explain Observations

jueves, 18 de noviembre de 2010 Springer Science+Business Media



- **Título de publicación:** Weird Astronomy: Tales of Unusual, Bizarre and Other Hard to Explain Observations
- **Autor:** David A. J. Seargent
- **Clase de publicación:** Libro (en rústica)
- **Fecha de publicación:** lunes, 01 de noviembre de 2010
- **Número de páginas:** 304
- **Número ISBN:** 978-1-4419-6423-6
- **Precio:** 39,95 EUR Euros

New book documents the many oddball astronomical phenomena encountered by novice astronomers and experts

When amateur astronomers or scientists study the stars and heavens, they usually know what to expect - the Moon, stars, constellations, and planets. But what happens when they look up into the sky and see something completely new, something unexplainable?

In his new book, Weird Astronomy: Tales of Unusual, Bizarre and Other Hard to Explain Observations, David A. J. Seargent chronicles the odd, unexplainable astronomical phenomena discovered throughout the years.

Seargent examines many weird astronomical discoveries, including:

· Fiery bursts spewing outward from the Moon on June 18, 1178, witnessed by a group of English monks,

· A bright star-like object to the left of the Sun as the Sun was setting, witnessed on August 7, 1921, by a group of people, including some astronomers,

· The early belief, which began in 1877, that there were canals criss-crossing Mars,

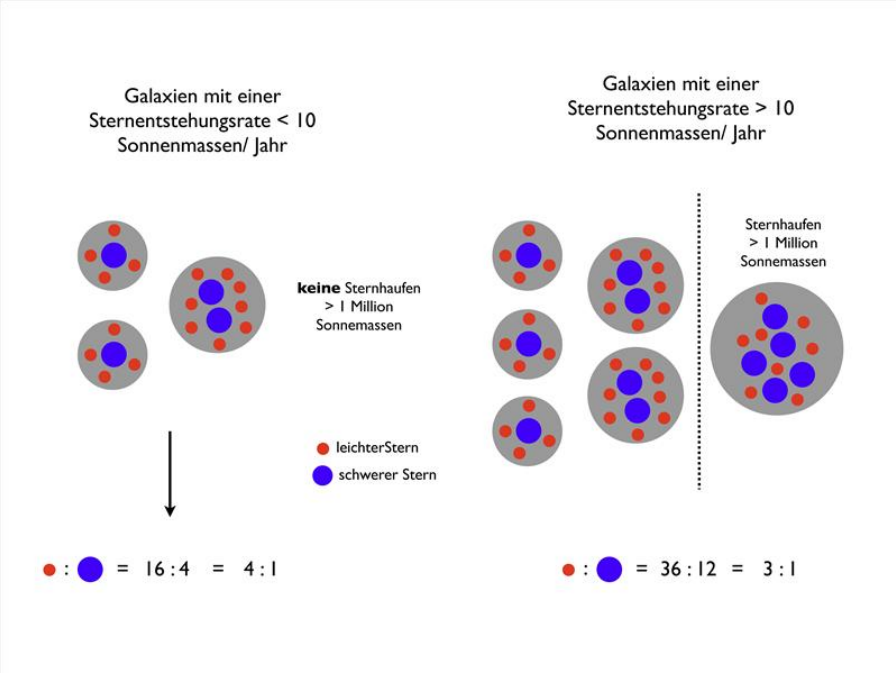
· The "spooky" Halloween star observed on October 31, 2006.

"For centuries, scientists and amateur astronomers have spent countless hours watching and studying the skies and stars. Inevitability, some of those watchers have encountered odd and hard to explain sights," Seargent said. "I wanted to delve into these many reports and accounts of odd astronomical phenomena, and offer possible answers or explanations of these various reports."

Weird Astronomy also includes a variety of astronomy projects that amateur astronomers can do themselves to learn more about astronomy. The projects range from very basic to a bit more challenging, but all are fun and all are very instructive about unusual sightings.

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90074&CultureCode=en

The enigma of the missing stars in space may be solved



Bonn, Universitaet

In the local group of galaxies that also includes the Andromeda Nebula and our Milky Way, there are about 100 billion stars. According to astronomers' calculations, there should be many more. Now, physicists from the University of Bonn and the University of St. Andrews in Scotland may have found an explanation for this discrepancy. Their study will appear in the upcoming issue of the Monthly Notices of the Royal Astronomical Society; but it can already be accessed online at http://arxiv.org/abs/1011.3814.

New stars are born in the Universe around the clock – on the Milky Way, currently about ten per year. From the birth rate in the past, we can generally calculate how populated space should actually be. But the problem is that the results of such calculations do not match our actual observations. "There should actually be a lot more stars that we can see," says Dr. Jan Pflamm-Altenburg, astrophysicist at the Argelander-Institut für Astronomie of the University of Bonn.

So, where are those stars?

For years, astronomers worldwide have been looking for a plausible explanation for this discrepancy. In cooperation with Dr. Carsten Weidner from St. Andrews University, Dr. Pflamm-Altenburg and Professor Dr. Pavel Kroupa, Professor of Astrophysics at the University of Bonn, may now have found the solution. It seems that so far, the birth rate has simply been overestimated. But this answer is not quite as simple as it sounds. Apparently, the error of estimation only occurs during periods of particularly high star production.

The reason for this lies in the manner in which astronomers calculate the birth rate. "For the local Universe – i.e., the Milky Way as our home and the adjacent galaxies – it is relatively simple," explains Professor Kroupa. "Here we are able to count the young stars one by one, using huge telescopes."

The problem with this method is that it only works for our immediate vicinity. But many galaxies are so distant that even the best telescope simply overlooks their small stars. As luck would have it, however,

occasionally there is an especially large whopper among the newbie's in the sky. Such a star will, even if it cannot be directly discovered as an individual star, leave its traces in the light of even the farthest galaxies. The number of large whoppers then determines the strength of this trace.

In our immediate vicinity, these large whoppers occur with a fixed probability. There are always about 300 lightweights to one "big star baby." This numerical ratio seemed to be universal. So it was sufficient for astronomers to know the number of the large whoppers, for this allowed them to determine the number of new-born stars by simply multiplying the former number by a factor of 300.

Population explosion in space

Recently, however, some Bonn astronomers around Professor Kroupa began doubting the fixed ratio. Their hypothesis is that at times when the galactic nurseries are booming, they generate a considerably higher number of stellar heavies than normal. The reason for this, according to this theory, is so-called stellar crowding. For stars are not single children; they are born in groups, as so-called star clusters. At birth, these clusters are always of a similar size – no matter whether they contain 100 star embryos - or 100,000.

Consequently, at times of a high birth rate, space can be at a premium in star clusters. Astronomers call such galaxies that are particularly rich in mass "ultra-compact dwarf galaxies," or UCD's for short. In these, things are so tight that some of the young stars fuse during formation. Thus, more stars rich in mass than normal emerge. The "small to large" ratio is then only about 50 to 1. "In other words, we used to estimate the number of newly formed small stars by far too high," explains Dr. Carsten Weidner.

The researchers from Bonn and St. Andrews have now corrected the birth rates according to the projections of the stellar crowding theory. With an encouraging result – they actually arrived at the number of stars that can be seen today.

Their study will appear in the upcoming issue of the Monthly Notices of the Royal Astronomical Society; but it can already be accessed online at http://arxiv.org/abs/1011.3814.Contact:

http://arxiv.org/abs/1011.3814

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90050&CultureCode=en

Exhaustion syndrome leaves measurable changes in the brain

Expertanswer (Expertsvar in Swedish)

Exhaustion syndrome, also called burnout and exhaustion depression, leaves objectively measurable changes in the brain – including reduced activity in the frontal lobes and altered regulation of the stress hormone cortisol. This is shown in a new dissertation from Umeå University in Sweden.
Certain personality traits heighten susceptibility to psychiatric disorders. Therefore a research team at Umeå University wanted to study whether this patient group had any susceptibility factors that could explain the development of their disorder. The patient group is distinguished by being anxious and pessimistic, with a weak sense of self, which is common in many psychiatric disorders. What was special about this group was that they stood out as persistent, ambitious, and pedantic individuals.
Being ambitious, fastidious, and overachieving also appears to make a person more prone to exhaustion syndrome. According to Agneta Sandström's dissertation, individuals with exhaustion syndrome demonstrate impaired memory and attention capacity as well as reduced brain activity in parts of the frontal lobes. Regulation of the stress hormone cortisol is also impacted in the group, with altered sensitivity in the hypothalamic-pituitary-adrenal axis (HPA axis).
The dissertation addresses whether it is possible to use neuropsychological tests to confirm and describe the cognitive problems reported by patients suffering from exhaustion syndrome. Above all, patients demonstrate problems regarding attention and working memory. Patients were also asked to perform working memory tests while lying in a functional magnetic resonance camera that measures the brains activity patterns. Exhaustion syndrome patients proved to have a different activity pattern in the brain when they performed a language test of their working memory, and they also activate parts of the frontal lobe less than healthy subjects and a group of patients who had recently developed depression.
The HPA axis in the patient group shows reduced sensitivity in the pituitary, with less secretion of adrenocorticotropic hormone (ACTH) following stimulation with corticotropin (CRH), as well as heightened sensitivity in the adrenal cortex, with increased release of cortisol in relation to the amount of ACTH secreted. There is also a difference in the diurnal rhythm of corisol, with the patients presenting a flatter secretion curve than the other two groups. The researchers could not detect any reduction in the volume of the hippocampus in the patient group. The proportion of individuals with measurable levels of the pro-inflammatory cytokine interleukin 1 is higher in the patient group.
In summary, the studies indicate that there is an association between personality, general health, cognitive ability, and neuroendocrinal dysfunction in exhaustion syndrome. The cognitive problems reflected in the test scores are also mirrored in a different activity pattern in the brain for patients with exhaustion depression. Agneta Sandström has also found support for there being similarities with clinical depression, but with well-defined differences.

Dissertation: Neurocognitive and endocrine dysfunction in women with exhaustion syndrome

http://urn.kb.se/resolve?urn=urn:nbn:se:umu:diva-37280

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90053&CultureCode=en

Video games lead innovation in the e-services economy

European Commission, Joint Research Centre (JRC)

The video games industry is leading the overall trend of transformation of digital products into e-services, according to the report "Born digital/ Grown digital – Assessing the future competitiveness of the EU video games software industry" published today by the European Commission's Joint Research Centre. Online games, for example, play a major role in the digital content convergence process based on digital distribution of different types of content and the diffusion of interactive capabilities for consumers. This phenomenon is having an effect on the movie, video, music and mobile communication industries, and the whole publishing sector in general.

As one of the most innovative industries, the video games world constantly develops and experiments with new digital services online, offline and mobile by providing user-friendly, intuitive services that include the latest information and communication technologies such as context aware devices, sensors, cognitive technologies or movement recognition cameras. Furthermore, the fact that the industry is growing faster than any other in media and entertainment could intensify its effect as a breeding ground for other e-services such as eGovernment, eHealth, eCulture and eEducation.

The global video games market, estimated to be €45 to €50 billion in 2009, is expected to grow four times faster than the media and entertainment market as a whole. The former is expected to grow by almost 70% by 2013, whereas the latter by only 17%. In the UK, the video game market outgrew the cinema market in 2009.

Where does Europe stand? – Strengths and weaknesses of EU firms

The study published by the JRC's Institute for Prospective Technological Studies (IPTS) focuses, among others, on two segments: online and mobile video games, analysing their software industry, growth potential, value chain, business models and current evolution. It outlines major emerging technologies, investigates their disruptive potential on the market and analyses their contribution to the competitiveness of the European ICT industry.

At the moment, European businesses play a role in all stages of the games software value chain but to different extents. The study shows that the competitiveness of EU video games software industry has an important role on the global front:

- The European industry supplies a large share of the world's games engines, which play a central role in the new era of modularised engines.

- Europe hosts a large population of developer studios, often the creators of major market successes. These highly creative small development studios can be found mainly in the UK, France, Germany, the Nordic countries and, to a lesser extent, Spain.

However, the positive conditions may not be sufficient to overcome the weaknesses in the publishing and device segments.

Europe is the largest market for video games. In 2009, France, Germany, Italy, Spain and the UK accounted for nearly 30% of the global video games market, and there is room for growth as other national markets are still unevenly developed. The EU market is likely to grow strongly over the next few years and will be increasingly focused on the online market with broadband penetration increasing and more consoles offer online game play options. This growing role of the online segment will open up opportunities for dynamic European companies.

Changing landscape of the online and mobile games market

Mobile games are challenging the monopolies of existing operating system owners (consoles, PCs) and offer a new distribution channel to developers. Online games are offering users a new role, which could bypass the publishers and create different revenue streams. These emerging trends will affect the future dynamics of video games software industry competitiveness. It is expected that the growth of the video games software market will be primarily driven by online and wireless game software, while revenues from hardware sales will proportionally decline, hence changing the landscape.

Online and mobile gaming point to the expansion of the video games industry in terms of supply, with the entry of new players (like portals of Internet Service Providers); demand, with the addition of new segments of customers, no longer the preserve of young males; and new business models based on advertising, micro-transactions or selling virtual items.

Background information

This study is part of the COMPLETE (Competitiveness by Leveraging Emerging Technologies Economically) project (2007-2010), financed by the European Commission Joint Research Centre's Institute for Prospective and Technological Studies (IPTS) and Directorate-General for Enterprise and Industry. It analyses the prospects of success for European ICT industries in the face of technological and market innovations in the following emerging technologies: online and mobile video games software, Web 2.0, displays (OLEDs and e-paper), RFID, emerging robotics and embedded software in the automotive sector.

Download

"Born digital/Grown digital – Assessing the future competitiveness of the EU videogames software industry": http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=3759

More information

COMPLETE project (videogames): http://is.jrc.ec.europa.eu/pages/ISG/COMPLETE/games/index.html

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90047&CultureCode=en

Researchers find new target for stopping tumours developing their own blood supply: phase I trial shows first drug to inhibit ALK-1 receptor is safe and effective

The European CanCer Organisation (ECCO)

Researchers have found that a newly developed drug, which is aimed at a particular receptor involved in the development of blood vessels that sustain tumour growth, is active in patients with advanced cancers and, in some cases, has halted the progress of the disease. The drug, ACE-041, targets a different molecular pathway to other anti-angiogenesis drugs and may provide a new option to treat cancer.

Results from a phase I clinical study of ACE-041 were presented at the 22nd EORTC-NCI-AACR [1] Symposium on Molecular Targets and Cancer Therapeutics in Berlin today (Friday). The drug targets a receptor known as activin receptor-like kinase-1 (ALK-1), which regulates the formation of new networks of blood vessels needed for tumour growth – a process known as angiogenesis. While existing anti-angiogenic drugs such as bevacizumab, sunitinib and sorafenib target other angiogenesis receptors such as VEGF, ACE-041 is one of the first to target the ALK-1 pathway.

Professor Sunil Sharma, the Jon and Karen Huntsman Presidential Professor of Cancer Research at the Huntsman Cancer Institute, University of Utah, Salt Lake City (USA), told the meeting that the connection of ALK-1 with angiogenesis was made with the discovery that mutations in the ALK-1 gene caused a condition known as hereditary haemorrhagic telangiectasia 2 (HHT2), which is characterised by impaired formation of capillary beds and causes red markings on the skin.

Acceleron Pharma, a biotechnology company in Cambridge, Massachusetts (USA), designed ACE-041 to inhibit ALK-1 signalling and asked Prof Sharma to be one of the investigators to conduct the first-in-man phase I clinical trial of the drug to see if it would inhibit tumour angiogenesis.

“Since ALK-1 is only transiently expressed on proliferating endothelial cells (the cells that line the inner surface of blood vessels), in contrast to the VEGF receptors which are constitutively expressed on endothelial and other cells, it may be a more selective target for the inhibition of angiogenesis,” said Prof Sharma. “ALK-1 expression on tumour vasculature has been noted on tumour biopsy samples from a wide range of tumour types.”

The phase I study enrolled patients with a range of advanced solid tumours that had spread to other parts of the body or that were inoperable, such as multiple myeloma, non-small cell lung cancer (NSCLC), head and neck cancers and carcinoid tumours (carcinoma-like neuroendocrine tumours that typically originate in the small intestine or appendix). Most patients had been treated unsuccessfully with a range of other treatments, including anti-VEGF drugs, before joining the trial. They were treated as out-patients and ACE-041 was given via subcutaneous injection.

“As of early September, 25 patients have been enrolled in the study, and we have escalated from the starting ACE-041 dose level of 0.1 mg/kg up to 4.8 mg/kg. One patient with head and neck cancer had a partial response, three patients have had stable disease and several other patients have had strongly positive responses as shown by FDG-PET scans. So far, ACE-041 has been well tolerated, with the most common adverse events being peripheral oedema, fatigue, anaemia, headache and nausea,” said Prof Sharma.

"It has been very encouraging to see so many signals of efficacy in this trial, in particular because of the study population. These are end-stage cancer patients, who have already been treated with and become refractory to multiple lines of standard therapy. It has also been encouraging to see signals of ACE-041 activity in a wide range of tumour types, since this aligns with our hypothesis that ACE-041 may have anti-tumour activity in any tumour that has angiogenic activity, regardless of tumour histology. It is also important to note that while we have demonstrated significant activity with ACE-041 monotherapy in this study, we might expect to see even more efficacy in future studies with ACE-041 used in combination with other therapies."

Prof Sharma and his colleagues are planning further investigations of the safety and tolerability of the drug in an additional group of patients and hope to start phase II studies of ACE-041 in 2011.

"The anti-VEGF angiogenesis inhibitors, including bevacizumab, sunitinib and sorafenib, have been an important addition to the armamentarium of anti-cancer therapies," said Prof Sharma. "However, their efficacy is somewhat limited since tumours eventually develop the ability to stimulate angiogenesis with non-VEGF angiogenic factors. They also have serious side-effects that arise from effects on blood vessels in normal tissues. Since ACE-041 inhibits angiogenesis in a completely different way, it may have synergistic efficacy with VEGF-inhibitors, and be effective in patients who have developed resistance to VEGF-inhibitors."

Abstract no: 465. Poster on Friday 19 November in the Exhibition Hall (ground level) from 07.00/08.00 hrs to 13.00 hrs CET.

Notes:

[1] EORTC [European Organisation for Research and Treatment of Cancer, NCI [National Cancer Institute], AACR [American Association for Cancer Research].

[2] This study was funded by Acceleron Pharma Inc. For further information on ACE-041 and Acceleron Pharma, visit: www.acceleronpharma.com

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90023&CultureCode=en

Glimpsing the Brain's Powers (and Limits)

By EDWARD ROTHSTEIN

A once-living example of the most complicated object in the universe is mounted in a case at the beginning of the ambitious exhibition "Brain: The Inside Story," which opens on Saturday at the American Museum of Natural History. And a sorry-looking object it is, if we put aside the symbolism and portentousness that have grown around it, and the research that barely has begun to dissect its innermost workings.

Approach it without preconceptions and its compressed tubular windings make it seem like a small intestine coiled for easy transport. And this particular organ on display — which undoubtedly once contemplated the world with much curiosity as its observers now do — looks particularly inconsequential and stolid; it was preserved using "plastination silicone technique."

But it is helpful, at times, to see the three-pound human brain as a somewhat bizarre and alien thing. We must use it in order to study it, but it offers very little help. You can't really peer into it, but it determines how we peer into anything else. For the most part, we can't even see it or feel it do anything at all. The brain is most visible when it is most strange, for that is when its powers and limitations stand out from the background hum of ordinary experience.

There are times, in this exhibition, when that happens, when we must stop and think about the organ that makes us stop and think. (There are also, unfortunately, a few too many times when our own brains are put into passive, textbook-reading mode.) But the high points stand out. Look at a seemingly random display of colored spools of thread in the first gallery, for example, an art installation by Devorah Sperber. Gaze at that array through a spherical lens and we see that the spools actually create a pixilated and inverted image of the Mona Lisa: a neat demonstration that it isn't just sensation that the brain processes; sensations are also given shape. In this case, we learn, the "fusiform face area" of the brain, which is utilized for facial recognition, is being put to work.

Or sit down, a little later in the show, and trace the figure of a star using a pointer, while looking in a mirror, not at your hand. There is a shocking moment of near paralysis when every familiar hand motion is rendered pitifully inadequate. It seems impossible to even follow a straight line. The only option is to stumble about, crashing against boundaries, until we learn to navigate in this mirror world.

In these cases, we actually feel something happen in our brains. There is a moment in which chaos is ordered, disarray displaced. We also come to forcefully understand that even the most trivial experiences are marked by this organ's struggles to make sense of the world. Our brains confront themselves, glimpsing their own limits and powers.

I wish that happened more here; I found the show slightly disappointing, despite its wealth of material. It certainly rises to the standard the museum has set for design: a projection of a woman's face displaying a range of emotional expressions hangs hauntingly in the middle of one gallery. An opening installation, by the artist Daniel Canogar, drapes the hallway with 1,500 pounds of recycled wire as beams and stroboscopic bursts of light dance over it, creating a corridor of firing neuronal networks.

The show's scope is also considerable and comes with the imprimatur of weighty scholarship. Its curators are led by Rob DeSalle, whose work at the museum's Division of Invertebrate Zoology accompanies research into "comparative genomics" and the evolution of the nervous system. The two other curators are Joy Hirsch, a professor of neuroscience at Columbia University and a pioneer in the analysis of brain imaging, and Margaret Zellner, a behavioral neuroscientist and psychoanalyst now at Rockefeller University.

And the landscape surveyed is remarkable, touching on emotion, sensation, evolutionary development, biological growth, neurotransmitters, even recent research into cyborglike innovations that merge brain and machine.

But for all the bright spots, the exhibition often falls short. One reason, peculiarly enough, may be that its overall approach seems guided by contemporary research and its new abilities to view brain activity using magnetic signals, radio waves and radioactive traces. The dominant focus in this renaissance of brain exploration is on brain topography — on the mapping of mental functions to different regions of the brain, thus identifying the prefrontal cortex (planning, short-term memory); the hippocampus (long-term memory); the amygdala (fear and anger); and, at the deep core of the organ, the brain stem, cerebellum and basal ganglia, associated with basic physical movements.

One gallery, for example, is meant to imitate the topography of the outer cortex as you walk around a gigantic bulbous sculpture of the subcortical brain made of opaque resin. We learn about language, reason and memory in the most gripping of the show's displays. But this spatial analogy never seems terribly important. And when a video of a dancer preparing to audition for Juilliard is accompanied by a model of the brain whose regions are illuminated when they come into play during her practice and performance, the information only seems to emphasize that this is a very complicated object.

The biology, of course, is incredible, and it is interesting that brains physiologically change in response to learning — that, say, violinists have larger brain regions controlling left-handed touch, or that London taxi drivers who memorize the city's complex map over the course of years have expanded hippocampus regions.

And yes we also begin to see that the arrangement of the brain is partly an evolutionary archaeology: the most primitive and ancient regions lie farthest down while the surface folds of the cortex are closest to the human in both time and function.

But the mapping of the brain, as yet, does very little for our understanding of how we think; close regions don't necessarily mean close connections. And as brain users rather than brain students, we also want to move in the other direction. While all experience ultimately is reflected in biological and chemical activity, how is that activity, in turn, reflected in our experience?

This is one reason brain injuries, some described here, have always been so horrifyingly illuminating: they reveal that mysterious interface between biology and experience. A metal rod destroys a man's prefrontal cortex and his emotions are also skewered; surgically removed hippocampi lead to the elimination of long-

term memory. Oliver Sacks's case histories are so gripping partly because, by stripping away the ordinary, they show the brain in all its injured peculiarity.

Some experiments in perception do something similar here: you are asked to look at words whose color is the same as their meaning ("yellow" is colored yellow), and then see how much harder it is to read words that might say "orange" but are colored blue. Or you listen to a sound while looking at an image of pouring rain, and don't realize that it is actually the sound of bacon sizzling. When our brains struggle or are stymied, their workings become more open to observation and inquiry. This show would have thrived if it had done more with this, in the spirit of the Exploratorium in San Francisco.

But one of the exhibition's most astonishing displays near its very end shows that in time this complaint might come to seem somewhat quaint: Biological events, human experience and mechanical devices are becoming intertwined in the latest research. An electronic camera sends electrical impulses directly into the brain through the retina; a patient manipulates the image of a hand on a screen by learning to alter brain waves picked up from sensors by a computer; regions of the brain are selectively activated by surgically inserting wires into the organ to treat brain disorders.

And when we think we've at least gotten a sense of the brain's mysteries, we stumble across another. Once you see the Mona Lisa upside down in spools of thread, try going back and seeing the colors as you once did, without pattern or purpose. It is almost impossible. The brain may wrestle to understand the world, but once it does, or thinks it does, can the world be seen in any other way?

"Brain: The Inside Story" opens on Saturday and runs through Aug. 14 at the American Museum of Natural History, Central Park West and 79th Street; (212) 769-5100, amnh.org.

http://www.nytimes.com/2010/11/20/arts/design/20museum.html?ref=arts

Tommy Guns and Other Crime World Curiosities

By JOSEPH BERGER

LORCAN OTWAY was sitting at Al Capone's table at Lanza's in the East Village, a congenial spot to explain why he opened the Museum of the American Gangster.

"I grew up in a speakeasy," he said, a twinkle in his eye.

Mr. Otway is a courtly polymath of 55 who has been, at various times, a theater operator, a lawyer, a harp player, a model-boat builder and a war photographer. Since March, he has been a museum curator.

"I'm either a Renaissance man or a victim of attention-deficit-hyperactivity disorder," he said.

His two-room museum is right above that former speakeasy, which for years has been known as Theater 80 St. Marks in a neighborhood that boasts its share of notorious ghosts like Capone (the Brooklyn-born Chicago mobster often visited Manhattan), Lucky Luciano and John Gotti.

The museum displays beguiling curiosities from the annals of crime: seven .45-caliber bullets from the St. Valentine's Day Massacre, the bullet that killed Pretty Boy Floyd, a shell recovered from the car in which Clyde Barrow (of "Bonnie and Clyde" fame) was gunned down, and two death masks of John Dillinger.

A classic tommy gun and an Appalachian copper still are on view. There is sheet music of Prohibition-era songs like "It's the Smart Little Feller Who Stocked Up His Cellar That's Getting the Beautiful Girls." The speakeasy's mahogany bar, from which a young Frank Sinatra was said to have served drinks as a singing waiter, and a basement beer locker can be viewed as part of a tour. The choicest artifacts came through a protégé of Calvin Goddard, a pioneer in ballistics science.

Theresa Dalessio, who has written a book about her life as the daughter of a Staten Island mobster and bootlegger, said the museum's tommy guns and other memorabilia "really brought back the era of Prohibition and what went on." She knows from crime. In the 1980s she served six months in prison for running a crew that stole brokerage checks from mailbags.

The museum is the size of a one-bedroom apartment. (Leon Trotsky was believed to have rented it.) But Mr. Otway is so encyclopedic that touring the rooms takes an hour. For him, the museum is more than a collection; it's a statement about America, particularly its perennial conflict between authoritarianism and

anarchy, or what he called “moral certainty” and freedom. The pendulum, he said, oscillates between periods of restraint like Prohibition and periods rife with Jazz Age-like hedonism.

Mr. Otway grew up a Quaker and still affects a mustacheless beard and plain dress. As a child, he was saturated with legends of the Underground Railroad, which he regards as a beneficial example of organized crime since the laws broken condoned slavery. His father, Howard, an actor, bought the two buildings, at 78 and 80 St. Marks Place, from Walter Scheib, the former speakeasy operator, in 1964. In a bunkerlike basement room, the elder Otway found a safe with $2 million in gold certificates, which he soon learned had expired.

Mr. Otway retains a touch of the anarchist, often questioning government motives. A Prohibition-era mandate that distillers put strychninelike substances into paint thinner and rubbing alcohol as a way of discouraging drinking ended up poisoning thousands of Americans, he said. His museum has old bottles as evidence.

That frame of mind explains why the museum is a for-profit institution with the legal name “Exhibition of the American Gangster: A Museum of the American Gangster.” A state charter would have required government oversight.

He amuses himself with examples of repression’s unintended consequences. Prohibition was, he said, a steppingstone to the feminist revolution because speakeasies were places where men and women mingled more equally than in pre-1920 saloons, where some states had barred women.

“Whatever you do politically,” he said, “the opposite happens.”

http://www.nytimes.com/2010/11/19/arts/design/19gangster.html?ref=design

Keeping It Real: A Show Made of Fakes

By EVE M. KAHN

Museums are letting the public in on some of their most embarrassing moments. Half a dozen exhibitions this year have revealed how forgers fooled curators, and a show of about 50 inauthentic or questionable objects dating back to a supposedly Sumerian statuette opens on Sunday at the Detroit Institute of Arts.

The contents of "Fakes, Forgeries and Mysteries" come from the institute's own collection. The staff has had to drastically revise the captions over the years. An English country-road scene with a fake Monet signature is now known to be the work of the landscape painter Alfred East. A granite head of an Egyptian king has turned out to be a Berlin carver's 1920s handiwork. An ebony table thought to have belonged to the Medicis is actually an 1840s Florentine copy.

The exhibition's wall texts and videos explain how connoisseurs and scientists have identified the impostors. The forger of the Egyptian head, Oxan Aslanian, tailored the lips and noses to suit his clients' tastes for Art Deco. The East painting appears in a 1910 photo of a show at the Carnegie Institute in Pittsburgh; it was clearly labeled back then as East's work.

The Detroit Institute has also brought out acquisitions that scholars are still debating, including a van Gogh carnation bouquet that perhaps looks a little too cute.

"We are being very transparent about our work, how we are constantly re-assessing our collection," said Salvador Salort-Pons, the show's curator. Publicly demonstrating the process, he added, "is a way of serving the community."

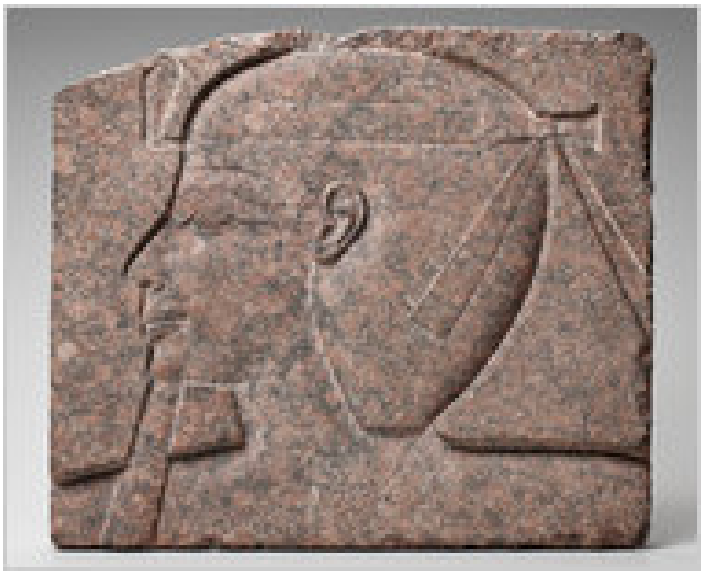
Earlier this year, the Isabella Stewart Gardner Museum in Boston showed Victorian wood and terra-cotta statues previously mislabeled as Renaissance antiques. The Mint Museum of Art in Charlotte, N.C., exhibited Sanford Robinson Gifford's 1860s scene of New Hampshire mountains that had long borne a fake signature of the more famous painter Jasper Francis Cropsey. The National Gallery and the Victoria and Albert Museum in London and the Museum Boijmans Van Beuningen in Rotterdam displayed paintings wrongly attributed to Botticelli, Holbein, Vermeer and Thomas Moran, among other masters.

On Jan. 4, a show called "Say It Isn't Faux" will open at the Paul and Lulu Hilliard University Art Museum in Lafayette, La. The museum is drawing on its own collection, including a recently donated copy of an 1890s waterfront scene of three women by the American Impressionist artist Charles Courtney Curran. In

September, "a man posing as a Jesuit priest" dropped off the piece at the museum and then blessed the staff in the parking lot, The Art Newspaper reported.

By exhibiting forgeries, Mr. Salort-Pons said, institutions can keep them off the market yet accessible for studies of criminal minds. Outside museum walls, proven fakes are usually scrapped. Last month, the Department of Justice announced that it seized a forged 1970s snow scene that had been attributed to Andrew Wyeth, which Christie's was scheduled to auction at an estimate of $300,000 to $500,000.

Curators will probably have little chance to analyze and display that watercolor piece. "It's currently in the U.S. government's possession and will remain there until it's destroyed," said David L. Hall, an assistant United States attorney in Delaware who prosecutes art crime.



FORE-EDGE PORTRAITS

Book collectors in Europe and the United States over the last two centuries entertained guests by bringing out volumes with secret pictures. The page edges, when slanted at certain angles, reveal miniature landscapes full of ruins and castles.

A few hundred of the images, known as fore-edge paintings, were hidden on the bookshelves of Dorothy Shea, an owner of nursing homes in California who died in 2006. On Dec. 3, Christie's in New York will auction her collection. Estimates range from $300 for an inch-tall Victorian prayer book with a view of a Gothic church along its rim to $20,000 for a 1640s volume on the history of French Huguenot wars painted with fore-edge flowers, a butterfly and a snail.

Ms. Shea bought, in addition to pastoral scenery, fore-edge portraits of literary figures including Shakespeare and the poet Robert Burns, and tableaus of historical moments like the assassination of Caesar and the eruption of Vesuvius. A few images are signed by artists as prominent as the Victorian architect Owen Jones and the miniaturist C. B. Currie.

Ms. Shea "was like a comet with her buying" in the 1980s and '90s, said Jeff Weber, a bookseller in Los Angeles who has written and published a new study, "An Annotated Dictionary of Fore-edge Painting Artists and Binders (Mostly English and American)." Contemporary painters have revived fore-edge art and are confusingly applying it to vintage books, he added, but the Shea paintings were applied fairly soon after the volumes' publication dates.

The auction previews starting Nov. 27 will offer a rare chance to see fore-edge works. Museums almost never display them; when the pages are kept pressed open even for a few weeks to expose the paintings, the books could end up permanently curled. “They memorize that position,” Mr. Weber said.

QUILT ENHANCEMENTS

Laura Fisher, a textiles dealer in Manhattan, knew that the e-mail announcement for her winter show would often end up in spam filters. She nonetheless gave it an attention-getting title, “Male Enhancements,” based on Viagra ads.

Her 30 quilts in the show are made of fabric from men’s clothing, including socks, neckties, long johns, shirt and pant cuffs, haberdashery labels for brands like Wear-Weev and Man-Brooke, and military uniforms and ribbons. Ms. Fisher, who runs her gallery out of overflowing storage units inside Hayes Storage and Logistics on East 61st Street, finds the artifacts full of “mystery and unanswered questions,” she said.

An Indian tailor working for British colonial regiments perhaps studded her checkerboard of pastel uniform scraps ($19,500) with sequins and gold braid. A church group may have raised funds by selling a quilt with rectangles from men’s suits ($3,800), embroidered with religious slogans and congregants’ names in spidery letters.

On a brown and tan blanket ($1,275) stitched for a toddler named Wesley, pink embroidered butterflies, cats and fruit contrast improbably with the macho fabric palette. Shimmering rayon used for vest linings runs along the back of a tweedy textile ($4,000), as if the quilter set out to imitate pragmatic suit construction. The squares on a brown and ivory quilt ($3,500) are arranged in giant bowties, as if in homage to the menswear theme.

“I look for the compositions that have thought, concept and planning behind them,” Ms. Fisher said. “They aren’t just sewn together.”

http://www.nytimes.com/2010/11/19/arts/design/19antiques.html?ref=design

Seating All the Americas at the Same Table

By HOLLAND COTTER

BOSTON — Five years after breaking ground, the new Art of the Americas Wing at the Museum of Fine Arts here is opening on Saturday, and it's a wow. Almost double-wow. Really good.

I'm not talking about the outside — your basic blank glass box — designed by the British architects Norman Foster & Partners, but the inside: 53 well-proportioned galleries, large and small, holding some 5,000 objects, more than twice the amount of Americas material previously on display. And given that this museum's American colonial collection is the world's best, more is definitely more.

But what does "Americas" mean here? That's the question the new permanent installation asks up front. It's a big, inclusive word, though rarely treated that way in museums. Usually we get North America, meaning Euro-America, over here; America Indian and Mesoamerica over there, with African and Oceanic; and South America almost nowhere.

But what if you bring them together, hook them up, seat them as equals at a hemispheric table? Intriguing things can happen. Boston homeboys like Paul Revere begin to look, in their great harbor city, unexpectedly cosmopolitan. Sophisticated civilizations like Olmec and Maya break free of the "primitive" slot. South America, that grand ballerina en pointe, starts to look like the big global deal it, of course, is.

If any museum could pull off such a summit meeting, this one could. And under the leadership of Elliot Bostwick Davis, chairman of its Art of the Americas department, it has. The Americas collection is spread in continuous, ascending chronological order through four floors, with pre-Columbian at the bottom, modern at the top. The layout of each floor is identical: a long central core gallery, with smaller spaces on each side for focused installations, and two semi-detached galleries at the back that connect to the main museum.

The first level starts with a visual coup de théâtre in a virtual wall of Maya ceramic burial urns, dating from the seventh to eighth century A.D., covered with sculptural reliefs and each large enough to hold a curled-up corpse. Stretching out behind them are smaller marvels: a fleshy Olmec mask carved from iron-hard jadeite; a

minute gold Tairona figure of a shaman transformed into a bat; a Maya cup painted with near-nude male figures — gods? kings? — who lounge around like Ingres odalisques.

As a group these objects attest to centuries of cultural interchange, via trade, expansion and war, among Mesoamerican societies, though now and then a distinctly foreign element turns up.

The design on a 16th- or 17th-century Peruvian textile incorporates fleur-de-lis and images of little white dogs, symbols of the Dominican order of Roman Catholic priests who were setting up churches in New Spain.

The theme of colonial enterprise is picked up in side galleries. One is given over to an extraordinary array of vintage European and American ship models, the earliest dated 1717. Originally made as templates for shipbuilders, they survive as emblems of people in constant motion, shuttling between North and South America, and back and forth across oceans, carrying objects and people, including slaves, to the New World.

Some of those objects appear in a gallery of 17th-century Puritan domestic artifacts, which include German pottery, English silver and a local version of Old World furniture. And who knew that these pious pioneers painted their chairs and chests with zany patterns, the equivalent of plaids and polka dots, to warm up New England winters?

And there's a gallery — a sheer delight — given over to embroidered samplers. Two of the dozens on view were made in England and inspired the production of imaginative spinoffs in Boston, a city that identified itself as British (some would say still does) until politics dictated otherwise.

That story of disruption is told on the next floor up, which opens with John Singleton Copley's 1768 portrait of the Boston silversmith and midnight rider Paul Revere. Copley presents his subject, with ostentatious informality, as a working man in shirt-sleeves momentarily distracted from a job. The teapot he holds is unfinished, but his masterpiece is right there in the gallery: the famous "Sons of Liberty Bowl," a homage in advance to a revolution to come.

Revere is positioned as a hero in the museum's 18th- and early-19th-century galleries, as is George Washington, seen in Thomas Sully's billboard-size "Passage of the Delaware." But Copley is the star. His "Watson and the Shark," a dramatization of a real-life "Jaws" encounter, takes center stage in a side gallery. He yearned to produce more of this kind of narrative painting and complained that all his fellow Bostonians wanted was portraiture. There was a reason for that. No early American painter surpassed him in that genre, and the museum has the best of his best.

High on that list is his likeness of the Boston merchant Nicholas Boylston, who sits, as bright as a penny, in a morning coat of aquamarine silk damask and a rakish turban, with one of his ships visible in the distance. Equally impressive is a likeness of Boylston's not-young, unmarried sister Rebecca. By Boston standards she was over the hill, but Copley made her something of a dish in a low-cut, figure-accenting Jean Harlowesque gown. When the portrait was done, in 1767, the sitter and painter could not have predicted what their futures would hold. Rebecca Boylston made a late-in-life marriage, a happy one. In 1774 Copley moved permanently to England. You can understand why. He wanted wider creative horizons, though as it happened the postrevolutionary provinces became steadily more receptive to internationalist art.

You'll see this in a salon-style installation of 19th-century paintings and sculptures on the next floor. Much of the story of North American art, or fine art, of the time is encapsulated there, in pastoral landscapes inspired by Claude Lorraine, Alpine scenes imitating German models and religious painting carrying a learned-in-Italy stamp. A hybrid dynamic is especially obvious in sculpture, which is neo-classical but not really: William Wetmore Story's marble "Medea" clearly has murder on her mind, but she's dressed for a Beacon Hill stroll.

Where the meeting of high and vernacular really gave off sparks, though, was in multiethnic Central and South America. And the one small gallery holding this material is a dazzler, a visual shock, with its portraits

of church prelates by native painters, its furniture glinting with mother-of-pearl inlay, and its silver liturgical vessels in Baroque styles that survived through the 19th century. That century draws to a close and a new one opens on the next, and third, level of the Americas Wing. The urbane and peripatetic John Singer Sargent, a Bostonian by choice but only sporadically, is a signature figure here. His 1882 painting "The Daughters of Edward Darley Boit," is the first thing you see. Large, and perfectly square, it has long been a popular favorite in the collection, and it's wonderful. A product both of Sargent's Velázquez worship and his assimilative study of Whistler and Manet, the picture shows four young sisters in their family's Paris apartment, where they are dwarfed by two immense Japanese vases. And the vases have their own story.

The Boit seniors had such a passion for the vases that they took them to Paris whenever they went, then shipped them back to Boston. The vases made, with minor damage, 16 such trips, though their traveling days may be over. They entered the museum's collection in 1997, and now flank the painting — it's really a portrait of them — in the new installation.

The Boits could afford eccentricities; they were rich, as a fair number of North Americans were during and after the Gilded Age. Stupendous new fortunes spurred art production, and aesthetic fads flooded in: the Gothic Revival, the Arts and Crafts Movement, and the customized version of Impressionism represented by Childe Hassam's "Boston Common at Twilight" (1885-86), with its barely-fooled-with realism and its marvelous pink-gold afterglow. At the same time Americans were turning acquisitive eyes outward to the world and going after it. People were traveling farther and farther. The exotic was no longer so exotic. Look around the third-level galleries, and you'll see evidence of the expanded global market, in Japanese porcelain, Indian carpets and Islamic metalwork, or homegrown knockoffs of these.

What you don't see from this period is much material from Central and South America. That comes back into the picture in the modernist installation on the top floor, which is the one weak feature of the Americas Wing. Judging from what's here, apart from early modernist painting and photography, the museum's holdings in this area are thin, and most of the Latin American works are on loan from the Patricia Phelps de Cisneros Collection. It's far from being a disaster, and it's a correctable flaw. Call it a collection in progress. And, of course, it is seen to particular disadvantage because everything leading up to it is so strong, visually but also in concept. In creating any Art of the Americas Wing and throwing its institutional weight behind the idea, the museum has pushed the study of American art in new directions. Debates will inevitably follow as to whether there is such an art, and if so, what that means and who wins or loses when definitions are formed.

One can imagine arguments growing sharp in the present political climate, when opinions about what America was, is and should be are so polarized and proprietorial. And maybe this is where art itself comes to the rescue. So much about the new Americas Wing is so startling, stimulating and beautiful that you just want to lay down your arms.

ART OF THE AMERICAS WING AT THE MUSEUM OF FINE ARTS, BOSTON

WHERE AND WHEN Avenue of the Arts, 465 Huntington Avenue, Boston. Opens Saturday.

MORE INFO (617) 267-9300, mfa.org/americas-wing.

EATING IN BOSTON Brasserie Jo 120 Huntington Avenue, (617) 425-3240, brasseriejo.com; Savant Project 1625 Tremont Street, (617) 566-5958, thesavantproject.com; Trattoria Toscana 130 Jersey Street, (617) 247-9508.

http://www.nytimes.com/2010/11/19/arts/design/19americas.html?ref=design

Program Puts Sidelined Doctors Back in the Game

As medically underserved Hispanic communities cry out for doctors, a new program puts physicians in their midst back into practice.

By Frank Nelson

The International Medical Graduate Program targets the more than 2,000 Hispanic doctors, trained in Mexico and other parts of Latin America who are living in the U.S. legally but not licensed to practice medicine.

After spending seven years studying to become a doctor in her native Mexico, Nidia Payan found herself having to sell tamales to make ends meet when she first arrived in Los Angeles.

Later, just to be *considered* for a part-time job as a medical assistant, she had to start as a volunteer. "It was very hard," says the now 30-year-old, recalling those early months in the U.S. "This was a big transition. It was like starting at the bottom again."

Other equally well-trained Hispanic doctors have found themselves driving taxis or working in lowly medical jobs, unable to practice in the United States without the necessary licenses and board certifications.

This comes even as the Pew Hispanic Center reports that, "More than one-fourth of Hispanic adults in the United States [30 percent among the foreign-born] lack a usual health care provider, and a similar proportion report obtaining no health care information from medical personnel in the past year."

Today the medical careers of close to 40 such professionals are firmly back on track thanks to a pioneering program being run by the University of California, Los Angeles.

The International Medical Graduate Program targets the more than 2,000 Hispanic doctors, trained in Mexico and other parts of Latin America who are living in the U.S. legally but not licensed to practice medicine.

The program, administered by UCLA's Department of Family Medicine, helps these foreign-trained doctors prepare for and pass their licensing exams with courses polishing their workplace English and basic science skills, as well as their medical and clinical skills.

The program also opens the door to sophisticated technology, research databases and new drug treatments that these doctors may not have experienced in their own poorer, less well-equipped health systems.

Students spend up to 15 months completing the full-time program, which costs around $50,000 for things like course fees, books and living expenses. The money is paid by the privately funded program, which recently received a $2 million boost from health care provider Kaiser Permanente.

Successful candidates, who must commit to careers in family medicine, leave the program with a letter of recommendation from UCLA paving the way to paid, three-year family medicine residencies across California." Last month, Payan, who originally graduated from the Universidad Autonoma de Sinaloa School of Medicine, joined a residency in Fresno.

They emerge as board-certified family physicians, licensed to practice in California and are contracted for another 18 to 36 months to serve medically underserved communities.

Launched in 2006, this unique program has so far placed 20 students in residencies with 19 others currently working through the course. The first two freshly minted U.S. physicians are due to graduate next January, followed by a further seven in 2011.

The program does more than just prevent talented overseas doctors languishing in jobs for which they are way over-qualified: It's also offering a solution to the state's severe shortage of Hispanic physicians — especially among immigrant communities. "Foreign-born and less-assimilated Latinos — those who mainly speak Spanish, who lack U.S. citizenship, or who have been in the United States for a short time — are less likely than other Latinos to report that they have a usual place to go for medical treatment or advice," according to Pew.

Drawing on statistics from the U.S. Census Bureau, Michelle Anne Bholat, the program's executive director, said Hispanics account for one-third of California's 36.5 million population but only 5 percent of physicians. Plus, a third of the state's Hispanics live in those medically underserved areas, according to the program.

"We predict California will face a physician shortage of up to 17,000 by 2015, and this shortage disproportionately affects underserved communities," said Patrick Dowling, Department of Family Medicine chair and co-founder of this program.

The program hopes to redress linguistic and cultural imbalances that research shows can create barriers between patients and doctors, and may impact compliance levels and resulting health quality.

"Speaking and understanding Spanish well allows the doctor to understand the details of their patients in a manner it wouldn't be possible to obtain otherwise," program graduate Isabel Gonzalez, who studied in Barcelona originally, told the EFE news service last year. She's now in practice in Riverside."Language and culture matter," Bholat said. "It's a benefit to have someone who fully understands the nuances of a patient's language and culture. Ninety percent of diagnosis is from history, so we have to get that story."

http://www.miller-mccune.com/health/program-puts-sidelined-doctors-back-in-the-game-3479/

Photography: A Coming-of-Age Story

By KAREN ROSENBERG

Like other major American museums, the Metropolitan was slow to recognize photography, but Alfred Stieglitz gave it a big push in the right direction. In 1928 this Photo-Secession pioneer donated 22 of his own works to the Met. They were the first photos to enter the collection.

A few years later, in 1933, Stieglitz made a larger gift of more than 400 works by his contemporaries: Edward Steichen, Paul Strand, Clarence White, Gertrude Käsebier and many of the other photographers he had promoted in his New York gallery, 291, and his influential journal, Camera Work.

The museum's stunning "Stieglitz, Steichen, Strand," mostly drawn from the collection, gives us just the big three — the impresario and his two greatest photographer discoveries. (Georgia O'Keeffe, arguably his best find in any medium, appears as a portrait subject.) They were a contentious group, if you could call them a group at all. Steichen made his mark in the early years of 291, while Strand appeared toward the end of the gallery's run. In between Stieglitz was preoccupied with other art forms, notably abstract painting and sculpture.

Organized by Malcolm Daniel, the curator in charge of the Met's photography department, "Stieglitz, Steichen, Strand" clearly delineates the strengths and weaknesses of its three distinct personalities. (Each has a gallery to himself.)

And though the pictures come from the collection, the show has an impressive story arc about photography's coming of age. The exhibition segues from Steichen's hazy, nostalgic Pictorialism to Strand's crisp, forward-looking still lifes and cityscapes, with justly famous examples from each category.

Stieglitz's own transition to a more clean-lined, geometric style is well documented in the first and largest gallery, with a rich selection of New York City views from early and late phases of his career. Other highlights include his piecemeal portraits of O'Keeffe and his cloud studies, or "Equivalents."

"Winter, Fifth Avenue" (1893), taken with a hand camera on a Midtown street corner in blizzard conditions, romanticizes the city (and the photographer's place in it). So does "The Terminal," a picture taken the day after the storm; it shows a carriage driver watering his horses in the bitter cold, producing great clouds of steam. Stieglitz made several prints from this negative, an unassuming street view that somehow encapsulates his deep loneliness. "How fortunate the horses seemed, having a human being to tend to them," he wrote.

Nearly three decades later he photographed the city from on high, looking out the windows of his 30th-floor apartment in the Shelton Hotel and his nearby 17th-floor gallery, An American Place. Here the metropolis is brisk and orderly, if still a bit alienating, epitomized by the neat scaffolding of a fast-rising skyscraper in the distance.

The Met's show reaffirms that while Stieglitz was a great photographer, he was an even better cultivator of talent. In 1900 a 20-year-old named Edward Steichen paid a visit to Stieglitz on his way to Paris from Milwaukee. Just a few years later Steichen had made his name as a photographer and become Stieglitz's indispensable European liaison, bringing work by artists like Cézanne and Picasso to 291.

Although Steichen's shadowy nudes and foggy woods shared the fussy look of fin-de-siècle painting, they were products of state-of-the-art photographic technology. He was a virtuoso printer, employing as many different techniques and pigments as necessary to produce the desired pastel-like effect. In the Met's three large exhibition prints of "The Flatiron" — the only ones known to exist — Steichen used a combination of gum bichromate and palladium to envelop the downtown landmark in Whistleresque mists of indigo and gray.

Back in Paris he lent a similar presence to Rodin's plaster sculpture of Balzac, photographing it on a moonlit terrace. He had already paid homage to Rodin in a remarkable portrait, printing from two negatives to create a ménage of the artist, his "Thinker" and his "Monument to Victor Hugo."

Steichen's flair for portraiture ensured a steady income stream and some excellent social connections. After World War I he worked as the chief photographer for Vogue and Vanity Fair; the Met has a smattering of these images, though its vision of Steichen is filtered through Stieglitz's collection.

For the same reason Paul Strand is represented by early work, which fortunately is superb. Under Stieglitz's direction he developed a precise, "brutal" (to use Stieglitz's word) aesthetic that was in tune with the radical modernism of the 1913 Armory Show.

The Met has several of Strand's stark cityscapes, "Wall Street" being the most famous example. (It's shown as it appeared in an issue of Camera Work.) "Winter, Central Park, New York," with its tree-branch shadows crisscrossing a tundralike expanse of white, seems to abstract the loneliness of Stieglitz's snowy cityscapes. And "Geometric Backyards, New York," taken from the rear window of Strand's family's town house on West 83rd Street, transforms a row of clotheslines into a Cubo-Futurist fantasia.

Strand's humanism — nurtured early on by his teacher Lewis Hine at the Ethical Culture School, and later apparent in his famous street shot of a blind woman — led him in a different direction. World War I was a factor. So was his falling out with Stieglitz, who had a flirtation with Strand's wife, Rebecca (and photographed her nude at Lake George).

In 1929 Strand made a portrait of Stieglitz, who was having his own romantic issues. (O'Keeffe was in New Mexico, getting close — or so he feared — to a friend's husband.) It's a complicated picture, full of frustrations.

The central dynamic of "Stieglitz, Steichen, Strand" is just as complicated. One might see this show as a tale of two protégés moving on, Steichen and Strand outgrowing Stieglitz. But the story is told by Stieglitz, or at least inflected by his largesse.

"Stieglitz, Steichen, Strand" continues through April 10 at the Metropolitan Museum of Art; (212) 535-7710, metmuseum.org.

http://www.nytimes.com/2010/11/19/arts/design/19stieglitz.html?ref=design

A Spectacle With a Message

By ROBERTA SMITH

The German artist Anselm Kiefer knows how to put on a show. The dour and dusty copse of art with which he has forested the vast Gagosian Gallery in Chelsea may elicit awe, skepticism or disdain — or perhaps a conflicted combination of all three. But its initial power is hard to deny.

This is Mr. Kiefer's first exhibition in New York in eight years and possibly the best he has ever mounted in the city, at least on his own terms. Those terms value theatricality, moral instruction and a variety of materials and objects — natural, artistic, industrial, found, made — employed with brutish verve.

His new works blend painting, sculpture and set design; incorporate elements of filmmaking, performance and photography; and marshal the forces of history, literature and religious thought. They demonstrate his ineluctable progress within the presumptuous Wagnerian tradition of the gesamtkunstwerk, or total work of art. This evolution was undoubtedly aided by ambitious undertakings like a 2007 solo show at the cavernous Grand Palais in Paris and "In the Beginning," a 2009 primal theater work in Paris that was evidently mostly music- and plot-free, made in collaboration with the composer and clarinetist Jörg Widmann.

Portentously titled "Next Year in Jerusalem," the Gagosian exhibition is effective middlebrow art as catharsis, spectacle with a message. As with many a successful Broadway drama, we leave feeling that our heartstrings have been exercised or at least manipulated. We've been through the ringer, and it was awesome. Now 65, Mr. Kiefer began his career in the late 1960s on the cusp of Post-Minimalism, an admiring student of Joseph Beuys working in the triangle of Conceptual art, photography and performance. In his best-known work from that period, he documented himself delivering the Nazi salute on once-occupied lands, often in his father's Nazi uniforms. But he rode to fame in the 1980s as a Neo-Expressionist painter, and then kept moving toward increasingly theatrical mixings of mediums.

He's been on his own now for a couple of decades, a philosopher-showman with an immense following whose art popularizes Post-Minimalism's strategies with the use of big, accessible themes. His main theme is

Germanness and its discontents, of which he is a prime example. He was born in the last weeks of World War II, and the human cost and devastation of that conflict remain the spine and the hook of his art.

Mr. Kiefer's latest efforts take the ash-strewn, desiccated wasteland where his art has long dwelt to new, enveloping extremes. The Gagosian space is crowded with 25 sculptures encased in large, often towering vitrines with floors of cracked (or scorched) earth. Each contains a sinister ruin: the fuselage or engine of a vintage airplane; a fleet of small suspended U-boats made of lead; a white plaster ball or wedding gown jagged with shards of glass; an immense and brittle thorn bush dotted with painted flames.

There are giant burned books of lead and paper; Jacob's Ladder, also in lead; and Lilith's dresses in sackcloth. Titles scrawled on the vitrines ricochet from fact to faith and back: "Flying Fortress," "The Red Sea," "Valentinus" (a second-century Gnostic theologian), "Thora" (a Norse goddess represented by a typewriter made of lead).

There are occasional moments of amusing self-reference. In the vitrine-sculpture "Zerstörung des Tempels" ("The Destruction of the Temple") strands of repeating images suggest giant filmstrips of a bombed building but document a sculpture from Mr. Kiefer's Grand Palais exhibition. The strips occur in other pieces, always accompanied by an outsize film reel and canister made of soft lead that form one of the show's best details. They evoke Beuys, the young Richard Serra and Claes Oldenburg all at once.

Meanwhile the gallery walls are ringed with paint-encrusted landscapes of the panoramic kind that have long been part of Mr. Kiefer's repertory. Mountains loom above snowy fields spiked with dead stalks. Winged palettes hover over expanses of gray ocean. And then there is the show's heart of darkness: "Occupations," a large steel shed that evokes box cars, crematoria, barracks or meat lockers. Visible through its many doors, shaggy photographs hang from hooks like enormous pelts. They are the images from Mr. Kiefer's 1970s world tour of Nazi salutes — blown up and mounted on lead on burlap. Their loaded repackaging here signifies his expanded ambition, and a determination that we not miss the point. Never forget. Ever.

To wander among these works is to participate in a performance piece of the artist's devising. The sheer density of the installation gives it an almost interactive, relational-aesthetics quality. As we gawk, peer and crane, decipher the titles and mull over the allusions — all the while avoiding collisions with other similarly engaged people — we form a cast of extras trapped in some museum of devastation.

It's the dustbin of history expanded into giant prop storage in a theater where death and destruction prevail, but various ancient faiths offer the possibility of redemption. And yet really giving in to the work requires suspending the suspicion that religion and faith are not part of the solution. They are most of the problem.

There's a disconnect in most of these pieces between the ideas and the extravagant materiality. The themes are rarely in the forms; they're more in the titles, their explanations or the heavy-handed associations, not to mention the extensive Anselm Kiefer glossary on the Web site, which accounts for the feeling of being manipulated. The strongest, freshest paintings — which are also glass-encased and depict wintery sun-shot expanses of barren trees — personify the emotional push-pull typical of Mr. Kiefer's art.

Heavy with paint yet photographic in depth, these images are banked with more dried bushes, cast-resin ferns and occasionally strewn with large, synthetic teeth and snakeskins. They look a little like neglected shop windows, yet they achieve a stark, haunting beauty even as they rather too obviously evoke the kind of woods where refugees hide.

Three are titled "Merkaba," which means, roughly, vehicle of enlightenment. A fourth, with a U-boat lurking in the bushes, is titled "Fitzcarraldo," evoking the grandiose determination of both the 19th-century Peruvian rubber baron Carlos Fitzcarrald, who transported a 30-ton steamboat over a mountainous isthmus for business purposes, and Werner Herzog, who made a back-breaking movie about it.

Mr. Kiefer has become better and better at making Anselm Kiefers. In them grandiosity rarely takes a holiday. A very few pieces here stand on their own as visual and emotional entities. One is "Steigend steigend sinke nieder" ("Rising, rising, falling down"), a tall vitrine occupied by a cluster of giant white cast-resin sunflowers growing downward from its ceiling. These mysterious creature-plants resemble mushrooms, but they turn heliotropically upward as if seeking the sun. They're alive.

"Anselm Kiefer: Next Year in Jerusalem" runs through Dec. 18 at the Gagosian Gallery, 555 West 24th Street, Chelsea; (212) 741-1111 or gagosian.com.

http://www.nytimes.com/2010/11/19/arts/design/19kiefer.html?ref=design

Nathan Oliveira, 81, Dies; Painted Human Conflict
By WILLIAM GRIMES

Nathan Oliveira, a leading Bay Area artist who achieved national prominence fusing Abstract Expressionism and figuration in psychologically charged canvases that explored human isolation and alienation, died on Saturday at his home in Palo Alto, Calif. He was 81.

The cause was complications of pulmonary fibrosis and diabetes, his son, Joe, said.

Mr. Oliveira emerged as an artist in the swirling creative milieu that made San Francisco a magnet for poets, jazz musicians and painters in the late 1940s and early 1950s. Almost by default he is assigned to the Bay Area figurative school, a group of painters whose members had absorbed the lessons of Abstract Expressionism but who returned to the human figure and landscape in their canvases. Yet his work resisted neat categorization.

Like his somewhat older peers in that group, notably David Park, Elmer Bischoff and Richard Diebenkorn, Mr. Oliveira employed a bravura, brushy style of paint application. His abstracted figures and landscapes, however, reflected an affinity with the darker vision of European artists like Oskar Kokoschka and Edvard Munch, or more nearly contemporary artists like Alberto Giacometti and Francis Bacon, who shared his sense of human conflict and existential angst.

Particularly influential was the German painter Max Beckmann, with whom he studied briefly.

“There was a power that was emanating from his painting that was far more potent than what I was recognizing in most things I was seeing, and I wanted this,” Mr. Oliveira said in a 1992 interview. “That made sense to me, that was the influence.”

Mr. Oliveira’s canvases, with their solitary, spindly figures suspended in a soupy atmosphere, shared the vivid color sense of his fellow Bay Area artists, but his commitment to the darker side of the human drama set his paintings apart from the sun-kissed, hedonistic world of Mr. Diebenkorn’s landscapes.

His somber lithographs and monotypes, usually in black and white and strongly influenced by Goya, conveyed a turbulent sense of drama and struggle. Early prints like “Death of an Ant” (1956), with its magnified subject twisted in what seems an almost human agony, served as precursors to works like “To

Edgar Allan Poe" (1971), a haunting series of lithographs that evoke the romantic sturm und drang of a poet Mr. Oliveira admired deeply.

"I'm not part of the avant-garde," he told Stanford magazine in 2002, "I'm part of the garde that comes afterwards, assimilates, consolidates, refines."

Nathan Joseph Roderick was born in Oakland, Calif., on Dec. 19, 1928. His father, a Portuguese immigrant who changed his name from Rodrigues, separated from Nathan's mother when the boy was an infant. She later married another Portuguese immigrant, George Oliveira, whose last name his stepson adopted.

After taking painting lessons from a marine artist, Mr. Oliveira enrolled in the California College of Arts and Crafts in Oakland, where he earned a bachelor's degree in fine arts in 1951 and a master's degree in 1952. It was in the summer of 1950 that he studied with Beckmann at Mills College in Oakland.

In 1951 he married Ramona Christensen, who died in 2006. In addition to their son, Joe, of Palo Alto, he is survived by a sister, Marcia Heath of Millbrae, Calif.; two daughters, Lisa Lamoure of Fresno, Calif., and Gina Oliveira of Kihei, Hawaii; and five grandchildren.

After serving in the Army as a cartographic draftsman, stationed at the Presidio in San Francisco, Mr. Oliveira began showing in California and in 1958 was given a solo show in Manhattan at the Alan Gallery.

He remained a local figure, however, known primarily for his printmaking, until Peter Selz, at the time the new curator of painting and sculpture at the Museum of Modern Art, included him in the exhibition "New Figures of Man" in 1959. Overnight, Mr. Oliveira found wide acclaim for his nervous human images, built up with thick layers of scuffed and scratched paint. The canvases had a spontaneous, searching quality, as if, Mr. Selz once wrote, the artist was "finding the figure in the process of painting it."

The wave of adulation nearly overwhelmed him. He worked frantically to meet the demand for his paintings, but soon became exhausted by his schedule and dispirited by the rise of Pop Art, which was relegating his own art to the margins. "I reached a dry spell, lacking in imagination, and the incentive seemed to be gone," he said in a 1978 interview.

Abandoning painting, he concentrated on prints, watercolors and drawings. He did not return to the easel until 1965, the year that he became a permanent member of the art department at Stanford University, where he created a printmaking program and taught studio art for nearly 30 years.

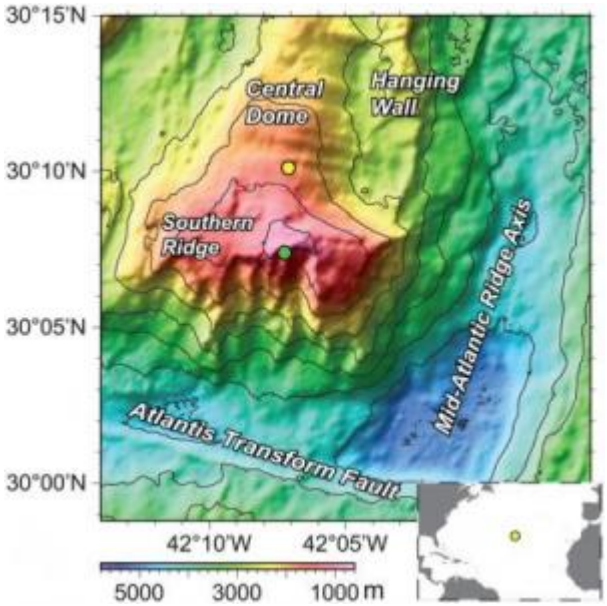
Mr. Oliveira strayed from the human figure from time to time but always returned, with startling intensity in works like "Standing Figure" (1970), a pink female figure turned toward the viewer with a ghostly white death mask instead of a face. Just as compelling were the elongated dancers and runners, virtually dissolved into their red or burnt-orange backgrounds, in his paintings of the last decade.

In the 1990s he embarked on a series of paintings, the "Stelae," whose vertical forms evoked the solemn majesty of Egyptian obelisks, Han dynasty tomb posts or the menhirs of Stonehenge. At the same time they bore an unmistakable resemblance to the isolated figures of his earlier, human-centric paintings.

In his later years Mr. Oliveira intermittently worked on "The Windhover," a series of large-scale landscapes. Named after a Gerard Manley Hopkins poem, they incorporate the curves and wings of the kestrels and red-tailed hawks he observed outside his studio in the Stanford foothills.

http://www.nytimes.com/2010/11/19/arts/design/19oliveira.html?ref=design

Busy Microbial World Discovered in Deepest Ocean Crust Ever Explored



Rock from deep beneath this undersea mountain in the Atlantic Ocean was recently studied to reveal some of the microbial life interactions going on in the deepest ocean crust ever explored. (Credit: Image courtesy of PLoS One)

ScienceDaily (Nov. 19, 2010) — The first study to ever explore biological activity in the deepest layer of ocean crust has found bacteria with a remarkable range of capabilities, including eating hydrocarbons and natural gas, and "fixing" or storing carbon.

The research, just published in the journal *PLoS One,* showed that a significant number and amount of bacterial forms were present, even in temperatures near the boiling point of water.

"This is a new ecosystem that almost no one has ever explored," said Martin Fisk, a professor in the College of Oceanic and Atmospheric Sciences at Oregon State University. "We expected some bacterial forms, but the long list of biological functions that are taking place so deep beneath the Earth is surprising."

Oceanic crust covers about 70 percent of the surface of the Earth and its geology has been explored to some extent, but practically nothing is known about its biology -- partly because it's difficult and expensive, and partly because most researchers had assumed not all that much was going on.

The temperature of the sediments and rock increases with depth, and scientists now believe that the upper temperature at which life can exist is around 250 degrees. The ocean floor is generally composed of three levels, including a shallow layer of sediment; basalt formed from solidified magma; and an even deeper level of basalt that cooled more slowly and is called the "gabbro" layer, which forms the majority of ocean crust.

The gabbro layer doesn't even begin until the crust is about two miles thick. But at a site in the Atlantic Ocean near an undersea mountain, the Atlantis Massif, core samples were obtained from gabbro rock formations that were closer to the surface than usual because they had been uplifted and exposed by faulting. This allowed the researchers to investigate for the first time the microbiology of these rocks.

A research expedition drilled more than 4,600 feet into this formation, into rock that was very deep and very old, and found a wide range of biological activity. Microbes were degrading hydrocarbons, some appeared to be capable of oxidizing methane, and there were genes active in the process of fixing, or converting from a gas, both nitrogen and carbon.

The findings are of interest, in part, because little is known about the role the deep ocean crust may play in carbon storage and fixation. Increasing levels of carbon dioxide, a greenhouse gas when in the atmosphere, in turn raise the levels of carbon dioxide in the oceans.

But it now appears that microbes in the deep ocean crust have at least a genetic potential for carbon storage, the report said. And it may lend credence to one concept for reducing carbon emissions in the atmosphere, by pumping carbon dioxide into deep subsurface layers where it might be sequestered permanently.

The researchers also noted that methane found on Mars could be derived from geological sources, and concluded that subsurface environments on Mars where methane is produced could support bacteria like those found in this study.

"These findings don't offer any easy or simple solutions to some of the environmental issues that are of interest to us on Earth, such as greenhouse warming or oil spill pollution," Fisk said. "However, they do indicate there's a whole world of biological activity deep beneath the ocean that we don't know much about, and we need to study."

Microbial processes in this expansive subseafloor environment "have the potential to significantly influence the biogeochemistry of the ocean and the atmosphere," the researchers wrote in their report.

The research was supported by the National Science Foundation, U.S. Department of Energy, Gordon and Betty Moore Foundation, and the Integrated Ocean Drilling Program. Collaborators were from OSU, the Lawrence Berkeley National Laboratory, Tohoku University in Japan, Universitat Bremen in Germany, University of Oklahoma, and National Institute of Advanced Industrial Science and Technology in Japan.

Story Source:

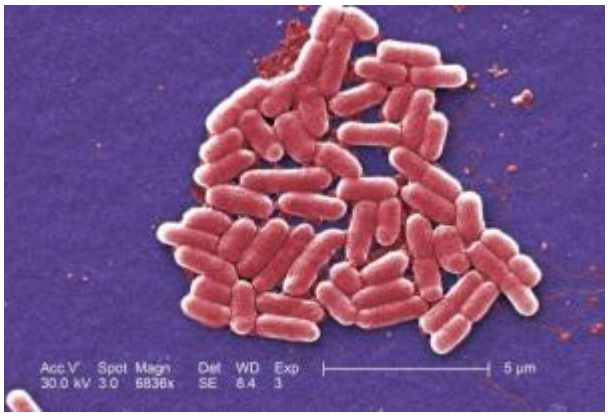
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Oregon State University**.

Journal Reference:

1. Olivia U. Mason, Tatsunori Nakagawa, Martin Rosner, Joy D. Van Nostrand, Jizhong Zhou, Akihiko Maruyama, Martin R. Fisk, Stephen J. Giovannoni, Jack Anthony Gilbert. **First Investigation of the Microbiology of the Deepest Layer of Ocean Crust**. *PLoS ONE*, 2010; 5 (11): e15399 DOI: 10.1371/journal.pone.0015399

http://www.sciencedaily.com/releases/2010/11/101119162926.htm

E. Coli Infection Linked to Long-Term Health Problems



Under a magnification of 6836x, this colorized scanning electron micrograph (SEM) depicted a number of Gram-negative Escherichia coli bacteria of the strain O157:H7, which is one of hundreds of strains of this bacterium. Although most strains are harmless, and live in the intestines of healthy humans and animals, this strain produces a powerful toxin, which can cause severe illness. (Credit: Janice Haney Carr)

ScienceDaily (Nov. 19, 2010) — People who contract gastroenteritis from drinking water contaminated with *E. coli* are at an increased risk of developing high blood pressure, kidney problems and heart disease in later life, finds a study published on the British Medical Journal website.

The findings underline the importance of ensuring a safe food and water supply and the need for regular monitoring for those affected.

It is estimated that *E. coli* O157:H7 infections cause up to 120,000 gastro-enteric illnesses annually in the US alone, resulting in over 2,000 hospitalisations and 60 deaths. However, the long term health effects of *E. coli* infection in adults are largely unknown.

So a team of researchers in Canada assessed the risk for hypertension, renal impairment and cardiovascular disease within eight years of gastroenteritis from drinking contaminated water.

They used data from the Walkerton Health Study -- the first study to evaluate long term health after an outbreak of gastroenteritis in May 2000 when a municipal water system became contaminated with *E. coli* O157:H7 and Campylobacter bacteria.

Study participants were surveyed annually and underwent a physical examination and laboratory assessment to track their long term health.

Of 1,977 adult participants, 1,067 (54%) experienced acute gastroenteritis of whom 378 sought medical attention.

Compared with participants who were not ill or only mildly ill during the outbreak, participants who experienced acute gastroenteritis were 1.3 times more likely to develop hypertension, 3.4 times more likely to develop renal impairment, and 2.1 times more likely to have a cardiovascular event, such as a heart attack or stroke.

The authors conclude: "Our findings underline the need for following up individual cases of food or water poisoning by *E. coli* O157:H7 to prevent or reduce silent progressive vascular injury."

They add: "These long term consequences emphasise the importance of ensuring safe food and water supply as a cornerstone of public health."

***Editor's Note**: This article is not intended to provide medical advice, diagnosis or treatment.*

Story Source:

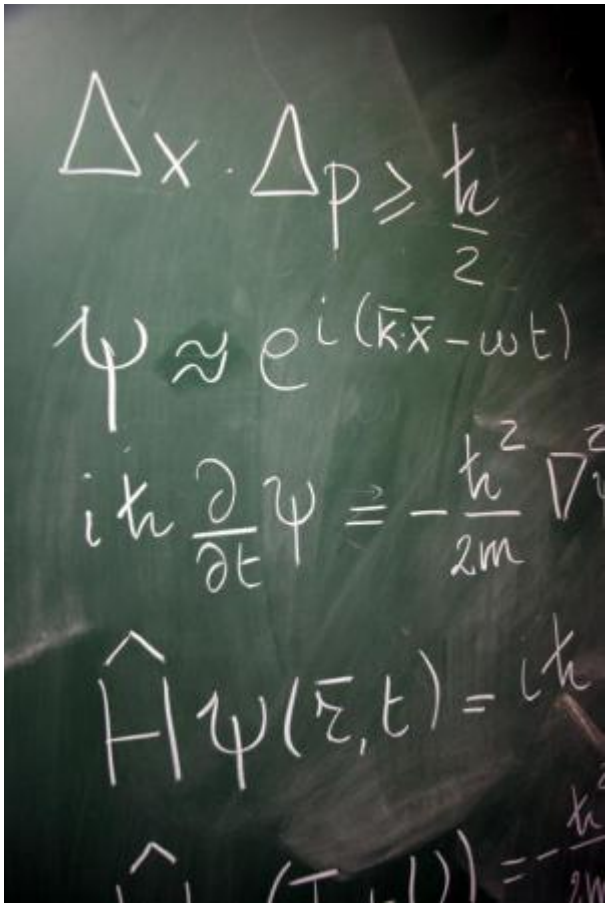
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **BMJ-British Medical Journal**, via EurekAlert!, a service of AAAS.

Journal Reference:

1. W. F. Clark, J. M. Sontrop, J. J. Macnab, M. Salvadori, L. Moist, R. Suri, A. X. Garg. **Long term risk for hypertension, renal impairment, and cardiovascular disease after gastroenteritis from drinking water contaminated with Escherichia coli O157:H7: a prospective cohort study**. *BMJ*, 2010; 341 (nov17 2): c6020 DOI: 10.1136/bmj.c6020

http://www.sciencedaily.com/releases/2010/11/101118194607.htm

Surprise Link Between Weird Quantum Phenomena: Heisenberg Uncertainty Principle Sets Limits on Einstein's 'Spooky Action at a Distance'



New research shows that quantum non-locality, what Einstein called "spooky action at a distance," is in fact limited by Heisenberg's uncertainty principle. (Credit: iStockphoto)

ScienceDaily (Nov. 19, 2010) — Researchers have uncovered a fundamental link between the two defining properties of quantum physics. The result is being heralded as a dramatic breakthrough in our basic understanding of quantum mechanics and provides new clues to researchers seeking to understand the foundations of quantum theory. The result addresses the question of why quantum behaviour is as weird as it is -- but no weirder.

Stephanie Wehner of Singapore's Centre for Quantum Technologies and the National University of Singapore and Jonathan Oppenheim of the United Kingdom's University of Cambridge published their work in the latest edition of the journal *Science*.

The strange behaviour of quantum particles, such as atoms, electrons and the photons that make up light, has perplexed scientists for nearly a century. Albert Einstein was among those who thought the quantum world was so strange that quantum theory must be wrong, but experiments have borne out the theory's predictions.

One of the weird aspects of quantum theory is that it is impossible to know certain things, such as a particle's momentum and position, simultaneously. Knowledge of one of these properties affects the accuracy with which you can learn the other. This is known as the "Heisenberg Uncertainty Principle."

Another weird aspect is the quantum phenomenon of non-locality, which arises from the better-known phenomenon of entanglement. When two quantum particles are entangled, they can perform actions that look as if they are coordinated with each other in ways that defy classical intuition about physically separated particles.

Previously, researchers have treated non-locality and uncertainty as two separate phenomena. Now Wehner and Oppenheim have shown that they are intricately linked. What's more, they show that this link is quantitative and have found an equation which shows that the "amount" of non-locality is determined by the uncertainty principle.

"It's a surprising and perhaps ironic twist," said Oppenheim, a Royal Society University Research Fellow from the Department of Applied Mathematics & Theoretical Physics at the University of Cambridge. Einstein and his co-workers discovered non-locality while searching for a way to undermine the uncertainty principle. "Now the uncertainty principle appears to be biting back."

Non-locality determines how well two distant parties can coordinate their actions without sending each other information. Physicists believe that even in quantum mechanics, information cannot travel faster than light. Nevertheless, it turns out that quantum mechanics allows two parties to coordinate much better than would be possible under the laws of classical physics. In fact, their actions can be coordinated in a way that almost seems as if they had been able to talk. Einstein famously referred to this phenomenon as "spooky action at a distance."

However, quantum non-locality could be even spookier than it actually is. It's possible to have theories which allow distant parties to coordinate their actions much better than nature allows, while still not allowing information to travel faster than light. Nature could be weirder, and yet it isn't -- quantum theory appears to impose an additional limit on the weirdness.

"Quantum theory is pretty weird, but it isn't as weird as it could be. We really have to ask ourselves, why is quantum mechanics this limited? Why doesn't nature allow even stronger non-locality?" Oppenheim says.

The surprising result by Wehner and Oppenheim is that the uncertainty principle provides an answer. Two parties can only coordinate their actions better if they break the uncertainty principle, which imposes a strict bound on how strong non-locality can be.

"It would be great if we could better coordinate our actions over long distances, as it would enable us to solve many information processing tasks very efficiently," Wehner says. "However, physics would be fundamentally different. If we break the uncertainty principle, there is really no telling what our world would look like."

How did the researchers discover a connection that had gone unnoticed so long? Before entering academia, Wehner worked as a 'computer hacker for hire', and now works in quantum information theory, while Oppenheim is a physicist. Wehner thinks that applying techniques from computer science to the laws of theoretical physics was key to spotting the connection. "I think one of the crucial ideas is to link the question to a coding problem," Wehner says. "Traditional ways of viewing non-locality and uncertainty obscured the close connection between the two concepts."

Wehner and Oppenheim recast the phenomena of quantum physics in terms that would be familiar to a computer hacker. They treat non-locality as the result of one party, Alice, creating and encoding information and a second party, Bob, retrieving information from the encoding. How well Alice and Bob can encode and retrieve information is determined by uncertainty relations. In some situations, they found that and a third property known as "steering" enters the picture.

Wehner and Oppenheim compare their discovery to uncovering what determines how easily two players can win a quantum board game: the board has only two squares, on which Alice, can place a counter of two possible colours: green or pink. She is told to place the same colour on both squares, or to place a different colour on each. Bob has to guess the colour that Alice put on square one or two. If his guess is correct, Alice and Bob win the game. Clearly, Alice and Bob could win the game if they could talk to each other: Alice would simply tell Bob what colours are on squares one and two. But Bob and Alice are situated so far apart from each other that light -- and thus an information-carrying signal -- does not have time to pass between them during the game.

If they can't talk, they won't always win, but by measuring on quantum particles, they can win the game more often than any strategy which doesn't rely on quantum theory. However, the uncertainty principle prevents them from doing any better, and even determines how often they lose the game.

The finding bears on the deep question of what principles underlie quantum physics. Many attempts to understand the underpinnings of quantum mechanics have focused on non-locality. Wehner thinks there may be more to gain from examining the details of the uncertainty principle. "However, we have barely scratched the surface of understanding uncertainty relations," she says.

The breakthrough is future-proof, the researchers say. Scientists are still searching for a quantum theory of gravity and Wehner and Oppenheim's result concerning non-locality, uncertainty and steering applies to all possible theories -- including any future replacement for quantum mechanics.

Story Source:

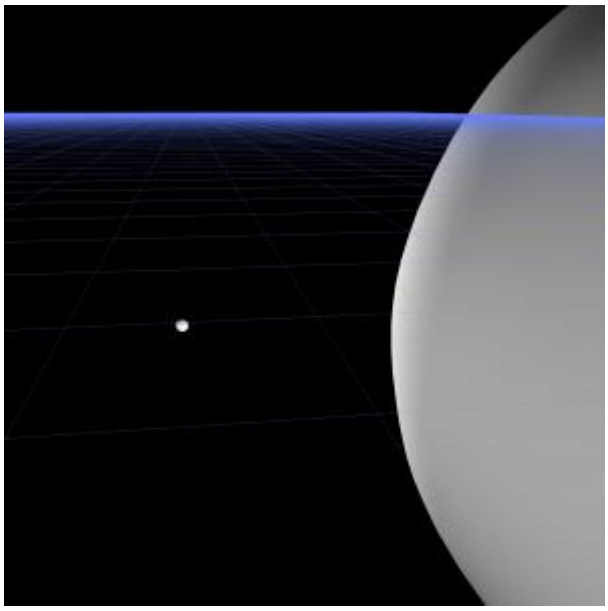
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Centre for Quantum Technologies at the National University of Singapore**, via EurekAlert!, a service of AAAS.

Journal Reference:

1. Jonathan Oppenheim, Stephanie Wehner. **The Uncertainty Principle Determines the Nonlocality of Quantum Mechanics**. *Science*, 2010; 330 (6007): 1072-1074 DOI: 10.1126/science.1192065

http://www.sciencedaily.com/releases/2010/11/101118141541.htm

Pushing Black-Hole Mergers to the Extreme: Scientists Achieve 100:1 Mass Ratio in Simulation



Still image from movie displaying the computed horizons of large and small black holes immediately prior to their final merger and the aftermath. The oscillations induced by the small black hole falling into its companion are depicted. At the moment of merger, the large black hole's radius increases with the absorption of the smaller mass. (Credit: Simulation by Carlos Lousto and Yosef Zlochower; visualization by Hans-Peter Bischof at the Center for Computational Relativity and Gravitation at Rochester Institute of Technology)

ScienceDaily (Nov. 19, 2010) — Scientists have simulated, for the first time, the merger of two black holes of vastly different sizes, with one mass 100 times larger than the other. This extreme mass ratio of 100:1 breaks a barrier in the fields of numerical relativity and gravitational wave astronomy.

Until now, the problem of simulating the merger of binary black holes with extreme size differences had remained an unexplored region of black-hole physics.

"Nature doesn't collide black holes of equal masses," says Carlos Lousto, associate professor of mathematical sciences at Rochester Institute of Technology and a member of the Center for Computational Relativity and Gravitation. "They have mass ratios of 1:3, 1:10, 1:100 or even 1:1 million. This puts us in a better situation for simulating realistic astrophysical scenarios and for predicting what observers should see and for telling them what to look for.

"Leaders in the field believed solving the 100:1 mass ratio problem would take five to 10 more years and significant advances in computational power. It was thought to be technically impossible."

"These simulations were made possible by advances both in the scaling and performance of relativity computer codes on thousands of processors, and advances in our understanding of how gauge conditions can be modified to self-adapt to the vastly different scales in the problem," adds Yosef Zlochower, assistant professor of mathematical sciences and a member of the center.

A paper announcing Lousto and Zlochower's findings was submitted for publication in *Physical Review Letters*.

The only prior simulation describing an extreme merger of black holes focused on a scenario involving a 1:10 mass ratio. Those techniques could not be expanded to a bigger scale, Lousto explained. To handle the larger mass ratios, he and Zlochower developed numerical and analytical techniques based on the moving puncture approach -- a breakthrough, created with Manuela Campanelli, director of the Center for Computational Relativity and Gravitation, that led to one of the first simulations of black holes on supercomputers in 2005.

The flexible techniques Lousto and Zlochower advanced for this scenario also translate to spinning binary black holes and for cases involving smaller mass ratios. These methods give the scientists ways to explore mass ratio limits and for modeling observational effects.

Lousto and Zlochower used resources at the Texas Advanced Computer Center, home to the Ranger supercomputer, to process the massive computations. The computer, which has 70,000 processors, took nearly three months to complete the simulation describing the most extreme-mass-ratio merger of black holes to date.

"Their work is pushing the limit of what we can do today," Campanelli says. "Now we have the tools to deal with a new system."

Simulations like Lousto and Zlochower's will help observational astronomers detect mergers of black holes with large size differentials using the future Advanced LIGO (Laser Interferometer Gravitational-wave Observatory) and the space probe LISA (Laser Interferometer Space Antenna). Simulations of black-hole mergers provide blueprints or templates for observational scientists attempting to discern signatures of massive collisions. Observing and measuring gravitational waves created when black holes coalesce could confirm a key prediction of Einstein's general theory of relativity.

Story Source:

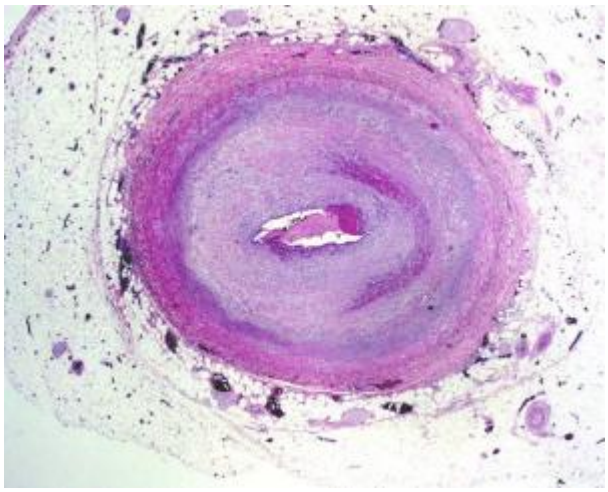
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Rochester Institute of Technology**.

Journal Reference:

1. Carlos O. Lousto, Yosef Zlochower. **Extreme-Mass-Ratio-Black-Hole-Binary Evolutions with Numerical Relativity**. *Physical Review Letters*, 2010; (submitted) [link]

http://www.sciencedaily.com/releases/2010/11/101118124212.htm

Mechanism Behind Organ Transplant Rejection Identified



Heart-transplant blood vessel in chronic rejection. (Credit: Image courtesy of University of California - Los Angeles)

ScienceDaily (Nov. 19, 2010) — UCLA researchers have pinpointed the culprit behind chronic rejection of heart, lung and kidney transplants. Published in the Nov. 23 edition of *Science Signaling,* their findings suggest new therapeutic approaches for preventing transplant rejection and sabotaging cancer growth.

The team focused on the mechanism behind narrowing of the donor's grafted blood vessels, which blocks blood from reaching the transplanted organ. Starved of oxygen and other nutrients, the organ eventually fails, forcing the patient back on the transplant waiting list.

"Chronic rejection is the No. 1 cause of organ failure in the first year of transplant," explained Elaine Reed, director of the UCLA Immunogenetics Center and professor of pathology at the David Geffen School of Medicine at UCLA. "In the first five years, some 40 percent of organs fail after transplant due to blockage of the grafted blood vessels. Currently, we have no way to treat this deadly condition."

Earlier research by Reed's laboratory discovered that patients whose immune systems manufactured antibodies to their donor's human leukocyte antigens (HLA) were at higher risk for chronic rejection.

In this study, Reed and her colleagues looked at how HLA molecules on donor tissue provoke an immune response in the patient. The team examined how the patient's antibodies trigger signals that spark overgrowth of the cells lining the inner blood vessels of the grafted organ.

The scientists discovered that HLA's ability to stimulate cell growth and movement depends upon a quid pro quo relationship with another molecule called integrin beta 4.

"Integrin enables cells to survive and spread, which is essential for tumor progression," said Reed. "We suspect that integrin hijacks HLA and takes over its functions. When we suppressed integrin, HLA was unable to make cells grow and move."

Conversely, when the team suppressed HLA, integrin could no longer support cells' communication with their environment. The finding implies that HLA is required for functions regulated by integrin, such as cellular movement.

"Ours is the first study to demonstrate a physical and functional liaison between HLA and integrin," said Reed. "HLA's role in helping integrin is a completely new function that has never been described before."

The UCLA findings offer valuable insight into the molecular mechanisms that allow HLA to stimulate cellular growth and movement.

"What I'm excited about from a medical point of view is how our findings offer new therapeutic opportunities," said Reed. "If we can identify ways to disrupt the relationship between HLA and integrin, we may be able to prevent chronic organ rejection in transplant patients."

The UCLA team's next step will be to investigate how integrin and HLA function together to promote cancer growth. The research suggests a new approach for halting cancer progression by preventing angiogenesis, the process by which a tumor develops its own blood supply.

"By interfering with integrin's reliance upon HLA to signal cells, we can sabotage cells' ability to sprout new blood vessels to feed the tumor," observed Reed.

Reed's UCLA coauthors included Xiaohai Zhang and Enrique Rozengurt.

The study was supported by grants from the National Institute of Allergy and Infectious Diseases, the National Heart Lung and Blood Institute and the National Institute of Diabetes, Digestive and Kidney Disease.

Editor's Note: *This article is not intended to provide medical advice, diagnosis or treatment.*

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **University of California - Los Angeles**. The original article was written by Elaine Schmidt.
http://www.sciencedaily.com/releases/2010/11/101118141549.htm

Hubble Captures New Star Birth in an Ancient Galaxy

Fresh star birth in the ancient elliptical galaxy NGC 4150, located about 44 million light-years away. (Credit: NASA, ESA, R.M. Crockett (Univ. of Oxford, UK), S. Kaviraj (Imperial College London and Univ. of Oxford), J. Silk (Univ. of Oxford), M. Mutchler (STScI), R. O'Connell (Univ. of Virginia, Charlottesville), and the WFC3 Scientific Oversight Committee)

ScienceDaily (Nov. 20, 2010) — Elliptical galaxies were once thought to be aging star cities whose star-making heyday was billions of years ago.

But new observations with NASA's Hubble Space Telescope are helping to show that elliptical galaxies still have some youthful vigor left, thanks to encounters with smaller galaxies.

Images of the core of NGC 4150, taken in near-ultraviolet light with the sharp-eyed Wide Field Camera 3 (WFC3), reveal streamers of dust and gas and clumps of young, blue stars that are significantly less than a billion years old. Evidence shows that the star birth was sparked by a merger with a dwarf galaxy.

The new study helps bolster the emerging view that most elliptical galaxies have young stars, bringing new life to old galaxies.

"Elliptical galaxies were thought to have made all of their stars billions of years ago," says astronomer Mark Crockett of the University of Oxford, leader of the Hubble observations. "They had consumed all their gas to

make new stars. Now we are finding evidence of star birth in many elliptical galaxies, fueled mostly by cannibalizing smaller galaxies.

"These observations support the theory that galaxies built themselves up over billions of years by collisions with dwarf galaxies," Crockett continues. "NGC 4150 is a dramatic example in our galactic back yard of a common occurrence in the early universe."

The Hubble images reveal turbulent activity deep inside the galaxy's core. Clusters of young, blue stars trace a ring around the center that is rotating with the galaxy. The stellar breeding ground is about 1,300 light-years across. Long strands of dust are silhouetted against the yellowish core, which is composed of populations of older stars.

From a Hubble analysis of the stars' colors, Crockett and his team calculated that the star-formation boom started about a billion years ago, a comparatively recent event in cosmological history. The galaxy's star-making factory has slowed down since then.

"We are seeing this galaxy after the major starburst has occurred," explains team member Joseph Silk of the University of Oxford. "The most massive stars are already gone. The youngest stars are between 50 million and 300 to 400 million years old. By comparison, most of the stars in the galaxy are around 10 billion years old."

The encounter that triggered the star birth would have been similar to our Milky Way swallowing the nearby Large Magellanic Cloud.

"We believe that a merger with a small, gas-rich galaxy around one billion years ago supplied NGC 4150 with the fuel necessary to form new stars," says team member Sugata Kaviraj of the Imperial College London and the University of Oxford. "The abundance of 'metals'--elements heavier than hydrogen and helium--in the young stars is very low, suggesting the galaxy that merged with NGC 4150 was also metal-poor. This points towards a small, dwarf galaxy, around one-twentieth the mass of NGC 4150."

Minor mergers such as this one are more ubiquitous than interactions between hefty galaxies, the astronomers say. For every major encounter, there are probably up to 10 times more frequent clashes between a large and a small galaxy. Major collisions are easier to see because they create incredible fireworks: distorted galaxies, long streamers of gas, and dozens of young star clusters. Smaller interactions are harder to detect because they leave relatively little trace.

Over the past five years, however, ground- and space-based telescopes have offered hints of fresh star formation in elliptical galaxies. Ground-based observatories captured the blue glow of stars in elliptical galaxies, and satellites such as the Galaxy Evolution Explorer (GALEX), which looks in far- and near-ultraviolet light, confirmed that the blue glow came from fledgling stars much less than a billion years old. Ultraviolet light traces the glow of hot, young stars.

Crockett and his team selected NGC 4150 for their Hubble study because a ground-based spectroscopic analysis gave tantalizing hints that the galaxy's core was not a quiet place. The ground-based survey, called the Spectrographic Areal Unit for Research on Optical Nebulae (SAURON), revealed the presence of young stars and dynamic activity that was out of sync with the galaxy.

"In visible light, elliptical galaxies such as NGC 4150 look like normal elliptical galaxies," Silk says. "But the picture changes when we look in ultraviolet light. At least a third of all elliptical galaxies glow with the blue light of young stars."

Adds Crockett: "Ellipticals are the perfect laboratory for studying minor mergers in ultraviolet light because they are dominated by old red stars, allowing astronomers to see the faint blue glow of young stars."

The astronomers hope to study other elliptical galaxies in the SAURON survey to look for the signposts of new star birth. The team's results have been accepted for publication in T*he Astrophysical Journal*.

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Space Telescope Science Institute (STScI)**.

http://www.sciencedaily.com/releases/2010/11/101119201429.htm

Orangutans Count on Stats for Survival

A study run by The Nature Conservancy (TNC) is aimed at protecting orangutans in the Indonesian states of Borneo and Sumatra. (Credit: Nardiyono of The Nature Conservancy)

ScienceDaily (Nov. 16, 2010) — Orangutans threatened with extinction could be brought back from the brink with help from a Queensland University of Technology (QUT) statistician.

Professor Kerrie Mengersen, from the School of Mathematical Sciences, is part of a study to guide efforts for saving the Indonesian primate whose name means "person of the forest."

Professor Mengersen said the study had found a quarter of villagers who lived side-by-side with orangutans did not know it was illegal under Indonesian law to kill the primates, and five per cent admitted to killing 1000 orangutans last year.

Professor Mengersen is participating in the study run by The Nature Conservancy (TNC) in their quest to protect orangutans in the Indonesian states of Borneo and Sumatra.

She designed and led the statistical analysis of the study's survey, which was completed by almost 7000 villagers.

In addition to learning about the location and abundance of remaining orangutans, the study investigated issues of conflict and hunting.

"Killing rates of more than one per cent of the orangutan population per year are thought to lead to certain extinction in local areas, but the survey results indicate rates of local killing may be much higher than this," Professor Mengersen said.

"Just over half of the killings were reportedly for food, followed by more than 10 per cent each for self-defence, crop protection and unspecified reasons.

"Very few reported killing for traditional medicine, selling orangutan babies for the pet trade, hunting for fun or being paid to kill."

Professor Mengersen said by identifying factors related to the killing, education campaigns could be tailored to specific areas and cultural groups.

"Not a single conservation program is effectively targeting orangutan hunting at present," she said.

"There appears to be a role for increased education about protection of orangutans under Indonesian law."

Professor Mengersen said the survey also found villagers felt overwhelming support for the forest, saying it contributed to their health and culture, but also appreciated the wealth, schools and health services provided where forest was cleared for industry, such as palm oil and eucalypt plantations.

"Through the work of TNC and others, and through the use of powerful statistical modelling, we can learn from the wealth of knowledge vested in these 'eyes and ears' of the forest and learn how to work more effectively towards goals for the conservation of orangutans," she said.

Professor Mengersen's findings have been published in the journal *Significance,* published by the Royal Statistical Society and the American Statistical Association.

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Queensland University of Technology**.

Journal Reference:

1. Kerrie Mengersen. **The sound of silence: listening to the villagers to learn about orangutans**. *Significance*, 2010; 7 (3): 101 DOI: 10.1111/j.1740-9713.2010.00434.x

http://www.sciencedaily.com/releases/2010/11/101117094252.htm

Graphic Images Influence Intentions to Quit Smoking

Researchers surveyed smokers intentions to quit after viewing four cigarette packages, including one with a warning label only and three with photographs of the negative consequences of smoking. (Credit: Image courtesy of University of Arkansas, Fayetteville)

ScienceDaily (Nov. 19, 2010) — Marketing researchers at the University of Arkansas, Villanova University and Marquette University surveyed more than 500 U.S. and Canadian smokers and found that the highly graphic images of the negative consequences of smoking have the greatest impact on smokers' intentions to quit. The most graphic images, such as those showing severe mouth diseases, including disfigured, blackened and cancerous tissue, evoked fear about the consequences of smoking and thus influenced consumer intentions to quit.

"These results suggest that there appears to be little downside on intentions to quit from using extremely graphic pictorial depictions of the negative health outcomes due to smoking," said Scot Burton, co-author of the study and marketing professor in the Sam M. Walton College of Business. "Our research shows that strong, negative graphic imagery -- and fear evoked from such imagery -- influences smokers' intentions to quit. We also found this to be the case even though recall of the written messages on package labels was reduced by the more graphic images. In other words, smokers were influenced primarily by the images and not by the written message."

Burton, Jeremy Kees and John Kozup, both marketing professors at the Villanova University, and Craig Andrews, marketing professor at Marquette University, developed the study to help officials at the U.S. Food and Drug Administration and the U.S. Department of Health and Human Services better understand what types of pictorial warnings are most effective and why they are effective. These agencies are responsible for implementing the 2009 Family Smoking Prevention and Tobacco Control Act, which requires graphic pictorial warning labels on cigarette packages by 2011. According to the law, "color graphics depicting the negative health consequences of smoking" must accompany cigarette package message statements, such as "Smoking Causes Mouth Diseases."

To mostly positive effects, Canada, Australia and many European countries already use strong written messages and graphic images on cigarette packages. The new U.S. law will align messages and pictorial warnings more closely with those on cigarette packages in these countries.

Smoking causes many health problems, from emphysema and lung cancer to a variety of cardiovascular diseases. For this study, the researchers chose its effect on oral diseases, the most externally visible health consequence. They started by using images that ranged from highly graphic -- vivid and powerful images of advanced mouth cancer -- to less graphic -- photographs of stained teeth caused by nicotine. In all, the graphic pictorial warnings were categorized as low, moderate or highly graphic.

In the primary study, 511 adult smokers, all members of a web-based research panel, were shown one of four different types of warning information on cigarette packages. These included one of the three photographs along with this written message: "WARNING: Smoking Causes Mouth Diseases." The fourth package included the written message with no picture. The warning information covered approximately 40 percent of

the entire package. Participants were asked questions concerning their opinions about the cigarette package and intentions to quit smoking.

Participant responses indicated that pictorial warnings had a significantly positive effect on smokers' intentions to quit. Specifically, when compared to the moderate and low graphic levels, the highly graphic condition resulted in a significant increase in quit intentions. Moderate graphic levels also were associated with higher quit intentions than low graphic levels. Compared to the warning label with a written message only, the less graphic picture was not effective at strengthening smokers' intentions to quit.

The researchers found that participant recall of the written-message statement was reduced by the moderate and highly graphic pictorial warnings. Participants had greater recall of the written messages when they were packaged with "low" graphic pictorial warnings or with no image.

"However, it is worth noting here that recall of the stated warning is likely to be influenced by multiple exposures to the warnings," Kees said. "For instance, the graphic pictorial warnings may negatively affect recall initially because smokers are more 'shocked' by the warnings, but the stated message may be better remembered over time."

The researchers found that the graphic images evoked fear, which in turn served as the primary underlying mechanism explaining the effects of the pictorial warnings. As depictions of the consequences of smoking were presented more graphically, smokers reported higher levels of fear, Burton said. Also, the findings were consistent across variations in the amount of time participants were exposed to the packages, which suggested that even a relatively limited exposure to the warning label might achieve the desired effect to motivate smokers to quit.

"We believe our study provides some valuable implications for health policy," Burton said. "As public health officials and policy makers in the U.S. and around the world consider potential changes to warnings on cigarette packages, the addition of pictorial warnings, especially more graphic depictions of the consequences of smoking, to text-based messages appears beneficial. These data show that at least moderately graphic pictures should be used."

The researchers' study will be published in the fall issue of the *Journal of Public Policy & Marketing*.

Editor's Note: *This article is not intended to provide medical advice, diagnosis or treatment.*

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **University of Arkansas, Fayetteville**.

Journal Reference:

1. Andrea Heintz Tangari, Jeremy Kees, J. Craig Andrews, Scot Burton. **Can Corrective Ad Statements Based onU.S. v. Philip Morris USA Inc. Affect Consumer Beliefs About Smoking?** *Journal of Public Policy & Marketing*, 2010; 29 (2): 153 DOI: 10.1509/jppm.29.2.153

http://www.sciencedaily.com/releases/2010/11/101119205212.htm

Pomegranate Juice Reduces Damage to Tissues, Inflammation and Infections, Study Suggests

Fresh half of pomegranate and juice. (Credit: iStockphoto/Serghei Platonov)

ScienceDaily (Nov. 19, 2010) — Studies in recent years have claimed multiple health benefits of pomegranate juice, including that it is a good source of antioxidants and lowers both cholesterol and blood pressure, especially in diabetic and hypertensive patients. A preliminary study now suggests that it can ward off a number of complications in kidney disease patients on dialysis, including the high morbidity rate due to infections and cardiovascular events, according to a paper being presented at the American Society of Nephrology's 43rd Annual Meeting and Scientific Exposition in Denver, CO.

Batya Kristal, MD, FASN (Western Galilee Hospital, in Nahariya, Ruth & Bruce Rappaport Faculty of Medicine, Technion-Israel Institute of Technology, Haifa, Israel), PhD candidate, Lilach Shema, and colleagues studied 101 dialysis patients who received either pomegranate juice or another placebo drink at the beginning of each dialysis session, three times a week for one year.

Laboratory tests showed that patients who drank pomegranate juice experienced reduced inflammation and the damage of oxidative stress caused by free radicals, was minimized. Furthermore, pomegranate juice drinkers were less likely to be hospitalized due to infections. These findings support other studies that suggest pomegranate juice has potent antioxidant properties.

Recent analyses of data not included in this abstract, revealed that those who drank pomegranate juice also showed an improvement in cardiovascular risk factors, such as reduced blood pressure, improvement in lipid profile and fewer cardiovascular events, suggesting that they had better heart health. These results are in agreement with other studied populations and particularly important for hemodialysis patients, because most kidney disease patients die either from cardiovascular-related causes or infections.

The authors say their findings suggest that drinking a controlled amount of pomegranate juice with a safe and monitored content of potassium may help reduce the complications that often occur in dialysis patients. It is important to consider the risk involved in potassium overload, especially in chronic kidney disease (CKD) patients with dietary potassium restriction.

"Considering the expected epidemic of CKD in the next decade, further clinical trials using pomegranate juice aimed at reducing the high cardiovascular morbidity of CKD patients and their deterioration to end-stage renal disease should be conducted," said Dr. Kristal.

Study co-authors include Ronit Geron, MD, Galina Shapiro, Shifra Sela, PhD (Western Galilee Hospital), and Liora Ore (University of Haifa).

The study was supported by the Chief Scientist Office of the Ministry of Health, Israel; Jess & Midred Fisher Family Cardiology Research Fund, and the Office of the Executive Vice President for Research, Technion, Israel.

"One Year of Pomegranate Juice Consumption Decreases Oxidative Stress, Inflammation and Incidence of Infections in Hemodialysis Patients," [TH-FC059] will be presented as an oral presentation on November 18, 2010 at the Colorado Convention Center in Denver, CO.

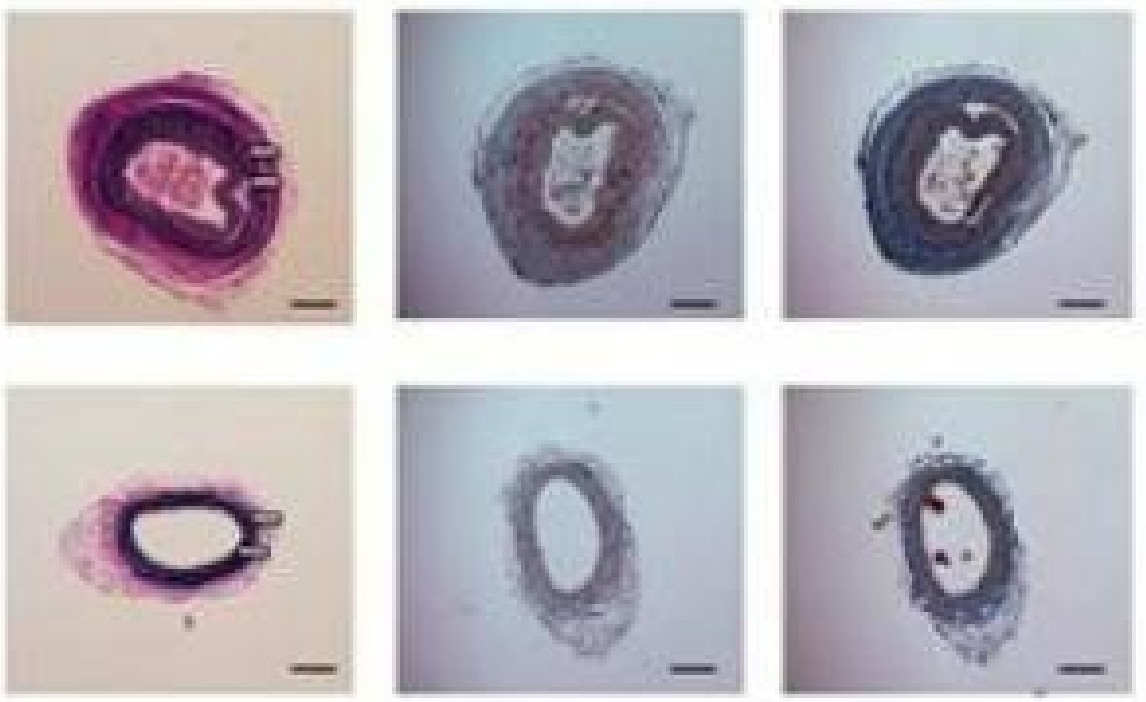
Editor's Note: *This article is not intended to provide medical advice, diagnosis or treatment.*

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **American Society of Nephrology**, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2010/11/101119083126.htm

Well-Known Molecule May Be Behind Alcohol's Benefits to Heart Health



Vessel thickening is reduced in the carotid arteries of mice fed the equivalent of two drinks, compared to no-alcohol controls. (Credit: Image courtesy of University of Rochester Medical Center)

ScienceDaily (Nov. 19, 2010) — Many studies support the assertion that moderate drinking is beneficial when it comes to cardiovascular health, and for the first time scientists have discovered that a well-known molecule, called Notch, may be behind alcohol's protective effects. Down the road, this finding could help scientists create a new treatment for heart disease that mimics the beneficial influence of modest alcohol consumption."Any understanding of a socially acceptable, modifiable activity that many people engage in, like drinking, is useful as we continue to search for new ways to improve health," said Eileen M. Redmond, Ph.D., lead study author and associate professor in the Department of Surgery, Basic and Translational Research Division, at the University of Rochester Medical Center. "If we can figure out at the basic science level how alcohol is beneficial it wouldn't translate to doctors prescribing people to drink, but hopefully will lead to the development of a new therapy for the millions of people with coronary heart disease."

Population studies looking at patterns of health and illness and associated factors have shown that heart disease and cardiac-related death is 20 to 40 percent lower in light to moderate drinkers, compared to people who don't drink. Redmond notes that even if the reduction is only 20 percent, that still translates to a considerable benefit that warrants further investigation to better understand how alcohol works its protective magic.In the study, published in *Arteriosclerosis, Thrombosis and Vascular Biology*, scientists found that alcohol at moderate levels of consumption -- generally considered one to three drinks per day -- inhibits Notch, and subsequently prevents the buildup of smooth muscle cells in blood vessels, which contributes to narrowing of the arteries and can lead to a heart attack or stroke.

In trying to uncover the molecular players involved when it comes to alcohol and improved cardiovascular health, Redmond and her team focused in on Notch because research has shown it influences the fate -- growth, migration or death -- of vascular smooth muscle cells. In blood vessels, the growth and movement of smooth muscle cells plays a key role in the development of atherosclerosis, the hardening and narrowing of

arteries, and in restenosis, the re-narrowing of arteries after they have been treated to remove buildups of plaque: Both are risk factors for heart attack and stroke.The team studied the effects of moderate amounts of alcohol in human coronary artery smooth muscle cells and in the carotid arteries of mice. In both scenarios, regular, limited amounts of alcohol decreased Notch, which in turn decreased the production and growth of smooth muscle cells, leaving vessels open and relatively free of blockages or build-up -- a desirable state for a healthy heart.

Specifically, in human smooth muscle cells, treatment with moderate levels of alcohol significantly decreased the expression of the Notch 1 receptor and inhibited Notch signaling, leading to decreased growth of smooth muscle cells. The inhibitory effect of moderate alcohol on smooth muscle cell growth was reversed if the Notch pathway was artificially switched on in these cells.In a mouse model of vessel remodeling, daily feeding of alcohol -- equivalent to two drinks per day, adjusted for body weight -- inhibited Notch in the vessel wall and markedly reduced vessel thickening, compared to the control, no alcohol group. Vessel remodeling occurs when vessels change shape and thickness in response to different injurious stimuli.

"At the molecular level, this is the first time anyone has linked the benefits of moderate drinking on cardiovascular disease with Notch," said David Morrow, Ph.D., an instructor in the Department of Surgery at the Medical Center, first author of the study and an expert on Notch. "Now that we've identified Notch as a cell signaling pathway regulated by alcohol, we're going to delve deeper into the nuts and bolts of the process to try to find out exactly how alcohol inhibits Notch in smooth muscle cells."

Researchers admit that uncovering how alcohol inhibits Notch signaling in these cells will not be an easy task. According to Redmond, "The Notch pathway is complex, and there are multiple potential regulatory points which could be affected by alcohol."In addition to Redmond and Morrow, co-authors on the study include John P. Cullen, Ph.D., and Weimin Liu, M.D., Ph.D., also in the Department of Surgery, Research Division at the University of Rochester Medical Center, and Paul A. Cahill, Ph.D., at the Vascular Health Research Center, Dublin City University, Ireland. The study was funded by grants from the National Institute on Alcohol Abuse and Alcoholism at the National Institutes of Health and the American Heart Association.

***Editor's Note**: This article is not intended to provide medical advice, diagnosis or treatment.*

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **University of Rochester Medical Center**.

Journal Reference:

1. D. Morrow, J. P. Cullen, W. Liu, P. A. Cahill, E. M. Redmond. **Alcohol Inhibits Smooth Muscle Cell Proliferation via Regulation of the Notch Signaling Pathway**. *Arteriosclerosis, Thrombosis, and Vascular Biology*, 2010; 30 (12): 2597 DOI: 10.1161/ATVBAHA.110.215681

http://www.sciencedaily.com/releases/2010/11/101118124210.htm

Cloaking effect in atoms baffles scientists

- 19:39 04 November 2010 by **Hazel Muir**

Finding mysterious positron sources in the Milky Way (Image: Gerhard Hüdepohl/ESO)

Atoms called positronium inexplicably scatter off gas particles as if they were lone electrons, even though they contain an anti-electron as well. The finding hints that engineers could use the well-known scattering properties of electrons as a rule of thumb in designing future medical scanners that employ positronium. It could also help interpret puzzling astronomical observations.

"Knowledge of how positronium interacts with the surrounding medium is important, whether this is human tissue or interstellar gas," says experiment leader Gaetana Laricchia of University College London.

Positronium atoms are like hydrogen atoms, except the proton is replaced by a positron, the positively charged antiparticle of the electron. The atoms are unstable and their two constituent particles disappear in a puff of gamma rays within a microsecond.

When a beam of electrons or positrons flies through a gas, they scatter off the gas particles at predictable rates. Scientists guessed that positronium atoms, being twice as heavy as an electron and electrically neutral, would have very different scattering rates.

Competing effects

To test this, Laricchia's team fired positronium atoms at 1100 to 4400 kilometres per second into various gases, including hydrogen, krypton and water vapour. Curiously, the scattering rates for positronium were almost identical to that of a plain electron, as though the positron's influence was somehow "cloaked".

James Walters, a theorist at Queen's University Belfast who studies matter-antimatter interactions, says the result will be tough to explain mathematically because the scattering process is so complex.

"When positronium hits an atom, the electrons in the atom don't know what to do – do they stick with the nucleus, or try to chase after the positron?" he asks. "There's a lot of competition going on and theoretically it's difficult to model that accurately."

Limiting damage

Laricchia speculates that the electron might play a dominant role in each positronium scattering by getting closer to a gas particle, on average, than the positron does.

Whatever the reason for the strange results, they could have important consequences for medical PET (positron emission tomography) scanning. PET scanners pick up gamma rays emitted by positronium formed when a radioactive tracer that emits positrons is injected into the body.

Knowing the positronium scattering rates should clarify how the particles deposit energy along their tracks as they collide with molecules in tissue. "That's required to limit damage to healthy tissue," Laricchia told **New Scientist**. It would also help refine estimates of how far positronium travels, allowing tumour volumes to be measured more accurately.

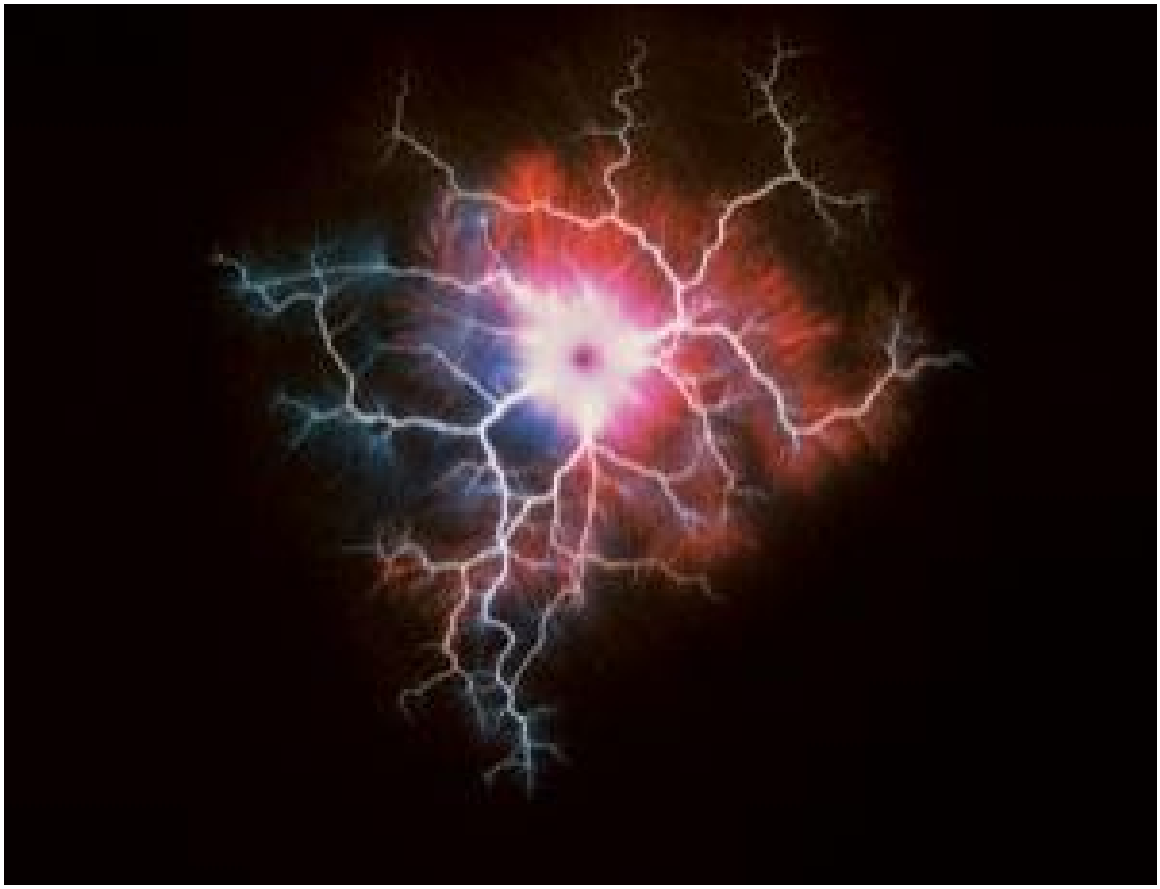
Positronium also forms in space. Understanding its interaction with interstellar gas clouds could prove crucial for determining the positions of some mysterious positron sources in the Milky Way.

Journal reference: *Science* DOI: 10.1126/science.1192322

http://www.newscientist.com/article/dn19682-cloaking-effect-in-atoms-baffles-scientists.html?full=true&print=true

Why the early universe was free of charge

- 04 November 2010 by **Anil Ananthaswamy**
- Magazine issue 2785.



Absent when the universe was very young? (Image: Henry Dakin/SPL)

MOST of us would find living without electricity almost impossible, but in the early universe electric charge was practically nonexistent. It turns out that the electric charge of fundamental particles could have been close to zero when the universe was fractions of a second old. It's all because of the action of gravity - a discovery that, if confirmed, could help pave the way for a unified description of physical reality.

The standard model of particle physics does a great job of accounting for the fundamental particles of nature and three of the forces that act upon them - the weak and strong nuclear forces, and the electromagnetic force. Unfortunately, no one knows how to fit gravity into the model.

In 2004, Frank Wilczek, David Gross and David Politzer won the physics Nobel prize for showing that particles which are acted upon by the strong force will feel it weaken as they get very close together. In quantum mechanics, small distances are associated with high energies as only energetic photons of very short wavelengths can probe down to these scales. This means that at the very large energies that existed in the early universe, the strong force would have been much less significant than now. The result helped

show that the strengths of the strong, weak and electromagnetic forces were very nearly the same in the early universe, even though today the strong force is far more powerful than the other two.

In 2006, Wilczek and Sean Robinson, both at the Massachusetts Institute of Technology, showed that the electromagnetic force also weakens at higher energies, but only in the presence of gravity, which is neglected in the standard model (*Physical Review Letters*, DOI: 10.1103/PhysRevLett.96.231601). Others punched holes in their calculations, however, and so the idea remained controversial. "We tried to do it without going through the heavy formal mathematics," Wilczek says.

Now David Toms of Newcastle University in the UK has redone the calculations more rigorously and come up with the same conclusions. In the presence of gravity, electric charge - a barometer of the strength of the electromagnetic force - tends to go to zero as energies rise (*Nature*, DOI: 10.1038/nature09506). "With no gravity, the electric charge gets bigger [with higher energies]," says Toms. "Gravity changes the picture."

The finding could have implications for attempts to unify all the four forces within one theoretical framework. "This is a step in that direction," says Wilczek.

The Large Hadron Collider at CERN near Geneva could provide experimental confirmation of the idea, but only if the universe has extra unseen dimensions as some theories suggest. In ordinary four-dimensional space-time, however, the electric charge would approach zero only at energies well beyond the reach of terrestrial experiment.

http://www.newscientist.com/article/mg20827853.600-why-the-early-universe-was-free-of-charge.html

Dreaming through drought

- 19 November 2010 by **Caroline Williams**
- Magazine issue 2786.

African bullfrogs don't let a lack of water get them down (Image: Karl H. Switak/SPL)

Lots of animals sleep through dry spells, but to get through dry decades you have to turn your cells into sugar glass

Of all the limits on life, water is the least negotiable. All cells need water as a medium for their chemical reactions to take place in, and to keep their membranes intact.

For most animals, drying out means certain death. A few life forms, however, can survive by hunkering down and waiting for the rains to come. Tardigrades, rotifers, nematode worms and the larvae of some shrimps and one fly dry up, roll into a ball and sit out the drought. Most lichens and mosses, some fungi and bacteria, and hundreds of species of flowering plants also dry up and wait for conditions to improve, sometimes for years or decades.

All of these organisms survive drying by replacing water molecules in and around the cell with sugars, which maintain the cell's structure. As the sugar level in the cell increases it turns the cytoplasm from a liquid into a solid called sugar glass, freezing the cell in time.

These animals replace water molecules with sugar, turning their cytoplasm into a solid called sugar glass

It is a clever trick, but in the grand scheme of things, not a common one. Other methods of sitting it out are less drastic. For example, some toads and several species of frog, including the African bullfrog (*Pyxicephalus adspersus*), dig themselves into a hole, form a waterproof cocoon around their body leaving their nostrils free, and go into a state similar to hibernation until the rainy season comes. Countless other creatures, from snails to crocodiles, do something similar. Even a few mammals, including ground squirrels and one species of lemur, can sleep through the dry times.

For all these organisms, though, drying out and hiding are only temporary measures. Lack of water is the ultimate outer limit of life on Earth and, as most species have found, the best strategy is to avoid such areas in the first place.

Caroline Williams is a science journalist based in London

http://www.newscientist.com/article/mg20827862.200-extreme-survival-dreaming-through-drought.html?full=true&print=true

The toughest beast in the world

- 19 November 2010 by **Caroline Williams**
- Magazine issue 2786.

Record breaker (Image: SPL)

What shrugs off lethal gamma rays, temperatures close to absolute zero, the vacuum of space, unearthly pressure and 120 years without water?

Tardigrades, or water bears, are tiny invertebrates that are found pretty much everywhere, from freshwater to marine habitats, and from the lichens in your garden to the top of the highest mountains. They are among the world's hardiest creatures, thanks to their ability to curl up, switch off their metabolism and wait for conditions to improve. In fact, tardigrades hold the record for surviving several kinds of extreme environment, although it is debatable whether they should really count as they only set them when in their so-called "tun" state of extreme hibernation.

Tardigrades have survived:

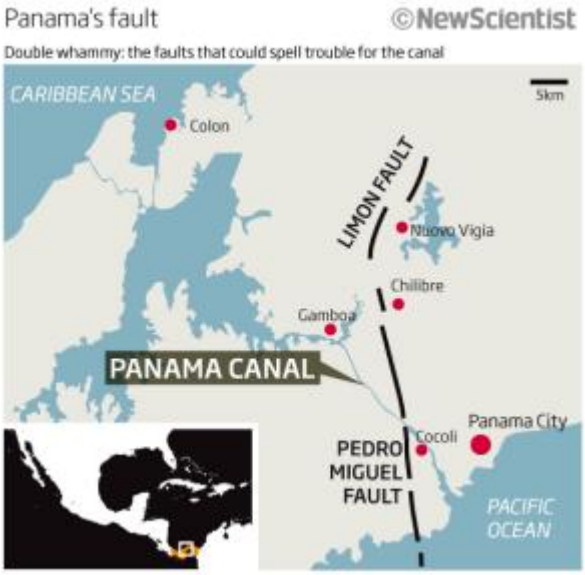
- Without water for 120 years
- Freezing to -272.8 °C, very close to absolute zero
- Heating to 151 °C
- The vacuum of space. Samples lived for 10 days on board a European Space Agency experimental satellite in September 2007
- Pressure six times as great as that felt at the bottom of the deepest ocean
- Doses of X-ray and gamma radiation that are lethal to other life forms

Caroline Williams is a science journalist based in London

http://www.newscientist.com/article/mg20827862.100-extreme-survival-the-toughest-beast-in-the-world.html?full=true&print=true

Panama canal is due a big earthquake

- 19:00 18 November 2010 by **Andy Coghlan**



The Panama canal is at greater risk of a catastrophic earthquake than previously assumed, a seismological survey of faults around the canal has warned.

It reveals that two known faults adjacent to the canal are far more active than previously thought, raising the possibility of a major quake just as the canal is being widened and upgraded in a project due for completion in 2014.

The authors of the survey estimate that quakes occur every 300 to 900 years. The most recent one was in 1621, so another could happen at any time.

Along both faults, surfaces normally rub harmlessly past one another at a rate of around half a centimetre a year. But stresses can build up, causing the faults to jump suddenly, say the authors of the survey. The question is by how much.

In the worst case, the ground could shift laterally by up to 3 metres, says Tom Rockwell of San Diego State University, California, head of the survey team. "That means that any structures built directly on the fault are likely to be damaged or destroyed, as an earthquake of this size will produce very strong ground shaking."

Locks out

Rockwell says that the major damage would probably be to buildings in Panama City that are not built to withstand earthquakes. On the canal itself, the major threat is to locks – and if these are damaged there would be no way to control the flow of water, which would severely disrupt shipping. "As for chasms opening up, that's the stuff of movies," says Rockwell.

One of the fissures, called the Pedro Miguel fault, actually runs directly underneath the canal (see map) but, mercifully, not directly under any locks. The other, the Limon fault, is roughly a northward continuation of the first.

By cutting vertical trenches into the ground along the faults, Rockwell and his colleagues were able to see signs of previous quakes from the exposed cross-sections of earth and rock. They corroborated these findings with observations of recent sideward shifts in previously straight surface features, such as streams.

They conclude that there have been at least three major quakes along the faults in the past 1400 years, the most recent being a large tremor along the Pedro Miguel fault in 1621. Records from that time indicate that this quake shifted by 3 metres the course of the Camino de Cruces, an old Spanish cobblestone road along which gold was hauled by mules. "Another such earthquake today could have dramatic effects," says Rockwell.

The researchers estimate that the earliest quake in the region that they could find evidence for was in 455 AD. More worryingly, the evidence suggests that both faults slipped at once in around 700 AD. The researchers warn that this might happen again, perhaps with one setting the other off, which would add to the destruction.

Quake-proof advice

The researchers are advising the Panama Canal Authority, which is overseeing the expansion programme and commissioned the survey, to earthquake-proof all canal structures. The same goes for vulnerable buildings and structures in the region's major cities.

The whole region is earthquake prone because it overlies an area where tectonic plates of Central America and the Caribbean rub against those of South America. Notable recent quakes include the one in Haiti earlier this year and a series of quakes in San Francisco two decades ago.

Other seismologists welcomed identification of the new risks, especially those associated with both faults failing at once. "The study puts forward a convincing argument for them to be linked, and the longer the fault, the larger the potential earthquake magnitude," says Clark Fenton, a senior lecturer in seismic hazards at Imperial College London.

Fenton says that until the 1992 Landers earthquake in southern California, multi-fault rupture would have been considered unlikely. But in that quake, no fewer than five adjacent faults set each other off. "Other recent surface-rupturing earthquakes, such as the 1999 Hector Mine quake in southern California, have opened our eyes to the potential for earthquake rupture to cascade from one fault to another," he says – hence the concern about the "end-to-end" positions of the Panama faults.

Fenton says that the potential damage to Panama City is more concerning than damage to the canal. "As one of the oldest cities in Central America, it has an abundance of heritage buildings that will have very little resistance to strong seismic shaking."

Journal reference: *Bulletin of the Seismological Society of America*

http://www.newscientist.com/article/dn19745-panama-canal-is-due-a-big-earthquake.html

The Kindergarten Advantage

How everything you learned in kindergarten affects your salary, your chances of going to college and owning a home, and even your retirement savings.By Melinda Burns

One study says a kindergarten teacher with more than 10 years on the job is worth an extra $1,100 per year to his or her students by the time they are earning a salary at age 27. (woodleywonderworks/istockphoto)

An experienced teacher and a small class in kindergarten can set a person up for life, according to a large-scale study by the National Bureau of Economic Research.

On average, a kindergarten teacher with more than 10 years on the job is worth an extra $1,100 per year to his or her students by the time they are earning a salary at age 27, the study shows. The lifetime gain for a class of 20 students with an above-average teacher totals $320,000 — and that's from a single year in a high-quality kindergarten class.

"We're not saying that teachers should be paid this much," said John Friedman, a faculty research fellow at the bureau and an economist at Harvard Kennedy School. "But very large amounts of money look like they might be worth it when it comes to finding better teachers."

Small classes make a difference, too: They are linked to higher test scores in kindergarten, which in turn improve a student's chances of attending college, the study shows. And regardless of race, gender or family income, students who learn more in kindergarten — or in any grade through third grade, for that matter — also are more likely to get into better colleges, marry, own homes, live in better neighborhoods and save for retirement by the time they turn 27, the economists found.

The results are surprising because previous research has shown that the impact of early grades on test scores fades out by eighth grade, said Raj Chetty, a research associate at the bureau and an economist at Harvard University.

"We found that everything comes back," he said. "Our paper shows that investments in early childhood education have potentially very large payoffs. In the U.S., kids from disadvantaged families attend lower quality schools because of property tax financing. That system basically perpetuates income inequality. Disadvantaged kids end up not doing so well. We should think about improving schools at the lower end of the school distribution."

The bureau study, conducted by Friedman, Chetty and a team of four other economists from Harvard, Northwestern University and the University of California, Berkeley, draws on data from Project STAR, one of the most widely studied education experiments in the United States. The project included 11,600 students and their teachers in kindergarten through third grade across 79 schools in Tennessee from 1985 to 1989. Previous studies of STAR students have shown that those with more experienced teachers scored higher on standardized academic tests. The bureau economists for the first time found a similar impact on earnings in young adulthood. Based on the federal tax returns and W-2 forms of the former STAR students, they found that the students in the highest-earning kindergarten class were earning $1,520 per year more per student, on average, than their peers in the lowest-earning class. That's an extra $39,100 over a lifetime, or a lifetime gain of about $782,000 for a single class of 20 students.

"It gives you a sense of what's at play," Friedman said.

Numerous studies have highlighted the long-term benefits of Head Start and other intensive preschool programs. But the bureau study is the first to show on a large scale, using randomized data, that a better classroom environment in the earliest grades can have substantial benefits in adulthood, even without intervention in preschool.

Under the STAR project, the students were randomly assigned to less or more experienced teachers, either in small classes of between 13 and 17 students or in classes of 20 to 25 students. Most of the students stayed in the same size classes through third grade and took standard math and reading tests at the end of every grade. Thirty-six percent of participants were African-American. The students were less affluent, on the whole, than their peers nationwide: Sixty percent were eligible for free or reduced-price school lunches, compared to 49 percent of students in the same grades around the country.

In the bureau study, the economists tracked virtually all of the STAR children into early adulthood, looking at things like their income, college attendance, contributions to 401(k) retirement accounts, home ownership and marital status. They consulted *U.S. News and World Report* rankings to assess the quality of the colleges the students went to, and ZIP codes from the 2000 census to measure the quality of neighborhoods where they were living.

Why would the beneficial effects of good classrooms in the early grades fade out by eighth grade but re-emerge in adulthood? Perhaps the students in those classes are building skills such as focus, initiative and discipline, things that cannot be measured on academic tests but can pay off in other ways, the economists said. Previous studies have shown that students assigned to small classes in the early grades are more likely to complete high school and, in the case of white females and black males, less likely to give birth or father a child as teens.

Maybe Robert Fulghum was right — all he really needed to know was learnable in kindergarten.

"We don't see inside the classroom," Friedman said. "All we see is what happens on test scores. The positive effect works more through a teacher's ability to convey non-cognitive skills, like the ability to get along with your peers, pay attention in class and cooperate in groups. If you can share your toys with others, it's easy to see how you'd earn more, 20 years later in life."

http://www.miller-mccune.com/culture-society/the-kindergarten-advantage-25522/?utm_source=Newsletter136&utm_medium=email&utm_content=1123&utm_campaign=newsletters

Who Cares If It's All Meaningless Anyway?

A startling proportion of the population, the existentially indifferent, demonstrates little concern for meaning in their lives.By Brad Wittwer

Research suggests a proportion of the modern population demonstrates little concern for meaning in their lives — unlike Woody Allen. (Google Images)

Now that Westerners no longer have to fight for their existence, they have more time and inclination to ponder it. The resulting existential arguments are perhaps more prevalent than ever in a time where technology, leisure, resources and freedom make pursuing whatever an individual finds meaningful a real option.

New quantitative psychological research suggests a considerable percentage of the population can't be bothered by these ambitious if ambiguous questions, and when pressed don't really care that they feel their lives, in the big picture, are meaningless.

Tatjana Schnell, a research psychologist at the University of Innsbruck in Austria, surveyed perceived meaningfulness in a modern population. She found, as many might intuit, that many find no meaning in their lives, and those actively wrestling with meaning suffer from increased anxiety, depression and dissatisfaction with life. But this either/or result — either meaningful or meaningless — is over-simplified, Schnell argues; it's not just a matter of someone feeling their life has meaning or no meaning, but whether they care that their life has no meaning.

The research, reminiscent of a European art-house flick, puts numbers to something humanist psychologist Abraham Maslow cited as a "valuelessness" in Western societies, "a rather bleak, boring, unexciting, unemotional, cool philosophy of life." Psychologist Victor Frankl referred to an "existential vacuum" due to a lack of commitment to values. Empirical psychological research has avoided the topic, partly because meaningfulness is hard to measure while the detachment generally congruent with its absence is subtle compared to outright psychopathology — is this hipster irony or mild depression?

Participants were surveyed using the SoMe scale, which measures people on a scale from those who believe they have a total lack of meaning in their lives to those who feel their lives are full of meaning, and breaks down individuals into four groups. Schnell categorizes people in this way:

• High meaningfulness, low crisis of meaning (meaningful)
• Low meaningfulness, low crisis of meaning (existentially indifferent)
• High meaningfulness, high crisis of meaning (conflicting)

• Low meaningfulness, high crisis of meaning (crisis of meaning)
The meaningfulness value is based upon one's appraisal of life as "coherent, significant, directed, and belonging." The crisis of meaning variable measures absence or presence of suffering drawn from meaninglessness.
Looking at a sample of 603 Germans, Schnell found that 61 percent were "meaningful," 4 percent suffered a "crisis of meaning," and 35 percent were "existentially indifferent," those who "neither experience their lives as meaningful nor suffer from this lack of meaning." So of the people who felt their lives lacked meaning, it really only bothered one in 10 of them.
Schnell found no strong trend in gender or extent of education among the indifferent, but age did matter. The indifferent skewed younger, on average five years younger, than those who found meaning in their lives. Think: *The Graduate*'s Ben Braddock floating in his pool after returning home. And for those who hadn't graduated — adults who were students — existential indifference was present in 53 percent.
Relationship, or the lack of them, also mattered. Singles and those living with a partner could go either way, but the married were much more likely to be in the meaningful category (70 percent). Schnell hypothesizes that marriage provides an individual with belonging and commitment, "direction through the implicit aim of building a home and raising children" and a sense of responsibility for children that all promote a feeling of meaning in one's life.
Crises of meaning, on the other hand, occurred most often among those married but living apart and singles. Maybe taking out the trash when she tells you to is a meaningful endeavor after all.
Employment status, however, was not a solid predictor — 58 percent of unemployed and 59 percent of employed saw their lives as meaningful, although the unemployed were the most likely to have a crisis of meaning. Schnell posits that work is a potentially great source of meaning, but the shift in labor toward temporary and short-term jobs does not encourage the commitment and identity employment once provided.
The academics identified 26 "sources of meaning" in their study, and noted that the indifferent lacked sources like love, social commitment and unison of nature. They were especially low in self-knowledge, spirituality, explicit religiosity and generativity, even compared to those in a crisis.
Schnell stresses the low self-awareness among the apathetic. They do not face their own personal strengths and weaknesses because they are of little importance to them. Exceedingly little energy is invested in reflecting on themselves, their needs and motives.
Those in a crisis showed greater self-knowledge. As Schnell describes, "Combined with the awareness of a lack of meaning, the active search for self-understanding might more likely lead to the detection or construction of meaning than the passive and disinterested condition of existential indifference."
On the other hand, Schnell noted that overzealous self-analysis can impede the path to good mental health. Just ask Woody Allen!
Ironically, the indifferent still found life satisfying (more so than those suffering a crisis of meaning), though still less than those with meaning in their lives. The indifferent experienced less anxiety and depression than those with a crisis of meaning, and those traits measured similarly to those who viewed their lives as meaningful.
The existentially indifferent appear to live a life of complacency, with few highs and little or no introspection. As Schnell puts it, "Without commitment to sources of meaning, life remains superficial. But superficiality is not necessarily a state of suffering." They aren't classified as having "psychological stress," but they "can hardly be viewed as living a life of health and well-being," according to Schnell. An existentialist would say they are asleep.
"Existential philosophers and psychologists, from Heidegger to Frankl … have discussed distinctions between an authentic, complex life and a shallow, 'everydayness' mode of existence," Schnell comments. The existentially indifferent characterize this "everyday" mode of existence, and as if to defy existentialism, are perfectly fine with it. To replace meaningful pursuits, they have a wide array of superficial weaponry. "Surrogates for meaningful commitment abound: They range from material possessions to pleasure seeking, from busy-ness to sexuality."

http://www.miller-mccune.com/culture-society/who-cares-if-its-all-meaningless-anyway-20601/

Meditating on the Meaning of Main Street

By JAMES KINDALL

Gordon M. Grant for The New York Times

Riverhead, N.Y.
WENDY FEINBERG, 64, looked puzzled when asked if she thought her photo of downtown Port Jefferson was representative of Suffolk County's Main Streets. That, after all, was the theme of the exhibition in which the shot had just won second place.
Hmmm. A typical Main Street?
"Not really," said Ms. Feinberg, who lives in South Setauket. "Most of the Main Streets on Long Island are more New Englandy."
That might be debatable among both exhibitors and visitors. The show, "Main Street Suffolk County," sponsored by the Suffolk County Historical Society, made it clear that the subject was more of a personal concept than a bricks-and-mortar reality.
"I was pretty sure we'd get a parade and some buildings, but I really didn't know what to expect," said Wally Broege, the director.
The exhibition did, in fact, get photos of parades and buildings. But the 46 entries also included shots of everything from a Westhampton theater to a Montauk street scene of a dog on a parked motorcycle.
Robert Dohrenwend, 47, of Miller Place, the third-place winner, decided Main Street was an antique truck in Yaphank. Peter Dicke, 65, of Huntington, who took fourth place, chose to depict it as suburbia's quintessential hunting-and-gathering place: — a mall, specifically, the Walt Whitman Mall in Huntington Station.
"If you're a shopper on Long Island, a mall is Main Street to you," he said.
Started three years ago, the competition was created to encourage community involvement with the society, Mr. Broege said. Agriculture was the subject of the first event. Last year's contest had a maritime theme.
At the opening, the entrants, mostly amateurs, nibbled on cheese and crackers while discussing their work, which included color and black-and-white shots. Winners received ribbons.
The photos will be displayed at the society's Riverhead headquarters, 300 West Main Street, through Dec. 18.
For historical perspective, the society also displayed some selections from its collection of glass-plate negatives by Hal B. Fullerton alongside the contestants' entries. Mr. Fullerton was a special agent for the

Long Island Rail Road in the early 20th century who took pictures throughout the island to encourage rail traffic. The seven shown are street scenes, including a loaded hay wagon traveling down a prototypical Main Street — a dirt road.

Ray Germann, of Huntington, the judge of the competition and a documentary photographer whose work has ranged from New York street scenes to landscapes of the American West, was impressed by the entries.

"It wasn't easy picking prize winners," he said.

His top choice was a night shot of the Stony Brook post office, which he liked because of its technical detail and visual impact, he said.

The winner, Virginia Bushart, 65, flushed with embarrassment at the attention, said she almost did not attend the event because she did not like competitions. But, she added, she is proud of her photo, which shows off the building's illuminated facade and the warm glow of lights from adjoining shops on either side.

In the opinion of Ms. Bushart, a longtime Stony Brook resident, the setting is a Norman Rockwell painting come to life — a community focal point where people sit on the steps eating ice cream and where tethered dogs await their owners picking up the mail.

"I've taken my kids and now my grandchildren there over the years," she said. "I think what I love about it is its reliability."

Taking a different view was Diane Tucci, 40, a fourth-generation Riverhead woman who worried about the sustainability of Main Streets in America, especially her own. She saw it changing in front of her eyes, and not necessarily for the better.

The photo she entered in the contest shows an elderly man walking in downtown Riverhead while peering into the closed storefronts. His hands are clasped behind his back, and Ms. Tucci imagines him remembering better times.

"Why is it we have such a beautiful setting for this town right on the Peconic River and yet nothing thrives here?" she said.

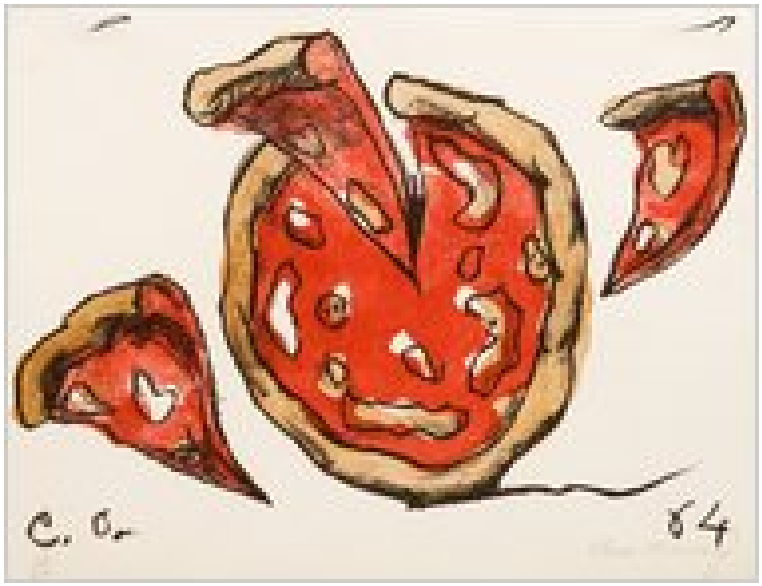
Ms. Tucci has taken this very stroll herself, she said, and has had many of the same forlorn thoughts she imagined her subject having. She gestured at the historic Fullerton photos on display, then back at her own.

"Maybe one day this picture will be the only thing left" of Main Street, she said. "It'll be like one of those shots of a horse and carriage."

"Main Street Suffolk County" runs through Dec. 18 at the Suffolk County Historical Society, 300 West Main Street. suffolkcountyhistoricalsociety.org; (631) 727-2881.

http://www.nytimes.com/2010/11/21/nyregion/21artsli.html?ref=design

Art That Can Depict a Starvation Diet
By SYLVIANE GOLD



Claes Oldenburg' s "Flying Pizza"

From prehistoric cave paintings of beef on the hoof to Renaissance canvases depicting the Last Supper to Andy Warhol's picture of a Campbell's soup can, food has inspired art. But the most striking images in "Art and Appetite," a small, thought-provoking exhibition of prints and photographs at the Davison Art Center, on the campus of Wesleyan University in Middletown, are less about food than they are about its absence.

Not to worry — you won't go home feeling guilty about your Thanksgiving meal. The curator, Clare Rogan, offers several examples of what you might call the joy of looking at cooking. Roy Lichtenstein's "Sandwich and Soda," printed in red, white and blue (on plastic instead of paper), revels in the crisp triangles of bread and the spherical bubbles in a soft drink; Donald Sultan's richly colored screen prints of peppers, cherries and pears are sensuous and inviting. Even Claes Oldenburg's whimsical lithograph "Flying Pizza," with its blast of tomato red and its dancing slices, is about enjoyment.

Enjoyment, however, is only part of what artists have seen in food. In "Give Us This Day," a 1937 lithograph by the 20th-century American regionalist John Stockton De Martelly, a barefoot girl and two women huddling in shawls gather in a bare room around a bare table to share a pathetic bowl of soup. For all its inherent misery, the controlled drawing and restrained posing of the figures give the scene a quiet dignity.

But there's no discretion distancing viewers from the raw hunger in Käthe Kollwitz's 1924 lithograph "Bread!," in which two disconsolate children demand food from their mother, wretched and bent under the weight of her heartbreak.

These two prints bookend the darkest part of the exhibition. No sooner has the evocation of farm-country misery in "Give Us This Day" sunk in than we find ourselves in front of a similar room, a similar table, similar stools and similar misery — but this time in a photograph, taken in Gee's Bend, Ala., by Marion Post Wolcott for the Farm Security Administration in 1939.

It is one of several — others are by Walker Evans, Aaron Siskind and Russell Lee — that were made during the Depression to document poverty in America. There are food stands and grocery stores, their signs a reminder that as far back as the 1930s, it was cheaper to buy empty calories than real food: "Milk 6¢, Pepsi 5¢." There are food-free cupboards and dirt floors and, as in the Kollwitz, children with not enough to eat.

Needless to say, the artists of the 20th century were not the first to take notice. Boisterous meals are in progress in both "The Thin Kitchen" and "The Fat Kitchen," a pair of 1563 engravings by Pieter van der Heyden after the Flemish master Pieter Bruegel the Elder. But in the first, emaciated diners squabble over

meager portions while a gaunt mother funnels food into the mouth of her skeletal infant. Even the caldron over the fire is undersize, sending a skinny column of smoke up the chimney.

In "The Fat Kitchen," voluminous clouds of steam rise from the three pots over the fire, and there's a pig roasting on a spit as well, as rotund burghers and chubby children devour piles of sausage, poultry and other foodstuffs. Whether intended as social commentary or allegory — Ms. Rogen argues for the latter — these two images speak forcefully to today's economy.

Another set of paired prints, William Hogarth's "Beer Street" and "Gin Lane," from 1751, contrasts the salubrious effects of good old-fashioned British beer with the drunken degeneracy resulting from that more recent Dutch invention, gin. Mayhem reigns in Gin Lane, where drunks lie sprawled in the street, a woman pawns her kettle to buy more liquor and a mother is so preoccupied with taking snuff that she doesn't notice that her baby has slipped out of her arms and is tumbling over a railing. She's a far cry from the prancing redhead in a billowing yellow dress exuberantly pouring a stream of "Vin Mariani" into her glass in the 1894 advertising poster by Jules Chéret.

Created by a chemist, Vin Mariani was basically red wine fortified with cocaine. No wonder the lady is prancing. No wonder the drink became wildly popular — and eventually inspired the alcohol-free variation known as Coca-Cola. There are a few other sidelong references to Coke in "Art and Appetite," but Julia Jacquette gets the last word on our current world of branded edibles marketed with sex. In "Four Sweets," her deadpan 1995 print, a quartet of candy wrappers are emblazoned not with the names of the sugary products they usually contain, but with those of more suggestive, more grown-up treats, like "Your Eyes" and "Your Lips."

"Art and Appetite," Davison Art Center, 301 High Street, Middletown, through Dec. 12. Information: wesleyan.edu/dac or (860) 685-2500.

http://www.nytimes.com/2010/11/21/nyregion/21artct.html?ref=design

Extreme Makeover for Home of the Royal Shakespeare Company

By ERIK PIEPENBURG

Peter Cook The new thrust stage at the Royal Shakespeare Company's home in Stratford-upon-Avon.

The Royal Shakespeare Company opened its revamped home in Stratford-upon-Avon on Wednesday. Highlights include a renovated 1,040-seat thrust-stage theater that will bring audiences closer to the actors, a 118-foot viewing tower that overlooks the countryside, a riverside walk and rooftop restaurant.

The project took about three and a half years to complete for the equivalent of about $179 million, according to the company. The theater complex is open to the public, but performances on the new stage won't begin until April. (A Hollywood-style trailer for the fall season is here.)

Early reviews of the remodeling are positive to mixed:

Charlotte Higgins, The Guardian: "It's not what you'd call flash architecturally, but it does the job; the important thing is that many of the old problems of the theater are solved."

Jay Merrick, The Independent: "The Royal Shakespeare Theater's transformation by Rab Bennetts has turned a famously stolid architectural mongrel into a re-branded 21st-century visitor experience that is, by turns, engrossing, neutral and strange."

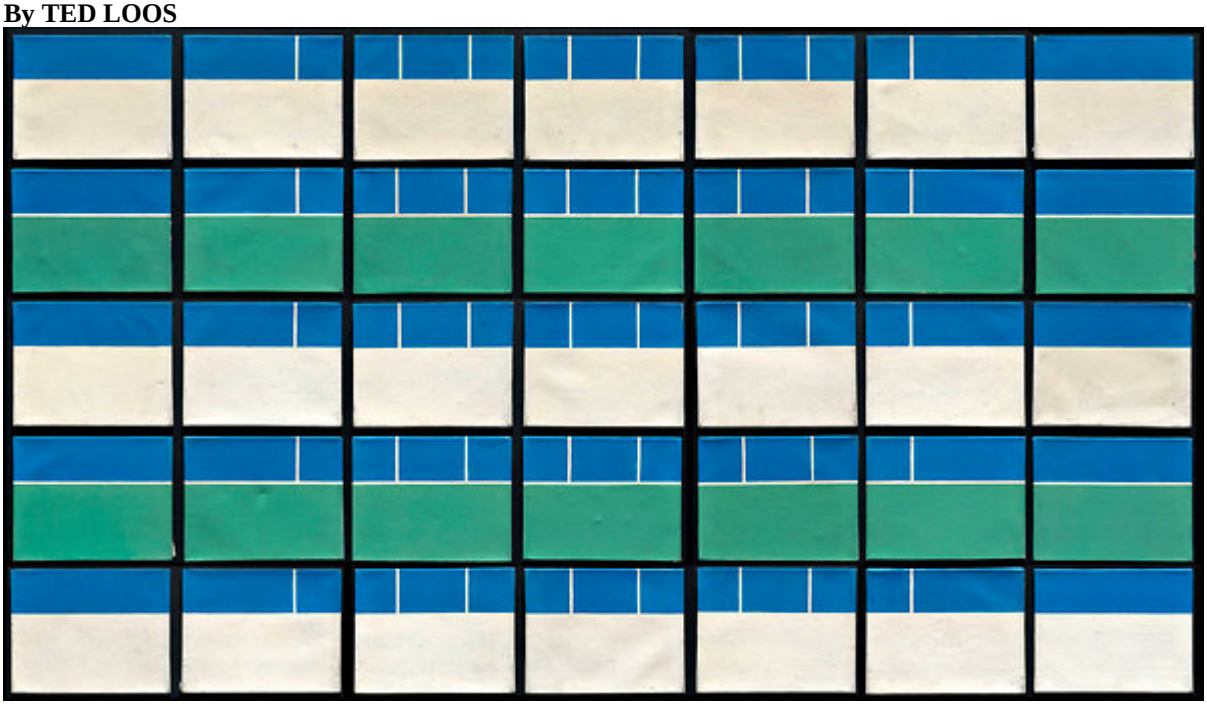
Ellis Woodman, The Telegraph: "This is a project of dizzying intricacy – the product of highly taxing technical and conservation constraints – and not everything about it succeeds; but [the artistic director Michael] Boyd's vision of the future of theater shines through it vividly."

New Yorkers won't have to travel to Britain to see the Royal Shakespeare in action, however. In February the company announced a lineup of five plays — including "Romeo and Juliet" and "Antony and Cleopatra" — that it will perform during a six-week residency on a site-specific stage to be built inside the Park Avenue Armory as part of next summer's Lincoln Center Festival.

http://artsbeat.blogs.nytimes.com/2010/11/24/extreme-makeover-for-home-of-the-royal-shakespeare-company/?ref=design

Enough to Cause Art Lovers to Swoon

By TED LOOS



Museum of Fine Arts, Boston

Boston

IN just sheer numbers, the new Art of the Americas wing at the Museum of Fine Arts, Boston is enough to induce Stendhal's syndrome, named for the fainting spell that struck down that 19th-century French writer when exposed to a superabundance of art in Florence. The four-level wing, scheduled to open this weekend, holds more than 5,000 pieces spread over 53 galleries that take up 51,000 square feet, and spanning the centuries, with ancient American Indian art at one end and contemporary paintings at the other.

"With this many objects we hope there's something to catch everyone's fancy," said Elliot Bostwick Davis, the museum's chairwoman of American art. Plenty of Museum of Fine Arts favorites are on view in the addition, designed by Foster & Partners, including Copley's 1768 portrait of Paul Revere and Sargent's "Daughters of Edward Darley Boit" (1882). Some of the most absorbing works, though, are those acquired specifically for the wing, or that have languished in storage. Here are five rarely seen pieces that are worth a closer look.

'Blue, White, Green'

Ralph Coburn, about 1950

Though born in Minnesota, Mr. Coburn, now 87, is a hometown boy of sorts. He studied architecture at M.I.T. in the 1940s and was affiliated with the museum's art school. His influence on and by the Minimalist painter Ellsworth Kelly, a close friend, is evident in his abstract work; the two men discovered the Surrealist practice of "automatic drawing" together in Paris in 1949.

"Blue, White, Green" reflects Mr. Coburn's interest in chaos and chance. The work is made up of 35 canvases that can be arranged in any combination. The museum is giving visitors the chance to rearrange them on a multimedia terminal. Ms. Davis said that the curators would be open to adjusting the work based on visitors' suggested configurations. "Maybe we'll do it on Ralph's birthday," she said.

C. Andrews (1844)

Though made in France, this 16-inch-long model is based on an American merchant ship. The captain and crew of the C. Andrews may have commissioned this Mini-Me version of their vessel and themselves (tiny

sailors are included) while visiting Marseille. The museum bought it in 2005, even though it was damaged, because it's almost identical to the Henry Newell, another model in the collection.
Using the Newell as a guide, curators rebuilt the C. Andrews — in particular the sails, made of mica, and the rigging and masts, made of glass, which were shattered. The work took nearly a year at the hands of a glass artist.
"We're unusual, being an art museum with a ship model collection," said Gerry Ward, the museum's senior curator of American decorative arts and sculpture. "But a lot of these models are great works of art. They are beautiful examples of our material culture."

'Mrs. Richard Patteshall (Martha Woody) and Child'

Attributed to Thomas Smith, 1679
This image of a Boston family, which hasn't been on view since 1994, stands out for several reasons. It's very old — the third-oldest North American portrait in the collection — and mothers were rarely painted with their children in colonial times. Though unsigned, its stylistic similarities to other works by Thomas Smith has led experts to attribute it to him. It was donated by direct descendants of the Patteshalls.
"We can't ask for a better provenance," said Cody Hartley, an assistant curator of paintings. After exhaustive study, including a trip to a Boston graveyard to confirm the year that Mrs. Patteshall died, the curators realized just this year that she was the great-grandmother of Paul Revere. "Here we are, with the greatest collection of Revere silver in the world, and the iconic Copley portrait," Mr. Hartley said. "It was amazing to make that connection only now."

'Flight of Man'

Jackson Pollock, 1939
Before he was a master of Abstract Expressionism, Pollock worked and studied in New York, and counted the Regionalist Thomas Hart Benton among his teachers. When Pollock underwent Jungian therapy for alcoholism, Benton's wife gave him 10 ceramic "blanks," or unadorned pieces, to decorate. She hoped it would free him from painter's block.
This bowl's flaming figures recall El Greco, a touchstone artist for Pollock, Ms. Davis said. Pollock gave the bowl to his analyst, who called it "Flight of Man," based on the artist's description.
"It's very intimate," Ms. Davis said. "It shows a side of him that few people know. You see the determination to get through." The bowl is flanked by two drawings Pollock made while in psychoanalysis. In a different gallery the museum is displaying "Number 10" (1949), a familiar drip painting. "People will be able to see the whole progression of his work," Ms. Davis said.

Escritorio (1650 - 1700)

Ms. Davis called this elaborate fall-front desk a "Spanish Colonial laptop," since it was made for travel. Probably owned by a high-ranking government or church official, this desk, known as an escritorio, comes from Oaxaca, Mexico. The top features a detailed map of the town where it was made. Inside the drawers are scenes that depict saints and Renaissance-style scrolls.
The period stand is not original to the desk but is a close approximation of the one that would have accompanied it. It was acquired in June for the wing's gallery of Spanish Colonial art — something new for the museum, which is known for its trove of works from the North American colonies.
"We knew we had to be modest with this gallery, since we don't have the depth yet in this area," Ms. Davis said. "But with a major piece like this, we're sending a big message that we want to build this collection."

http://www.nytimes.com/2010/11/21/arts/design/21boston.html?ref=design

Gotham Chronicle: Sharp Eye, and Pencil
By CAROL KINO

Courtesy of Denys Wortman

IF there is a single constant in the creative world, it is that fame has a nasty habit of disappearing overnight. One prime example is the cartoonist Denys Wortman, who from 1924 to 1954 contributed six drawings a week to The New York World and its successors.

His feature, "Metropolitan Movies," was admired for its strikingly naturalistic portrayal of daily life in Gotham. Using a single panel and a conversational caption, Mr. Wortman adroitly summoned up an entirely believable world of housewives talking across fire escapes, girls in the subway hashing over last night's date, and men and women trying to make a buck in diners, offices, music halls and factories — or struggling to keep afloat during the Great Depression. Mr. Wortman's drawings were also beautifully composed and finely worked, a legacy of his art school years, when he studied alongside future Ashcan school painters like Edward Hopper and George Bellows, and with their guru Robert Henri.

Even then "there was nothing quite like it," said the cartoonist Jules Feiffer, who enjoyed the drawings as a boy. "His work didn't seem studied. It was as if you were looking out the window — or my window in the Bronx." And because it was syndicated nationwide (as "Everyday Movies"), Mr. Wortman's world spread far beyond the Hudson.

But in 1958, four years after his retirement, Mr. Wortman died of a heart attack. By then cartooning had become character-driven and graphically streamlined (think of Charles M. Schulz's "Peanuts") while art was ruled by the Abstract Expressionists. And when The World's successor The World-Telegram and Sun folded, he was as forgotten as yesterday's fish wrap.

Now, however, Mr. Wortman is back in the limelight. On Friday, the Museum of the City of New York opened "Denys Wortman Rediscovered: Drawings for The World-Telegram and Sun, 1930-1953," a major retrospective that runs through March 20. And this month, the graphic novel publisher Drawn & Quarterly came out with "Denys Wortman's New York," the first collection of his work in nearly 50 years.

His resurrection has been aided by the devotion of his only child, Denys Wortman VIII, who since 1998 has maintained an extensive archive on the Web site dwortman.com.

But the real push came from the graphic novelist James Sturm ("The Golem's Mighty Swing" and "Market Day") who happened across one of Mr. Wortman's books four years ago and made it his mission to resuscitate his career. It was Mr. Sturm, also the director of the Center for Cartoon Studies in White River Junction, Vt., who brought the work to Drawn & Quarterly and proposed the show to the museum.

When he saw Mr. Wortman's art, "I was blown away," he said. "I was also surprised that I had never heard of somebody so accomplished and prolific. For me he was this missing link between cartooning and early-20th-century fine art."

The line between cartooning and fine art seems to have been even blurrier in Mr. Wortman's time than it is today. The healthy newspaper and magazine market allowed a painter like Bellows to support himself as an

illustrator and an illustrator like Frederick Burr Opper to make it as a cartoonist, even as Henri urged newspaper illustrators like John Sloan and William Glackens to turn their talents to oil painting.

Mr. Wortman, born in Saugerties, N.Y., in 1887, grew up at exactly the right moment to capitalize on this golden age, but it took him years to figure out how. Although he loved drawing, he initially studied engineering. ("There's very few that can survive being artists," explained his son, a Boston stockbroker.) When he finally entered the New York School of Fine and Applied Art, he pursued painting rather than his longtime love, drawing cartoons, to please his mother. Mr. Wortman did achieve some small success: he contributed a brushily worked Bermuda waterfront scene to the 1913 Armory Show. But he was such a perfectionist that he found it hard to finish a canvas. Only in the early 1920s, after consulting a psychiatrist, did he realize newspaper illustration — a career he was pursuing half-heartedly to support himself — was his true calling.

"The doctor told him, 'You can't agonize over these paintings,' " his son recalled. " 'You need something you can do every day and then it's done.' "

Mr. Wortman soon landed the "Metropolitan Movies" gig at The World. "I found myself, to my everlasting amazement, in a job that paid me money for doing exactly what I wanted most to do," he wrote years later. "I began to report in pictures and words, for a newspaper, the life around me in a great city."

His enthusiasm for the job is abundantly evident in his drawings. Looking at their span (he produced more than 9,000 in 30 years, and some 5,000 are still extant) it sometimes seems as though he was spying on every sort of person, office building, apartment and street corner at once. Each panel is also richly laden with architectural and sociological details. For repeated series, like "Show Bizzness" and "Mrs. Rumpel's Rooming House," he often picked out a specific street, office or building and made detailed exterior and interior sketches from various angles.

Mr. Wortman also seemed to display a special sensitivity toward the daily lives of women, perhaps because his drawings were often based on photographs taken by his devoted wife, Hilda. (She stopped photographing for him in April 1938, when their son was born.) Throughout his career Hilda also reported back snatches of overheard conversation for his captions. Friends and readers fed him ideas too.

His sources came in handy when the family moved from the West Village to Martha's Vineyard in 1941 after his first heart attack. There the Wortmans kept up their connection to New York with a stream of visitors — Reginald Marsh, Rube Goldberg, James Thurber, Jackson Pollock, James Cagney and others.

Today Mr. Wortman's New York, with its shoeshine boys, organ grinders and El trains is a thing of the past. Yet in some ways it remains eternal. Take his 1933 drawing of Albert Einstein, surrounded by reporters. "Let's leave out that stuff about an expanding universe in a curved space, Professor," one says. "What we want is your theory on red-hot coeds." Or his 1938 depiction of two dejected-looking men standing on a crowded street. "They call this a 'recession,' not a 'depression,' one notes, "but I don't feel any difference."

Although Mr. Wortman is "called a cartoonist because his work appeared in newspapers and had captions," said Stephanie Plunkett, chief curator of the Norman Rockwell Museum in Stockbridge, Mass., "he was very much a genre artist. There's just this real beauty to the drawings and an inner life to the characters, more than one might normally find in a cartoon."

That's precisely what got Mr. Sturm, when he saw a copy of "Mopey Dick and the Duke," Mr. Wortman's 1952 collection of tramp cartoons, in 2006. (Mopey was based on an acquaintance — a retired sea captain — and the Duke was his self-portrait.) He quickly Googled the name, found the Web site, and tracked down Mr. Wortman's son, who was living in his father's old house. "When he said he had about 5,000 drawings in his attic and shed," Mr. Sturm said, "I nearly fell off my chair. "

Half those drawings have been donated to the Center for Cartoon Studies, where they reside alongside work by Garry Trudeau and Chris Ware. Mr. Sturm and Denys VIII intend to sell enough of the rest to endow a scholarship in Mr. Wortman's name.

Since Mr. Wortman's death, Mr. Sturm noted, the fact that he wasn't quite a fine artist or a cartoonist has made him "a man without a country." But now "I've opened the door," he added, "my hope is that there will be other curators and academics who will figure out where Wortman belongs in American art."

http://www.nytimes.com/2010/11/21/arts/design/21wortman.html?ref=design

Art Inflation: Macy's Murakamis

By DAVE ITZKOFF

Nicole Bengiveno/The New York Times

It is not uncommon for people to react with awe to their first up-close encounter with a balloon from the Macy's Thanksgiving Day Parade. But when Takashi Murakami saw his contributions to Thursday's event, he bowed. Twice.

On Wednesday afternoon, on a stretch of West 81st Street in Manhattan where brightly colored, 30-foot-tall inflatable versions of his characters Kaikai and Kiki were wriggling and writhing underneath a huge net, Mr. Murakami, the Japanese pop artist, held a brief Shinto ceremony for purity and luck. He stood at a table where he poured out a glass of water and a glass of sake in front of two plates, one of white rice and one of sea salt. He gave two bows and clapped twice, then declared the ritual complete.

Kaikai, a childlike character in a rabbit costume, and Kiki, an impish figure with three eyes and two dangling fangs, were ready to greet the parade-watching public.

In an interview after the ceremony Mr. Murakami, his bushy hair tied in a knot, seemed exuberant. He said he was less concerned about whether Kaikai and Kiki — who do not promote any television cartoon shows or breakfast cereals, and are merely ambassadors of Mr. Murakami's own playfully esoteric art — could hold their own in the Macy's parade than about Thursday morning's weather.

"I was thinking about sunshine," Mr. Murakami said in his broken English. "Tomorrow the report is a little bit rainy. But I already talk with my feng shui master in Taiwan, and he already take care about that."

For the organizers of the Macy's parade the addition of Mr. Murakami and his characters to its lineup is the fulfillment of a longtime goal and several years of work.

Robin Hall, the executive producer of the parade, said in a telephone interview that Mr. Murakami was one of a handful of artists Macy's sought out when it started its series of balloons designed by internationally recognized artists in 2005.

The parade, Mr. Hall said, "is a snapshot of American culture." While much of its roster is dedicated to readily identifiable figures like SpongeBob SquarePants and Dora the Explorer, he said, "I do believe there's room in this parade — and have always believed this — for high art."

In that spirit the sculptor Tom Otterness created a Humpty Dumpty balloon for Macy's in 2005, depicting that nursery-rhyme character suspended upside-down in a perpetual tumble. In 2007 the parade added a shimmering silver rabbit designed by Jeff Koons, and the following year incorporated a giant Keith Haring figure holding up a heart, to mark what would have been the artist's 50th birthday.

In 2008 Macy's also began communicating with Mr. Murakami, who in the global art scene is known as much for his inflatable sculptures of psychedelic anime-style cartoon characters as for the Louis Vuitton handbags and Casio watches he designs. But at that time he was preparing for a retrospective at the Brooklyn Museum and could not immediately contribute to the parade.

This year Mr. Murakami sent word that he wanted to create balloons of Kaikai and Kiki. In response to e-mailed questions, he explained that the characters "in many ways represent the aesthetic philosophy behind my work."

"They are cute yet fearsome," he wrote, "modern and yet connected to the past. They embody eccentric beauty."

The Macy's parade studio in Hoboken, N.J., had only a few months to work on the designs with Mr. Murakami. Of particular concern to John Piper, the vice president of the studio, was whether the balloonified characters, with their gigantic heads and teeny-tiny limbs, would be able to achieve what he called free lift — meaning, Mr. Piper said, "that there's enough helium inside the balloon to not only compensate for its weight but to make it fly."

At an accelerated pace Mr. Piper and his team exchanged sketches with Mr. Murakami and his staff, and over the summer Mr. Piper chaperoned two small clay sculptures of the balloons on a trip to the artist's Tokyo studio. (The sculptures, Mr. Piper said, traveled in "a very big, very sturdy piece of luggage, inside of which was a whole other steel structure to absorb any shock.")

The completed balloons were flown for the first time this month at a Macy's testing facility in South Dakota, but Mr. Murakami — who plans to accompany them in the parade wearing a flower costume of his own design — had not seen the finished works until Wednesday.

Nor, for that matter, have the thousands of children who will watch the parade live — or the millions who will watch on television — Thursday morning, and have likely never heard of Mr. Murakami.

Mr. Hall acknowledged that Kaikai and Kiki's mix of cuteness and weirdness was pushing boundaries for Macy's. "There are details about them that, I think in isolation, as they're described, sound kind of grotesque," Mr. Hall said. But, he added, "the final thing is not so bad."

Ultimately, Mr. Hall said, Macy's criterion for its parade balloons is "not a question of: Will the kids recognize it?"

"Our rule here," he continued, "is whether the kids understand it or not? Will the kids like it?"

Watching the inflation of Kaikai and Kiki on 81st Street, Tami Marsden and her son Alex, 6, were less sure about what they were seeing.

"We don't know who that is, but he knows Kung Fu Panda," Ms. Marden said, indicating another nearby balloon. "I thought it was a Pokémon thing."

She added: "I hate to say it, but boys really don't like anything that's pink."

http://www.nytimes.com/2010/11/25/arts/design/25murakami.html?ref=arts

Vietnam : an "Asian miracle"?

Institut de recherche pour le développement

24 November 2010 Institut de Recherche pour le Développement (IRD)
Is Vietnam, on its scale, a representative of the Asian Miracle, akin to the continent's four tigers -Hong Kong, Singapore, Taiwan and South Korea? IRD scientists from research unit UMR *Développement, institutions et mondialisation*[1] and their partners[2] have studied the economic policies which have enabled that country to raise itself up, after decades of war followed by years of severe economic problems.
Vietnamese success story
Since the early 1990s Vietnam has experienced a spectacular decrease in poverty. The percentage of the Vietnamese population living below the poverty line fell from 58 % in 1993 to 14.5% in 2008. Twenty-five million people have thus emerged from poverty in 15 years. In urban areas in 2008, only 3.5 % of the population is considered to be poor, even though the cost of living continues to rise.
Vietnam owes its people's increase in wealth to the remarkable economic growth it has achieved over the past 20 years, one of the fastest in the world. The country thus recently entered the sphere of the emerging countries.
A "socialist" form of capitalism
How has Vietnam managed so successfully in playing the capitalist game? The adoption in 1986 of *Doi Moi*[3], Vietnamese for "Renovation", marked the country's conversion to a particular model, a "socialist-based market economy". A dynamic private sector then built up alongside a strong public sector. The public powers maintained control over whole areas of the economy such as energy, industry and banks. The State also continued to be highly active in running certain public policies (for agriculture, industry, planning and so on) and pursued price regulation for basic products and so on.
Vietnam founded its drive forward on export-based growth and rapidly joined the international economy. Now it is the world's top exporter of both Robusta coffee and pepper and second among clothing exporters to the American market. And it now takes an active part in international bodies. In January 2007, the country became the 150th member of the World Trade Organization.
Distributed wealth
However, the beneficial effects of the economic boom are not to the advantage of all Vietnamese. The Kinh[5] majority is more strongly favoured than the ethnic minorities, most of whom live in the mountains or other remote areas, where poverty is still rife. To alleviate a potential rise in inequality, Vietnam pursues an ambitious policy of budget transfer from rich to poor regions. The wealthier areas transmit up to three-quarters of their receipts to the more deprived ones, for which these transfers can amount to half their GDP. This redistribution enables the poorer regions to develop their infrastructure (such as education, health, electricity, road network, water supply and drainage networks) and provide health cover and other social services.
These strategies led to improvement in the human development indicators. Schooling rate in primary has reached nearly 100 %, life expectancy rose from 63 years 1990 to 68 in 2005 for men and from 67 to 73 for women. Vietnam is even ahead of schedule in its drive to meet the 2015 target for achieving the Millennium Development Objectives.
Persistent insecurity
To beat poverty completely, the country still has a number of challenges to meet. One in particular concerns the reduction of the informal[4] sector, which operates like a parallel economy and maintains a high level of insecurity. This involves street vendors, tradesmen, domestic services and so on. In Vietnam over 10 million

people who run small-scale businesses, practising without making any official declaration. The global financial crisis has on the whole been absorbed by the Vietnamese economy, but it has destroyed a large number of jobs and indeed reinforced the informal sector, where unfortunate working people have found refuge. This sector constitutes, agriculture excepted, 50 % of the labour market and generated an estimated 20 % of GDP. Some means of combating these trends exist, such as microcredit, or training. The research team observed, however, that their impact was still limited and short term. For this reason they recommend that support be provided for the informal sector as it is, with for example the setting-up of a social security system for workers in this informal sector. The government indeed recently adopted such a scheme.
The informal sector is the primary generator of jobs. However, it is still largely neglected in the Vietnamese government's policies, owing to insufficiency of official data. The research conducted is shedding light on the parallel economy. If Vietnam continues along this line and succeeds in combating informal workers' insecurity and in reducing poverty among the ethnic minorities, in one generation it could join the sphere of the industrial countries.
1. UMR DIAL (IRD / Université Paris-Dauphine)
2. The investigations were conducted jointly in the Vietnamese General Statistics Office. They were presented as part of the Tam Dao Summer School/Uni co-organized annually by the Vietnam Academy of Social Sciences along with the IRD, AFD (Agence Française de Développement), AUF (Agence Universitaire de la Francophonie) and EFFEO.
3. *Doi Moi* is a major economic reform the Vietnamese Communist Party has been running since 1986, combining capitalism with a strong degree of State intervention.
4. The informal sector consists of all undeclared economic activities which therefore avoid State control and regulation.
5. *Kinh*, Vietnamese for "majority", is the official designation for the Viet, ethnic group originating from the North of present-day Vietnam and Southern China. The Kinh make up over 80% of the country's population.
http://en.ird.fr/the-media-library/scientific-news-sheets/359-vietnam-an-asian-miracle

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90245&CultureCode=en

Mildew-resistant and infertile

24 November 2010 Max-Planck-Gesellschaft
Two proteins involved in powdery mildew infection in plants also play an important role in fertilisation. Mildew infections not only cause unsightly vegetable patches, they can also result in extensive crop failure. Interestingly, the processes involved in infections with this garden pest are similar to those involved in fertilisation. Scientists from the Max Planck Institute for Plant Breeding Research in Cologne and the University of Zurich have identified two proteins in the model plant species Arabidopsis thaliana that are necessary for both fertilisation and infection with powdery mildew. This explains why mildew-resistant plants, in which these genes are mutated, are infertile. (Science, Vol 330, p 968-971)
Pollen tubes and hyphae, the filamentous structures of which fungi are formed, not only look very similar, they also require similar proteins. The two proteins in question, which have just been discovered, are named after the Etruscan fertility goddesses Feronia and Nortia. The scientists discovered that these proteins are both beneficial and harmful to plants. They link the capacity for seed formation with the absence of resistance to mildew infection.

Feronia signals to the pollen tube, which germinates from the pollen, that it has reached its destination and that it is time to release the male gametes. The protein is also formed in the leaves, however, and provides mildew with access to the plant. For the latter to become resistant to the intruder, both the maternal and paternal copies of the feronia gene must be defective. If the plant lacks the feronia protein, however, the pollen tube does not stop growing at the entrance to the embryo sac but continues to penetrate into the female part of the flower and does not trigger the release of sperm cells. As a result, fertilisation does not take place and an embryo does not develop.

The protein Nortia is also involved in fertilisation; however, it does not occur in the leaves. A protein known

as MLO, which is closely related to Nortia, is found there instead. MLO makes plants, e.g. barley, in which Ralph Panstruga discovered the MLO gene a few years ago, prone to mildew. However, they only become resistant if both copies of the MLO gene are mutated. Because *Arabidopsis* has three MLO genes that play a role in susceptibility to mildew, in this plant, six copies must become defunct before it becomes resistant to mildew. Various other genes exist, however, that also cause resistance to fungal infections in plants.

Resistant or fertile

Feronia and Nortia are formed by the helper cells of the embryo sac. They bring about the fusion of the gametes in the ovary. Feronia and MLO in the leaves enable mildew to penetrate into the plant. "This dual function indicates why evolution has not yet succeeded in blocking this point of access to mildew. It would clearly be very difficult to decouple these two functions. Therefore, the alternatives are: resistant and infertile, or vulnerable and fertile," says Ralph Panstruga from the Max Planck Institute for Plant Breeding Research.

Feronia is a receptor that apparently directly influences Nortia. However, the scientists do not yet know how Feronia cooperates with Nortia and MLO. "Our goal is to breed mildew-resistant plants based on Feronia mutants that are also fertile," says Panstruga. This is a very ambitious aim, as evolution appears not to have produced any such mutants up to now. Feronia evidently plays such an important role in the ovary and the leaves that the plant simply cannot manage without it.
http://goto.mpg.de/mpg/news/20101124/

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90533&CultureCode=en

Chronic High Cholesterol Diet Produces Brain Damage

Elsevier

Research from the Laboratory of Psychiatry and Experimental Alzheimers Research (http://www2.i-med.ac.at/psychlab/) at the Medical University Innsbruck (Austria) demonstrated that chronic high fat cholesterol diet in rats exhibited pathologies similar to Alzheimer's disease. The results were published in *Molecular Cellular Neuroscience* (45(4):408-417, 2010) with lead author Dr. Christian Humpel. The study was co-authored by PhD students, Celine Ullrich and Michael Pirchl, from the same Laboratory.

Alzheimer's disease is a severe neurodegenerative disorder of the brain that is characterized by loss of memory and cognitive decline. The majority of Alzheimer's disease cases are sporadic (risk age >60 years), and only <2.5% have a genetic disposition. It is estimated that in 2050, approximately 80 million people will suffer from Alzheimer's disease worldwide. The major pathological hallmarks of Alzheimer's disease are extracellular aggregates (plaques) of the small peptide beta-amyloid, hyperphosphorylation of the protein tau and subsequent formation of intracellular neurofibrillary tangles, degeneration of neurons secreting the neurotransmitter acetylcholine, inflammation, and cerebrovascular dysfunction.

The causes for Alzheimer's disease are not known, but dysregulation of amyloid-precursor protein expression and beta-amyloid clearance is hypothesized (beta-amyloid cascade). Alternatively, a pathological cascade of events may trigger hyper-phosphorylation of tau, putting the tau-hypothesis into the center. A third hypothesis suggests that chronic long-lasting mild cerebrovascular damage, including inflammatory processes and oxidative stress, may cause Alzheimer's disease. It has been suggested that Alzheimer's disease starts 20-30 years before first symptoms appear and recent studies have shown, that high cholesterol levels are linked to the pathology of this disease.

The aim of the study led by Humpel was to study the effects of hypercholesterolemia in adult rats. Male 6 months old Sprague Dawley rats were fed with normal food (controls) or with a special 5% cholesterol-enriched diet (hypercholesterolemia). After 5 months animals were tested for behavioral impairments and pathological markers similar to those found in the brains of patients with Alzheimer's disease. The results showed that chronic hypercholesterolemia caused memory impairment, cholinergic dysfunction, inflammation, enhanced cortical beta-amyloid and tau and induced microbleedings, all indications, which resemble an Alzheimer's disease-like pathology.

Thus the data are in line with earlier studies showing that high fat lipids, including cholesterol, may participate in the development of sporadic Alzheimer's disease. However, since Alzheimer's disease is a complex heterogenous disease, these data do not allow the conclusion that cholesterol alone is responsible for the disease. It can be speculated that chronic mild cerebrovascular damage caused and potentiated by different vascular risk factors (including cholesterol) may contribute to these pathologies. It needs to be determined in future studies how mild chronic microvascular bleedings, silent strokes and mild blood-brain barrier damage over decades may play a role in the development of this disease. Indeed several data (Ladecola, Nat.Rev.Neurosci. 5, 347-360, 2004) support the view that Alzheimer's disease can be considered as a vascular disease and that a dysfunctional clearance of beta-amyloid from brain to blood and vice versa may be a secondary important step in the cascade of initiation of the disease.

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90530&CultureCode=en

Dinosaurs: using 3D technology to discover their secrets

24 November 2010 Fondazione Bruno Kessler

The Bruno Kessler Foundation in a collaborative project with the Natural History Museum of Trento to digitally collect dinosaur footprints

Throughout Trentino region – in the north of Italy, there are many signs left by the giants that trod the beaches which, millions of years ago, and even before the valleys were formed, once dominated the landscape here – the dinosaurs. Icnologists – scientists who study the traces of animal behaviour – have long been trying to discover more about the types of animals that once roamed the earth. "There are very few other places in the world – says Marco Avanzini, the curator of the geology department of the Museo Tridentino di Scienze Naturali (MTSN, Tridentine Natural History Museum) and a renowned expert in icnology – that offer similar opportunities to see continuous sequences of rocky formations containing such large numbers of perfectly dated fossils. The mountains of Trentino allow us to observe the appearance and disappearance of entire groups of vertebrates, and to correlate these events with the geography and climate of their eras. The idea of permanently collecting these fossils virtually in a huge digital archive was a fascinating challenge, and is now a real possibility."

Analysing footprints to understand what these large animals looked like millions of years ago is much more difficult than it sounds. The conventional methods to evaluate findings applied in palaeontology are based on a visual analysis of the footprint itself and on the measurement of its depth, to ascertain the weight and characteristics of the animal. The number and shape of the prints allow scientists to determine whether the animal was alone or in a herd, whether it was a carnivore or a herbivore, its posture and many other factors. In addition to these studies, icnologists also make casts using transparent plastic, resin or plaster, which are subsequently analysed in the laboratory. However, these invasive and imprecise techniques are more likely to damage the actual fossil itself, which has already been worn by the passage of time.

But academics are still trying to – or, to be more precise – still want to find an effective way to discover the secrets concealed in dinosaur footprints. Coming to their aid are new three-dimensional scanning technologies developed by the Trento research centre, which are non-invasive and extremely precise, using photogrammetry and 3D laser scanners to offer a clearer diagnosis and more accurate documentation of the fossil. Continuing a collaborative relationship that began a number of years ago, the researchers Fabio Remondino, Giorgio Agugiaro, Alessandro Rizzi and Stefano Girardi of the 3DOM (3D Optical Metrology) research unit of the Fondazione Bruno Kessler in Trento worked together with the geologists of the Tridentino Museum of Natural History to complete the 3D scanning and digital archiving of numerous dinosaur footprints and tracks.

The most recent discovery by the geologists of the MTSN were three dinosaur footprints found last summer as natural casts in the ceiling of a tunnel excavated during the First World War. The prints were discovered at Monte Buso, on the Pasubio limestone massif at the border between the provinces of Trento and Vicenza (Italy). This finding could revolutionise the Jurassic geography of Italy, "as – explains the palaeoicnologist Avanzini – there are not supposed to be any dinosaurs in this area of the mountain and in strata from this era. In the models envisaged by experts to date, during the lower Jurassic, Trentino consisted of mud flats which

were largely submerged and distant from any continent: an environment in which large dinosaurs clearly could not have lived. It is now apparent, however, that if there are large dinosaur footprints at Monte Buso (those found belong to examples weighing 3-400 Kg and measuring 6-7 metres in length), then these mud flats could not have been that far from stable continents."

So, alongside the picks and brushes of the palaeontologists, the FBK researchers took their own tools of the trade to the site: computers, cameras and two laser scanners – a time-of-flight scanner and a triangulation system. These instruments are capable of acquiring the details of an object to a resolution of a tenth of a millimetre.

Through experiments and tests conducted in the field, the researchers developed a method that yielded fascinating results, producing identical reconstructions of the dinosaur footprints in a digital rather than physical format. Through specific software, the prints left by dinosaurs can now be viewed on a computer monitor: allowing researchers to analyse them quickly and from any angle, rotating them in space, turning them upside down or zooming in and out, all of which with such precision as to reveal details that would be invisible to the naked eye. But that's not all the new technology can do, and the acquisition process also allows palaeontologists to study, in great detail, the actual site where the prints were found – whether in a tunnel, a cave or outdoors – and reproduce it faithfully in 3D.

"By using the laser scanner – explains Avanzini – a print is reproduced in three dimensions with a precision far superior to the capabilities of the human eye. To give an idea of depth, different colours are attributed to different levels, and the virtual object can be analysed and processed to extract the largest amount of data possible. No less importantly, the print is immortalised: by creating a perfect digital copy, all the data regarding the print is protected from weathering and from intrinsic deterioration. Laser techniques also offer the advantage of recreating footprints and even sequences of prints from inaccessible places in three dimensions, allowing them to be compared – practically automatically – with other prints or skeletons, offering valuable information about the animal that made them". This new tool therefore offers significant support for conventional measurement methods.

"Our collaboration with FBK – continues Avanzini – began almost six years ago with the discovery, near Caserta, of the oldest human footprints in Europe, dating to approximately 360 thousand years ago. The potential of the acquisition methods being developed by the 3DOM unit at the time seemed perfect for revealing the morphology of footprints, on the basis of which the humans responsible for them, and how these humans walked, could be reconstructed. This collaboration was then continued in projects to acquire dinosaur footprints and prehistoric reptile prints in general in many other locations in Italy".

In conclusion, Dr. Avanzini, do you think that 3D technology represents the future for palaeontology?

"It's hard to say" says the specialist. "Undoubtedly, laser scanning has represented a major step forward in documentation, with its ability to archive and exchange data almost in real time. It is also true, however, that the costs of these instruments – which are still very high – represent a significant limitation. On the other hand, digital photogrammetry, used in conjunction with automatic image correlation, seems to be much more promising".

One thing that is certain, however, is that the collaboration between the FBK 3DOM research unit and MTSN has resulted in the 3D acquisition of numerous prints: in Trentino region (Italy), at the Coste dell'Anglone site (Dro – Trento), at Monte Finonchio (Rovereto -Trento), at Castello di S. Gottardo (Mezzocorona – Trento), at Zone (Brescia -I) and at Monte Pelmetto (Belluno -I), while many casts already held by the MTSN have also been scanned.

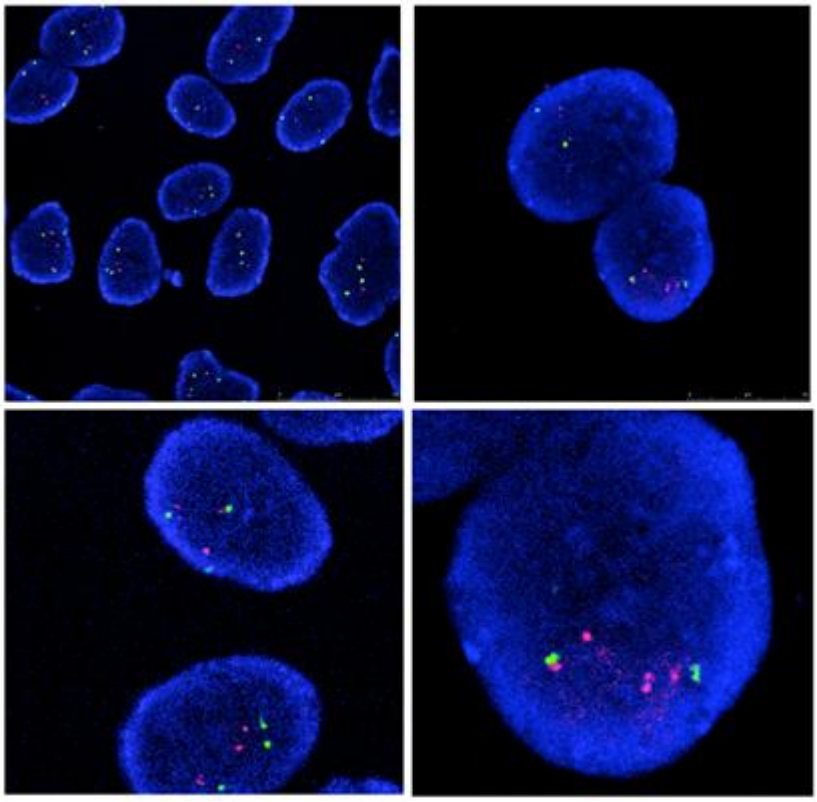
In future, the FBK researchers will be working at Lavini di Marco (Rovereto –Tn -Italy) to scan the entire area – a significant site with over 1500 prints – in 3D. It is clear, therefore, that the production of three dimensional models based on archaeological data is an extremely useful tool for palaeontological research, as illustrated by the case of Trentino. The footprints left behind by the giants of the past are part of the artistic and cultural heritage of our country, and this new technology developed by FBK means that they can be safeguarded and continue to be valuable assets for both education and tourism.

http://www.fbk.eu/dinosaurs3d

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90524&CultureCode=en

The most aggressive forms of breast cancer elude the cellular control mechanisms in order to expand

24 November 2010 Institute for Research in Biomedicine-IRB



About 30% of breast cancer patients have tumours that show rapid growth and invasion through the body. A common denominator in all of these cases is the presence of a large number of Her2 proteins in tumour cellular membranes. Consequently, these aggressive tumours are referred to as HER2+. Scientists working in the Metastasis Laboratory (MetLab) at IRB Barcelona headed by ICREA researcher Roger Gomis, have described the molecular mechanism that induces HER2+ tumours to ignore the signals that protect cells from excessive growth. The study is published this week in the specialized journal *Cancer Research*.

Certain external molecules bind to the Her family proteins, thus instructing the cell to divide. However, when cells have multiple copies of the Her2 gene, as is the case of HER2+ patients, they show uncontrolled division and do not respect the signals from their milieu. The prospects for HER2+ patients changed dramatically about ten years ago when the drug Herceptin came onto the market. This agent binds to Her2 to inhibit its proliferative activity, thereby leading to an improved prognosis and greater survival.

LIP disobeys the body's defense system

When cells detect potential harm, they activate a series of protective responses which often lead to cell death or senescence (no growth). All these mechanisms are systems through which the cell can avoid the irreversible errors that lead them to generate tumours. This explains why tumour cells are removed from the body and replaced by healthy ones. In this context, tumour suppression mechanisms are of particular relevance, among these that induced by the hormone TGF-β and the senescence caused by genes that contribute to the development of malignant cells (OIS).

Through experiments using metastatic cells from patients and animal models, the researchers have discovered that Her2 not only accelerates cell division but also evades these cell arrest systems. Her2 stimulates the production of the protein Lip, which deactivates the mechanisms that prevent cell division mediated by TGF-β and the senescence mediated by OIS, thereby leading to accelerated division. "Lip is the baddie in the film. It affects TGF-β and OIS function, both tumour suppression mechanisms", explains Gomis.

Towards more rational drug administration
One of the problems associated with Herceptin is that after long periods of treatment patients begin to develop drug resistance. This study shows that tumour cells that produce an excess of Lip continue to grow in the presence of the drug. This observation indicates that part of the resistance derives from the increase in Lip shown by these individuals.
"In patients that have an alteration in Her2 plus an increase in Lip, treatment with Herceptin may not be as effective. It should be remembered that this drug acts only against the membrane protein Her2", explains Gomis. These discoveries highlight the need to rationalise drug administration, from patient to patient, and to provide new data for the design of novel pharmaceutical agents against cancer that improve its diagnosis and treatment.
This study has involved the collaboration of Joan Massagué, Chairman of the Cancer Biology and Genetics Program at the Memorial Sloan-Kettering Cancer Center, New York City, assessor to the MetLab at IRB Barcelona, and adjunct director of the same institute, and has been supported by funding from the BBVA Foundation and the Ministry of Science and Innovation.
http://www.irbbarcelona.com/index.php/en/news/irb-news/scientific/the-most-aggressive-forms-of-breast-cancer-elude-the-cellular-control-mechanisms-in-order-to-expand

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90521&CultureCode=en

Heavy metals in seafood: Satisfactory results of interlaboratory comparison

24 November 2010 European Commission, Joint Research Centre (JRC)
A new study which benchmarks the abilities of laboratories around the world to measure heavy metals (arsenic, cadmium, lead, mercury, methylmercury and inorganic arsenic) in seafood has been published today by the Joint Research Centre. The outcome of the exercise was generally positive, with 80 to 96% of laboratories obtaining satisfactory scores, depending on the heavy metal considered. This result corroborates seafood consumers' protection in the EU, where the levels of lead, cadmium and total mercury are regulated by law.
Fifty-seven laboratories from 29 countries volunteered to put their measuring competence to the test. Each laboratory received a sample without knowing the levels of heavy metals present, and was asked to measure and report the values back to the JRC.
The good results should enhance consumers' confidence, as maximum levels of lead, cadmium and total mercury in seafood are regulated by EU law and it has been proven that most participants are able to correctly measure them. In addition, this comparison has highlighted other issues, such as the apparent dependency of the measurements of inorganic arsenic on the type of food tested.
Excessive intake of heavy metals may lead to a decline in mental, cognitive and physical health. A particular concern is potential developmental defects in children exposed *in utero*. From a toxicological point of view, the chemical form in which the metal is ingested plays a significant role. For example, methylmercury is much more toxic than inorganic mercury compounds, whilst inorganic arsenic is more toxic than the organic species of arsenic.
The interlaboratory comparison
The interlaboratory comparison was organised in support of the European Co-operation for Accreditation (EA), the Asia Pacific Laboratory Accreditation Cooperation (APLAC) and the national reference laboratories associated to the European Union Reference Laboratory for Heavy Metals in Feed and Food.
Participants were asked to report both the measured value of each heavy metal in question in the sample and the uncertainties associated with those measurements. The results were scored according to international standards[1].
The outcome of the exercise was generally positive. All of the 57 laboratories that registered reported results. The share of satisfactory scores ranged between 80% and 96% (Table 1 in the url link). Participants tended to underestimate the content of total arsenic, and to a lesser extent total cadmium. The distribution of the participating laboratories by country is shown in Figure 2 (url link).
Contrary to a previous exercise (IMEP-107 on total and inorganic arsenic in rice), the values reported for inorganic arsenic showed a large spread. Interestingly, this indicates that the matrix (in this case, seafood), has a major influence on the analytical determination of inorganic arsenic. This is a crucial consideration for legislators, because specifying single maximum level of arsenic in food would appear to be unfeasible.
Legislative situation
In Europe, maximum levels for lead, cadmium and total mercury in food are laid down in legislation[2], varying from 0.5 to 1.0 mg. per kg. for different seafood. No maximum level exists for the methylmercury form of mercury, as its measurement requires specific analytical equipment not routinely present in testing laboratories. However, methylmercury is the main source of human intake of mercury in fish and fishery products, and is important due to its high toxicity compared to inorganic mercury.
No maximum levels for arsenic have been laid down in European legislation either, due to a lack of information about reliable analytical methods for determining inorganic arsenic in different food commodities, and measurement values of inorganic arsenic are generally believed to be method-dependent.

The interlaboratory comparison was, therefore, extended to include methylmercury and inorganic arsenic, in order to investigate the issues that laboratories encounter in measuring these substances.
JRC-IRMM and the EU Reference Laboratories
The Institute for Reference Materials and Measurements (IRMM) is one of the seven institutes of the Joint Research Centre (JRC) which is a Directorate-General of the European Commission.
It operates four European Union Reference Laboratories (EU-RL), including the EU-RL for heavy metals in feed and food. The EU-RLs are analytical laboratories designated by EU legislation and which are an integral part of European risk management system. Their duties include setting up EU-wide standards for reliable testing methods, organising comparative tests, training analysts from national laboratories and providing scientific and technical assistance to the European Commission.
JRC-IRMM also operates the International Measurement Evaluation Programme (IMEP®). It organises interlaboratory comparisons in support to EU policies. Many of the interlaboratory comparisons are open to all laboratories that wish to participate, but some are restricted to, for example, national reference laboratories. Proficiency tests are normally carried out only on request of another Commission department or agency. Some comparisons are run to certify reference materials and validation studies are organised regularly to validate analysis methods.
[1] ISO 13528, Statistical Methods for Use in Proficiency Testing by Interlaboratory Comparisons (2005), issued by ISO-Geneva (CH), International Organization for Standardization
[2] Commission Regulation (EC) No 1881/2006 of 19 December 2006 setting maximum levels for certain contaminants in foodstuffs.

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90518&CultureCode=en

A new electromagnetism can be simulated through a quantum simulator

24 November 2010 madrimasd
A quantum simulator is a variant of a quantum computer that allows us to outperform classical computers in the understanding of complex quantum systems.

There are two fundamental aspects that make these devices attractive for scientists. On the one hand, quantum simulators will play a leading role in clarifying some important, but yet unsolved, puzzles of theoretical physics.. On the other hand, such deeper understanding of a given phenomenon will certainly give rise to useful technological applications.

One of the best quantum simulators consists of a gas of extremely cold atoms loaded in an artificial crystal made of light: an optical lattice. Experimental physicists have developed efficient techniques to control the quantum properties of this system, to such extent, that it serves as an ideal quantum simulator of different phenomena.

So far, efforts have been focused on condensed-matter systems, where many open and interesting problems remain to be solved. In a recent work published in Physical Review Letters by a collaboration of international teams (Universidad Complutense de Madrid: A. Bermudez and M.A. Martin-Delgado; ICFO Barcelona: M. Lewenstein; Max-Planck Institute Garching: L. Mazza, M. Rizzi; Universite de Brussels: N. Goldman), this platform has also been shown to be a potential quantum simulator of high-energy physics. The authors have proposed a clean and controllable setup where a variety of exotic, but still unobserved, phenomena arise. They describe how to build a quantum simulator of Axion Electrodynamics (high-energy physics), and 3D Topological Insulators (condensed matter). In particular, these results pave the way to the fabrication of an Axion, a long sought-after missing particle in the standard model of elementary particles. They show that their atomic setup constitutes an axion medium, where an underlying topological order gives rise to a non-vanishing axion field. Besides, they show how the value of the axion can attain arbitrary values, and how its dynamics and space-dependence can be experimentally controlled. Accordingly, their optical-lattice simulator offers a unique possibility to observe diverse effects, such as the Wiiten effect, the Wormhole effect, or a fractionally charged capacitor, in atomic-physics laboratories.

This work has an interdisciplinary character, which brings together physicists specializing in lattice gauge theories, atomic molecular and optical physics, and condensed matter physics.

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90488&CultureCode=en

Early Urine Test Predicts Pregnancy Complication

24 November 2010 Leicester, University of

Research led by the University of Leicester and University Hospitals of Leicester NHS Trust has provided a new advance in predicting a potentially serious pregnancy complication.
The team led by Dr Matt Hall, of the Department of Infection, Immunity and Inflammation at the University of Leicester, conducted a study to see if analyzing the protein content of pregnant women's urine before the 20th week of pregnancy might predict a condition known as pre-eclampsia. Pre-eclampsia affects approximately 5% of pregnancies and can pose serious health concerns for mother and child. Some patients develop severe disease associated with kidney, liver, and neurological problems. The condition is characterized by high blood pressure and the loss of protein in the urine during the second half of pregnancy.
The researchers recruited 145 patients at risk of pre-eclampsia from Leicester Royal Infirmary early in pregnancy. Eleven subsequently developed pre-eclampsia. An analysis of urine samples obtained prior to week 20 revealed a panel of 5 proteins that correctly predicted pre-eclampsia with 92% accuracy.
Dr Hall said: "Our study suggests that changes in levels of certain proteins in the urine early in pregnancy can predict who will develop pre-eclampsia about 5 months before symptoms develop.
“Although these results do not give us a cure for pre-eclampsia, early identification of women at highest risk will allow focused monitoring and timely delivery of their babies, as well as reassurance for women found to be low risk."
Study co-authors include Paul Bosio, MD (Sandwell and West Birmingham NHS Trust, in Birmingham, the United Kingdom), Jonathan Barratt, MD, PhD; Nigel Brunskill, MD, PhD; Susan Carr MD (Leicester General Hospital and the University of Leicester); and Karen Molyneux, PhD (University of Leicester).
The research was funded with pharmaceutical company support as well as clinical revenue support. The study abstract, "An Early Pregnancy Urinary Proteomic Fingerprint Accurately Predicts Later Pre-Eclampsia," [F-FC223] was presented as an oral presentation at the Colorado Convention Center in Denver, CO. as part of the American Society of Nephrology Renal Week.

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90503&CultureCode=en

IOP Institute of Physics

When Belgium sneezes, the world catches a cold

24 November 2010 Institute of Physics

As the eurozone continues to wobble, new analysis of countries' economic interconnectedness finds that some of the countries with the greatest potential to cause a global crash have surprisingly small gross domestic production.

Using data from Bureau Van Dijk - the company information and business intelligence provider - to assess the reach and size of different countries' economies, and applying the Susceptible-Infected-Recovered (SIR) model, physicists from universities in Greece, Switzerland and Israel have identified the twelve countries with greatest power to spread a crisis globally.

The research published today, Thursday 25 November 2010, in *New Journal of Physics* (co-owned by the Institute of Physics and German Physical Society), groups Belgium and Luxembourg alongside more obviously impactful economies such as the USA in the top twelve.

Using a statistical physics approach, the researchers from the Universities of Thessaloniki, Lausanne and Bar-Ilan used two different databases to model the effect of hypothetical economic crashes in different countries. The use of two different databases aided the avoidance of bias but threw up very similar results.

The data used allowed the physicists to identify links between the different countries, by mapping the global economy to a complex network, and gauge the likelihood of one failed economy having an effect on another. One network was created using data on the 4000 world corporations with highest turnover and a second using data on import and export relations between 82 countries.

The SIR model, successfully used previously to model the spreading of disease epidemics, is applied to these two networks taking into consideration the strength of links between countries, the size of the crash, and the economic strength of the country in potential danger.

When put to the test with the corporate data, the USA, the UK, France, Germany, Netherlands, Japan, Sweden, Italy, Switzerland, Spain, Belgium and Luxembourg were part of an inner core of countries that would individually cause the most economic damage globally if their economies were to fail.

Using the import/export data, China, Russia, Japan, Spain, UK, Netherlands, Italy, Germany, Belgium, Luxembourg, USA, and France formed the inner core, with the researchers explaining that the difference – particularly the addition of China to this second list – is due to a large fraction of Chinese trade volume coming from subsidiaries of western corporations based in China.

The researchers write, "Surprisingly, not all 12 countries have the largest total weights or the largest GDP. Nevertheless, our results suggest that they do play an important role in the global economic network. This is explained by the fact that these smaller countries do not support only their local economy, but they are a haven for foreign investments."

The researchers' paper can be downloaded for free from Thursday 25 November 2010 here:
http://iopscience.iop.org/1367-2630/12/11/113043/fulltext

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90497&CultureCode=en

New Study Reveals How Cannabis Suppresses Immune Functions

24 November 2010 Wiley - Blackwell
Cannabis Compounds Found to Trigger Unique Immune Cells Which Promote Cancer Growth

An international team of immunologists studying the effects of cannabis have discovered how smoking marijuana can trigger a suppression of the body's immune functions. The research, published in the European Journal of Immunology, reveals why cannabis users are more susceptible to certain types of cancers and infections.

The team, led by Dr Prakash Nagarkatti from the University of South Carolina, focused their research on cannabinoids, a group of compounds found inside the cannabis plant, including THC (delta-9 tetahydrocannabinol) which is already used for medical purposes such as pain relief.

"Cannabis is one of the most widely used drugs of abuse worldwide and it is already believed to suppress immune functions making the user more susceptible to infections and some types of cancer," said Dr Nagarkatti. "We believe the key to this suppression is a unique type of immune cell, which has only recently been identified by immunologists, called myeloid-derived suppressor cells, MDSCs."

While most immune cells fight against infections and cancers to protect the host, MDSCs actively suppress the immune system. The presence of these cells is known to increase in cancer patients and it is believed that MDSCs may suppress the immune system against cancer therapy, actually promoting cancer growth.

Dr Nagarkatti's team demonstrated that cannabinoids can trigger a massive number of MDSCs through activation of cannabinoid receptors. This research reveals, for the first time, that marijuana cannabinoids may suppress the immune system by activating these unique cells.

"These results raise interesting questions on whether increased susceptibility to certain types of cancers or infections caused from smoking marijuana results from induction of MDSCs," said Nagarkatti. "MDSCs seem to be unique and important cells that may be triggered by inappropriate production of certain growth factors by cancer cells or other chemical agents such as cannabinoids, which lead to a suppression of the immune system's response."

In a related study, also published in the European journal of Immunology, Dr Christian Vosshenrich from the Institut Pasteur in Paris, reveals that when cancer cells grow they produce a molecule called interleukin-1 β (IL-1β), which also triggers MDSCs. This study identifies how MDSCs produced during cancer growth also weaken the ability of immune cells to kill cancer cells.

"Marijuana cannabinoids present us with a double edged sword," concluded Dr Nagarkatti. "On one hand, due to their immunosuppressive nature, they can cause increased susceptibility to cancer and infections. However, further research of these compounds could provide opportunities to treat a large number of clinical disorders where suppressing the immune response is actually beneficial."

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90494&CultureCode=en

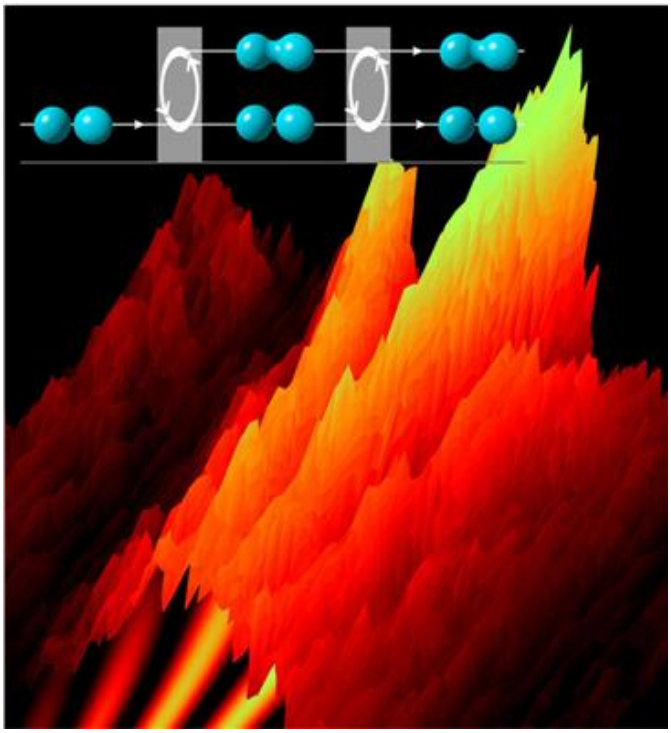
New YouTube videos explain Graphene for the baffled

24 November 2010 COST
With the aid of science video communication charity, The Vega Science Trust , COST Action MP0901 "NanoTP" has produced two short videos explaining graphene and its amazing properties. The videos are written and presented by Jonathan Hare, and show how amazingly graphene can be produced using just a pencil and some sticky tape.
Jonathan has previously appeared in BBC Science programmes such as "Rough Science" and now runs the Creative Science Centre in Sussex.
"The Nobel prize was a surprise that couldn't be more timely for us – Graphene is a wonderful material that has been on the 'wish list' of theoretical science for a long time before it actually existed", says Carla Bittencourt, Chair of NanoTP. "It's a great playground for the scientists in our project. Tools that we have developed to study other forms of carbon like nanotubes are all in place, it means graphene will rapidly make the transition from basic science to real-world applications. I hope that awarding the prize to Graphene will call the attention of funding agencies to the importance of 'scientific curiosity' in the centre of research projects".
NanoTP involves more than 150 scientists from 24 different countries working in the field of nanotechnology. "NanoTP brings together scientists from across Europe, America and Asia, to pool resources and ideas, and cross geographical and scientific borders", says Chris Ewels, vice-chair of NanoTP.
"For us it's important to communicate with the public. People want to know about nanoscience and its implications for the future, and as scientists working in this area we have a responsibility to get involved in the public debate."
To watch the videos, please visit the website below:
http://www.cost.eu/library/videos/Graphene-and-the-Carbon-Revolution

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90482&CultureCode=en

To be or not to be a pair - ultralarge molecules in a superposition

23 November 2010 University of Stuttgart



Everybody is familiar with the problem to choose between two alternatives. This also holds for relationships. The question whether being a couple or not has a yes-or-no answer – either one is a couple or not. Quantum physics offers an interesting alternative. There, the couples are pairs of atoms that are held together by binding forces to form molecules. Quantum mechanics allows another loophole: a superpostion of free and bound state, where the two atoms are bound and free at the same time. Although this is impossible in our classical world, it is a well known property for quantum mechanical states. Such superpositions have now been observed at the „Universität Stuttgart“ (University of Stuttgart) for weakly bound ultralong-range molecules. Physicist Tilman Pfau and his group showed, that these superposition states last for several millionth of a second - too short for a real relationship, but long enough for molecules, as Björn Butscher and his colleagues report in the online version of Nature Phyiscs.

Only recently, the Stuttgart physicists provided experimental proof for the existence of the so-called ultralong-range Rydberg molecules. These are weakly bound molecules where one atom is in its ground-state while the other atom is in a highly excited state – a Rydberg state. With bond lengths of 100 nanometers, these molecules are extraordinarilly large. In their new experiment, the scientists now demonstrate the control of these superposition states.

To form the exotic molecule, two ground state atoms need to be at the right distance. Since atoms at room temperature are moving too fast to form a molecule, the physicists cool a gas of Rubidium atoms to a temperature close to the absolute zero temperature and illuminate it with laser pulses. This lifts the outer electron of one atom to a high orbit and Rydberg-molecules can be formed. In their new experiment the physicists could show that they can coherently control the transition from the unbound state of two free atoms to the molecular state. This means that the atom-pair is bound to the light so much that it oscillates periodically between the bound and the unbound state and take all intermediate superpositions while the light is on.

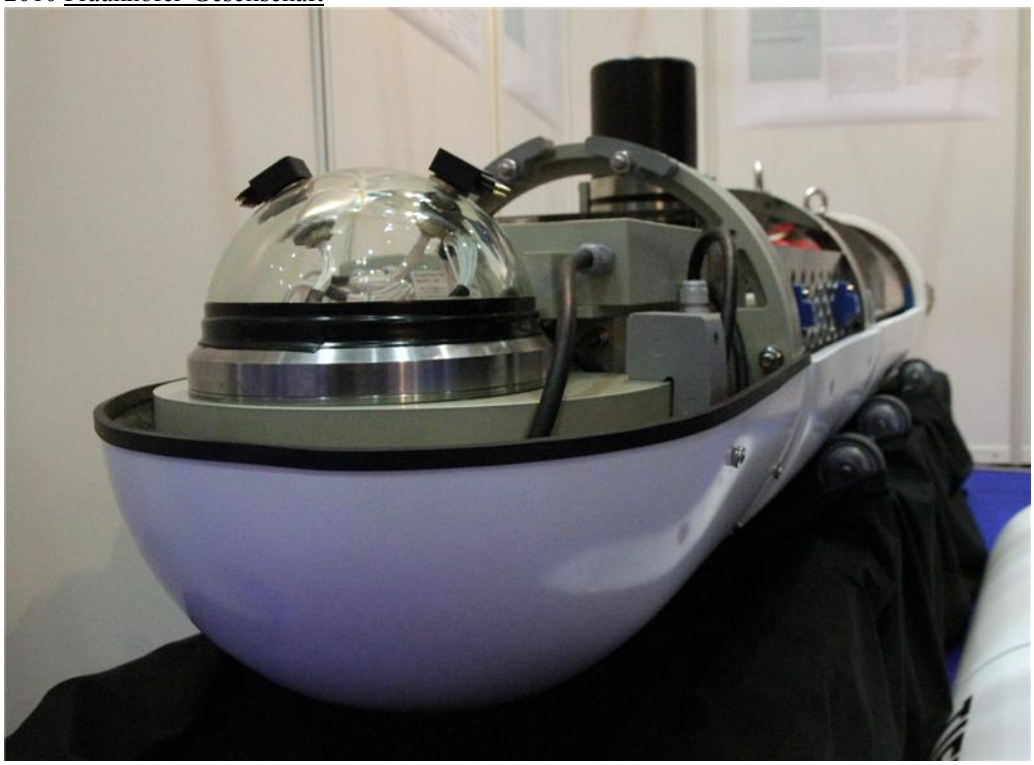
Depending on the length of the laser pulse, they can create a bound pair or an unbound pair or a pair that is simultaneously in both, the bound and in the unbound state – the superposition state. If the pair is in such a superposition, it is extremely sensitive to external effects that diffently affect the bound and the unbound state. Using two separated laser pulses, the physicists could realize an interferometer for bound states that they employed to measure the lifetime of the molecules.

This work has been funded by the Deutschen Forschungsgemeinschaft DFG, SFB/TRR 21 (Control of quantum correlations in tailored matter) and the Carl-Zeiss-Stiftung unterstützt.

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90473&CultureCode=en

Underwater robots on course to the deep sea

23 November 2010 Fraunhofer-Gesellschaft



Robots do not have to breathe. For this reason they can dive longer than any human. Equipped with the necessary sensor technology they inspect docks or venture down to the ocean fl oor to search for raw materials. At present, researchers are developing a model which will carry out routine tasks independently, without help from humans.

Even when equipped with compressed-air bottles and diving regulators, humans reach their limits very quickly under water. In contrast, unmanned submarine vehicles that are connected by cable to the control center permit long and deep dives. Today remote-controlled diving robots are used for research, inspection and maintenance work. The possible applications of this technology are limited, however, by the length of the cable and the instinct of the navigator. No wonder that researchers are working on autonomous underwater robots which orient themselves under water and carry out jobs without any help from humans.

In the meantime, there are AUVs (autonomous underwater vehicles) which collect data independently or take samples before they return to the starting points. “For the time being, the technology is too expensive to carry out routine work, such as inspections of bulkheads, dams or ships’ bellies,” explains Dr. Thomas Rauschenbach, Director of the Application Center System Technology AST Ilmenau, Germany at the Fraunhofer Institute for Optronics, System Technologies and Image Exploitation IOSB. This may change soon. Together with the researchers at four Fraunhofer Institutes, Rauschenbach’s team is presently working on a generation of autonomous underwater robots which will be smaller, more robust and cheaper than the previous models. The AUVs shall be able to find their bearings in clear mountain reservoirs equally well as in turbid harbor water. They will be suitable for work on the floor of the deep sea as well as for inspections of shallow concrete bases that offshore wind power station have been mounted on.

The engineers from Fraunhofer Institute for Optronics, System Technologies and Image Exploitation in Karlsruhe, Germany are working on the “eyes” for underwater robots. Optical perception is based on a special exposure and analysis technology which even permits orientation in turbid water as well. First of all, it determines the distance to the object, and then the camera emits a laser impulse which is reflected by the

object, such as a wall. Microseconds before the reflected light flash arrives, the camera opens the aperture and the sensors capture the incident light pulses. At the Ilmenau branch of the Fraunhofer Institute for Optronics, System Technologies and Image Exploitation, Rauschenbach's team is developing the "brain" of the robot: a control program that keeps the AUV on course in currents such as at a certain distance to the wall that is to be examined. The Fraunhofer Institute for Biomedical Engineering IBMT in St. Ingbert provides the silicone encapsulation for the pressure-tolerant construction of electronic circuits as well as the "ears" of the new robot: ultrasound sensors permit the inspection of objects. Contrary to the previously conventional sonar technology, researchers are now using high-frequency sound waves which are reflected by the obstacles and registered by the sensor. The powerful but lightweight lithium batteries of the Fraunhofer ISIT in Itzehoe that supply the AUV with energy are encapsulated by silicone. A special energy management system that researchers at the Fraunhofer Institute for Environmental, Safety and Energy Technology UMSICHT in Oberhausen, Germany have developed saves power and ensures that the data are saved in emergencies before the robot runs out of energy and has to surface.
A torpedo-shaped prototype two meters long that is equipped with eyes, ears, a brain, a motor and batteries will go on its maiden voyage this year in a new tank in Ilmenau. The tank is only three meters deep, but "that's enough to test the decisive functions," affirms Dr. Rauschenbach. In autumn 2011, the autonomous diving robot will put to sea for the first time from the research vessel POSEIDON: Several dives up to a depth of 6,000 meters have been planned.
http://www.fraunhofer.de/en/press/research-news/2010/11/underwater-robots-on-course-to-the-deep-sea.jsp

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90464&CultureCode=en

A wide range of nano-coatings in a few spray applications!

23 November 2010 CNRS (Délégation Paris Michel-Ange)
Easy-to-use nano-coating sprays with optical, electronic, biological properties, etc to cover surfaces! Teams from the Institut Charles Sadron (CNRS / Université de Strasbourg), in collaboration with researchers from the Laboratoire de Biomatériaux et Ingénierie Tissulaire (Inserm / Université de Strasbourg), have managed to improve and extend their technique of "layer by layer" deposition. This scientific synergy has led to the development of a very wide range of nano-coatings with new and varied applications that will doubtless be of great interest to industry. Their work was published online on 23 November 2010 on the site of the journal *Angewandte Chemie International Edition*.
Contact lenses, cars, non-stick saucepans or stickers: numerous objects in our daily lives have coatings with specific functions. Over fifteen years ago, Gero Decher invented a novel method of depositing nano-materials in the form of thin films. The principle of this technique simply consists in "stacking", with nanometric precision, layers whose structure and chemical functionalities are controlled by the sequence and nature of the constituents incorporated in the film (polymers, pigments, proteins, particles, etc.). This "layer-by-layer" method makes it possible to produce materials with extremely varied properties. Neither costly nor polluting, this process ranks among the ten most important results in chemistry over the last decade.
Recently, teams of chemists and physical chemistry specialists, headed by Gero Decher and Pierre Schaaf of the Institut Charles Sadron (CNRS/Université de Strasbourg), in collaboration with Jean-Claude Voegel's team from the Laboratoire de Biomatériaux et Ingénierie Tissulaire (Inserm/Université de Strasbourg), have recently succeeded in making this deposition method even more powerful and easy to apply. Initially, the technique required successive dippings in different liquids and long deposition times. Now, using two bottles, the scientists can simultaneously spray two liquids on a surface to be coated. Time saving and logistical advantages are considerable.
Better still, this original method applies to a whole range of nano-coatings, including completely new classes of materials, such as purely inorganic films. The already wide range of applications of these thin films has therefore been further extended. The nano-coatings obtained by these various deposition methods have many applications in materials science: light emitting diodes, fuel cells, photovoltaic cells, anti-corrosion coatings, flexible screens, separation membranes, etc. Furthermore, the introduction of biologically active molecules (peptides, enzymes, medicines, proteins, DNA, cells, etc.) within these films makes it possible to obtain nano-coatings that have numerous applications in life sciences: biocompatibility of implants, preparation of dressings, tissue engineering, gene transfection, pharmaceutical vectors, bio-sensors, etc. This host of applications is likely to meet industry's objectives to cut production costs, invest in sustainable product development and extend product ranges. In short, this innovative nano-assembly method makes it possible to envisage the elaboration of a large number of (bio)-materials or products that do not yet exist.

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90461&CultureCode=en

Opening new complex Academic Centre for Dentistry Amsterdam

Universiteit van Amsterdam (UVA)
The Academic Centre for Dentistry Amsterdam (ACTA), a collaborative venture between the University of Amsterdam (UvA) and the VU University Amsterdam (VU), has new main premises at the Zuidas in Amsterdam. The official opening will take place on Thursday, 25 November 2010. Professor Robbert Dijkgraaf, president of the Royal Netherlands Academy of Sciences (KNAW), Professor Dymph van den Boom and Professor Lex Bouter, the Rectores Magnifici of the UvA and VU respectively, will conduct the opening ceremony.

The building was designed by Benthem Crouwel Architects, with the ACTA's three primary functions in mind: teaching, research and patient care. Patient treatment takes place in the low-rise building, so patients can quickly find their destination. The teaching activities are also concentrated in the low-rise building. The offices and laboratories are located in the high-rise tower. All the activities are conducted around the atrium, which forms the heart of the new building.

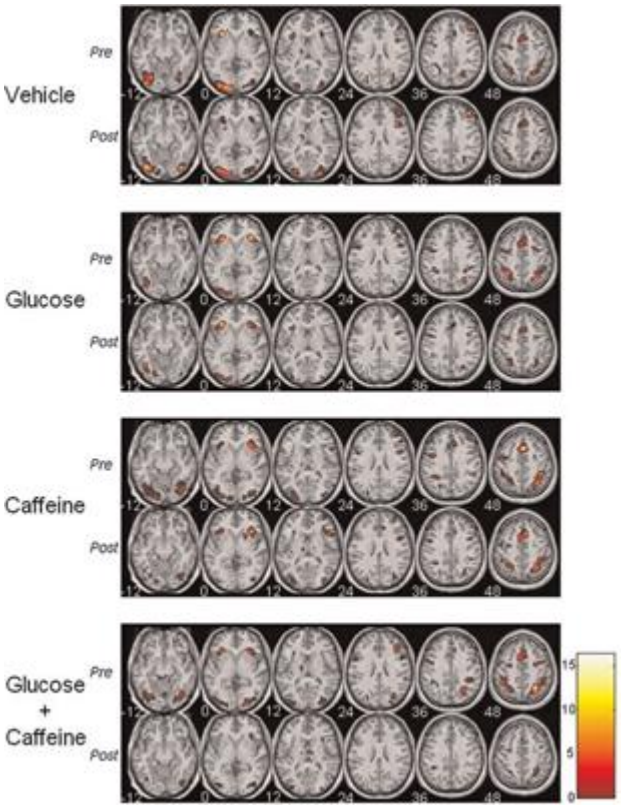
27,000 patients

The new building occupies 25,000 m2, and has thirteen floors and 248 treatment spaces. There are forty *Simodonts*, simulators which students can use to practice dental procedures in a realistic virtual environment. With 900 students, 500 staff members and 27,000 patients, the ACTA is the largest dental faculty in the Netherlands and one of the largest in Europe. Every day, approximately 350 patients receive dental care. Half of all Dutch dentists are trained at the ACTA. In addition to training students to become dentists, the ACTA offers postgraduate courses and specialised study programmes.

The new building also houses the *Stichting Bijzondere Tandheelkunde* (Foundation for Special Dentistry, SBT) and the Inholland University of Applied Sciences' Oral Hygiene study programme. ACTA's main premises are in Amsterdam with additional branches in Almere and Hoorn.

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90446&CultureCode=en

Combined consumption of caffeine and glucose improves the efficiency of brain activity



Universidad de Barcelona

The combination of caffeine and glucose can improve the efficiency of brain activity, according to a recent study in which functional magnetic resonance imaging was used to identify the neural substrate for the combined effects of these two substances. The study, which was published in the journal *Human Psychopharmacology: Clinical and Experimental*, is led by the researchers Josep M. Serra Grabulosa, from the Department of Psychiatry and Clinical Psychobiology at the UB and a member of the August Pi i Sunyer Biomedical Research Institute (IDIBAPS); Ana Adan, a lecturer from the same department and a member of the UB's Institute of Brain, Cognition and Behaviour (IR3C); and Carles Falcón, a member of the Biomedical Research Networking Center in Bioengineering, Biomaterials and Nanomedicine (CIBER-BBN).

"Our main finding is that the combination of the two substances improves cognitive performance in terms of sustained attention and working memory by increasing the efficiency of the areas of the brain responsible for these two functions", explains Josep M. Serra Grabulosa. This supports the idea of a synergistic effect between two substances, in which each one boosts the effect of the other. Specifically, the team found that individuals who consumed caffeine and glucose in combination showed reduced brain activation associated with the task in the bilateral parietal cortex and the left prefrontal cortex – two regions that actively participate in attention and working memory processes. The reduced activity and the fact that no drop in behavioural performance was observed during the task suggests that the brain is more efficient under the combined effect of the two substances, since it needs fewer resources to produce the same level of performance than required by those subjects who were administered the placebo or who took only caffeine or glucose.

For the study, the team of researchers from the UB used functional MRI to analyse brain activity during the *n-back* task, which evaluates sustained attention and working memory – basic capacities in improving everyday cognitive tasks. In a double-blind randomized design, participants were tested after drinking a study beverage containing either caffeine, glucose or the two combined or a placebo consisting only of water. Tests were conducted with a sample of 40 healthy volunteers at the Diagnostic Imaging Centre of the Hospital Clínic de Barcelona.

An earlier study by the same research team on the effects of caffeine and glucose consumption revealed improvements in attention span and declarative memory without significant alteration of the participants' subjective state. The conclusions suggested that a combination of caffeine and glucose has beneficial effects on attention (sequential reaction time tasks) and learning and on the consolidation of verbal memory, none of which were observed when the substances were consumed separately.

http://www.ub.edu

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90452&CultureCode=en

Science & Technology Facilities Council

Extending the life of oil reserves: Greener, cheaper more efficient oil extraction made possible at ISIS

Science and Technology Facilities Council (STFC)

A research team led by the University of Bristol has used STFC's ISIS Neutron Source to come up with a new way to treat carbon dioxide (CO_2), so that it can be used in efficient and environmentally friendly methods for extracting oil. These new CO_2 soluble additives can also be used to reduce the environmental damage caused by every day industrial processes such as food processing and the manufacture of electronics. The results of this work are published in the journal Langmuir.

The researchers have developed a soap-like additive for CO_2 that turns it into a viable solvent for commercial-scale enhanced oil recovery to increase the amount of crude oil that can be extracted from oil fields.

"Carbon dioxide is useful in enhanced oil recovery as it is able to flow through the pores in the rock much more easily than water," said Professor Julian Eastoe from the University of Bristol. *"The additive, a surfactant, will help thicken the carbon dioxide, which is vital for this process, allowing it to flow through the rock more efficiently. There is also a useful side effect of our ability to use CO_2 in this way, as in the future the process will take carbon dioxide generated by industrial activity from the atmosphere and lock it deep underground. Getting longer life out of existing oil reserves will also give more time for research into replacements into non-carbon energy sources such as solar or hydrogen."*

Minister for Science and Universities David Willetts said: "This shows what science can do for the environment. It's why the Government has protected the science budget. In particular it shows how financing core science facilities can lead to many different projects with valuable applications."

Liquid CO_2 is increasingly being used industrially to replace common petrochemical solvents because it requires less processing and it can be easily recycled. The difficulty has been that in order to operate effectively as a solvent, carbon dioxide needs additives, many of which are in themselves, damaging to the environment. This new development by an international team including scientists from Bristol University led by Professor Julian Eastoe, from the University of Pittsburgh led by Professor Bob Enick and ISIS scientists Dr Sarah Rogers and Dr Richard Heenan provides a solution. The project has been funded by the UK Engineering and Physical Sciences Research Council (EPSRC) and the US Department of Energy to explore using high pressure CO_2 to extract residual oil retained in the pores of rock.

"The quest to find a chemical capable of modifying the properties of CO_2 to make it suitable for widespread use as a solvent in enhanced oil recovery has been long," said Professor Bob Enick. *"Previous advances have involved surfactants containing fluorine, which although highly soluble in CO_2, are very environmentally damaging. The new additive, surfactant TC14, contains no fluorine at all and is a harmless hydrocarbon."*

CO_2 offers an efficient, cheap, non-toxic, non-flammable and environmentally responsible alternative to conventional petrochemical solvents. Even water as a solvent for example, comes with its own set of problems; after being used to flush out oil from rocks it then requires cleaning before it can be used again, whereas liquid CO_2 can be re-used immediately.

The paper published in the Langmuir is the first to come from Sans2d, one of seven new neutron instruments built at the ISIS second target station, a £145 million expansion to the facility completed last year. It is also one of the first to be published using data collected at the new target station.

The new additive, surfactant TC14 enables small pockets to form in the liquid CO_2 called reverse micelles causing the liquid to thicken. Neutron scattering at ISIS allowed the structure of the reverse micelles to be studied in the CO_2 as they formed under high pressure. The neutron instruments giving this molecular level viewpoint are often described as 'super-microscopes'.

"*Beams of neutrons are able to penetrate deep inside samples giving unique information about the location and arrangement of the micelles at a molecular level,"* said ISIS scientist Dr Sarah Rogers.

"By altering the pressure in a specially constructed experimental cell, dissolved material can easily be separated and removed leaving the carbon dioxide for the next use. It would be difficult to look at this system

using any other technique as the CO_2 needs to be kept under high pressure. Only under the scrutiny of neutron beams can you fully reveal its actions and properties."
"Experiments on Sans2d are particularly fast and accurate in comparison to some older neutron scattering instruments. This development of neutron instrument technology is part of what makes ISIS a world leading science facility," said Professor Eastoe.

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90449&CultureCode=en

A digital future for the Humanities

Nottingham, University of

Colourful 3D reconstructions of ancient monuments, virtual galleries and a multi-screen 'intelligent' classrooms will transform teaching and research in the Humanities, thanks to a new Digital Centre at The University of Nottingham.

The Centre will give students and staff instant access to a wide variety of digitised images, multimedia and 3D models of ancient artefacts and will make the use of traditional slides and 2D screen presentations like 'Powerpoint' a thing of the past.

Work in the Departments of Art History, Classics, and Archaeology, as well as Music, Philosophy and Theology, has in the past relied on lantern slides and printed versions of thousands of images, objects and texts.

Now the new Centre will make available a wide variety of the latest visualisation technologies and equipment, setting new standards for the study and teaching of the Humanities in the digital age. And it will be truly cross-disciplinary with colleagues in the Faculties of Engineering and Biomedical Sciences also making use of the equipment and exchanging expertise with Arts and Humanities.

The new technology will be installed in several locations in the current Humanities premises but the Centre will eventually have its own bespoke space in the new Humanities building, currently under construction on University Park and due to open in September 2011.

Among the new resources available to staff and students will be an equipment pool including photo and video kit, design and editing software and a state-of-the-art 3D scanner. New digitisation equipment will be used to create a vast digital archive of thousands of slides and photographs, and objects. Art History alone has more than 80,000 slides in its image library.

Dr Katharina Lorenz from the Department of Classics said: "Digital technologies are dramatically changing the appearance and delivery of our teaching and research. The Humanities are ideal disciplines to engage with these new visualisation methods because most of the sources we deal with are highly fragmented — to bring them to life, sophisticated technologies and methodological rigour are required."

Art History's Dr Mark Rawlinson added: "New digital technologies are capable of producing high-quality scans of individual artworks which help preserve originals whilst simultaneously offering access to students, researchers and members of the public from anywhere in the world. 3D modelling also enables the recreation of art exhibitions from the past, creating a new kind of visual archive and offering the opportunity to take virtual tours of historical art shows."

Dr Will Bowden from Archaeology said: "The 3D modelling of objects will have a direct benefit for our research projects and will also stimulate new developments in teaching, for example allowing students to undertake detailed examination of objects that would be otherwise unavailable to them, or allowing multiple students to simultaneously examine and discuss a single object."

In collaboration with the University's Centre for Advanced Study and the Digital Humanities Network, the Centre will also provide a meeting hub to exchange ideas and develop projects in the area of Digital Humanities. Further details and enquiry form can be found on the Centre's website at www.nottingham.ac.uk/digitalhumanities

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90440&CultureCode=en

Tobacco: Out of sight, out of mind?

Nottingham, University of

Putting tobacco out of sight in shops can change the attitude of young people to smoking, while not hitting retailers in the pocket, researchers at The University of Nottingham have discovered.

Academics from the University's UK Centre for Tobacco Control Studies looked at the effect of the removal of tobacco displays in the Republic of Ireland, ahead of similar legislation which is due to come into force in the UK. The findings are published today in the journal Tobacco Control.

In one study the research team found that the number of teenagers who recalled tobacco displays dropped from 81 per cent to only 22 per cent, after July 1 when the displays were removed.

After they were removed, fewer young people believed smoking is widespread among their peers — before this 62 per cent thought that more than one in five children their own age smoked, which fell to 46 per cent afterwards.

After displays were covered up, 38 per cent of teenagers thought the measure would make it easier for children not to smoke and 14 per cent of adults thought the law made it easier to quit smoking. The research also showed support for putting tobacco out of sight rose from 58 per cent to 66 per cent after the measure came into force.

Professor Ann McNeill, lead researcher on the project, said: "Our research shows that removing point of sale displays of tobacco has a measurable impact on how young people think about tobacco, and helps underline that they are not 'normal consumer products'. The law is popular among adults, even adult smokers.

"Removing cigarettes from sight will stop smokers from being constantly reminded of tobacco. Our research adds to the clear body of evidence that this measure should be implemented by other countries as soon as possible."

In a further study, the team showed that taking tobacco displays down did not result in any loss of income for retailers. The results should ease concerns that the measures — which are designed to protect children from tobacco marketing and uncontrolled access to cigarettes — will have a negative effect on business. They rebuff claims that Irish shops suffered a large drop in sales and small businesses have expressed concern about this in Ireland.

Dr Quinn, the economist at the University of Nottingham stated: "As expected we did not see any significant change in sales following the implementation of the legislation beyond the trend of falling sales that already exists. This legislation was designed to make smoking less attractive to children and young people not to make adult smokers quit. It will take some time for the impact to work its way through as the next generation of children grow up protected from large and colourful cigarette displays every time they go to buy their sweets. These findings contradict several reports coming from the retail sector that cigarette sales have rapidly decreased since the removal of promotional displays and that this decline is due to the new legislation.

Professor McNeill added: "The removal of point of sale displays is aimed at reducing the pernicious effects of tobacco advertising on children and is therefore likely to have an impact on sales over a much more protracted time period. Removing tobacco displays from sight is important to help reduce the devastating impact tobacco has on so many lives. Our research shows that retailers do not need to fear this measure designed to protect children from tobacco marketing."

Tobacco displays were removed and cigarette vending machines outlawed in Ireland on July 1 2009 and similar legislation is due to be introduced across the UK in October 2011 for large shops and October 2013 for smaller retailers.

The research projects both received funding from Cancer Research UK, the leading charity dedicated to beating cancer through research.

Jean King, Cancer Research UK's director of tobacco control, said: "This evidence from Ireland adds to that from other countries to show that businesses easily adapt when tobacco displays are removed. Claims by the tobacco industry and groups supported by it have been to the contrary, but research-based evidence like this helps to debunk the myths.
"Removing tobacco displays in shops will help protect children from tobacco marketing. For too long the law has allowed the flashy, eye-catching walls of cigarettes to remain when most other forms of advertising have been removed. Half of all long-term smokers will be killed by tobacco so doing all we can to stop the next generation from starting to smoke is vital."

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90437&CultureCode=en

Early Diagnosis of Rheumatoid Arthritis Crucial to Positive Outcomes for Patients

Wiley - Blackwell

Delay in Assessment by Rheumatologist Increases Risk of Joint Destruction, Decreases Remission Chances

Positive outcomes in rheumatoid arthritis (RA) are closely linked to early diagnosis and treatment with disease-modifying antirheumatic drugs (DMARDs). A study by researchers in the Netherlands found that patients who are assessed by rheumatologists soon after RA symptoms appear are more likely to experience less joint destruction and improved chances of DMARD-free disease remission. Details of this novel study are published in the December issue of Arthritis & Rheumatism, a journal of the American College of Rheumatology.

The World Health Organization (WHO) estimates that RA affects up to 1% of the population worldwide and is associated with increased morbidity, mortality, and healthcare costs. This chronic, systemic disease is characterized by inflammation in the lining of the joints which can frequently lead to joint damage. Current medical evidence suggests that early initiation of an optimal RA treatment strategy—within 12 weeks of symptom onset—can prevent joint damage, improve long-term function, and increase the likelihood of achieving disease remission.

Dr. Michael van der Linden and colleagues from the Leiden University Medical Center examined 1674 early arthritis patients from the Leiden Early Arthritis Clinic cohort. Of those participants, 598 (36%) were RA patients who were diagnosed between 1993 and 2006. Researchers studied the associations among total delay to physician assessment, achievement of DMARD-free-remission, and the rate of joint damage over a six-year follow-up period. Total delay was calculated as the sum of "patient delay" (time from symptom onset until patient seeks and is assessed by a general practitioner (GP)) and "GP delay" (time lapse between seeing the GP and a referral to- and appointment with a rheumatologist).

Results showed the median patient, GP, and total delay in evaluation of early arthritis patients were 2.4, 8.0, and 13.7 weeks, respectively. "Early treatment intervention dramatically improves clinical outcomes in patients with RA," said Dr. van der Linden. "Our study presents the first evidence that RA patients who have a delay longer than 12 weeks between first symptoms and visiting a rheumatologist have a higher rate of joint destruction and lower chance of achieving a sustained DMARD-free remission." In 69% of RA patients, an examination by a rheumatologist took place 12 or more weeks after symptoms began, which researchers suggest contributed to a joint destruction rate that was 1.3 times higher than patients assessed prior to 12 weeks. A delay in treatment was also associated with greater risk (1.87 hazard ratio) of not achieving DMARD-free disease remission.

In a related editorial published in this month's issue, Dr. Paul Emery, Arthritis Research UK Professor of Rheumatology and Head of Musculoskeletal Diseases at Chapel Allerton Hospital in the United Kingdom and Dr. Vivian Bykerk from Brigham and Women's Hospital in Boston, Massachusetts point out that previous studies showed delays to care are frequent, but the study by van der Linden et al. was the first to actually document the negative impact of delayed RA treatment. "These data provide further evidence that

rheumatologists have the greatest impact on patients with RA when they intervene early in the disease course," commented Dr. Emery. He further noted strategies that may help reduce delays in care such as prescreening referrals, an introduction of a specialized rheumatology referral form for GPs to use that identify urgent referrals, or set-up of central triage clinics.
Dr. van der Linden concluded, "Our results highlight the importance of reducing the delay in assessment by a rheumatologist and further studies could test whether accelerated treatment leads to improved disease outcomes in RA." The ACR and European League Against Rheumatism (EULAR) have set up a task force to address the issue of improving RA patient outcomes through early intervention.

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90431&CultureCode=en

Growth-factor gel shows promise as hearing-loss treatment

BioMed Central Limited

A new treatment has been developed for sudden sensorineural hearing loss (SSHL), a condition that causes deafness in 40,000 Americans each year, usually in early middle-age. Researchers writing in the open access journal *BMC Medicine* describe the positive results of a preliminary trial of insulin-like growth factor 1 (IGF1), applied as a topical gel.

Takayuki Nakagawa, from Kyoto University, Japan, worked with a team of researchers to test the gel in 25 patients whose SSHL had not responded to the normal treatment of systemic gluticosteroids. He said, "The results indicated that the topical IGF1 application using gelatin hydrogels was safe, and had equivalent or superior efficiency to the hyperbaric oxygen therapy that was used as a historical control; this suggests that the efficacy of topical IGF1 application should be further evaluated using randomized clinical trials".

At 12 weeks after the test treatment, 48% of patients showed hearing improvement, and the proportion increased to 56% at 24 weeks. No serious adverse events were observed. This is the first time that growth factors have been tested as a hearing remedy. According to Nakagawa, "Although systemic glucocorticoid application results in hearing recovery in some patients with SSHL, approximately 20% show no recovery. Topical IGF1 application using gelatin hydrogels is well tolerated and may be efficacious for these patients".

http://www.biomedcentral.com/bmcmed/

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90416&CultureCode=en

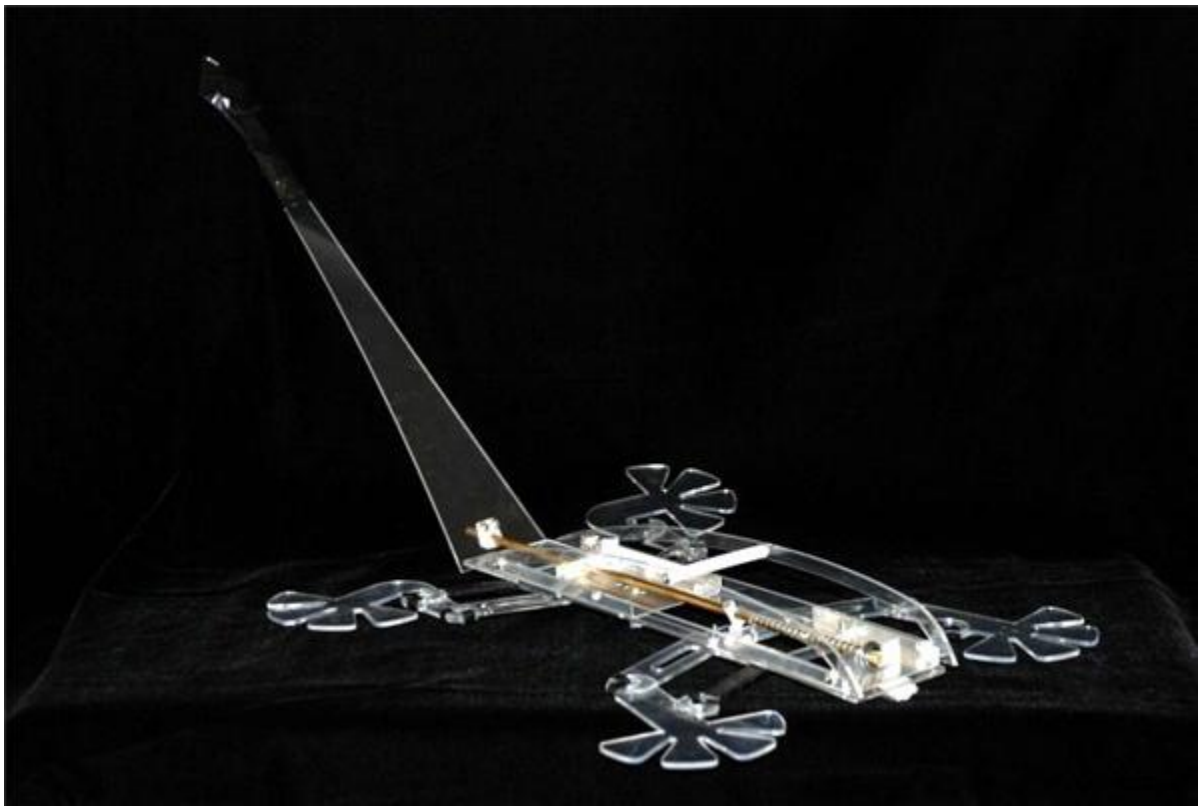
Fatal blood clot genetic risk breakthrough announced

Leicester, University of

An international team led by researchers from the Universities of Leicester and Cambridge has announced a breakthrough in identifying people at risk of developing potentially fatal blood clots that can lead to heart attack.
The discovery, published this week (25 November) in the leading haematology journal *Blood,* is expected to advance ways of detecting and treating coronary heart disease – the most common form of disease affecting the heart and an important cause of premature death.
The research led by Professor Alison Goodall from the University of Leicester and Professor Willem Ouwehand from the University of Cambridge and NHS Blood and Transplant was carried out in collaboration with colleagues at the Wellcome Trust Sanger Institute, University College Dublin, and the University of Leuven, as part of a large programme to discover novel genes regulating platelets; the tiny cells in the blood that stick together to form a blood clot.
Understanding what makes these cells more sticky in some people than others could provide potential therapeutic targets for treatment of cardiovascular disease.
Lead author Professor Goodall, of the Department of Cardiovascular Sciences at the University of Leicester, said: "We have long known that platelet activity and clot formation varied between different people – but we now have identified some of the genetic reasons for this."
Professor Ouwehand said the research had uncovered a new molecule that plays an important role in platelets. He said: "Studies in large number of NHS patients who experienced a heart attack and healthy controls suggests that genetic differences in the gene for this protein slightly modifies the risk for blood clots. This type of study will help us to unravel the complex question why some people have a higher risk of a heart attack than others. One day this type of research may lead to a new generation of drugs that can be used to reduce the risk of this devastating disease."
The study was carried out as part of the European Union funded Bloodomics's project.

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90410&CultureCode=en

When bird meets machine, bioinspired flight



Institute of Physics

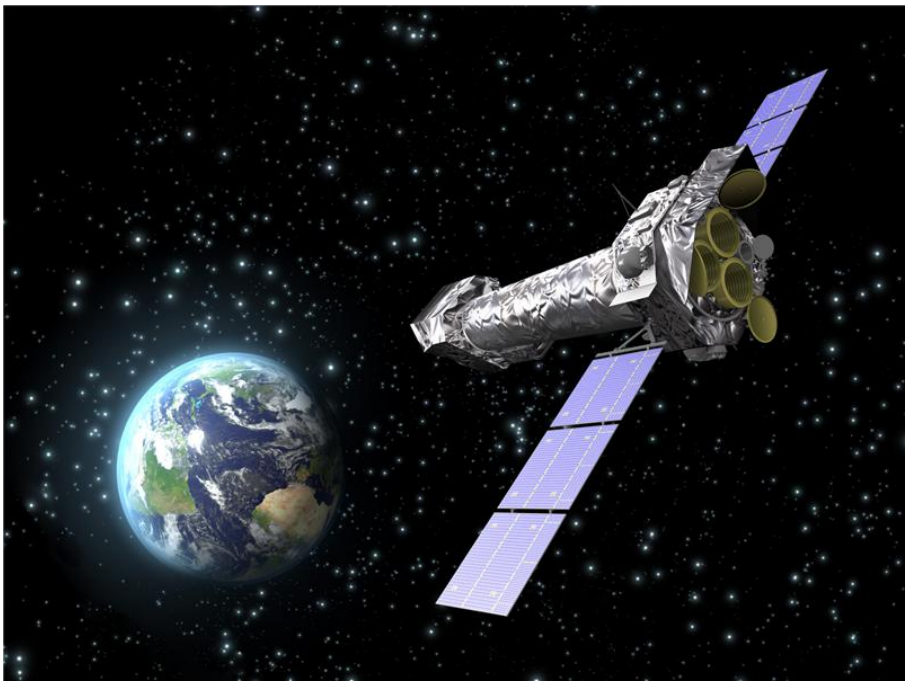
- Everything will be available from the special edition contents page - http://iopscience.iop.org/1748-3190/5/4

Working at a crossroad between biology and engineering, scientists have modeled and are now mimicking the ingenious natural design of falling geckoes, gliding snakes, cruising seagulls, flapping insects and floating maple seeds to improve the design of air vehicles.
IOP Publishing's Bioinspiration & Biomimetics publishes a special edition today, Wednesday 24 November 2010, entitled *Bioinspired Flight*, comprising of nine journal papers which display the wealth of knowledge being accrued by researchers in the field.
Nature outclasses man's best efforts at robotic flight, as even the geometry and descent dynamics of a simple maple seed lead one research team from the University of Maryland, led by Dr. Evan Ulrich, to show that micro helicopters could be much simplified by imitating the maple seed's wing pitch for controlled hovering and, surprisingly, forward flight.
The issue, starting with two papers on tactics employed for controlled descent by geckoes and flying snakes, is accompanied by a selection of films - four of which are available on YouTube.
The first film, from a team led by graduate student Ardian Jusufi from UC Berkeley, shows how researchers have studied the gecko's trick of employing its tail to right and turn itself mid-air, helping it always fall on its feet, and have now made a robot model gecko which can employ the same grace on descent.
A second film from Professor Jake Socha and his team at Virginia Tech displays the mystifying skills of flying snakes, which direct their flight mid-air by slithering.
Moving on from tactical descent, the special edition also covers humming birds' perfect hover; birds' intuitive exploitation of thermal updrafts; the mechanical motion of insects' wings, and seagulls' magnificent sense of flight environment, which allows them incredible angles of attack and increased control in crosswinds.

As the special edition's editor, Professor David Lentink from Wageningen University, writes in an accompanying editorial, "Because biologists and engineers are typically trained quite differently, there is a gap between the understanding of natural flight of biologists and the engineer's expertise in designing vehicles that function well. In the middle however is a few pioneering engineers who are able to bridge both fields."
All articles in the special edition will be available to read from Wednesday 24 November at http://iopscience.iop.org/1748-3190/5/4
YouTube clips are available from http://www.youtube.com/user/InstituteofPhysics?feature=mhum#p/c/B675B10CD3DBC204

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90395&CultureCode=en

Europe maintains its presence on the final frontier



European Space Agency

ESA has decided to extend the productive lives of 11 of its operating space science missions. This will enable ESA's world-class science missions to continue returning pioneering results until at least 2014.

ESA's Science Programme Committee (SPC) had to make significant decisions at its 18-19 November meeting in Paris: 11 science missions, all of them still working beyond their planned lifetimes, all of them still delivering exceptional science, and yet all coming to the end of their funding.

"Their longevity is a testament to the care with which the industrial teams built these satellites, the expert way the project teams operate them, and the ingenuity of the scientists who keep thinking of new and valuable science investigations to make with them," says Martin Kessler, Head of ESA's Science Operations Department.

Two years ago, a new approach to extending missions was built into ESA's financial plan for science missions. It means that, every two years, a comprehensive evaluation is made of all missions approaching the end of their funding, with a view to extending them.

The missions under consideration during this round were Cluster, Integral, Planck, Mars Express, Venus Express and XMM-Newton - all led by ESA.

Also considered were ESA's contributions to the international collaborative missions Hinode (with Japan), Cassini-Huygens, Hubble Space Telescope and SOHO (all with NASA), and to science operations of ESA's Proba-2 technology demonstrator.

Last week, the SPC confirmed previously agreed extensions for these missions until 2012 and approved new extensions to 2014, subject to confirmation in late 2012 on the regular two-year cycle.

The extensions for SOHO, Hinode and Proba-2 will ensure that our Sun is closely watched during the rise to its next peak of magnetic activity, expected in 2013. Meanwhile, the four Cluster satellites will measure the effect of this activity nearer to home, in Earth's magnetosphere.

ESA last year launched the Herschel observatory working in the infrared and submillimetre bands. ESA's now-extended high-energy observatories, Integral and XMM-Newton, mean that European astronomers have access to an unprecedented range of observations providing unique insights into the violent Universe. These

complement the ultraviolet, visible and near-infrared data flowing from the long-serving Hubble Space Telescope.
Within the Solar System, Mars Express and Venus Express are investigating Earth's nearest planetary neighbours, while Cassini-Huygens continues its comprehensive study of Saturn and its moons.
The Planck satellite is mapping the leftover radiation from the Big Bang, the 'cosmic microwave background radiation'. The new decision calls for a one-year extension to use its low-frequency sensor in a new way to extract as much information as possible from the signals that constitute a blueprint of the Big Bang.
"It is not an easy time to make such commitments but we should not doubt the wisdom of the SPC in squeezing even more return from the big investments of the past," says David Southwood, ESA's Director of Science and Robotic Exploration. "The highest quality science will continue to flow from this armada of spacecraft. It is a good day for European space science. Europe will continue to play an important part in unlocking the mysteries of our Universe."
http://www.esa.int/esaSC/SEMR1MIRPGG_index_0.html

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90386&CultureCode=en

Research demonstrates the cost effectiveness of ecological restoration

Bournemouth University

Research demonstrates the cost effectiveness of ecological restoration in the drylands of Latin America
Research published today by the leading academic journal *Proceedings of the National Academy of Sciences (PNAS)* provides new evidence that ecological restoration can provide a cost effective response to environmental degradation.
The research focused on the dryland forests of Latin America, and examined the cost effectiveness of ecological restoration techniques such as tree planting and forest regeneration. This was achieved using a novel research approach, which involved mapping the value of different benefits provided by these forests. The research was conducted by a team of ecologists from the UK, Mexico, Chile and Argentina, headed by Professor Adrian Newton of Bournemouth University, UK.
Worldwide, billions of dollars are now being spent annually on different approaches to ecological restoration, which aims to reverse the process of environmental degradation. However, very little evidence is available regarding whether such interventions are cost effective. The problem of environmental degradation is most intense in arid and semi-arid areas, which together cover nearly 30% of the earth's surface and comprise half the surface area of the world's developing countries.
Despite their aridity, dryland areas are of global importance for biodiversity, being the centres of origin for many agricultural crops and other economically important species. Rural communities in dryland areas are often highly dependent on forest resources to support their livelihoods, particularly fuelwood and fodder. However, in many areas dryland forests have been subjected to unsustainable land use practices, including expansion of rangeland for livestock, overharvesting (particularly for fuelwood), conversion to agriculture and rapid growth of urban settlements. These processes have resulted in the widespread degradation of dryland ecosystems, which has resulted in negative impacts on biodiversity, soil fertility and water availability, and on the livelihoods of local people[1].
Environmental degradation presents a major challenge to policy initiatives aiming to support sustainable development. Restoration of dryland forest ecosystems can potentially offer a solution to this problem. With this in mind, the team of academics led by Jenny Birch, analysed six different study areas across Latin America. As she explains: "Values were analysed through interviews with local people and other stakeholders and by reference to the scientific literature. Research focused on valuing the benefits provided by forests to people, including carbon sequestration, timber, non-timber products (such as medicines and honey), and

tourism. The costs of forest restoration were also estimated, including loss of livestock production, cost of fencing, fire suppression and tree establishment."
Three different restoration approaches were examined, which were compared using a simulation model of forest landscapes. This enables the potential future impact of restoration approaches on the provision of benefits to people to be compared.
The results showed that ecological restoration of dry forests is most likely to be cost effective if 'passive' approaches are adopted, which support the natural process of forest recovery. 'Active' restoration approaches, involving tree planting, are less likely to be cost effective, because of the high costs associated with new tree establishment. However, in each of the study landscapes, some locations were identified where even this approach is likely to be cost effective.
Professor Adrian Newton, who coordinated the research project, explains the potential impact of the study. "At the recent meeting of the Convention of Biological Diversity in Nagoya, Japan, countries of the world committed to a new target to restore 15% of degraded ecosystems worldwide by 2020. Our research demonstrates that in dryland areas, where it is most needed, investment in ecological restoration can provide a net increase in the value of ecosystems to people. Hopefully, our research will encourage decision-makers to support restoration efforts, so that the global restoration target is achieved".
The research paper is freely downloadable from:
http://www.pnas.org/

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90362&CultureCode=en

Norway: Adapting to climate change via research

Research Council of Norway, The

A new government report documents Norway's vulnerability to climate change and discusses adaptation measures. The committee behind the report emphasises that research must be a prioritised means of addressing climate challenges.

"The report validates the national Klima21 strategy approved earlier this year," says Arvid Hallén, Director General of the Research Council. "The new report supports the strategy's recommendations in terms of both research needs and the need for funding climate research."

Climate projections

Entitled "Adapting to a changing climate", the report deals with the full range of climate-related challenges facing society. The committee that prepared the report was headed by Oddvar Flæte, County Governor of Sogn og Fjordane County, and based its work on three climate projections which, together, provide a risk picture of potential impacts during this century:

- Annual average temperatures in Norway are projected to rise 2.3°C to 4.6°C. The largest increases will occur in wintertime and in Northern Norway, the smallest in summertime and in Western Norway.
- Annual precipitation is expected to increase by five to 30 per cent by the year 2100, but with large seasonal and regional variations. More days with heavy precipitation are also expected.
- Ocean temperatures will rise along the entire Norwegian coastline and in the North Sea. Ocean acidification will worsen, likely dropping in pH value by 0.5 units.
- By the year 2100, sea levels could rise 50–100 cm along Norway's southern and western coastlines, 40–90 cm in Northern Norway, and 20–70 cm in the Oslo Fjord and Trondheim Fjord.

The committee recommends that impacts and response measures be assessed on the basis of the projection(s) that pose the greatest challenges for the various sectors.

More research needed in many fields

The report states that the need for a regularly updated knowledge base is not adequately met through ordinary research programmes and projects of a relatively short-term nature. The committee therefore supports the Klima21 strategy's recommendation to establish large-scale, long-term research programmes that specifically address the climate system and the impacts of, and adaptation to, climate change. It also recommends that the

Research Council establish a strategic research programme for the construction industry with a primary focus on the impacts of climate change on that industry.
Existing monitoring programmes must be shored up and new programmes must be developed, particularly relating to the natural environment and natural hazards. The committee also advises strengthening the monitoring of wind and short-term precipitation.
A focus on knowledge dissemination
The report gives high priority to the dissemination of research-based knowledge to the public administration and trade and industry. There is a great need for downscaled and specially prepared climate projections, and for data from monitoring, mapping and climate modelling in formats that are comprehensible to users in sectors and technical circles that do not possess expertise in meteorology or hydrology.
Social science perspectives missing
Dr Hallén expressed disappointment over how little mention the committee made of social science research, which he says could provide valuable insight into how to implement the proposed measures.
"The committee recommends investing in databases, knowledge centres, mapping and monitoring – all of which are necessary as a basis for sound planning. But social science research, which can provide answers for how to convert that knowledge into action, is forgotten along the way. How should the necessary adaptations be managed and funded?" asks Dr Hallén. "And how should society distribute the costs between those who are most at risk from climate change and those who personally will be spared the worst of the environmental problems?"
Impacts of global changes
Dr Hallén would also welcome a stronger focus on the indirect impacts on Norway of the major climate change occurring in far more vulnerable places around the world. "Because Norway's economy is tightly integrated with the global economy, we need much more knowledge about how these global changes will affect our nation socially and economically."
http://www.forskningsradet.no/en/Newsarticle/Adapting_to_climate_change_via_research/1253963115433?WT.mc_id=alphagalileo

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90347&CultureCode=en

The Attention-Span Myth

By VIRGINIA HEFFERNAN

Kevin Van Aelst

We seem to know a great deal about attention spans, those constituents of character that have become the digital-age equivalent of souls.

Everyone has an attention span. It can be short or long. Long is good. Good scholars, good citizens and good children have long attention spans. Attention spans used to be robust; now they are stunted. Technology — MTV, the Internet, the iPhone — shriveled them. Nicholas Carr, who argued in "The Shallows" that Web use practically causes brain damage, told PBS that technology is "pushing even more distractions and interruptions on us" and thus will never "return to us our attention span."

At the same time, there is a pro-technology view of attention spans — rarer, but no less confident. Science writers like Jonah Lehrer have pointed to studies that seem to demonstrate perfectly respectable attention spans in gamers and Web users.

And so polemicists of various stripes continue to calibrate the effect of technology on attention spans. But I'm surprised that anyone ventures so far into this thicket of sophistry. I get stuck much earlier in the equation. Everyone has an attention span: really? And really again: an attention span is a freestanding entity like a boxer's reach, existing independently of any newspaper or chess game that might engage or repel it, and which might be measured by the psychologist's equivalent of a tailor's tape?

Maybe my own brain is faltering in a Web wasteland, but I don't get it. Whether the Web is making us smarter or dumber, isn't there something just unconvincing about the idea that an occult "span" in the brain makes certain cultural objects more compelling than others? So a kid loves the drums but can hardly get through a chapter of "The Sun Also Rises"; and another aces algebra tests but can't even understand how Call of Duty is played. The actions of these children may dismay or please adults, but anyone who has ever been bored by one practice and absorbed by another can explain the kids' choices more persuasively than does the

dominant model, which ignores the content of activities in favor of a wonky span thought vaguely to be in the brain.

So how did we find ourselves with this unhappy attention-span conceit, and with the companion idea that a big attention span is humankind's best moral and aesthetic asset? In other eras, distractibility wasn't considered shameful. It was regularly praised, in fact — as autonomy, exuberance and versatility. To be brooding, morbid, obsessive or easily mesmerized was thought much worse than being distractible. In "Moby-Dick," Starbuck tries to distract Ahab from his monomania with evocations of family life in Nantucket. Under the spell of "a cruel, remorseless emperor" — his own single-mindedness — Ahab stays his fatal course. Ahab's doom comes from his undistractibility.

In 19th-century American literature, the resting state from which characters seek distraction is sorrow or fury. No wonder distraction seems kind. In "The Adventures of Tom Sawyer," Tom, the prototypical hyperactive rascal who plays with a beetle rather than sit still in church, resists sadness "not because his troubles were one whit less heavy and bitter to him than a man's are to a man, but because a new and powerful interest bore them down and drove them out of his mind for the time — just as men's misfortunes are forgotten in the excitement of new enterprises."

In the 1920s, a decade before T. S. Eliot recognized being "distracted from distraction by distraction" as part of the modernist plight, Bertolt Brecht made the case for a "smokers' theater," which encouraged the audience to light up cigars during plays. Condemning his fellow Germans for being "uncommonly good at putting up with boredom," he hoped that by smoking during a play — or pacing, talking, walking out — they could also cultivate individuality and ideally an immunity to tyranny. A healthy fidgetiness would keep them from sitting silently, sheepish and spellbound.

And speaking of sitting silently without fidgeting: that's essentially what we want of children with bum attention spans, isn't it? The first sign that a distractible child is doing "better" — with age or Adderall, say — is that he sits still. This is why the A.D.H.D. diagnosis, which popularized the idea of an "attention span" that can be pathologically short, grew out of the old "hyperactive" diagnosis. The hyperactive child squirmed at church and at the dinner table, embarrassing his mother.

At some point, we stopped calling Tom Sawyer-style distractibility either animal spirits or a discipline problem. We started to call it sick, even after an early twin study showed that a relatively short attention span is virtually synonymous with standard-issue irritability and distemper. But the fact that the attention-span theory makes news of what was once considered ordinary or artistic behavior is not what's wrong with it. These cultural transitions — disruptive as they are — happen all the time as society's demands on individuals change.

Instead, the problem with the attention-span discourse is that it's founded on the phantom idea of an attention span. A healthy "attention span" becomes just another ineffable quality to remember having, to believe you've lost, to worry about your kids lacking, to blame the culture for destroying. Who needs it?

Points of Entry: This Week's Recommendations

SNACK CULTURE

"New Media, Young Audiences and Discourses of Attention: From 'Sesame Street' to 'Snack Culture,' " by Michael Z. Newman, in the July issue of Media, Culture and Society: mcs.sagepub.com.

COMIC TIMING

Jerry Seinfeld says: "There is no such thing as an attention span. There is only the quality of what you are viewing." His latest proof is the Broadway show "Long Story Short," which he is directing.

DISGUSTING GRAMMARS

Back in 1798, Sir Alexander Crichton noted many students "to whom the dryness and difficulties of the Latin and Greek grammars are so disgusting that neither the terrors of the rod, nor the indulgence of kind intreaty can cause them to give their attention to them." Up-to-date info on A.D.H.D. can be found at health.nytimes.com.

http://www.nytimes.com/2010/11/21/magazine/21FOB-medium-t.html?_r=1&ref=magazine

In China, Cultivating the Urge to Splurge

By DAVID LEONHARDT

When the Wuqi International Hotel was completed this spring, it immediately dominated the modest skyline of Wuqi, a small city in north central China. The hotel stands 21 stories tall and is wrapped in gleaming gray metal, with two glass elevators running up the outside. On a recent stay there, I had a clear view of the nearby mountains from my 19th-floor room.

The hotel is part of an effort by local officials to reshape their city in ways that many economists, both inside and outside China, have been recommending for the country as a whole. The government of Wuqi (pronounced, roughly, Wu-tzi) offers more generous health insurance to its citizens than many places. Its schools are free all the way through high school, rather than through only ninth grade, as is usual in China, and have been the subject of admiring stories in the Chinese media. Over the last decade, the city has embarked on an ambitious tree-planting program that has brought green to the yellow-brown hills of the Loess Plateau, where Wuqi is located. The Communists ended their Long March in those hills in 1935, and the Wuqi International Hotel is meant to host tourists who come for this history.

The larger idea is to build a more sustainable economy, or what Chinese leaders have called a balanced and harmonious society. In that economy, families would not have to save 20 percent of their income in order to pay for schooling and medical care, as many do now. They would instead be able to afford more of the comforts of modern life — better housing, clothing, transportation and communication. In time, China would become the world's next great consumer society.

That term may have negative connotations in the United States, particularly after the last decade of debt excess. But the term means something very different for China. A Chinese consumer society would improve the lives of hundreds of millions of people. The benefits of the industrial boom that began in the 1980s would spread more rapidly beyond the country's eastern coast. The service sector would grow, and the economy would no longer be quite so dependent on smoke-spewing factories.

For the rest of the world, the Chinese consumer is one of the best hopes for future economic growth. In the years ahead, when the United States, Europe and Japan will have no choice but to slow their spending and pay off their debts, China could pick up the slack. Millions of Americans — yes, millions — could end up with jobs that exist, at least in part, to design, make or sell goods and services to China. This possibility helps

explain why Democrats, Republicans, economists, business consultants, corporate executives and labor leaders all devote so much time to urging China to consume more. One subtext of the recent G-20 meeting in Seoul was the encouragement of Chinese consumption.

What's striking about Wuqi is just how serious its officials are about making this transition happen — and yet how difficult it nonetheless will be. The Wuqi International Hotel was as comfortable as most Marriotts or Hiltons in the United States, but the surrounding streets had the dusty feel of a backwater. The hardware, liquor and food stores down the block were each the size of a storage closet and about as well lighted. In the evenings, when Wuqi residents gathered in a public square to talk or perform exercises together, many of the stores were closed. The parents I met were thrilled that high school was free but were still saving an enormous portion of their modest incomes to pay for college or a new home. Those savings create a self-reinforcing cycle, in which stores don't flourish because people don't shop much and people don't shop much partly because there aren't many good stores. As Feng Zhendong, Wuqi's reform-minded Communist Party secretary, says, "There's only so much to spend on."

Then there was the hotel itself. During my first night there, I don't think I saw a single other guest — in the lobby, the restaurant, the elevator or on the 19th floor. After I used the hotel gym, the front desk called to ask if I would be using it the next morning as well. In that case, someone would make sure it was unlocked.

No one believes the Chinese economy will transform itself overnight. But how long will it take and how difficult will it be? Preoccupied with our own economic insecurity, Americans may well be underestimating the challenges — and fears — of their new rival.

The rise of China can often seem inevitable. It is the world's most populous country, now reclaiming its long-lost power. Its economy recently passed Japan's as the second-biggest in the world, leaving economists to debate whether China was on pace to overtake the United States by the year 2025 or 2030. Yet China's rise has been anything but inevitable. Consider other poor countries — in South America, Africa and even Asia — with vast pools of cheap labor, which nonetheless have not been able to grow rapidly. Or consider other once-socialist countries, mostly in Eastern Europe, still suffering from a post-Soviet hangover. Even look at India, which is often paired with China as the great growth story of modern times. As recently as 1990, India had a comparable per-capita income to China. Today, China's is more than twice as high. So having a lot of cheap labor or moving toward a market system, or even both, does not guarantee the phenomenal growth China has experienced.

That growth — among the most rapid in human history — has been a result of strategy and good fortune. The Maoist period was brutal and repressive, but despite the terrible famines and the Cultural Revolution's assault on education, China did emerge with an unusually literate and healthy population for a poor country. Toward the end of that period, even before the one-child policy, a baby boom ended, creating a relatively small group of children and elderly to be supported by a large group of able workers. Into this fertile economic ground, Deng Xiaoping and his fellow reformers planted the seeds of a market evolution. Workers gained an incentive to succeed, while central planners, unconstrained by democracy, made the investments to turn China into the world's factory.

This model is part of something that has been called the Beijing Consensus, and it is understandably appealing to other poor countries. Yet in many respects it is not new. Politics aside, China's story is the classic one of economic development: investments in physical capital and education make a society more productive and are combined with a huge shift of people from farms to factories. England, Germany, the United States, Japan and South Korea have all followed the model over the last 250 years. The economist Gregory Clark, author of "A Farewell to Alms," calls it the only story of economic development.

And this same story explains why China's continued rise is no more inevitable than its recent rise. From far away, China may look like an unstoppable colossus. From the inside, it looks more vulnerable. Indeed, Chinese economists, business executives and Communist Party officials are debating, sometimes passionately, just how vulnerable it is. "In the short and medium term, there should be no problem," says Yu Yongding, a prominent economist. Among other things, the government has built up enough savings to spend its way out of most problems over the next several years. "But there are fundamental contradictions in the Chinese economy. We can waste our strengths in one or two decades. If we exhaust these strengths, then we'll be in a big trouble."

To continue growing rapidly, China needs to make the next transition, from sweatshop economy to innovation economy. This transition is the one that has often proved difficult elsewhere. Once a country has

turned itself into an export factory, it cannot keep growing by repeating the exercise. It can't move a worker from an inefficient farm to a modern factory more than once. It cannot even retain its industrial might forever. As a country industrializes, workers will demand their share of the bounty, as has started happening in China, and some factories will start moving to poorer countries. Eventually, a rising economy needs to take two crucial steps: manufacture goods that aren't just cheaper than the competition, but better; and create a thriving domestic market, so that its own consumers can pick up the slack when exports inevitably slow. These steps go hand in hand. Big consumer markets become laboratories where companies know that innovations will be tested and the successful ones richly rewarded. Those products can then expand into countries with less mature consumer markets. Look at the telephone, the personal computer and the iPhone and iPad, all of which were designed in the United States and are now sold around the world.

Today's China cannot claim any such achievement, a fact that weighs on Chinese policymakers. They worry about the country's ability to innovate and, in particular, about the quality of its education system. When I met with Guo Shuqing, a party official and the chairman of China Construction Bank, in his office high above Beijing's financial district, he mentioned that a recent ranking of the world's top 100 universities included 53 from the United States but just three from mainland China. Even those numbers, Guo said, probably overstated the strengths of China's universities: "In terms of innovation — really original, creative ideas — they're very weak," he told me. By contrast, the American education system helped make possible Google and other companies.

Clearly, many of China's weaknesses can be ascribed to its stage of development. Yet there is no iron law that it will reach the next stage. Japan and the Soviet Union, in different ways, both failed to make the transition to an innovation economy. While they may seem like unimpressive comparisons today, they once occupied a position much like China's. They were rising powers that appeared to have found a new model for growth. In a 1994 essay in Foreign Affairs, Paul Krugman, the economist who is now a New York Times columnist, pointed out that Americans were then talking about Japan and the so-called East Asian tigers in ways remarkably similar to how they had talked about the Soviet bloc in the 1960s. "Once upon a time," he wrote, "Western opinion leaders found themselves both impressed and frightened by the extraordinary growth rates achieved by a set of Eastern economies."

The Soviet Union, of course, utterly failed to take the next steps. Japan did nurture some of the world's most successful exporters, like Sony and Toyota, and developed just-in-time manufacturing processes that were widely copied. But its domestic market remains sheltered and inefficient, especially in the service sector, which has held back growth and innovation. Japan has not merely slowed down, as is inevitable when countries get richer; it has become a global symbol of economic mismanagement. These troubles seem directly relevant to China, given that China, too, has protected much of its domestic economy from competition.

The United States, for all of our current problems, is still easily the world's largest economy, which is partly because we made the transition from an industrial economy to a consumer economy. Income in the United States remains about 30 percent higher than in Germany or England on a per-capita basis, 40 percent higher than in Japan and more than six times as high as in China.

China does have advantages that other countries did not, starting with its size. But it still will not find the transition easy. A consumer economy revolves around individual choice, and Beijing's authoritarian government is often hostile to the idea of choice. The government is also filled with many officials who have known only industrial-led growth — and have benefited from it — and who are at least as influential as the economic reformers preaching the virtues of domestic consumption. These reformers will have to persuade their colleagues to step back from the most aggressive industrialization any country has ever undertaken.

China now spends about 50 percent of its gross domestic product on a broad category economists call investment — roads, bridges, trains, ports, technology, factories and office buildings. That is the highest share in recorded history. During their great booms in the 1960s and '70s, Japan and South Korea never topped 40 percent. China itself was spending 35 percent only a decade ago.

Already, there are signs that China is bumping up against the limits of its industrial revolution. Other countries are frustrated with its growing share of exports and are pressing China to raise the value of its currency, the renminbi. And the demographic wind that has been at China's back is on the verge of switching direction, leaving the country with fewer workers and more retirees. Without a seemingly endless supply of cheap labor, companies will have to raise wages, which — like a higher renminbi — would make Chinese

exports less competitive. Even before the demographic trends put pressure on pay, this year's strikes at a Honda plant in Guangdong Province, among other factories, led some companies to lift wages more than 20 percent. Twenty-eight provincial governments increased their minimum wage between 12 percent and 32 percent.

Perhaps the most telling sign that China's economic model is reaching its limits is a decline in its efficiency. To maintain 10 percent annual economic growth, it has had to invest more and more in roads, buildings and the like. In other words, the return on its investments has begun to fall, which is never a good sign. "We've got a problem," Guo, the bank chairman, told me. "We realize this kind of growth is not sustainable. It's not the kind of problem like a financial crisis. But if such inefficiencies accumulate for quite a long time, you reach the point where, suddenly, maybe things burst."

During my recent stay in China, I came away, as many Westerners do, awed by the country's accomplishments. Cities have sprouted from nothing, allowing peasants to leap a century of economic history in a decade. Rural areas have highways that are smoother than in many major American cities. One bullet train I took could cover the distance between New York and Washington in an hour. The United States is on course to have such a train approximately never.

But once you start to notice the signs of unsustainability, you start seeing them everywhere. Some highways are strangely empty. So are some buildings. When I tagged along with a group of American businessmen on a tour of what we thought was a new energy-efficient office building in Hangzhou, a coastal city a couple of hours south of Shanghai, we soon realized that it was — hard as such a thing may be to imagine — a sample office building. It had been built to show potential investors what their business might look like if it moved to Hangzhou.

This unsustainability is especially pronounced in the current real estate mania. Housing prices have been soaring, despite government efforts to cool the market. Relative to rents, housing prices in Beijing, Shanghai and Hangzhou are higher than they were in most any American city at the peak of our housing bubble. In Beijing or Shanghai, four or five different real estate agencies might open on a single block. Other agents simply set up shop on the sidewalk, with a table and brochures. At traffic lights in Beijing, young men walk among the idling cars and hand out brochures for newly built apartments.

It is true that an economy growing as rapidly as China's can catch up to many of its excesses. But it will probably need to change to do so. Wages will have to rise faster, and people will have to spend more of their income. Otherwise, many infrastructure projects will end up resembling make-work, and house prices will fall. Banks and the government will then be saddled with bad loans, exhausting the fiscal strength that Yu and other economists see as China's biggest advantage.

None of this means China is on the verge of running out of steam. It probably has at least 5 or 10 years of rapid growth ahead, even if it simply doubles down on its current growth strategy, because it can still take more industrial market share from other countries. In a way, though, the country's short-term strengths in manufacturing and exporting may be another reason to wonder what the future holds. Those strengths will make it harder for China to summon the urgency to remake itself.

The debate over economic policy in China feels different from other political debates. People who will not mention the words "Tibet," "Falun Gong" or "1989" in polite conversation talk openly and critically about the state of the economy. The criticism serves party leaders' purposes in some ways, because it tends to underscore that China remains a poor country, unable — in their telling — to reduce pollution or raise the value of the renminbi without causing economic misery for its citizens. The closest thing to a loyalty test in the public discussion of the economy is the renminbi. Chinese economists often harshly criticize the United States for putting pressure on China to appreciate its currency, even if they eventually get around to mentioning that they, too, think it should rise.

Yu, the economist who worries that China has only a decade or two to avoid trouble, qualifies as a moderate reformer. Sixty-two years old, with a mop of graying hair and long, loose sideburns, he is part of the generation that has lived through nearly all of the Communists' time in power. His great-grandparents immigrated to the United States as laborers in the 19th century, but the family eventually returned to China. His father was a journalist, and Yu himself was going to college in Beijing when the Cultural Revolution began in the mid-1960s. Branded an intellectual, he spent 10 years working as a semiskilled laborer at the Beijing Heavy Machinery Factory. "If you were lucky, you went to a factory," he told me. The unlucky students were sent to remote provinces or worse. Still, he refers to his time in the factory as hard labor.

When not on the job, he read voraciously and realized he wanted to become an economist. He is not great at any one thing, he says, but is interested in many, including history and math. Economics seemed like the ideal profession. In 1979, he joined the Chinese Academy of Social Sciences, a research group founded as part of Deng's economic reforms. Except for the six years he spent at Oxford earning his doctorate, he has been at the academy ever since. Stephen Green, a Shanghai-based economist with Standard Chartered, the British bank, calls Yu one of the pioneers who brought statistically rigorous methods to Chinese economics and was willing to follow the evidence wherever it led. This doesn't make Yu a dissident, however. He calls himself quite conservative. "I believe in gradualism," he told me.

China's gradualist approach to economic policy has been a big part of its success. The country avoided the turmoil that some of Eastern Europe experienced when it switched almost overnight to a market system. China has also escaped the fate of old-style centrally planned economies like Cuba's, because Deng and his followers were more pragmatic than ideological. If something worked — if it led to growth and jobs — they usually favored it. As Yu says: "Growth has been the single-most-important objective of Chinese policies for decades. Without growth, there are not enough jobs, and there is instability." To create these jobs, the party has heavily subsidized companies, especially manufacturers that export goods. Some of these subsidies are direct and obvious, like those now benefiting China's clean-energy industry. But most are subtler. Yu ticked off a few:

The government holds down the price of coal, oil and other natural resources, hurting interior provinces that produce these resources to the benefit of coastal exporters that use them. Beijing also sets a ceiling on interest rates, which harms households trying to build a nest egg and helps capital-intensive businesses that borrow to expand. The price of labor is indirectly suppressed, too. Independent unions are illegal, and a household-registration system called *hukou* has long treated many migrants who move from distant provinces to cities to work as if they were illegal immigrants. Basic benefits — free schooling, pension, health insurance — are often unavailable to people who work outside their native regions.

The renminbi falls into the same category. By buying large amounts of United States Treasury bonds (and, to a lesser extent, Japanese and European bonds), China has kept its currency artificially low. The renminbi has roughly the same value today as it did in 1990, relative to a basket of other currencies, which is remarkable considering how much faster China's economy has grown than the world economy. The low renminbi holds down the price of Chinese-made goods in other countries, increasing exports. But it also means that foreign-made products are more expensive within China than they would otherwise be. In effect, China's government is deliberately reducing the buying power of its own consumers to subsidize its exporters.

On the currency, Yu takes the typical stance for a reform-oriented economist. "For the sake of China, I am a strong supporter of renminbi appreciation," he told me. On the other hand, he is angered by Americans who argue that the exchange rate damages the United States. "That's total rubbish," he says. "The problem is not between China and the United States. The problem is between American companies that invest in China and American workers within the United States." This analysis may overstate the case; because exports are a larger part of China's economy than imports, it does seem to benefit on net from the low renminbi. But Yu is certainly correct that Western companies with a large presence inside China — a long and influential list — also benefit from the low renminbi. American workers who have lost their jobs to outsourcing do not.

On a September afternoon, Yu and I were sitting in the living room of a hotel suite on the outskirts of Beijing. He lives in the city with his wife, but he was staying at the hotel for a few nights to attend a conference for American and Chinese economists called the Summer Palace Dialogue. The Summer Palace was the emperor's country retreat, and the resort where the economists were staying tried to combine ancient grandeur with five-star amenities. "I don't like this," Yu said, gesturing around the room with its finely appointed furniture. "It is too much. It is not necessary." Such excess, he noted, "is a problem with China's political system."

The subsidies that China showers on its corporate sector have been crucial to building an industrial economy. But they have also led to a severe concentration of income. Some of it takes a form Americans are used to: the rich receive a much larger share of the national income than they did a few decades ago. Forbes reported early this year that mainland China and Hong Kong had 89 billionaires. Japan, with an economy almost as large as China's and per-capita income several times higher, had just 22. Shanghai now has three of its own Louis Vuitton stores.

In addition to the high degree of income concentration, China has another kind of inequality. All the corporate subsidies have allowed companies to accumulate enormous profits, and a corporation's gains and losses ultimately flow to individuals. In China, today's huge profits mostly benefit the well-off, be they executives, investors or party officials. The well-off not only have much higher take-home pay than the rank-and-file but also tend to be the ones who have access to the benefits of hoarded corporate cash. Many of the new Audi and Buick sedans on the streets — China's versions of the Lincoln Town Car — are company cars, and many of the guests at the Summer Palace resort are on expense accounts. State-owned companies have done especially well, even in resource industries where the price of their products is kept artificially low. Huang Yiping, an economist who previously worked at Citigroup, points out that state-owned banks tend to have much grander office buildings than their private, generally foreign rivals. In Wuqi, the only building that compares with the new hotel is another hotel owned by the local oil company.

Yet despite the long boom, most Chinese citizens remain fairly poor. Per-capita G.D.P. is about $7,000, and consumption makes up only 35 percent of the economy, thanks to the high levels of savings and corporate profits. So per-capita consumption — the amount of money the average person spends — is only about $2,500 a year. In the United States, by comparison, it is about $30,000. In Brazil, where per-capita G.D.P. is one and a half times that of China's, consumption is more than two and a half times as high, or about $7,000.

Of course, anyone who has lived through the global bubble and bust of the last few years may wonder what's so great about a consumer society. In the United States, the idea that we have reoriented our economy toward consumption and don't make things anymore has become a standard lament, not a sign of progress. But China is a long way from consuming too much. Saying that China does not have a big-enough consumer economy is really another way of saying that not enough of its resources reach the broad mass of its people. If they had more resources, they would surely spend more. This is why the recent labor strikes, and the pay increases that followed, were so important. They were a sign that Chinese households might start to enjoy more of the fruits of the long boom.

In coming years, the pressure to raise wages will increase. The size of China's labor force, relative to the rest of its population, will peak in the next few years, if it hasn't already. The country is still a long way from facing labor shortages, but the flow of young workers from the countryside will slow. Companies will probably have to respond by raising wages of their existing workers or by moving inland, where wages are lower, and paying workers there what they once paid workers on the coast. Either way, the effect will be to raise the average wage nationwide. Foxconn, which employs 920,000 people making iPhones and other technology products, is opening new factories in Chongqing, a large city 1,000 miles inland.

Given that China is not exactly a free-market economy, the extent to which wages rise will depend in no small part on government policy. Party officials are themselves torn over what to do. One businessman told me he knew that most outsiders thought of China as a top-down, centralized country. "But China is a collection of special interests," he said, "like the U.S." Leaders understand that suppressing labor unrest may help economic growth in the short term by holding down wages and thus the price of exports. But many also know that economic discontent risks political instability of the kind that in the last century alone toppled an emperor and Chiang Kai-shek, led to the chaos of the Cultural Revolution and threatened the current regime in Tiananmen Square.

Yu finds the allocation of resources to be perhaps the most frustrating aspect of today's economy. Even as companies and the largest cities are prospering, many parts of society are starved of resources. Last year, Yu's wife spent part of the summer tutoring the daughter of the woman who cleans their building. The girl was moving from her hometown to live with her mother in Beijing and needed to learn English to keep up with her new classmates. The rural school she came from did not teach English. (Her family also had to pay tuition, because the *hukou* household-registration system denied them free education outside their home province.) In some rural areas, the teachers themselves have not graduated from high school. As part of a lecture he recently gave, Yu included some photographs among the usual economic charts and graphs. One showed students at their desks in a rural classroom, surrounded by muddy puddles on a dirt floor. Others showed the spectacular new Beijing Opera House, a bullet train and a series of gaudy provincial government buildings.

It is worth pausing for a minute on this contrast. In the big cities of the coast, the creation of a Chinese consumer society is proceeding apace. Sometimes, it can even seem a step ahead of the United States. On the tunnel walls between some stops of the Beijing subway, video advertisements move at the same speed as the

train, vying for riders' attention with televisions, also showing ads, inside the subway cars. Modern Chinese society hardly seems hostile to the idea of consumption. The problem is how little money so many people have.

Wuqi has been able to try a different economic model because it is neither too rich nor too poor. Located in Shaanxi Province, about a third of the way west from Beijing toward Tibet, it is too remote to be a factory boomtown. Indeed, it can feel more like part of China's past than its future. The billboards lining the mountain roads into Wuqi display Communist Party sayings like "Support the military, and the military should love the people." The older homes in the area are the same kind as those in which Mao and his comrades lived during their Shaanxi exile: mountainside caves, fronted by a stone archway and facade. But Wuqi also has oil. Feng, the party secretary, has decided to spend a large portion of the oil money on education.

Growing up in a farmer's family in Shaanxi, Feng was the sixth child of seven, and the only one to go to college. When I asked him why, he said his family could not afford to send more than one child and decided he was the most clever. Most of his siblings are now farmers or laborers. Feng became a hydro-engineer at a state-owned company until the party told him to go into government. Today, at 44, he travels around Wuqi in a government-issued white Toyota Land Cruiser, frequently checking e-mail on his Coolpad smartphone.

Many of the teachers Feng had growing up were unqualified. As party secretary, he has closed more than 100 village schools and built new, centralized ones. Students as young as 6 spend Sunday through Thursday nights in brightly colored dormitory rooms that, like many newer local houses, have archways evoking the caves. Wuqi has also raided other cities to hire well-regarded teachers, sometimes offering annual salaries equivalent to $30,000, which is several times what a locally hired teacher makes.

In some ways, Wuqi's schools are impressive. Feng made sure a new preschool was built in advance of a neighboring low-income apartment complex, so that children who moved in would immediately be able to enroll. The steps of an elementary school I visited were painted with American sayings to help students learn (like "That's all!" and, oddly, "I'm on a diet"). A middle school had a 2,500-seat sports stadium. At one Wuqi high school, uniformed students walked down a hallway beneath photographs of Amherst College and N.Y.U.

In other ways, though, the schools have a long way to go. Every high-school class I saw, for instance, had more than 50 students. The fairest conclusion seemed to be that Wuqi's schools were improving and that local party leaders were serious about continuing to improve them.

Education has already played an underappreciated role in China's rise. For decades, Chinese children have spent more years in school than their peers in other countries; among the world's many cheap laborers, China's have been uncommonly skilled. As Arthur Kroeber, editor of the China Economic Quarterly, says, "You can have a lot of cheap labor, but if that cheap labor can't read, can't follow instructions and is sick all the time, it doesn't help you."

The next step is to educate people not just for factory work but for the white-collar work that would be a growing part of a consumer economy. Much of that work requires a full high-school education, if not college too. Today 55 percent of China's adult population has graduated from high school (compared with less than 10 percent in India). But only about 5 percent of Chinese adults have a college degree of some kind.

The uneven quality of China's colleges presents one problem. A recent book coined the term "ant tribe" to describe the many struggling recent graduates, particularly of second- and third-tier colleges. Over the long term, the bigger problem is that education beyond junior high school is financially out of reach to many families. In most parts of China, tuition starts when children are about 14. In a recent poll, Chinese families cited education as the main reason that they save money.

Even in Wuqi, many parents, thinking ahead to college, worry about being able to afford their children's education. On a drizzly Tuesday in September, just before the start of the Mid-Autumn Festival holiday, I talked with a woman named Guo Xiuqin while she and her twin 4-year-old daughters waited outside a preschool for another child they were taking home. Guo, wearing a simple leather jacket, described how Wuqi had changed in recent years. "The new houses are so different, with tiles and bricks and new colors," she said. Farmers are no longer tied to their land, thanks in part to a local program that gives them money to plant trees on it instead. Her husband spends most of his time on the road, running a small transportation business. In all, the family makes about $8,000 a year, and the free preschool has allowed them to increase savings. Guo guessed they now saved about half their income. "College will cost a lot of money," she said, and she wants her daughters to go as far in school as they are able.

The rest of their income pays for food and clothing and to take care of elderly parents. I asked if there was anything Guo, who is 30, hoped to be able to buy in the future. “I don’t want anything,” she said. What about an apartment in the village, closer to the school, rather than in the countryside? “Of course,” she replied, smiling, “but how could I possibly dream of that?”

If China does ultimately build a consumer economy, it will probably depend more on Guo’s daughters than on Guo herself. Today’s teenagers were born after the Tiananmen massacre and have known nothing but boom times, and they may have a different attitude toward spending than their parents. For one thing, teenagers are surprisingly heavy users of technology, given China’s income level. A recent study by the Boston Consulting Group found that people in China spent more time online and were more likely to buy goods online than people in any other large developing country, even richer ones, like Brazil and Russia. The study also found that in rural China, nearly half of all Internet users were under 20. Nearly 80 percent were under 30.

In Wuqi, Internet service works quite well, and personal computers have become common in the last few years. “All my colleagues shop online,” says Ma Jingye, 24, who works for the county government. She was using the Internet regularly while she was going to college in Beijing, and when she returned to Wuqi this summer, she was surprised to find it had caught on there, too. Ma said she spent about 200 to 300 renminbi a month, which translates into roughly $30 to $45, shopping on Taobao, China’s version of Amazon.

Taobao makes for a nice example of the symbiotic relationship between consumption and innovation. Its parent company, Alibaba, which is based in Hangzhou, has grown to be one of the world’s most valuable Internet companies, as have two other Chinese companies — Tencent, an instant-messaging service, and Baidu, a search engine. They have been able to grow so large because of China’s high Internet usage and because the industry, unlike many others in the service sector, is not dominated by powerful state-owned firms. Internet companies succeed by providing good service at a reasonable price.

But Chinese Internet companies are still a long way from being as innovative as American or European ones. Taobao, Tencent and Baidu do little that Western companies do not. The Chinese companies have succeeded by copying innovations from elsewhere and then executing them well in their home market. Many of today’s start-ups are trying to follow the same business strategy. At Innovation Works, an incubator in Beijing founded by Lee Kai-Fu, the former head of Google’s China division, fresh-faced entrepreneurs work long hours in adjoining cubicles trying to create the next Taobao. They are charmingly honest about the fact that they are not on the cutting edge. One engineer at Innovation Works explained to me that success didn’t yet require innovation. The Chinese market is still hungry for the basics.

The dynamic is at work in industry after industry. One of the nicer stores in Wuqi is a small one run by Li Ning, a top Chinese sneaker and sporting- goods company. It resembles the kind of small sneaker store you might find in a low-end American mall. Even Li Ning’s logo, on its products and on the front of the store, is familiar. It is a modified Nike swoosh.

In addition to the immature consumer market, China’s education system also holds back innovation. Party leaders, from Feng to the highest levels in Beijing, worry that schools have not yet figured out how to create entrepreneurs who can build great businesses. “The traditional education produces a problem,” Feng said, “in which people can do well in exams but don’t have very innovative skills.” To address the problem, Wuqi has added more art and music to the curriculum, on top of the usual math, Chinese and English. The high school with the Amherst and N.Y.U. photos on the wall has created clubs for handicrafts, physics, chemistry and singing. Feng admits he does not yet know how well the efforts are working.

Still, you can see how China’s new entrepreneurs might begin to emerge. If schools began producing more innovation-minded students, they could feed off an increase in consumer spending to create products that really were different. If the government opened up more industries — airlines, banking, telecommunications, retail — to greater competition, the fight for customers would encourage innovation there, too. Eventually, ideas for new products might originate in Beijing or Hangzhou or even Wuqi. That would benefit the whole world, just as the world now benefits from American and European innovations. Imagine, say, if China developed a cheap form of clean energy. Above all, innovation would benefit China. Rather than merely having workers making $1 an hour to put together iPhones, it could also have software developers making $20 or $50 an hour to design the next iPhone.

After a Sichuan dinner in Wuqi one night — complete with raw hot peppers, dipped in salt, a local way of eating them — Feng asked if I wanted to climb the city’s almost-finished monument to the Long March. The

monument starts as a grand outdoor staircase and then becomes a paved path into the mountains, ascending about 1,000 feet over two miles, with scattered statues celebrating workers, peasants and soldiers. From the clearings, I could look down on Wuqi and imagine whether it might conceivably change as much over the next decade as coastal China changed over the last. Would tourists and business executives ultimately fill the new hotel? Would new industries come and stores open? I told Feng that, as impressive as Wuqi's efforts were, it was hard to see exactly how the city would build a self-sustaining economy in place of one that depended so much on hopeful construction. He did not exactly disagree. "We can't tell what will be here in 10 years," he said. "All I can do right now is build up Wuqi's environment and infrastructure and talent pool, for when the opportunity comes. We can only lay the foundation. It won't necessarily go as I plan."

Feng, of course, is not a typical local leader. In many other cities and provinces, the party has pursued short-term growth regardless of the long-term consequences. The party evaluates and promotes officials in large measure based on G.D.P. statistics and not on measures of education, employment or living standards. No wonder, then, that despite all the reform talk from Prime Minister Wen Jiabao and President Hu Jintao, consumption has continued to be a smaller part of the economy, and investment a larger one, since they took office in 2003.

Nonetheless, there are reasons to believe that China is starting to change and that today's reformers will ultimately win out, just as Deng did in his time. Economic growth in poorer provinces like Shaanxi has been somewhat faster over the last three years than in the richest areas, like Beijing and Shanghai, according to the University of Michigan's China Data Center. For many years, the reverse was true, and the gap was widening. Many provinces are also relaxing the *hukou* household-registration system. Looking ahead, party officials have indicated that their next five-year plan, China's 12th, to be released in March, will focus on the quality of economic growth — how it affects people's lives — rather than the quantity. China watchers inside and outside the country are now trying to figure out how much Xi Jinping, who is likely to become president in 2013, truly supports reform.

The centerpiece of the government's recent efforts to transform China's economy was the stimulus program announced in 2008. Relative to the size of the economy, the stimulus was more than twice as large as America's. It focused on infrastructure, mostly highways, trains and housing. Infrastructure spending is heavy-duty investment that plays off China's existing strengths. When tens of millions of workers were losing their factory jobs at the depths of the global recession, the government was able to put many of them back to work quickly on construction projects. (In an authoritarian state that does not have to worry much about property rights or environmental laws, shovel-ready projects are easy enough to find.) "The government does not have as strong instruments to influence consumption," as Yu says. "Investment is easier." That is especially true in a consumer economy as immature as China's.

But infrastructure can also help to foster a consumer economy. The new apartment buildings going up in hundreds of cities will employ workers now and will later become homes for rural migrants. Once in the cities, those migrants will be able to earn more and spend more. The new train lines and highways will reduce commutes and help stitch together China's domestic economy, much as the Interstate System of highways did in the United States. While I was in Hangzhou, officials there were getting ready to open a new train line that would cut travel time to Shanghai, which is 120 miles away, to less than an hour. "When it opens," Tu Dongdong, a deputy mayor, said, "Hangzhou will become part of Shanghai." Some of the new highways may be empty, but Kroeber, the editor of the China Economic Quarterly, said the high-speed trains are mostly full.

Pessimists argue that China has only a few years to start making major changes. According to this line of thinking, the recent splurge on infrastructure will lead mostly to empty buildings and unrecoverable loans, and the weak global economy will soon cause other countries to put up trade barriers unless China raises the value of the renminbi. Optimists reply that China remains a poor country and still has a couple of decades to switch from a factory economy to a consumer economy. Guo, the party leader and bank chairman, said that he did not think change had come quickly enough in recent years. But, he added, "I think we have plenty of time, plenty of tools and plenty of instruments to make a soft landing and a smooth transformation." Arthur Kroeber, who agrees, points out that China's per-capita income is still only where Japan's was in the mid-1960s.

One reason for optimism is that a version of the current strategy, what Guo calls "build first," has worked before. Deng and the other post-Mao leaders built the coastal cities before they had been established as manufacturing hubs. They plowed ahead, and China's natural advantages — size, location, literate population

and, hard as it may be to quantify, Confucian work ethic — allowed the strategy to pay off. If that happens again, not all of today's buildings and roads will be filled, but enough of them will be.

Kroeber first visited China in 1985 during the early stages of both Deng's reforms and the boom that has continued almost without interruption since. Even then, Kroeber said, he had a hard time imagining that China would find a way to make use of all of its new construction. During that visit, he would sometimes get around Beijing by biking on the recently built Second Ring Road, which encircled downtown. The road was big and wide, with few cars on it, and Kroeber remembers thinking it absurd that the city had spent the money to build it. Today, however, Second Ring Road is clogged with cars day and night. The subway is usually a faster way to travel. Third and Fourth Ring Roads are clogged, too. Fifth Ring Road, completed in 2003, and Sixth Ring Road, completed last year, are less congested. But you would not want to ride your bike on them.

In China's halting efforts to build a new economy today, there is an intriguing parallel to the United States: Both the world's largest economy and its latest challenger need to remake themselves. As Guo bluntly told me, "You are facing transformation, too." The United States needs to shift away from debt-financed consumption with little long-term benefit and toward investments that can create good-paying jobs, like education, infrastructure, energy and scientific research. China needs to invest less and consume more — to keep growing rapidly and, in the process, to stimulate economic growth around the world. In both countries, significant changes are necessary to create more sustainable growth. And in both countries, they inspire fierce internal opposition.

We tend to think of the United States and China as rivals, and they will continue to compete in coming years, over which will build the industries of the future and which will be the dominant power in Asia and the world. But our problems are also linked, just as the Chinese export boom and the American consumption boom depended on each other and, together, helped create the financial crisis. The worst outcome now, for both countries, might well be economic stagnation in China. That would slow U.S. growth and could lead to political chaos in China. The best outcome would be for both countries to reshape their economies gradually, benefiting both. In neither country will it be easy.

David Leonhardt is an economics columnist for The Times and a staff writer for the magazine.

http://www.nytimes.com/2010/11/28/magazine/28China-t.html?ref=magazine

An Exhibition That Gets to the (Square) Root of Sumerian Math

By NICHOLAS WADE

Christine Proust and Columbia University

Papyrus, parchment, paper ... videotape, DVDs, Blu-ray discs — long after all these materials have crumbled to dust, the first recording medium of all, the cuneiform clay tablet of ancient Mesopotamia, may still endure. Thirteen of the tablets are on display until Dec. 17 at the Institute for the Study of the Ancient World, part of New York University. Many are the exercises of students learning to be scribes. Their plight was not to be envied. They were mastering mathematics based on texts in Sumerian, a language that even at the time was long since dead. The students spoke Akkadian, a Semitic language unrelated to Sumerian. But both languages were written in cuneiform, meaning wedge-shaped, after the shape of the marks made by punching a reed into clay.

Sumerian math was a sexagesimal system, meaning it was based on the number 60. The system "is striking for its originality and simplicity," the mathematician Duncan J. Melville of St. Lawrence University, in Canton, N.Y., said at a symposium observing the opening of the exhibition.

A 59 x 59 multiplication table might not seem simple, and indeed is far too large to memorize, so tablets were needed to provide essential look-up tables. But cuneiform numbers are simple to write because each is a combination of only two symbols, those for 1 and 10.

Why the Sumerians picked 60 as the base of their numbering system is not known for sure. The idea seems to have developed from an earlier, more complex system known from 3200 B.C. in which the positions in a number alternated between 6 and 10 as bases. For a system that might seem even more deranged, if it weren't so familiar, consider this way of measuring length with four entirely different bases: 12 little units, called inches, make a foot, 3 feet make a yard, and 1,760 yards make a mile.

Over a thousand years, the Sumerian alternating-base method was simplified into the sexagesimal system, with the same symbol standing for 1 or 60 or 3,600, depending on its place in the number, Dr. Melville said, just as 1 in the decimal system denotes 1, 10 or 100, depending on its place.
The system was later adopted by Babylonian astronomers and through them is embedded in today's measurement of time: the "1:12:33" on a computer clock means 1 (x 60-squared) second + 12 (x 60) seconds + 33 seconds.
The considerable mathematical knowledge of the Babylonians was uncovered by the Austrian mathematician Otto E. Neugebauer, who died in 1990. Scholars since then have turned to the task of understanding how the knowledge was used. The items in the exhibition are drawn from the archaeological collections of Columbia, Yale and the University of Pennsylvania.
They include two celebrated tablets, known as YBC 7289 and Plimpton 322, that have played central roles in the reconstruction of Babylonian math. YBC 7289 is a small clay disc containing a rough sketch of a square and its diagonals. Across one of the diagonals is scrawled 1,24,51,10 — a sexagesimal number that corresponds to the decimal number 1.41421296. Yes, you recognized it at once — the square root of 2. In fact it's an approximation, a very good one, to the true value, 1.41421356.
Below is its reciprocal, the answer to the problem, that of calculating the diagonal of a square whose sides are 0.5 units. This bears on the issue of whether the Babylonians had discovered Pythagoras's theorem some 1,300 years before Pythagoras did. No tablet bears the well-known algebraic equation, that the squares of the two smaller sides of a right-angled triangle equal the square of the hypotenuse. But Plimpton 322 contains columns of numbers that seem to have been used in calculating Pythagorean triples, sets of numbers that correspond to the sides and hypotenuse of a right triangle, like 3, 4 and 5.
Plimpton 322 is thought to have been written in Larsa, just north of Ur, some 60 years before the city was captured by Hammurabi the lawgiver in 1762 B.C.
Other tablets bear lists of practical problems, like calculating the width of a canal, given information about its other dimensions, the cost of digging it and a worker's daily wage.
With some tablets the answers are stated without any explanation, giving the impression that they were for show, a possession designed to make the owner seem an academic.

http://www.nytimes.com/2010/11/23/science/23babylon.html?ref=science

Placenta Structure and Gestation Linked
By SINDYA N. BHANOO

Chris Gash

Some mammals have a longer gestation period than others in part because of the structure of the mother's placenta, according to new research published in The American Naturalist.
The placenta is the organ through which the mother passes nutrients to the fetus, and the fetus sends out waste. Researchers from Durham University and the University of Reading in England found that when the mother's tissues and the fetus's tissues are highly interlocked in the placenta, nutrients can pass between the two more efficiently, and the fetus can develop more rapidly.
After studying the placentas of 109 mammals, the researchers found that the tissues in some looked like interlocking fingers, and in others like a complex web.
"What we found is that when you have a weblike structure, the growth rate of the baby in the womb is twice as much as when there is a fingerlike structure," said Isabella Capellini, an anthropologist at Durham University and the study's lead author.
Humans, baboons, macaques and other anthropoid primates have fingerlike interconnectedness in the placenta, and so, relative to other mammals of the same size, have a longer gestation.
The female baboon, for instance, has a gestation time of about six months. The European porcupine has a similar body size but a weblike placenta structure and a gestation period of just two months.
The researchers are not sure why placenta structures vary, but it may be a "maternal conflict," said Dr. Capellini. "Broadly speaking, there is an agreement between the mother and the offspring to share nutrients," she said. "But there is a slight disagreement between how much nutrient the mother has to provide at a time."

http://www.nytimes.com/2010/11/23/science/23obmammal.html?ref=science

Mistakes Still Prevalent in Hospital Care, Study Finds
By DENISE GRADY

Efforts to make hospitals safer for patients are falling short, researchers report in the first large study in a decade to analyze harm from medical care and to track it over time.

The study, conducted from 2002 to 2007 in 10 North Carolina hospitals, found that harm to patients was common and that the number of incidents did not decrease over time. The most common problems were complications from procedures or drugs and hospital-acquired infections.

"It is unlikely that other regions of the country have fared better," said Dr. Christopher P. Landrigan, the lead author of the study and an assistant professor at Harvard Medical School. The study is being published on Thursday in The New England Journal of Medicine.

It is one of the most rigorous efforts to collect data about patient safety since a landmark report in 1999 found that medical mistakes caused as many as 98,000 deaths and more than one million injuries a year in the United States. That report, by the Institute of Medicine, an independent group that advises the government on health matters, led to a national movement to reduce errors and make hospital stays less hazardous to patients' health.

Among the preventable problems that Dr. Landrigan's team identified were severe bleeding during an operation, serious breathing trouble caused by a procedure that was performed incorrectly, a fall that dislocated a patient's hip and damaged a nerve, and vaginal cuts caused by a vacuum device used to help deliver a baby.

Dr. Landrigan's team focused on North Carolina because its hospitals, compared with those in most states, have been more involved in programs to improve patient safety.

But instead of improvements, the researchers found a high rate of problems. About 18 percent of patients were harmed by medical care, some more than once, and 63.1 percent of the injuries were judged to be preventable. Most of the problems were temporary and treatable, but some were serious, and a few — 2.4 percent — caused or contributed to a patient's death, the study found.

The findings were a disappointment but not a surprise, Dr. Landrigan said. Many of the problems were caused by the hospitals' failure to use measures that had been proved to avert mistakes and to prevent infections from devices like urinary catheters, ventilators and lines inserted into veins and arteries.

"Until there is a more coordinated effort to implement those strategies proven beneficial, I think that progress in patient safety will be very slow," he said.

An expert on hospital safety who was not associated with the study said the findings were a warning for the patient-safety movement. "We need to do more, and to do it more quickly," said the expert, Dr. Robert M. Wachter, the chief of hospital medicine at the University of California, San Francisco.

A recent government report found similar results, saying that in October 2008, 13.5 percent of Medicare beneficiaries — 134,000 patients — experienced "adverse events" during hospital stays. The report said the extra treatment required as a result of the injuries could cost Medicare several billion dollars a year. And in 1.5 percent of the patients — 15,000 in the month studied — medical mistakes contributed to their deaths. That report, issued this month by the inspector general of the Department of Health and Human Services, was based on a sample of Medicare records from patients discharged from hospitals.

Dr. Landrigan's study reviewed the records of 2,341 patients admitted to 10 hospitals — in both urban and rural areas and involving large and small medical centers. (The hospitals were not named.) The researchers used a "trigger tool," a list of 54 red flags that indicated something could have gone wrong. They included drugs used only to reverse an overdose, the presence of bedsores or the patient's readmission to the hospital within 30 days.

The researchers found 588 instances in which a patient was harmed by medical care, or 25.1 injuries per 100 admissions.

Not all the problems were serious. Most were temporary and treatable, like a bout with severe low blood sugar from receiving too much insulin or a urinary infection caused by a catheter. But 42.7 percent of them required extra time in the hospital for treatment of problems like an infected surgical incision.

In 2.9 percent of the cases, patients suffered a permanent injury — brain damage from a stroke that could have been prevented after an operation, for example. A little more than 8 percent of the problems were life-threatening, like severe bleeding during surgery. And 2.4 percent of them caused or contributed to a patient's death — like bleeding and organ failure after surgery.

Medication errors caused problems in 162 cases. Computerized systems for ordering drugs can cut such mistakes by up to 80 percent, Dr. Landrigan said. But only 17 percent of hospitals have such systems.
For the most part, the reporting of medical errors or harm to patients is voluntary, and that "vastly underestimates the frequency of errors and injuries that occur," Dr. Landrigan said.
"We need a monitoring system that is mandatory," he said. "There has to be some mechanism for federal-level reporting, where hospitals across the country are held to it."
Dr. Mark R. Chassin, president of the Joint Commission, which accredits hospitals, cautioned that the study was limited by its list of "triggers." If a hospital had performed a completely unnecessary operation, but had done it well, the study would not have uncovered it, he said. Similarly, he said, the study would not have found areas where many hospitals have made progress, such as in making sure that patients who had heart attacks or heart failure were sent home with the right medicines.
The bottom line, he said, "is that preventable complications are way too frequent in American health care, and "it's not a problem we're going to get rid of in six months or a year."
Dr. Wachter said the study made clear the difficulty in improving patients' safety.
"Process changes, like a new computer system or the use of a checklist, may help a bit," he said, "but if they are not embedded in a system in which the providers are engaged in safety efforts, educated about how to identify safety hazards and fix them, and have a culture of strong communication and teamwork, progress may be painfully slow."
Leah Binder, the chief executive officer of the Leapfrog Group, a patient safety organization whose members include large employers trying to improve health care, said it was essential that hospitals be more open about reporting problems.
"What we know works in a general sense is a competitive open market where consumers can compare providers and services," she said. "Right now you ought to be able to know the infection rate of every hospital in your community."
For hospitals with poor scores, there should be consequences, Ms. Binder said: "And the consequences need to be the feet of the American public."

http://www.nytimes.com/2010/11/25/health/research/25patient.html?ref=health

Exercise: For Type 2 Diabetes, 2 Types of Training

By RONI CARYN RABIN

Type 2 diabetics can significantly lower their blood sugar — and lose body fat in the bargain — with an exercise program that combines aerobics and weight lifting, a new study reports.

While that regimen is already recommended in Type 2 diabetes, researchers say the study offers some of the best evidence to date that a combined program offers greater benefits than aerobics or weight lifting by itself, even if it does not increase total exercise time.

"We can now look at individuals with diabetes right in the face and tell them, 'This is the best exercise prescription for you,'" said the paper's lead author, Dr. Timothy S. Church, director of preventive medicine research at Louisiana State University's Pennington Biomedical Research Center.

Such a program consists of "about 100 minutes of higher-intensity aerobics a week, and then give yourself one to two days of resistance training for 15 to 20 minutes a day," he said.

The study randomly divided 262 inactive Type 2 diabetics, average age 55.8, into four groups — 73 assigned to resistance training three days a week, 72 to aerobic exercise, 76 to the combination and 41 to a non-exercise comparison group. The study was notable in that almost half the participants were not white, and 63 percent were women.

After nine months of observed exercise, participants who did the combination training lowered their blood level of the glucose marker HbA1c to 7.3 percent from 7.7 percent, on average, a drop that corresponds to a significantly reduced risk of heart disease, Dr. Church said. The improvements in the other exercise groups were not significantly different from those in the non-exercise group.

Dr. Church said he was surprised but added that the findings made sense. "Diabetes is the failure to control the amount of sugar in your blood, and the biggest user of blood sugar is skeletal muscle," he said. "The healthier your skeletal muscle, the more blood sugar it's chewing up and taking out of the blood."

http://www.nytimes.com/2010/11/30/health/research/30exercise.html?ref=health

Daily Pill Greatly Lowers AIDS Risk, Study Finds
By DONALD G. McNEIL Jr.

Paul Sakuma

Healthy gay men who took an anti-AIDS pill every day were well protected against contracting H.I.V. in a study suggesting that a new weapon against the epidemic has emerged.
In the study, published Tuesday by the New England Journal of Medicine, researchers found that the men taking Truvada, a common combination of two antiretroviral drugs, were 44 percent less likely to get infected with the virus that causes AIDS than an equal number taking a placebo.
But when only the men whose blood tests showed that they had taken their pill faithfully every day were considered, the pill was more than 90 percent effective, said Dr. Anthony S. Fauci, head of the infectious diseases division of the National Institutes of Health, which paid for the study along with the Bill and Melinda Gates Foundation.
"That's huge," Dr. Fauci said. "That says it all for me."
The large study, nicknamed iPrEx, included nearly 2,500 men and was coordinated by the Gladstone Institutes of the University of California, San Francisco.
The results are the best news in the AIDS field in years, even better than this summer's revelation that a vaginal microbicide protected 39 percent of all the women testing it and 54 percent of those who used it faithfully.
Also, Truvada, a combination of tenofovir and emtricitabine that prevents the virus from replicating, is available by prescription in many countries right now, while the microbicide gel is made in only small amounts for clinical trials.
The protection, known as pre-exposure prophylaxis, is also the first new form available to men, especially men who cannot use condoms because they sell sex, are in danger of prison rape, are under pressure from partners or lose their inhibitions when drunk or high.
It "does not involve getting permission from the other partner, and that's important," said Phill Wilson, president of the Black AIDS Institute, which focuses on the epidemic among blacks.
Michel Sidibé, the head of the United Nations agency that fights AIDS, called it "a breakthrough that will accelerate the prevention revolution."
AIDS experts and the researchers issued several caveats about the study's limitations, emphasizing that it looked only at gay men and Truvada. More studies, now under way, are needed to see whether the results can be duplicated, whether other antiretroviral drugs will work and whether they will protect heterosexual men and women, prostitutes and drug users who share needles.
There is no medical reason to think the pill would not work in other groups, since it attacks the virus in the blood, not in the vaginal wall as a microbicide does. Pre-exposure prophylaxis became possible only in recent years as newer, less-toxic antiretroviral drugs were developed.
Some scientists fear that putting more people on the drugs will speed the evolution of drug-resistant strains, though that did not occur in the study.
Because Truvada is available now, some clinicians already prescribe it for prophylaxis, Dr. Fauci said, but whether doing so becomes official policy will depend on discussions by the Centers for Disease Control and Prevention, the Food and Drug Administration, medical societies and others, which could take months.

Although the C.D.C. would prefer that doctors wait for further studies, more will probably prescribe the drugs now that this study is out, said Dr. Kevin Fenton, chief of the agency's AIDS division, so the C.D.C. will soon release suggested guidelines.

The agency will suggest that the drug be prescribed only with close medical supervision and used only with other safe-sex practices.

"The results are encouraging, but it's not time for gay men to throw away their condoms," Dr. Fenton said.

AIDS advocacy groups were very excited by the results.

"If you comply with it, this works really well," said Chris Collins, policy director of amfAR, the Foundation for AIDS Research. "This is too big to walk away from."

Mitchell Warren, executive director of AVAC, an organization that lobbies for AIDS prevention, called the study "a great day for the fight against AIDS" and said gay men and others at risk needed to be consulted on the next steps.

In the study, 2,499 men in six countries — Brazil, Ecuador, Peru, South Africa, Thailand and the United States — were randomly assigned to take either Truvada or a placebo and were followed for up to three years. For ethical reasons, they were also given condoms, treatment for venereal diseases and advice on safe sex.

There were 64 infections in the placebo group and 36 in the group that took Truvada, a 44 percent risk reduction.

Two in the Truvada group turned out to have been infected before the study began. When the remaining 34 were tested, only 3 had any drug in their blood — suggesting that the other 31 had not taken their pills.

Different regimens, like taking the pills not daily but only when sex is anticipated, also need testing.

Also, many men in the study failed to take all of their pills, and some clearly lied about it. For example, some who claimed to take them 50 percent or 90 percent of the time had little or no drug in their bloodstreams.

The pills caused no major side effects, though men who began to show signs of liver problems were taken off them quickly. Some men stopped taking the pills because they disliked relatively minor side effects like nausea and headaches. Also, some stopped bothering once they suspected that they might be taking a placebo.

"People have their own reasons," Mr. Collins said. "People don't take their Lipitor every day either."

A major question now is who will pay for the drug.

In the United States, Truvada, made by Gilead Sciences, costs $12,000 to $14,000 a year. In very poor countries, generic versions cost as little as 40 cents a pill.

Globally, only about 5 million of the 33 million people infected with the AIDS virus are on antiretroviral drugs, and in an era of tight foreign-aid budgets, that number is not expected to rise quickly.

Hundreds of millions of Africans, Eastern Europeans and Asians are at risk and could benefit from prophylaxis, but that would cost tens of billions of dollars.

In this country, insurers and Medicare normally pay for the drugs, and the Ryan White Act covers the cost for the poor, but none of these payers yet have policies on supplying the drugs to healthy people.

No participant in the study developed resistance to tenofovir. Three were found to have strains resistant to emtricitabine, but investigators believe that all three were infected before the study began at levels low enough to have been missed by their first H.I.V. tests.

Another concern was that the participants would become so fearless that they would stop using condoms, but the opposite effect was seen — they used condoms more often and had fewer sex partners. But that can also be a result of simply being enrolled in a study and getting a steady diet of advice on safe sex and free condoms, the investigators said.

Other trials of pre-exposure prophylaxis have about 20,000 volunteers enrolled around the world. Their results are expected over the next two years.

http://www.nytimes.com/2010/11/24/health/research/24aids.html?ref=health

Queen's life-saving research wins education 'Oscar'

29 November 2010 Queen's University, Belfast
Queen's University's work in protecting the lives and livelihoods of some of the poorest people on the planet has won a prestigious national award.
At the Times Higher Education awards ceremony in London, Dr Bhaskar Sen Gupta and colleagues in the School of Planning, Architecture and Civil Engineering received the Outstanding Engineering Research Team of the Year title.
The award recognises the team's work in tackling the world's worst case of ongoing mass poisoning and creating the first low-cost chemical free arsenic removal plant in India.
Queen's Vice-Chancellor Professor Peter Gregson said that the award underlined the global impact of the University's research.
He said: "This pioneering project is a powerful example of how Queen's expertise and academic research can result in positive outcomes for society as a whole, and I am delighted to congratulate Dr Bhaskar Sen Gupta and his colleagues on winning this major award."
The judges said: "Engineering at its core is about solving critical problems. The team from Queen's has exemplified this, finding an innovative solution to overcome arsenic contamination of groundwater and thus improve the quality of life in rural communities.
"Through effective team-working locally and internationally, a low-cost technological approach has been developed and deployed."

Employment and Learning Minister Danny Kennedy welcomed the news. He said: "I am delighted that Queen's University has won this prestigious Award. The accolade demonstrates in a very tangible way how high quality research can have extremely practical applications throughout the world that benefit every section of society. This has been recognised by the significant funding provided by my Department for Research and Development in Northern Ireland's universities. Dr Sen Gupta and Queen's are to be congratulated on the Award which follows the success of Queen's in being named as the Entrepreneurial University of the Year in 2009."
Currently over 70 million people in Eastern India and Bangladesh experience involuntary arsenic exposure from consuming water and rice; the main staple food in the region. This includes farmers who have to use contaminated groundwater from minor irrigation schemes. It is estimated that for every random sample of 100 people in the Bengal Delta, at least one person will be near death as a result of arsenic poisoning, while five in 100 will be experiencing other symptoms.
Leading an international research team, Dr Sen Gupta implemented an innovative method of removing arsenic from groundwater without using chemicals. The team established a trial plant in Kasimpore, near Kolkata, offering chemical-free groundwater treatment technology to rural communities for all their drinking and farming needs. Six plants are now in operation in rural locations in West Bengal and are being used to supply water to the local populations using subterranean arsenic removal technology.
The award is the latest accolade for Dr Sen Gupta. Earlier this year he received an Excellence Award from the Asian Water Industry and the St Andrews Prize for the Environment.
http://www.qub.ac.uk/

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90827&CultureCode=en

Crucial sex hormones re-routed by missing molecule

29 November 2010 Biotechnology and Biological Sciences Research Council (BBSRC)
A hormone responsible for the onset of puberty can end up stuck in the wrong part of the body if the nerve pathways responsible for its transport to the brain fail to develop properly, according to research funded by the Biotechnology and Biological Sciences Research Council (BBSRC).

By tracking how nerve cells responsible for regulating sexual reproduction in mice find their way from their birth place in the foetal nose to their site of action in the adult brain, scientists from University College London (UCL) have found that if a certain molecule is missing, then these pathways are not formed correctly and gonadotropin releasing hormone (GnRH) can become lodged in the nose or the forehead, rather than in the brain, where it is needed to control the menstrual cycle in females and testosterone production in males.

Speaking about the findings, published today (29 November) in Human Molecular Genetics, co-investigator Dr Christiana Ruhrberg explains: "We discovered that a molecule essential for the growth of the nerve cables that transmit odour and pheromone signals from the nose to the brain is also crucial in the development of the highways responsible for transporting other nerve cells that make the sex hormone GnRH. We found that in mice with an inherited deficiency in the molecule SEMA3A, these highways did not lead to the brain, but instead formed impenetrable tangles outside the brain. This means that the nerve cells making GnRH are unable to get to their final destination and instead become stuck in the nose or forehead."

As a result the researchers found that the testes of mice lacking SEMA3A did not grow properly and the adult males were infertile. These findings have important implications for the study of Kallmann's syndrome and related genetic disorders that causes infertility.

Professor Douglas Kell, BBSRC Chief Executive said "This study highlights the importance of understanding the very earliest developmental processes of the brain, including how and where cells develop, how they migrate and how and where they mature. Such fundamental bioscience research helps drive medical advances by providing clues about the development of a variety of disorders which present huge challenges to individuals, their families and our wider society."

- **Full bibliographic information**The full paper is: Cariboni, A., Davidson, K., Rakic, S., Maggi, R., Parnavelas, J., Ruhrberg, C. (2010). Defective GnRH neuron migration in mice lacking SEMA3A signalling through NRP1 and NRP2: implications for the aetiology of hypogonadotropic hypogonadism. Human Molecular Genetics.

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90818&CultureCode=en

Eyespot breakthrough welcomed

29 November 2010 John Innes Centre

John Innes Centre researchers are working with plant breeders to understand more about the economically important fungal disease, eyespot and identify novel sources of genetic resistance to the disease that could be used to protect our cereal crops.

Eyespot is a fungal disease of cereals, affecting the stem base and causing large yield losses, making it economically important, especially in areas such as North West Europe and North West USA where mild damp autumns are ideal for its growth. Chemical control using fungicides, as well as being environmentally unsound, is often not cost effective for farmers, so crop varieties with higher levels of resistance are needed to help combat this disease

Dr Paul Nicholson, funded by the Biotechnology and Biological Sciences Research Council, has been working with the Home-Grown Cereals Authority (HGCA) and the plant breeding company RAGT Seeds, through a CASE studentship awarded to Chris Burt, to understand the disease and identify new sources of resistance.

Very little variation in genetic resistance to eyespot exists in commercially-grown wheat varieties. In most instances, any moderate resistance in varieties was thought to derive from a single gene, *Pch2*, bred in from a French wheat, Cappelle Desprez in the 1950s.

Eyespot is caused by two different, co-existing fungal species, *Oculimacula yallundae* and *Oculimacula acuformis*, and recent research from the John Innes Centre is now suggesting that the resistance derived from *Pch2* is differentially effective against the two species. Publishing in the journal *Plant Pathology*, Dr Paul Nicholson and his group have shown that the *Pch2* gene is significantly less effective against *O. yallundae* than against *O. acuformis*.

"In all probability this resistance is not, as previously supposed, responsible for the partial resistance observed in many varieties," said Dr Nicholson. "We have now characterised a source of genetic resistance that is effective against both eyespot pathogens, and it is this, rather than *Pch2*, that we believe confers the partial protection observed in moderately eyespot-resistant commercial wheat varieties."

The group looked at a second reported component of the resistance in Cappelle Desprez, but on a different chromosome to the *Pch2* gene. Publishing in the journal *Theoretical and Applied Genetics* they found that this confers significant resistance to both eyespot pathogens, and at both the seedling and adult stage, making it much more effective than *Pch2* alone.

"Breeders thought that they were working with *Pch2* while, in fact, if they had moderate eyespot resistance it was most probably coming from this other gene in Cappelle Desprez," said Dr Nicholson.

"This suggests that using *Pch2* as the sole source of genetic resistance may not provide adequate protection against eyespot where the predominant cause of eyespot is *O. yallundae.* Currently, in the UK, *O. acuformis* predominates but there is evidence that a shift in the type of fungicide used may be reducing this prevalence in favour of *O. yallundae*."
"In the search for genetic resistance against eyespot, it is going to be critical that we test any potential candidates for resistance against both species."
The group have found nearby genetic markers, which can be used by plant breeders to breed this resistance into commercial wheat varieties.
"This is an excellent example of applied research translating benefits all the way from lab bench through breeder hands and into farmer's fields," noted Peter Jack, cereal genotyping lead at RAGT Seeds. "It also prepares the ground for improvements in fundamental knowledge of plant-pathogen interactions and more generic benefits for a wide range of pathogen species."
Sarah Holdgate, lead cereal Pathologist for RAGT Seeds, added: "although eyespot is a globally important fungal pathogen, conventional approaches to the identification of resistant lines are time consuming and costly. This research, through dissection of resistance components and identification of linked markers, will clearly facilitate breeding of naturally resistant varieties."
"This is a very good example where coordination between funding bodies, BBSRC and HGCA, has enabled breeders to work directly with public sector researchers to tackle an important yield impacting trait," commented Richard Summers, R & D chairman of the British Society of Plant Breeders (BSPB) and cereal breeding lead, RAGT Seeds. "This is a model we would like to see develop further."

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90809&CultureCode=en

University of the Basque Country PhD thesis describes 35 hitherto unknown families of endogenous retroviruses, after analysing cattle and horses

lunes, 29 de noviembre de 2010 Elhuyar Fundazioa

Retroviruses are viruses made up of RNA genetic material. Endogenous retroviruses (ERV) are those sequences derived from retroviral infections introduced into the germinal line cells that, being incorporated in the genome, are transmitted from generation to generation. According to a number of investigations, the expression of ERV can benefit the host if it is controlled; it can help, for example, in the protection of the embryo. However, given its pathogenic nature, ERV also tends to be linked to cancer, schizophrenia and autoimmune diseases.

In any case, our knowledge about ERV is still scant. They have been detected in all mammals and in many vertebrates, but genic research in this regard has only been carried out on primates and rodents. Biologist Mr Koldo García has made a step forward in the field on studying ERV in cows and horses. He undertook the first genomic analysis of ERVs of two species respectively belonging to families of ruminants and equidae. His PhD thesis, presented at the University of the Basque Country (UPV/EHU), is entitled *Erretrobirus endogenoen detekzioa eta karakterizazioa behietan eta beste hainbat mamaliotan* (Detection and characterisation of endogenous retroviruses in cattle and a number of other mammals).

BoERV1, the most abundant amongst cattle

Mr García made use of computer tools in order to detect ERV. Concretely, he used three methods: the first based on the BLAST algorithm, and the other two on LTR_STRUC and Retrotector© programmes. As a result, a total of 35 families of ERV (cows and horses), hitherto not appearing in the literature, were detected; in concrete, 24 possible families of ERV in cattle, 20 of which had not been described experimentally. Amongst the latter, Mr García highlighted the BoERV1 family, being the most abundant amongst those found. As shown in the thesis, it may be the case that this is a family of ERV specific to ruminants. With regard to horses, 15 possible families were detected, none of them described to date.

The researcher also studied how ERV proliferates in both species and concluded that re-infection is the most common method in both cases. In general, ERV proliferates in two main ways: by transposition (occurring in

the germinal line cell itself) or by re-infection (the ERV exit their cells and infect another germinal line cell). The PhD thesis shows that re-infection is very common, as the same manner of proliferation is the most common in many other animals. In concrete, Mr García brought together data on humans, chimpanzees, mice, rats and dogs for his research, in order to compare them with that of cows and horses; and he thus showed that, excepting rats, all these animals use re-infection more than transposition.

Expression in cattle tissue

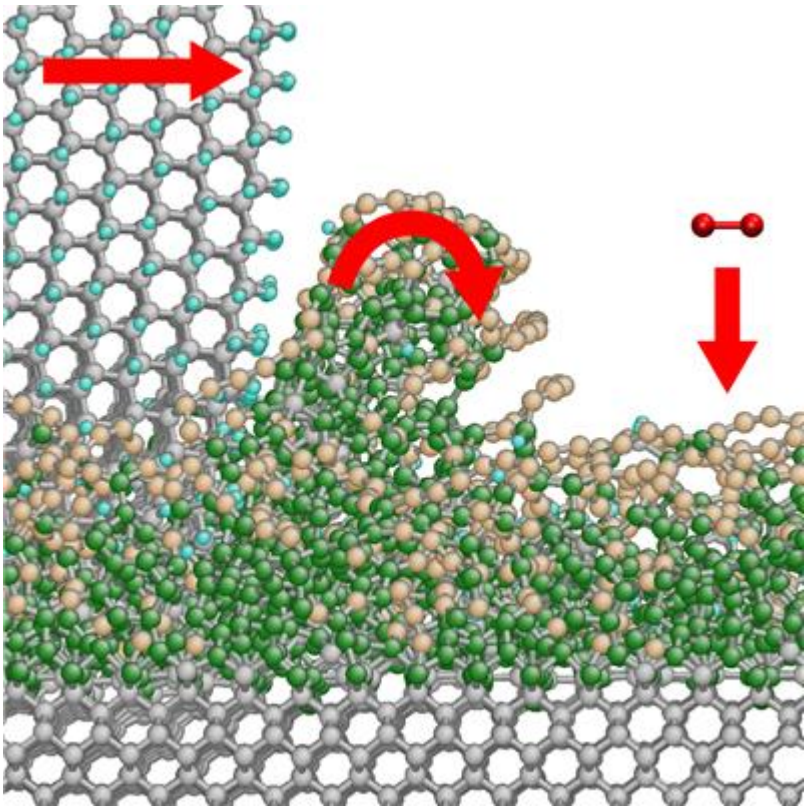
Mr García undertook a more in-depth investigation in the case of cattle, focusing also on the genes surrounding the ERV; in other words, within the genomic context. As shown in the thesis, many of the genes close to the ERV are linked to protecting themselves against viruses and with histones (proteins which participate in the compacting and regulation of DNA). According to the researcher, this could be due to the genes being active when the retroviruses are introduced, or to the fact that they have characteristics recognisable by them.

Apart from detecting ERVs, the thesis demonstrates their expression in bovine tissue for the first time. It involves, moreover, a controlled expression and, therefore, valuable for the protection of the host. As shown in the thesis, this expression occurs mainly in the endocrine glands and in embryos, and so could be linked to the protection of the embryo.

http://www.basqueresearch.com/berria_irakurri.asp?Berri_Kod=3071&hizk=I

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90791&CultureCode=en

How to soften a diamond



Fraunhofer-Gesellschaft

It is the hardest material in the world, and yet it can not only be used to cut other materials, but can be machined itself. Already over 600 years ago first diamonds were cut and the same technique is still used to transform precious stones into exquisite jewelry and later into unrivaled industrial tools. Dr. Lars Pastewka's and Prof. Michael Moseler's team at the Fraunhofer Institute for Mechanics of Materials IWM in Freiburg/Germany can now reveal the secret of why it is that diamonds can be machined. The team published its findings in the current online issue of Nature Materials (http://dx.doi.org/10.1038/nmat2902). This work represents major progress in tribology -the research of friction and wear. Despite the great significance for industry the scientific basics of tribology are poorly understood.

Diamonds have been ground by craftsmen for hundreds of years using cast iron wheels studded with fine diamond particles turning at around 30 meters per second at the outer rim. A highly tuned sense of sound and feeling enable an experienced diamond grinder to hold the rough diamond at just the right angle to achieve a smooth and polished surface. The fact that diamonds react directionally has been known for a long time, says Lars Pastewka. The physical phenomenon is known as anisotropy. The carbon atoms in the diamond lattice form lattice planes, some of which are easier to polish than others, depending on the angle at which the diamond is held.

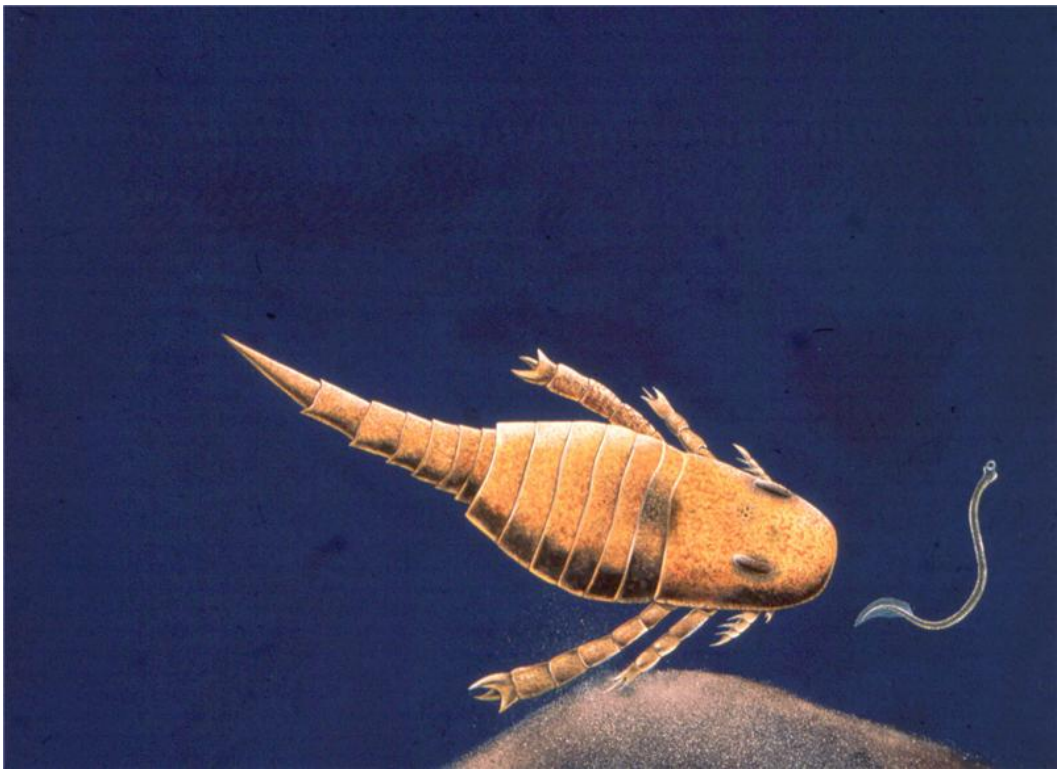
For hundreds of years, researchers have been looking for a logical way of explaining this empirical phenomenon, and have so far been unsuccessful. Equally, no one has been able to explain why it is possible that the hardest material in the world can be machined. The scientists in Freiburg have answered both these questions with the help of a newly developed calculation method.

Michael Moseler explains the method in layman's terms: »The moment a diamond is ground, it is no longer a diamond.« Due to the high-speed friction between the rough diamond and the diamond particles in the cast iron wheel, a completely different »glass-like carbon phase« is created on the surface of the precious stone in a mechanochemical process. The speed at which this material phase appears depends on the crystal orientation of the rough diamond. »This is where anisotropy comes in«, explains Moseler.

The new material on the surface of the diamond, adds Moseler, is then »peeled off« in two ways: the ploughing effect of the sharp-edged diamond particles in the wheel repeatedly scratches off tiny carbon dust particles from the surface - this would not be possible in the original diamond state, which is too hard and in which the bond forces would be too great. The second, equally important impingement on the normally impenetrably hard crystal surface is due to oxygen (O) in the air. The O_2 molecules bond with carbon atoms (C) within the instable, long carbon chains that have formed on the surface of the glassy phase to produce the atmospheric gas CO_2, carbon dioxide.
And how was it possible to determine when and which atoms would detach from the crystalline surface? »We looked extremely closely at the quantum mechanics of the bonds between the atoms at the surface of the rough diamond breaking. We had to analyze the force field between the atoms in detail«, explains Lars Pastewka.
If one understands these forces well enough, one can precisely describe - and model - how to make and break bonds. »This provided the basis for investigations into the dynamics of the atoms at the friction surface between a diamond particle on the wheel and the rough diamond itself«, adds Pastewka. He and his colleague Moseler have calculated the paths of around 10,000 diamond atoms and followed them on screen. Their calculations paid off: their model is able to explain all the processes involved in the dusty and long misunderstood method of diamond grinding.
The newly developed model is not only a milestone in the field of diamond research: »It proves also that friction and wear processes can be described precisely with modern material simulation methods ranging from the atomic level to macroscopic objects.« emphasizes Prof. Peter Gumbsch, director of the institute. He considers this just as one example of the many questions on wear that industry needs answers to. These questions will be addressed in future by the Fraunhofer IWM within the newly founded MicroTribology Centre µTC under the motto »make tribology predictable«.

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90761&CultureCode=en

Ancient Wind held Secret of Life and Death



Leicester, University of

The mystery of how an abundance of fossils have been marvellously preserved for nearly half a billion years in a remote region of Africa has been solved by a team of geologists from the University of Leicester's Department of Geology.

They have established that an ancient wind brought life to the region – and was then instrumental in the preservation of the dead.

Sarah Gabbott, Jan Zalasiewicz and colleagues investigated a site near the Table Mountains in South Africa. Their findings are published in the latest issue of the journal *Geology*.

Sarah Gabbott said: "Near Table Mountain in South Africa lies one of the world's most mysterious rock layers. Just a few metres thick, and almost half a billion years old, it contains the petrified remains of bizarre early life-forms, complete with eyes and guts and muscles.

"We investigated why these animals are so marvellously preserved, when most fossils are just fragments of bone and shell? The answer seems to lie in a bitter wind, blowing off a landscape left devastated by a massive ice-cap."

Gabbott and Zalasiewicz added that microscopic analysis of the shale layers using a specially designed 'Petroscope', obtained with funding from the Royal Society, revealed remarkable and so far unique structures – myriads of silt grains, neatly wrapped in the remains of marine algae.

The authors state: "The silt grains are sedimentary aliens - much bigger than the marine mud flakes in which they are embedded. They could only have been blown by fierce glacial winds on to the sea surface from that distant landscape. Arriving thick and fast, they carried nutrients into the surface waters, fuelling its prolific life. The deep waters, though, were overwhelmed by rotting, sinking vegetation, becoming stagnant and lifeless – ideal conditions to preserve the animal remains, down to their finest details. A cold wind, here, was key to both life and death."

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90752&CultureCode=en

Biological changes in suicidal patients

Lund University

Depressed and suicidal individuals have low levels of the stress hormone cortisol in their blood and saliva. They also have substances in their spinal fluid that suggest there is increased inflammation in the brain. These findings could help to develop new methods for diagnosing and treating suicidal patients.

Doctor Daniel Lindqvist from the Psychoimmunology Unit at Lund University is presenting these results in his PhD thesis. He is part of a research group led by Dr Lena Brundin, which sees inflammation in the brain as a strong contributory factor to depression. This is a new theory that challenges the prevalent view that depression is only due to a lack of the substances serotonin and noradrenaline.

"However, current serotonin-based medication cures far from all of the patients treated. We believe that inflammation is the first step in the development of depression and that this in turn affects serotonin and noradrenaline", says Daniel Lindqvist.

One of the articles in his thesis shows that suicidal patients had unusually high levels of inflammation-related substances (cytokines) in their spinal fluid. The levels were highest in patients who had been diagnosed with major depression or who had made violent suicide attempts, e.g. attempting to hang themselves.

The research group at the Division of Psychiatry in Lund is now getting ready to conduct a treatment study based on its theory. Depressed patients will be treated with anti-inflammatory medication in the hope that their symptoms will be reduced.

The researchers believe that the cause of the inflammation that sets off the process could vary. It could be serious influenza, or an auto-immune disease such as rheumatism, or a serious allergy that leads to inflammation in the body. A certain genetic vulnerability is probably also required, i.e. certain gene variants that make some people more sensitive than others.

Other studies in Daniel Lindqvist's thesis show that patients with depression and a serious intention of committing suicide had low levels of the stress hormone cortisol in their blood. The cortisol levels were also low in saliva samples from individuals several years after a suicide attempt. This has been interpreted to mean that the depressed patients' mental suffering led to a sort of 'breakdown' in the stress system, resulting in low levels of stress hormones.

"It is easy to take and analyse blood and saliva samples. Cortisol and inflammation substances could therefore be used as markers for suicide risk and depth of depression", says Daniel Lindqvist.

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90743&CultureCode=en

Bird-brained? Birds' personalities are correlated with their hormone levels

Veterinärmedizinische Universität Wien

Any dog or cat owner will agree that animals have personalities but it may come as a surprise to many to learn that birds also do. As an example, individual birds vary in their levels of curiosity, with distinctions being made between "fast" and "slow" explorers. A considerable body of research has examined the differences between fast and slow birds but the levels of stress hormones (glucocorticoids) have not previously been investigated, although these hormones are known to be important in a number of aspects of bird behaviour. Mareike Stöwe at the University of Veterinary Medicine, Vienna has now shown significant differences in the levels of glucocorticoids in fast and slow birds. She also found that fast birds respond to stress by dramatically increasing their glucocorticoid levels, while slow birds exhibit a much moderate response. Her results are published in issue 58 of the journal Hormones and Behavior.

The Great Tit is a common garden bird of many countries in Europe and Asia. Great Tits are generally thought of as fairly inquisitive but it has long been known individuals vary considerably in their willingness to explore new surroundings. Some birds – known as "fast" or "proactive" – are quick explorers and are comparatively aggressive, whereas "slow" or "reactive" birds are more cautious. The differences are at least in part genetically determined and as a result scientists in Holland, with whom the Vienna group has been collaborating closely, have been able to use this behavioural trait as a basis for selecting lines over several generations.

Stöwe measured the breakdown products of glucocorticoid hormones in the droppings of great tit nestlings of both "fast" and "slow" lines. She found that slow nestlings excreted more glucocorticoids than "fast" ones. She also notived that subjecting nestlings to stress caused an increase in the amounts of glucocorticoids they excreted. The rise was far more dramatic in fast nestlings than in slow ones, showing that the more proactive birds respond more intensely to stress than less curious individuals.

Stöwe's results indicate for the first time that birds that have been genetically selected on the basis of their levels of curiosity show pronounced differences both in their baseline levels of stress hormones and in their

reactions to stress. Interestingly, these factors are known to be important indicators of the young birds' future survival and the novel findings would suggest that the "fast" birds might have certain advantages over slower individuals. Clearly, however, environmental factors are also important in determining survival and there must be circumstances that favour less inquisitive birds: when a large number of predators are around, fortune may no longer favour the bold. Variation in the behaviour of the "bird-brained" Great Tit is presumably important in helping the species cope with a range of different conditions.

Because higher glucocorticoids are thought to be associated with more intense begging activity, Stöwe also examined the begging behaviour of the "fast" and "slow" nestlings. She found no differences between the lines but did observe an interesting difference between the sexes, with male nestlings begging significantly more often than females. Intriguingly, the difference disappeared when the birds were stressed. As Stöwe says, "male nestlings beg more to ensure they obtain enough food to meet their higher nutritional needs. But when they are frightened they are much less forward and actually behave just like female nestlings."

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90683&CultureCode=en

Crown reveals new holy female pharaoh

University of Gothenburg

A unique queen's crown with ancient symbols combined with a new method of studying status in Egyptian reliefs forms the basis for a re-interpretation of historical developments in Egypt in the period following the death of Alexander the Great. A thesis from the University of Gothenburg (Sweden) shows that Cleopatra was not ancient Egypt's only female pharaoh – Queen Arsinoë II came first, 200 years earlier.

Researchers are largely agreed on Queen Arsinoë II's importance from the day that she was deified. She was put on a level with the ancient goddesses Isis and Hathor, and was still respected and honoured 200 years after her death when her better-known descendant Cleopatra wore the same crown. But the reasons behind Arsinoë's huge influence have been interpreted in many different ways.

Maria Nilsson has studied her historical importance by interpreting her personal crown and its ancient symbols. The crown, which has never been found but is depicted on statues and Egyptian reliefs, was created with the help of the powerful Egyptian priesthood to symbolise the qualities of the queen. The thesis questions the traditional royal line which excludes female regents, and defies some researchers' attempts to minimise Arsinoë's importance while she was still alive.

"My conclusion instead is that Arsinoë was a female pharaoh and high priestess who was equal to and ruled jointly with her brother and husband, and that she was deified during her actual lifetime," says Nilsson. "It was this combination of religion and politics that was behind her long-lived influence."

But it was not only Cleopatra who wanted to re-use Arsinoë's important and symbolic crown. Male descendants – all named Ptolemy – used her crown as a template when creating a new crown which they gave to the goddess Hathor to honour the domestic priesthood and so win its support when Egypt was gripped by civil war.

The thesis is clearly structured around the crown and includes its wider context in the reliefs. Nilsson paints an all-round picture of the queen, how she dressed, the gods she was depicted with, the titles she was given, and so on.

The source material comes from Egypt and can be used as a basis for understanding the country's political and religious development. At the same time, Nilsson paves the way for future studies of Egyptian crowns as symbols of power and status, and of the development of art in a more general sense.

"The creation of Queen Arsinoë's crown was just the beginning," she says.

Title of thesis: The crown of Arsinoë II. The creation and development of an imagery of authority

http://hdl.handle.net/2077/23417

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90716&CultureCode=en

Managing nature reserves using ecological disturbances can easily go wrong

University of Gothenburg

Ecological disturbances are not necessarily a bad thing – deliberate disturbances can actually be used to preserve or even increase biodiversity in a nature reserve. The outcome depends on countless different factors, but many mistakes are made by those working with ecological disturbances and biodiversity, claims a researcher from the University of Gothenburg (Sweden).

"Nobody knows exactly what biodiversity is, and so different researchers test different measures of it and can draw completely different conclusions depending on the measures they've used," says Robin Svensson from the Department of Marine Ecology at the University of Gothenburg.

"If you test a hypothesis about the change in the number of species with a measure of how evenly species are distributed, rather than how many there are, you'll always be in trouble. It's rather like when comedian Kurt Olsson famously asked record-breaking high-jumper Patrik Sjöberg how 'wide' he'd jumped – or counting the number of apples on a pear tree!"

Ecological disturbances can come in many different forms and have very different effects on biodiversity. Common disturbances in nature include forest fires, storms, floods, waves, trawling, pollution, drought, ice cover and driftwood scraping species off rocky shores. Biological disturbances can also be included under this term, in other words animals that eat other animals and plants or stamp out other living creatures in their path. The most concrete and manageable definition is that a disturbance must kill or remove organisms in a community (an area with co-existing species), so making it easier for new species to become established. The seemingly innocuous sub-clause about the establishment of new species has proved surprisingly important when testing ecological explanatory models for disturbances and biodiversity.

The effects of a disturbance depend on what kind of disturbance it is, how it is measured, and which species are in the community when it occurs. Also playing a role when testing hypotheses about biodiversity and disturbances are the degree of competition between species and establishment of new species, and the measure of biodiversity used in the study.

"If you don't know how disturbances work and how they will affect the community where they are introduced, they can easily have the opposite to the desired effect," says Svensson. "How you calculate the effect will naturally have a major impact when managing nature reserves with the help of ecological disturbances."

The best-known example of this type of management can be found in Yellowstone, the world's oldest national park. In Sweden the method is used at Alvaret on the island of Öland, where the landscape is kept clear by grazing (a form of biological disturbance), and on the Koster Islands in the Kosterhavet national park off western Sweden.

http://hdl.handle.net/2077/23772

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90701&CultureCode=en

Amazonian biodiversity much older than originally thought

University of Gothenburg

Amazonia's huge biodiversity originated with the formation of the Andes and, as such, dates back further than previously realised, claims an article written by an international research group, headed by a researcher from the University of Gothenburg, published in the journal Science.

"With the results we present in this article, we've rewritten the entire history of Amazonia in terms of the development of its biodiversity," says Alexandre Antonelli from the University of Gothenburg's Department of Plant and Environmental Sciences, and scientific curator at the Gothenburg Botanical Garden (Sweden).

Amazonia's wealth of species is by far the greatest in the world. Although researchers have long suspected that the diversity of the Amazonian rainforest was affected by the Andes, the causal links have been unclear until now, and there have been a wide range of scientific theories on the origins of the species found there.

Compared data for 65 million years

A team of researchers led by Antonelli and the University of Amsterdam's Carina Hoorn has now compared the pattern of today's biodiversity in Amazonia with geological and molecular data for the last 65 million years – ever since the South American continent separated from Africa and the dinosaurs became extinct.

"We suspected from some scattered fossils and dated species trees that the Amazonian diversity arose after the separation from Africa. So we looked at the whole period. I worked mainly on coordinating a survey of DNA-based studies of the relationships between different species of plants and animals. We've examined hundreds of scientific publications and have found that very few of the genera are as young as people thought."

Greatest biodiversity in connection with the Andes

The collated results show that the greatest biodiversity is to be found in connection with the Andes, an area that formed when the tectonic plates along the Pacific coast were pressed together to create this mighty range of mountains. The new mountains had a major impact on the environment, with living conditions changing fundamentally for plants and animals in Amazonia. The restructuring of the Earth's crust changed the large wetland areas found in northern South America, which dried up as the Amazon River formed. This, in turn, opened up new land for colonisation by plants and animals.

"We were surprised that there was such a strong link between the formation of the Andes and the diversity in Amazonia," says Antonelli, who was born in Brazil. "The area was considered a kind of paradise where evolution could take place undisturbed, but this hasn't been the case at all – a lot has happened in the region."

The article Amazonia through time: Andean uplift, climate change, landscape evolution, and biodiversity was published in the journal Science on 12 November. The 18-strong team behind the article includes researchers from the Netherlands, Switzerland, Spain, the UK, Sweden, Brazil, Colombia, Panama, Venezuela and the US.

Subscribers can download the article from: www.sciencemag.org/cgi/content/short/330/6006/927, or a copy can be requested from Alexandre Antonelli (see below for contact information).

The results were presented at a seminar in Amsterdam, the Netherlands, on the same day: www.science.uva.nl/ibed/home.cfm

http://www.sciencemag.org/cgi/content/short/330/6006/927

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90698&CultureCode=en

Superantigens could be behind several illnesses

University of Gothenburg

Superantigens, the toxins produced by staphylococcus bacteria, are more complex than previously believed, reveals a team of researchers from the University of Gothenburg in an article published today in the scientific journal Nature Communications. Their discovery shows that the body's immune system can cause more illnesses than realised.

"Superantigens have a real talent for disrupting the body's immune system," says Karin Lindkvist from the University of Gothenburg's Department of Cell- and Molecular Biology, one of the authors of the article. "If you're infected with bacteria that secrete superantigens, your immune system will respond so strongly that it'll make you ill. Our study shows that superantigens activate the immune system in more ways than previously thought."

We are all exposed daily to various types of foreign organism that can harm us. The human body has therefore developed cells whose role it is to "kill" and remove all foreign invaders that find their way in – the immune system.

Antibiotic-resistant bacteria have become increasingly common with the more widespread use of different types of antibiotics. Yellow staphylococci (Staphylococcus aureus) are one of the most common bacteria in the world around us, with most children and adults carrying them at some point. One strain, MRSA (methicillin-resistant Staphylococcus aureus), has developed resistance to penicillin and other penicillin-like antibiotics that are normally used to treat infections caused by staphylococci. Staphylococci can cause a variety of conditions such as long-term wound infections and abscesses, and can also lead to food poisoning. The toxins produced by staphylococci are also known as superantigens. A normal viral infection will trigger the activation of around 0.0001% of the body's natural killer cells (T cells), which is enough to destroy the virus. However, contracting bacteria that secrete superantigens leads to the activation of 5-20% of the body's

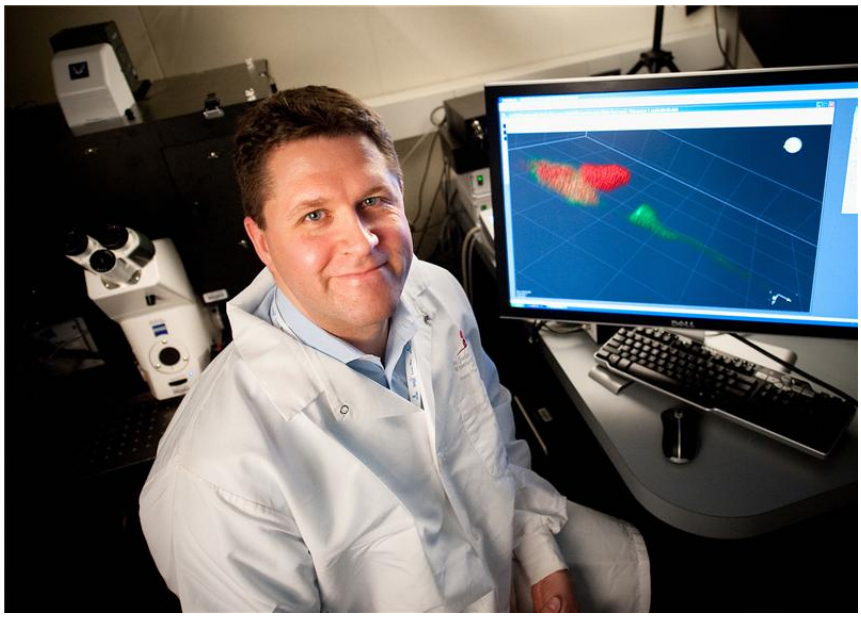
T cells. Such a strong immune response will often result in illness, which generally involves fever and extreme nausea. Superantigens are also well-known for causing toxic symptoms, as in toxic shock syndrome. There is also some speculation as to whether superantigens can cause autoimmune disorders such as rheumatoid arthritis.

"By investigating how superantigens activate the immune system via its T cells, we've been able to show that they bind to more than one part of the T cell receptor," says Lindkvist. "This is an important discovery for our understanding of superantigens' biological function, and for the future development of a vaccine against superantigens. We haven't yet looked at whether other superantigens can activate T cells in the same complex way, but it's reasonable to assume that they can."

In addition to Karin Lindkvist, the research team behind the discovery comprises Maria Saline, Karin Rödström, Gerhard Fischer, Vladislav Orekhov and Göran Karlsson, all from the University of Gothenburg. The study The structure of superantigen complexed with TCR
and MHC reveals novel insights into superantigenic T cell activation has been published in the scientific journal Nature Communications.
http://dx.doi.org/10.1038/ncomms1117

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90695&CultureCode=en

Researchers identify a molecular switch that controls neuronal migration in the developing brain



St. Jude Children's Research Hospital

St. Jude Children's Research Hospital scientists report new details about mechanisms regulating a crucial step in brain development, offering insight into the origins of epilepsy, mental retardation and possibly brain tumor metastasis

(MEMPHIS, Tenn. - Nov. 25, 2010) St. Jude Children's Research Hospital investigators have identified key components of a signaling pathway that controls the departure of neurons from the brain niche where they form and allows these cells to start migrating to their final destination. Defects in this system affect the architecture of the brain and are associated with epilepsy, mental retardation and perhaps malignant brain tumors.

The findings provide insight into brain development as well as clues about the mechanism at work in the other developing tissues and organ systems, particularly the epithelial tissue that covers body surfaces. The report appears November 25 in the journal Science online at the Science Express website.

"Neurons are born in germinal zones in the brain, and the places they occupy in the mature brain are sometimes quite a distance away. The cells have to physically move to get to that final destination," said David Solecki, Ph..D., an assistant member of the St. Jude Department of Developmental Neurobiology and the paper's senior author. "If the process is compromised, the result is devastating disruption of brain circuitry that specifically targets children."

In this study, investigators identified not only the molecular complexes that work antagonistically to control departure of brain cells from germinal zones, but also the adhesion molecule that functions as the cells' exit ticket. Solecki and his colleagues showed that high levels of Siah E3 ubiquitin ligase block neuronal departure by tagging a critical part of the cell's migration machinery for degradation through a process known as ubiquitination. Siah's target is Pard3A, which is part of the PAR complex.

By manipulating levels of both Siah and Pard3A, researchers showed that only when neuronal production of Siah falls and Pard3A rises will the cells move out of the germinal zone. The change prompts the cells to alter their migratory path and move toward the location where they will incorporate into the brain's circuitry. The findings mark the first instance of PAR complex activity being regulated by an ubiquitin-targeting protein like Siah.

Investigators used a technique called time-lapse microscopy to directly observe and document the process in the developing cerebellum, the region responsible for balance and fine-tuning body movements. Neurons are the specialized cells that make up the nervous system.

Investigators went on to show that Siah-Pard3A regulates neuronal migration via the adhesion molecule JAM-C, which is short for junctional adhesion molecule C. Researchers demonstrated that silencing JAM-C production in the neurons or preventing JAM-C binding to Pard3A blocked neuronal migration out of the germinal zone.

A similar system at work in epithelial cells relies on JAM-C to keep cells together in a process that also requires the adhesion molecule to bind to the PAR complex, Solecki said. But this is the first report of such mechanisms at work in the developing brain.

Earlier work from the laboratory of Solecki and others showed neurons migrate to their final location by moving along thin fibers produced by brain cells known as glial cells. This study suggests that JAM-C expression on the surface of developing neurons allows the cells to interact with their environment to reach the glial cells. "Without JAM-C, neurons do not move to their final position," he explained.

The researchers developed a fluorescent probe that when combined with time-lapse microscopy made real-time viewing of cell-to-cell binding possible for the first time. "Until now, cell adhesion was difficult to detect and the techniques involved were laborious," Solecki said. "With this approach, it is almost as if the cells are telling us what they are doing. It was very exciting for me to look at a dish of living neurons and see adhesion occur for the first time."

The findings may also offer clues about the spread of malignant brain tumors. Solecki noted that some types of the most common pediatric brain tumor, medulloblastoma, share similarities with immature neurons and seemingly fail to depart the cerebellar germinal zone. Solecki said Siah and Pard3A might provide insight into the mechanisms involved.

The paper's other authors are Jakub Famulski (St. Jude and University of Alberta, Edmonton, Canada); Niraj Trivedi, Danielle Howell, Yiai Tong and Richard Gilbertson (all St. Jude), and Yuan Yang (St. Jude and University of Cambridge, UK).

The study was supported in part by the National Cancer Institute, the March of Dimes and ALSAC.

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90692&CultureCode=en

Male reproductive problems may add to falling fertility rates
European Science Foundation

Reduced male fertility may be making it even harder for couples to conceive and be contributing to low birth rates in many countries, reveals a new European Science Foundation (ESF) report launching today at the IPSEN meeting in Paris.

More than 10% of couples worldwide are infertile, contributing to the growing demand for assisted reproduction techniques such as in vitro fertilisation (IVF) for which Robert G. Edwards won the Nobel Prize in Medicine last month.

Sperm counts have dropped significantly in the last 50 years in developed countries. Today, at least one in five 18-25 year old men in Europe have semen quality in the subfertile range. Testosterone levels are also declining. This is mirrored by increasing testicular cancer in most industrialised countries and more developmental abnormalities such as undescended testes. All of these factors are linked to reduced fertility and may have common origins during foetal development.

"The important impact of men's reproductive health on a couple's fertility is often overlooked," said Professor Niels Skakkebæk from the University of Copenhagen, who co-authored the report. "Women postponing motherhood have reduced fertility, and we now see that poor sperm may be making it even harder to conceive. While poor sperm may be part of the reason more couples are using IVF it may also be making those therapies less successful."

Skakkebæk continues: "We need a common strategy in Europe to target research so we can address the poor state of men's reproductive health. That this decrease in male reproductive health has occurred in just a few decades suggests it's caused by environmental and lifestyle factors rather than genetics. So it is preventable if we correctly identify the causes."

In men some lifestyle factors such as obesity and smoking can affect sperm counts, but the effects are small. In contrast, if women smoke heavily in pregnancy, a much larger fall in sperm count is likely in their sons when they grow up. Testosterone levels naturally drop as men age, which may predispose men to cardiovascular and metabolic health problems that pose large financial and healthcare issues for national governments. Low sperm counts and low testosterone levels are both associated with increased risk of early death for men.

The Science Policy Briefing 'Male Reproductive Health' is a comprehensive insight into male reproductive health with detailed research policy recommendations. It is available online:
http://www.esf.org/publications

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90629&CultureCode=en

Scientists at the IEO manage to adapt juvenile blue fin tuna to captivity in land installations

IEO Instituto Español de Oceanografía

Researchers at the Spanish Oceanographic Institute (IEO) have taken a new step towards achieving the domestication of bluefin tuna. A dozen juveniles have been adapted to the captivity in land based facilities, something that had already been successfully achieved in Japan, Australia and the USA in other species of tuna.

Research scientists Fernando de la Gándara and Aurelio Ortega, along with technicians Juan Ramón Prieto and Javier Viguri from the tuna culture team at the IEO, have managed to adapt around twenty juvenile bluefin tuna (*Thunnus thynnus*), to captivity in land based facilities at the Plant for Marine Culture at the Murcian Oceangraphic Centre.

This adaptation had already been successfully achieved in Japan, in Australia and in the USA, in other species of tuna such as the Pacific bluefin tuna (*Thunnus orientalis*), the southern bluefin tuna (*Thunnus maccoyii*), the yellowfin tuna (*Thunnus albacares*) and the blackfin tuna (*Thunnus atlanticus)* but never with the Atlantic bluefin tuna (*Thunnus thynnus*) making this a European first.

Some of the individuals were captured with a barbless hook and line just in front of the coast of Mazarrón, and transported directly to the Marine Culture facilities of the IEO in Mazarrón. Others were captured in front of Cabo de Palos and previously adapted to captivity in floating cages situated in the bay of El Gorguel, managed by the company Caladeros del Mediterráneo belonging to the Ricardo Fuentes group, prior to being transported to the IEO installations in Mazarrón. The survival rate in the first case was 70% while in the second case it was 100%, fundamentally due to the fact that in this second case the individuals had already been adapted to captivity in the cages. The twenty juveniles, each of around a kilo in weight, have been housed over the past two weeks in a fibreglass tank 8m wide x 2m deep. They are being fed with fresh anchovy and sardine pieces and show a very active feeding behaviour.

This activity is incorporated within the foreseen tasks for objective number 3 of the SELFDOTT project, aiming to develop artificial diets for this species that are both efficient and respectful of the environment. In order to achieve this, with the pertinent authorisations obtained from the Spanish General Secretary of the Sea and similarly to the previous two years, a campaign of experimental fishing for 0+ juveniles of this species is being carried out, in order to do artificial feeding trials both in the floating cages and at the land based facilities. This adaptation to land installations had been tried unsuccessfully in previous years. The success

achieved this year is due to the fact that they have the use of a larger tank than the ones used beforehand and also substantial improvement in methods of capture, transportation and handling. Shortly the feeding trials forecast in the project shall begin.

New installation for the project

Handling of this species is extremely difficult given it´s great sensitivity and the fact that it is a pelagic fish that is accustomed to living in an open-water environment, where no obstacles exist. The techniques employed in the adaptation of the bluefin tuna individuals to captivity at the land facilities will be used in the TANQUE project, co-financed by funds from FEDER and headed up by Aurelio Ortega. This project will equip the IEO with a large single installation for the reproduction of bluefin tuna, whose main element will consist of a tank of 25m in width and 12m deep, which will house bluefin tuna broodstock whose main objective will be the obtaining of viable eggs from this species.

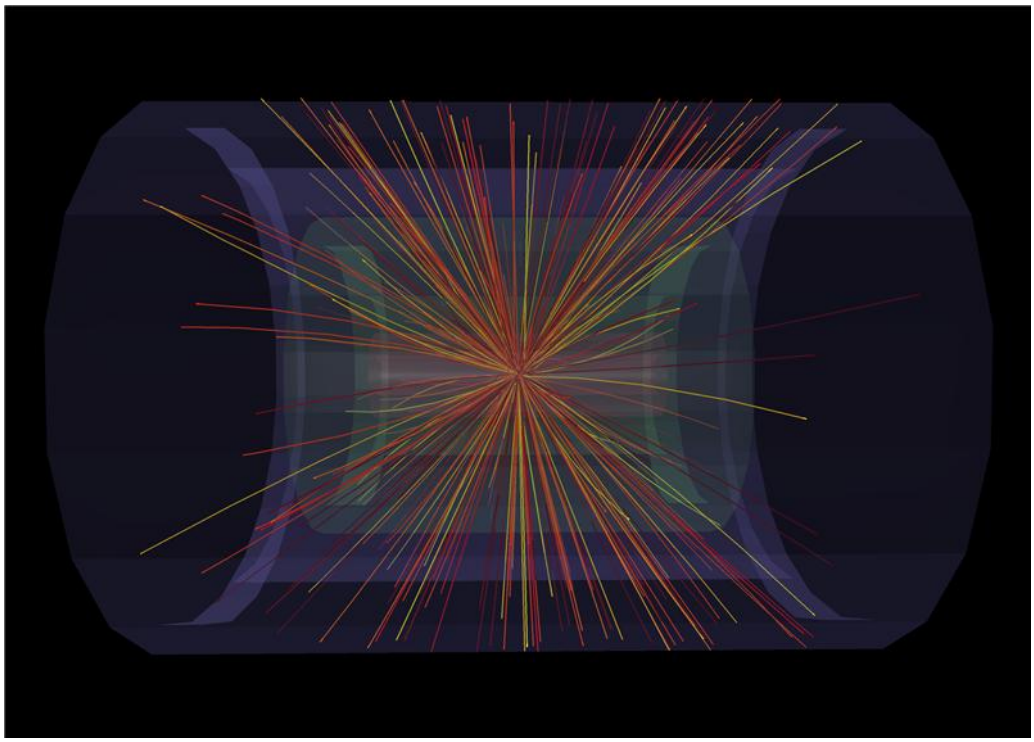
The process on video

On the link below you can see a video of how they captured, transported and adapted juvenile bluefin tuna. If you need the file, you can request it in the email address shown in Notes for editors (journalists only).

http://www.youtube.com/watch?v=YIvlSwy2Hn4

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90674&CultureCode=en

LHC experiments bring new insight into primordial universe



CERN

After less than three weeks of heavy-ion running, the three experiments studying lead ion collisions at the LHC have already brought new insight into matter as it would have existed in the very first instants of the Universe's life. The ALICE experiment, which is optimised for the study of heavy ions, published two papers just a few days after the start of lead-ion running. Now, the first direct observation of a phenomenon known as jet quenching has been made by both the ATLAS and CMS collaborations. This result is reported in a paper from the ATLAS collaboration accepted for publication yesterday in the scientific journal Physical Review Letters. A CMS paper will follow shortly, and results from all of the experiments will be presented at a seminar on Thursday 2 December at CERN[1]. Data taking with ions continues to 6 December.

"It is impressive how fast the experiments have arrived at these results, which deal with very complex physics," said CERN's Research Director Sergio Bertolucci*. "The experiments are competing with each other to publish first, but then working together to assemble the full picture and cross check their results. It's a beautiful example of how competition and collaboration is a key feature of this field of research."*

One of the primary goals of the lead-ion programme at CERN is to create matter as it would have been at the birth of the Universe. Back then, the ordinary nuclear matter of which we and the visible universe are made could not have existed: conditions would have been too hot and turbulent for quarks to be bound up by gluons into protons and neutrons, the building blocks of the elements. Instead, these elementary particles would have roamed freely in a sort of quark gluon plasma. Showing beyond doubt that we can produce and study quark gluon plasma will bring important insights into the evolution of the early Universe, and the nature of the strong force that binds quarks and gluons together into protons, neutrons and ultimately all the nuclei of the periodic table of the elements.

When lead-ions collide in the LHC, they can concentrate enough energy in a tiny volume to produce tiny droplets of this primordial state of matter, which signal their presence by a wide range of measureable signals. The ALICE papers point to a large increase in the number of particles produced in the collisions compared to previous experiments, and confirm that the much hotter plasma produced at the LHC behaves as a very low viscosity liquid (a perfect fluid), in keeping with earlier observations from Brookhaven's RHIC collider.

Taken together, these results have already ruled out some theories about how the primordial Universe behaved.

"*With nuclear collisions, the LHC has become a fantastic 'Big Bang' machine,"* said ALICE spokesperson Jürgen Schukraft. *"In some respects, the quark-gluon matter looks familiar, still the ideal liquid seen at RHIC, but we're also starting to see glimpses of something new"*

The ATLAS and CMS experiments play to the strength of their detectors, which both have very powerful and hermetic energy measuring capability. This allows them to measure jets of particles that emerge from collisions. Jets are formed as the basic constituents of nuclear matter, quarks and gluons, fly away from the collision point. In proton collisions, jets usually appear in pairs, emerging back to back. However, in heavy ion collisions the jets interact in the tumultuous conditions of the hot dense medium. This leads to a very characteristic signal, known as jet quenching, in which the energy of the jets can be severely degraded, signalling interactions with the medium more intense than ever seen before. Jet quenching is a powerful tool for studying the behaviour of the plasma in detail.

"ATLAS is the first experiment to report direct observation of jet quenching," said ATLAS Spokesperson Fabiola Gianotti. *"The excellent capabilities of ATLAS to determine jet energies enabled us to observe a striking imbalance in energies of pairs of jets, where one jet is almost completely absorbed by the medium. It's a very exciting result of which the Collaboration is proud, obtained in a very short time thanks in particular to the dedication and enthusiasm of young scientists."*

"It is truly amazing to be looking, albeit on a microscopic scale, at the conditions and state of matter that existed at the dawn of time," said CMS Spokesperson Guido Tonelli. *"Since the very first days of lead-ion collisions the quenching of jets appeared in our data while other striking features, like the observation of Z particles, never seen before in heavy-ion collisions, are under investigation. The challenge is now to put together all possible studies that could lead us to a much better understanding of the properties of this new, extraordinary state of matter"*

The ATLAS and CMS measurements herald a new era in the use of jets to probe the quark gluon plasma. Future jet quenching and other measurements from the three LHC experiments will provide powerful insight into the properties of the primordial plasma and the interactions among its quarks and gluons.

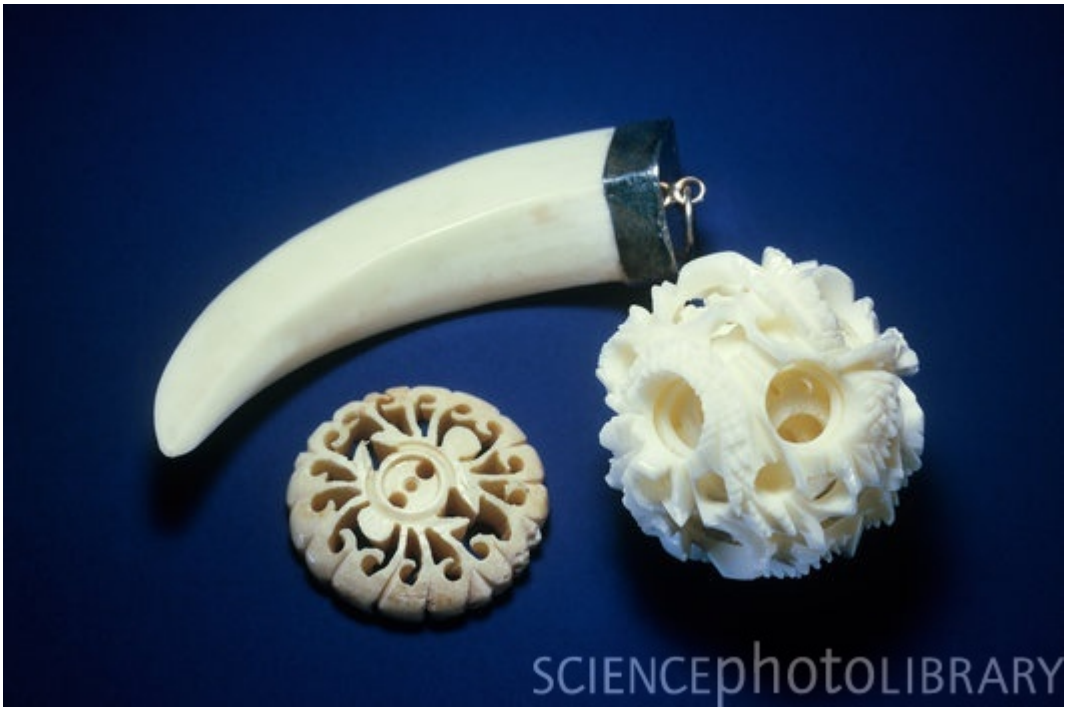
With data taking continuing for over one more week, and the LHC already having delivered the programmed amount of data for 2010, the heavy-ion community at the LHC is looking forward to further analysing their data, which will greatly contribute to the emergence of a more complete model of quark gluon plasma, and consequently the very early Universe.

[1] CERN, the European Organization for Nuclear Research, is the world's leading laboratory for particle physics. It has its headquarters in Geneva. At present, its Member States are Austria, Belgium, Bulgaria, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Italy, the Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom. India, Israel, Japan, the Russian Federation, the United States of America, Turkey, the European Commission and UNESCO have Observer status.

http://press.web.cern.ch/press/PressReleases/Releases2010/PR23.10E.html

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90671&CultureCode=en

Isotopes and species protection



Universität Mainz

Working in collaboration with the World Wide Fund for Nature (WWF) and the Bundesamt für Naturschutz (BfN, German Federal Agency for Nature Conservation), and with the support of the International Council for Game and Wildlife Conservation (CIC), a team of scientists at Johannes Gutenberg University Mainz is preparing an innovative reference database that allows the identification of the origin of elephant ivory. By means of analysis of the isotope profile of samples of known geographic origin, it is possible to prepare an "isotope map" for this material and thus determine the original provenance of any piece of ivory. The project is thus not only making a worthwhile contribution towards the suppression of the illegal trade in ivory but is also helping to protect an endangered species.

Analysis of the levels of accumulation of isotopes of specific elements provides reliable evidence of the origin of materials such as ivory and bone fragments. Isotopes are atoms of one and the same chemical element that differ in terms of their atomic mass. Organic materials derived from creatures that live in specific biotopes are characterized by the presence and the relative concentrations of certain isotopes of chemical elements. The element carbon, for example, consists in its natural state of three isotopes with different atomic masses, namely ^{12}C, ^{13}C, and ^{14}C. Low concentrations of the heavy carbon isotope ^{13}C indicate that the material sample originates from a thickly wooded habitat, while high levels are indicative of a savanna landscape. Such factors are used for the purpose of so-called provenance analysis. Living beings take up elements with their nutrition that have an isotope signature characteristic of their more immediate living environment; they then incorporate these elements into their own body substances, such as dental enamel. The analysis of the isotope profile of such materials can thus provide evidence of the precise origin of the sample in question. Although previous research had shown that isotope analysis can be used to determine the provenance of ivory, no attempts have yet been undertaken to prepare the detailed isotope maps that would enable the relative geographic origin of a particular ivory item to be pinpointed.

Since 1995, the International Union for Conservation of Nature (IUCN) has regularly been conducting surveys of and publishing status reports on the numbers and distribution range of elephants in Africa. In addition to information on the geographical spread of these animals, the reports also contain data on the geology, vegetation, and rainfall in the regions in question, providing the basis for the development of a reference database. Historical ivory items of known or "georeferenced" origin from collections worldwide are

being used to extend the database: The isotope signature of a sample is analyzed and its topographic provenance defined, while geostatistical techniques such as kriging are used for plotting purposes. The resultant isotope maps can be used to determine the region of origin of any sample of ivory.

Trade as necessity - the necessity of trade

The international trade in ivory has resulted in a dramatic decline in animal numbers in many African countries since the 1980s. In order to protect Africa's elephant population and as a result of an international accord, the African elephant was added in 1989 to Appendix I of the Washington Convention on International Trade in Endangered Species (CITES), and all commercial trade in ivory was thus banned. Thanks to the imposition of strict trade controls and effective protection measures, elephant populations in some African countries have significantly recovered. In countries such as Botswana, Namibia, Zimbabwe, and South Africa, limited trade in ivory products is permitted, although stringent restrictions are imposed. But the countries of the southern part of Africa in particular are increasingly arguing that they should be allowed to trade freely in ivory from the stocks they already hold so that they can raise the finances they urgently need for nature conservancy measures. Unfortunately, this method of generating income would not be without its problems: If free trade is permitted, it would become increasingly difficult to differentiate between legal and illegal ivory at the point of sale and the legalized trade could be used as a cover for ivory smuggling and poaching. Isotope maps provide an effective way of resolving this dilemma.

Working under the aegis of the German Federal Agency for Nature Conservation (BfN), the International Center of Ivory Studies (INCENTIVS) at the Institute for Geosciences at Johannes Gutenberg University Mainz is collaborating with the WWF in this joint project. The project is being partly financed by Germany's Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit), and is receiving the active support of the International Council for Game and Wildlife Conservation (CIC).

http://www.uni-mainz.de/eng/13938.php

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90665&CultureCode=en

UPC team designs intelligent detector to provide real-time information on available parking spaces

Universitat Politècnica de Catalunya

Testing of the new technology is currently underway at the UPC's North Campus and a patent is being sought. The system can be used to provide users with information via mobile devices such as phones, laptop computers, and iPads, or using luminous panels in public thoroughfares. In the coming months it will be installed in the 22@Barcelona innovation district and in downtown Figueres.

A team at the Department of Electronic Engineering of the Castelldefels School of Telecommunications and Aerospace Engineering (EETAC), part of the Universitat Politècnica de Catalunya (UPC), has designed a new method for continuously detecting the presence of vehicles using both an optical and a magnetic sensor. The detector incorporates the two sensors in a 4 by 13 cm casing that is set into the pavement of each parking space. Urbiòtica, a company set up by UPC professors and their industrial partners, is testing the system at the UPC's North Campus prior to placing it on the market.

The device works by first detecting the sudden change in the amount of light reaching the pavement that occurs when a vehicle passes over it. The optical sensor then activates the magnetic sensor to verify that the shadow is being produced by a vehicle. This is done by detecting the slight disturbance in the Earth's magnetic field that occurs when a car passes over or stops above the device. The two sensors are connected to a microcontroller that executes an algorithm to determine whether or not a vehicle is present. The system's optical sensor is always active but consumes an insignificant amount of power.

When a vehicle is detected, the microcontroller sends a radio-frequency signal, which conveys this information to an antenna connected to a transceiver. This way of transmitting signals is much more economical than using wiring. The transceiver, designed for installation on street lights, receives the information and transmits it to the database or control center within seconds (using technologies such as Wi-Fi or GPRS). Potential clients for the system include municipal services and parking lot operators.

According to Ramon Pallàs, head of the UPC team that developed the technology (for which a patent is being sought), the plan is to make the information available on luminous panels on public thoroughfares. Users will also be able to receive parking information on mobile devices such as phones, laptop computers, and iPads.

The innovative features of the product (which the UPC's AntenaLAB group also worked on) relate to the field of sensors, the circuits connecting the sensors to the microcontroller, the method for supplying power to the sensors, and management of the power supply for the system as a whole.

Continuous operation with low power consumption

The invention overcomes the shortcomings of the best existing systems for detecting stationary vehicles. There currently exist devices that emit a signal when a car passes over a sensor, but they do not detect whether the vehicle stops. In an enclosed facility these systems can be used to count vehicles entering and leaving and thus determine the number of parking spaces available, but they do not indicate where the free spaces are. Also, the magnetic sensors now in use consume too much energy to be kept running all the time. In contrast, the system developed by the UPC group and marketed by Urbiòtica operates continuously and uses very little power because the optical sensor is the only component that is always active and the magnetic sensor is activated less frequently than in other similar systems. The fact that the sensors are connected directly to the microcontroller, without any intermediate electronic circuit, also reduces power consumption.

Practical applications

The new system can be used to manage and monitor vehicles on public and private thoroughfares, particularly in urban areas. This makes it possible to monitor points of access to centers of population, restricted zones, security zones, and grade crossings, and to manage parking on streets, at airports, and in commercial and underground parking areas. These applications can reduce the time drivers spend looking for a parking spot, resulting in lower fuel consumption and less pollution.

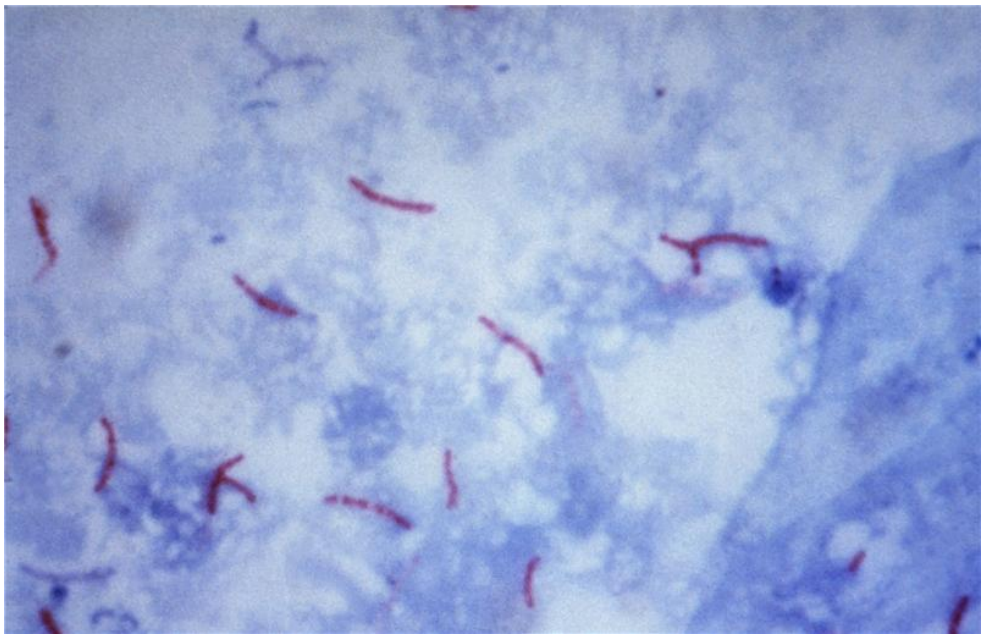
The characteristics of the system also facilitate other applications, such as the reservation of parking spaces for disabled drivers and payment based on the real time that a parking space is used. The system could also be used to detect areas where lighting is absent or insufficient.

Once pilot testing has been successfully completed, the system will be installed in the 22@Barcelona innovation district (from December on) as part of a Barcelona City Council project to deploy sensor systems, and in the town of Figueres (early in 2011), where it will be used to monitor traffic entering and leaving the city center.

http://www.upc.edu/saladepremsa/?set_language=en

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90638&CultureCode=en

Iron Compounds Synthesized to Combat Tuberculosis



Plataforma SINC

This research appears on 'Journal of Inorganic Biochemistry'

A team of researchers from Spain and Latin America have synthesized two iron compounds that inhibit the in vitro growth of Mycobacterium tuberculosis, the bacteria that causes tuberculosis. Due their low level of toxicity in mammel cells, the compounds could be used in the future as therapeutic agents and hospital disinfectants.

A group of researchers from the Universidad de Navarra (Spain), the Universidad de la República (Uruguay), the Universidad de São Paulo (Brazil) and the Universidad Nacional de La Plata (Argentina) have synthesized two iron complexes "that showed in vitro growth inhibitory activity on Mycobacterium tuberculosis", Dinorah Gambino and María Torre, authors of the study and researchers at the Universidad de la República explained to SINC.

The study, published this month by the Journal of Inorganic Biochemistry uses iron atoms to join organic molecules (derived from quinoxaline), forming compounds that act as bactericides (killing bacteria) or bacteriostatic agents (preventing bacteria from reproducing). The organic molecules were synthesized at the Universidad de Navarra.

"One of the greatest problems in relation to the pharmacotherapy for treating tuberculosis is the appearance of bacteria resistant to current medicines, which is why it is important to develop new active ingredients", the researchers indicate.

In order to treat tuberculosis, initially "first-line" antibiotics are used (such as isoniacide or estreptomicine), but when side effects appear, or in cases of stronger resistance, "second-line" antibiotics are resorted to (such as cicloserine or ciprofloxacine). The new compounds inhibit M. tuberculosis better than the "second-line" medicines.

Low Toxicity

Another advantage of the iron compounds is that they show low toxicity in mammel cells, as demonstrated by

the experiments performed with mice cells. "That is why these compounds are useful as hospital disinfectants or therapeutic agents," the Uruguayan researchers highlight, albeit recalling that, at present, they in vitro trials "and the line of research remains open to learn more about how they act."

Antonio Monge, co-author of the study and a researcher at the Universidad de Navarra, underlines the importance of cooperating with research centres in Latin America, where there are many cases of tuberculosis and other diseases such as malaria or chagas disease. "This type of cooperation always benefits the person who is suffering".

Tuberculosis kills more than one million people a year worldwide (1.3 million in 2008). Various Mycobacterium species - particularly M. tuberculosis- are the cause.

At present, tuberculosis is considered a re-emerging disease due to the increase in the number of people with HIV and other viruses that attack the immune system, as well as to the increasing consumption of immunosuppressive and recreational drugs. The World Health Organization (WHO) estimates that 30 million people will be infected by tuberculosis over the next 20 years.

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90620&CultureCode=en

Sewage water bacteria fills 'missing link' in early evolution of life on earth

University College Dublin

A common group of bacteria found in acid bogs and sewage treatment plants has provided scientists with evidence of a 'missing link' in one of the most important steps in the evolution of life on earth - the emergence of cells with a nucleus containing DNA (eukaryotic cells).

For billions of years, bacteria (single celled organisms without a nucleus) were the only cellular life form on earth. Then, about 1.6 – 2.1 billion years ago, eukaryotic cells emerged. These cells (with a nucleus) heralded the evolution of multi-cellular life on earth including: plants, insects, animals and humans.

Until now scientists have been unable to identify an 'ancestral cell' linking the early prokaryotes with the later eukaryotes, so fusion theory - where two cells merge to form a new cell – is often put forward to explain the appearance of these new cell types.

But new findings by scientists from University College Dublin and the European Molecular Biology Laboratory in Heidelberg, Germany, published in Science (26 November 2010), have put paid to the fusion theory explanation, and suggest that an intermediate or 'missing link' cell did exist all those billions of years ago.

"Our discovery means that the appearance of eukaryotic cells on earth can be explained by Darwinian evolution over billions of years rather than a 'big bang' fusion theory," says cell biologist Dr Emmanuel Reynaud from University College Dublin, one of the co-authors of the scientific paper.

"Our analysis shows that PVC [Planctomycetes, Verrucomicrobiae, Chlamydiae] bacteria, members of which are commonly found in today's sewage treatment plants or acid bogs, represent an intermediate type of cell structure. They are slightly bigger than other known bacteria, and they also divide more slowly."

"The structure of PVC suggests that it is an ancestor of a 'missing link' cell which connected prokaryotic to eukaryotic cells along an evolutionary path all those billions of years ago," says Dr Damien P Devos from the European Molecular Biology Laboratory, Heidelberg, Germany, who co-authored the scientific paper.

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90617&CultureCode=en

The world is growing older

Research Council of Norway, The

The fact that the world population is growing older will not only affect our pensions. In just a few decades there will be more elderly people than children in all parts of the world (with the exception of Africa). "The trend is dramatic," states the internationally-renowned Norwegian sociologist Gunhild Hagestad.

More than pension schemes and care

Media reports on the world's aging population tend to focus on pensions and care for the elderly. But other changes could be just as important. What will happen to family life, for example? And what will the relationship between the generations be like when so many of us live longer and have fewer children? These were some of the questions addressed by Chinese and Norwegian welfare researchers when they met in Shanghai in September for a seminar on welfare research hosted by the Research Council of Norway at the World Exhibition EXPO 2010.

Welfare policy shapes personal lives

Perhaps the most important point made by Professor Hagestad in her lecture about the aging problem to the Chinese and Norwegian welfare researchers in Shanghai was that our lives are shaped by the welfare policy of the states we live in to a much greater extent than we think. Both the Nordic region and China are examples of this.

China's one-child policy is well known. Without it there would be 400 million more Chinese people in the world today. But the Nordic region also stands out internationally; its welfare policy clearly sets it apart from large parts of the world.

Norway as the exception

The two phenomena of low mortality and low fertility are having a distinct impact on the population in many countries. The result is a steadily aging population in almost all parts of the world, apart from in Africa. Women are increasingly better educated, more independent and career-minded. This, combined with the lack of welfare schemes in many countries, goes a long way to explaining why women no longer want to have children. Researchers have identified this trend in a number of modern societies.

The Nordic region – and in particular Norway – is the exception to the rule, as childbirth rates there are still relatively high.

High birth rates among the poor

"In general, it is the poorest segments of the world's population that now have the highest birth rate. This is something we ought not ignore," says Professor Hagestad. She is aware that this perspective may seem elitist. All the same she thinks it too important not to be discussed.

"At this point in time there is a balance between the number of elderly people and the number of children in Norway. In my opinion it is important to try and maintain this," says Professor Hagestad, who works at the University of Agder and Norwegian Social Research (NOVA). She also participates in activities at the research centre Reassessing the Nordic Welfare Model, a Nordic Centre of Excellence under the auspices of the Nordic research organisation NordForsk. Professor Hagestad has held research positions and professorships in both Europe and the US and has served on several UN committees related to her field.

In China family is a family responsibility

China has one of the fastest growing elderly populations in the world. According to an article in the international journal Research on Aging in 2009, the elderly population in China will have tripled by 2050. Norway and China are in many ways extreme opposites when it comes to family policy. Under China's policy responsibility for the family rests entirely with families themselves. There are almost no institutions for the elderly, and few elderly people receive pensions. Most elderly people are therefore completely dependent on

their families – and traditionally primarily on the women family members. However, Chinese women, too, are much more likely to be out working now than previously. The family as a network is also being weakened by rapid urbanisation.

The many years of one-child policy have resulted in 400 million fewer inhabitants, and China will be facing a problem in the future. Who is going to take care of the elderly? More and more married couples will find themselves responsible for four aging parents, without any siblings to share the task.
Welfare schemes affect fertility rates

The same trend can be seen elsewhere in Europe, outside the Nordic region.

"In 2050 there will be four times as many elderly people in Italy as children. Greece, Spain, Portugal and many other countries will follow this pattern. Whereas Spanish women have to look after both their grandchildren and their elderly parents, in Norway this responsibility is divided between the public sector and the family. This is quite clearly the most important reason why fertility rates are so different," says Professor Hagestad.

Relationship between the generations
The relationship between the generations is also influenced by welfare schemes. This becomes clear if you compare the Nordic countries with countries in southern Europe.

"In Norway grandparents do not have to provide steady childcare for their grandchildren. They can come and go, providing back-up as required. In a country such as Spain, where the public sector does not provide the same level of childcare, this grandparenting strategy is much more risky. The result is that Norwegian and Nordic grandparents take their responsibility more seriously, as compared to grandparents in other European countries."

"In the Nordic region responsibility for the care of the elderly has become an established part of the public sector. Nevertheless it is extremely rare that families do not provide help to other family members who need it," Professor Hagestad remarks.
"The Nordic region is also an exception in another way: all over the world responsibility for taking care of the elderly primarily lies with women. But this is not the case in the Nordic countries. It is the only region where the researchers have found relatively small differences in expectations when it comes to how much daughters and sons should help their parents," she explains.
Alarming development

"When segregation between young and old people becomes too marked, it can have a negative impact on a society," says the professor.

"The result could be a society in which children, adults and the elderly spend even more of their time in separate spheres and gradually cease to understand each other. One way of counteracting this would be for children and elderly people to build alliances. But, if we are to succeed in this, society must first create the necessary framework."

Elderly population largely female

Apart from the increasing imbalance between the generations, the growing feminisation of the population is the most important demographic development trend in the world today.

"Women often cope better than men in the modern world. In most countries women outlive their husbands. In Norway girls born today can expect to live five years longer than boys (78 years versus 83 years). If you look at the oldest segment of the elderly population, in many countries there are twice as many women as men, including in Norway."

In China the differences in life expectancy are less pronounced. There girls can expect to live until they are 75 and boys until they are 71. But in Russia women live on average 12-13 years longer than men," Professor Hagestad points out. "Russian children may think that almost all old people are women. They hardly ever see any older men."

Warnings from social scientists

Professor Hagestad gave her lecture in Shanghai just a few days before China was to mark the 30th anniversary of its one-child policy.

The ban on families having more than one child was intended to last for 30 or 40 years. Now the Chinese authorities are saying that the policy will continue until 2015. But they are gradually allowing exceptions. A number of couples, in particular farmers, are permitted to have more than one child. The authorities now realise that the one-child policy will have significant negative ramifications, both economically and socially. In August the Chinese Academy of Social Sciences (CASS) presented a surprising report, in which the researchers urged the authorities to quickly bring the one-child policy to an end. The Chinese social scientists argued instead that people should be encouraged to have more children.

Researchers at CASS have found that it may be difficult to get Chinese people to have more children in the years to come, even if the authorities abandon their current stringent policy. In important areas of China, Chinese women will on average have fewer than 1.5 children in any case, the researchers warn. In order to maintain the current population level women need to have an average of 2.1 children each.

http://www.forskningsradet.no/en/Newsarticle/The_world_is_growing_older/1253963113828

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90614&CultureCode=en

The oldest salt mine known to date located in Azerbaijan

CNRS (Délégation Paris Michel-Ange)

CNRS (1) archeologists have recently provided proof that the Duzdagi salt deposits, situated in the Araxes Valley in Azerbaijan, were already being exploited from the second half of the 5th millennium BC. It is therefore the most ancient exploitation of rock salt attested to date. And, to the researchers' surprise, intensive salt production was carried out in this mine at least as early as 3500 BC. This work, conducted in collaboration with the Azerbaijan National Academy of Sciences and published on 1st December 2010 in the journal TÜBA-AR, should help to elucidate how the first complex civilizations, which emerged between 4500 BC and 3500 BC in the Caucasus, were organized.

The economic and symbolic importance of salt in ancient and medieval times is well known. Recent discoveries have shown that salt most probably played a predominant role in protohistoric societies, in other words those that preceded the appearance of writing. How is salt obtained? The two most widely used techniques are based on the extraction of rock salt, in other words a sedimentary deposit containing a high concentration of edible salt (2), and the collection of sun-dried salt in salt marshes, for example. Knowledge of the techniques used in former times to exploit raw materials such as salt, obsidian (3) or copper enables archeologists to deduce essential information on the needs and the level of complexity of ancient societies. In the Caucasus, the first traces of intensive exploitation of rock salt appeared at the very moment when these protohistoric societies were undergoing profound economic and technological changes, particularly with regard to the development, for the first time, of copper metallurgy.

In order to understand these interactions, CNRS researcher Catherine Marro and her team have been exploring the Araxes basin (Turkey, Iran, Azerbaijan) for the last ten years or so. The archeologists have been focusing particularly on the Duzdagi (4) salt mine situated in Azerbaijan, more specifically beside the old medieval Silk Road linking Tabriz (in the north west of Iran) with Constantinople. Until now, the oldest traces of exploitation of this deposit, which is still in activity, went back to the 2nd millennium BC. This dating was based on the fortuitous discovery in the 1970s of an ancient collapsed gallery that contained the remains of four workers buried with their tools.

In 2008, a French-Azerbaijani team directed by Marro and her colleague Veli Baxsaliyev began a systematic exploration of the Duzdagi mine. The team then made an inventory of a large number of remnants (tools, ceramics, etc.), the oldest of which date back to 4500 BC. It is the first time that artifacts from this period have been discovered in such large numbers in a salt mine. The researchers have thus been able to demonstrate that exploitation of this salt mine has been going on for a very long time, extending back at least to the second half of the 5th millennium BC: Duzdagi is therefore the oldest exploitation of rock salt known to date (5).

Another remarkable fact is that the abundance of artifacts dating from

the early Bronze Age suggests that the Duzdagi mine was intensively exploited from as early as the 4th millennium BC. Hundreds of stone picks and hammers have in fact been found near the entrances of collapsed tunnels. The frequent presence nearby of ceramic pottery fragments specific to the culture known as "Kuro-Araxes" has made it possible to date these archeological artifacts. Their spatial and chronological distribution was analyzed by a geographic information system, combining satellite photos (Spot 5), aerial photos taken from a kite and the plotting of artifacts by DGPS, a sort of enhanced global positioning system. Such intensive extraction suggests that the salt from Duzdagi was not limited to local use by small self-sufficient communities. It was undoubtedly distributed, within a still unknown economic framework, to more far-off destinations. Furthermore, it appears that the extracted salt was not accessible to all of the communities in the Araxes Valley. Its exploitation from the 5th millennium BC seems to have been the prerogative of certain prominent groups.

This work raises a lot of questions. Who and what was the salt intended for in the 5th and 4th millennia BC. How were the communities that exploited these deposits organized? What were the political and economic links between the different regional sites (villages, workshops and mines), etc.? To find part of the answers, the archeologists hope to excavate the collapsed tunnels of this deposit, which covers more than 6 km2, in the near future.

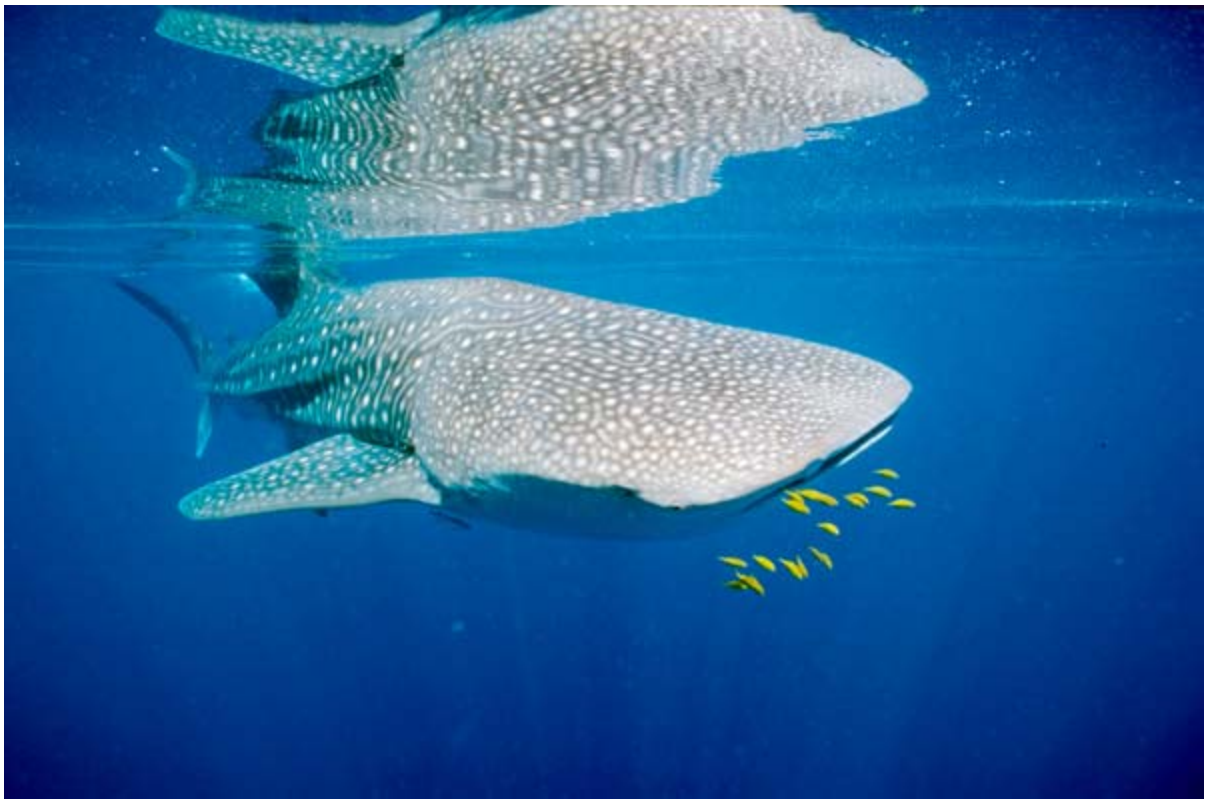
The explorations carried out on this site in 2008 and 2009 benefited in particular from funding from the French Ministry of Foreign Affairs and CNRS, as well as CNES support through the ISIS program. They were performed in collaboration with the Azerbaijan National Academy of Sciences./

Archaeological investigations on the salt mine of Duzdagi (Nakhchivan,

- Azerbaijan). C. Marro, V. Bakhshaliyev and S. Sanz. TÜBA-AR. Vol. 13, 2010

http://www.alphagalileo.org/ViewItem.aspx?ItemId=90605&CultureCode=en

What future for biodiversity? Scenarios for action



Institut de Recherche pour le Développement (IRD)

The loss of biodiversity will continue in the 21st Century. Global-scale extinctions will increase strongly, the average species abundance1 will decline and their distribution will be disturbed. Scientists thought until recently that the complexity of biodiversity made it unfeasible to predict future trends. Now, however, like the climatologists, life science specialists are able to predict future situations. A group of international experts2, including several IRD researchers, have just published a compilation of global-scale quantitative scenarios depicting possible changes in biodiversity. In spite of a degree of uncertainty in the models elaborated, the possible trends converge. If the processes of human and economic development do not change radically, the Earth is heading for disaster. With changes in land use, in climate and overexploitation of natural resources, humans activities are central to the major threats to biodiversity. The scenarios developed nevertheless point to possible lines of action.

Like their counterparts in the IPCC (Intergovernmental Panel on Climate Change) on the future climate, life sciences specialists can now attempt to predict changes in the biodiversity. For that domain, the future is scarcely any brighter. Biological diversity will continue to decline throughout the 21st- Century. A group of international experts[2], including several IRD scientists, recently published a summary compilation of model scenarios depicting the worldwide scale changes and developments in biodiversity. All the predictions point to the same conclusion: increase in the number of global extinctions, a fall in the abundance of species and substantial changes in their distribution.

Biodiversity in crisis

Even the most optimistic scenarios predict the decline, even the extinction, of many species over the next century. Most plants and animals will be subject to regression of their distribution area or abundance. The research team announces, for example, that the overall abundance of terrestrial species could diminish from 10 to 20 % during the first half of the century. In the “biodiversity crisis”, it is a change in composition of communities more than the disappearance of species which will be the most critical factor for humans.

Causes and consequences

The main factors behind loss of biodiversity are the degradation and destruction of natural habitats, climate change and overexploitation of biological resources. Changes in land use, brought on for instance by urbanization or the conversion of equatorial forest into pasture and arable land, is therefore the principal threat to biodiversity. It affects firstly the countries of the South, such as Central and Southern Africa, the Atlantic areas of South America and part of South-East Asia. Climate change is also severely upsetting habitats and disturbing ecosystems. It leads for example to invasion of Arctic tundra by boreal forest, which is shifting towards the Poles as the climate warms up. Other threats are acidification of oceans, rise in sea level and pollution which alter the coral reefs and destroy a significant number of coastal ecosystems. Overfishing leads to a decline in the top predators, such as tuna and shark, thereby completely disturbing the marine food chain. The resulting loss of biodiversity can have strong effects on human well-being and development. For example, irreversible degradation of littoral habitats exposes coasts to heightening risk of damage from waves and storm surges and loss of fishing productivity. Projections indicate that most factors behind erosion of diversity will persist and that climate change will amplify this trend over the next century.

Real progress is possible

The research team nevertheless shows that means for controlling the decline exist. Limiting deforestation can help counter the trend. The researchers forecast that, depending on the measures taken now, in the most advantageous cases, there will be an overall world increase in forest cover between now and 2030 of about 15%, amounting to 10 million km², equivalent to the surface area of Canada or China. Conversely, the worst scenario indicates a reduction by over 10% of the surface area of des forests.

Increasing the efficiency of agriculture, reducing greenhouse gas emissions, large-scale reforestation, reinforcement of fishing regulations, creation of both terrestrial and marine nature reserves, are all measures that could also enable humans to lessen their impact on the biodiversity.

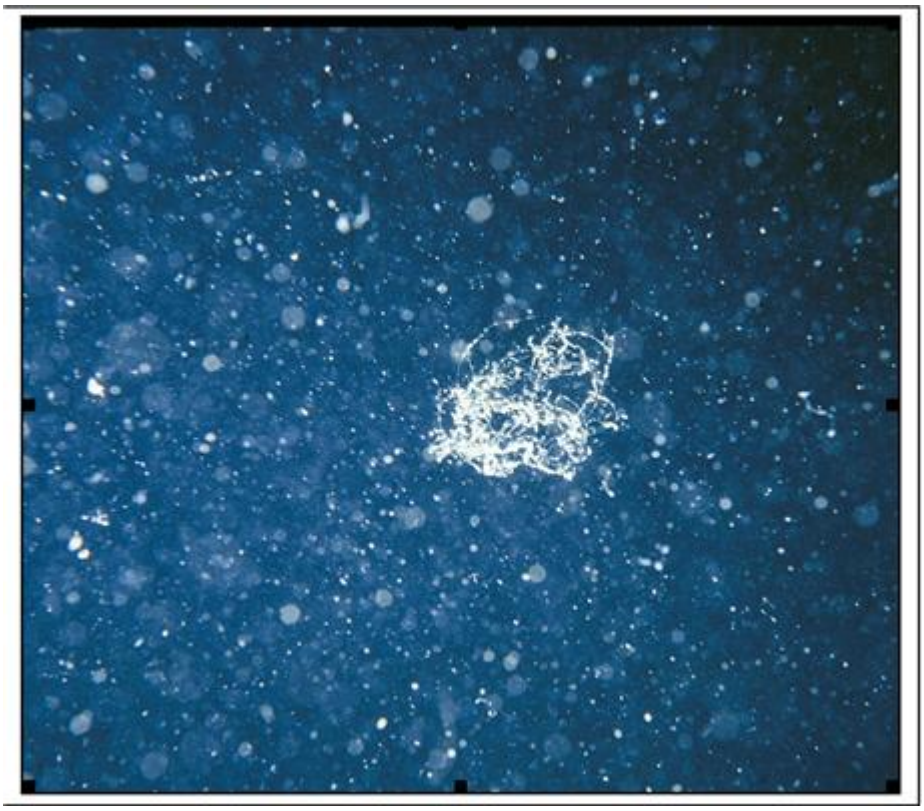
These optimistic scenarios strive to remain coherent with the economic constraints and populations' use of resources. Nevertheless, they indicate an imperative for radical changes in the present mode of development. In line with this, biodiversity specialists can now make predictions available to political decision-makers. Like the IPCC, an Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) is being formed. At national level, a wide-ranging programme was initiated in July 2010 aiming to continue the research and refine the models by the *Fondation pour la Recherche sur la Biodiversité*[3], of which the IRD is founder member.

1. Number of individuals of a species per unit of surface area or volume.
2. These investigations were conducted by DIVERSITAS (international research programme on biodiversity) and the United Nations Environment Programme World Conservation Monitoring Centre for the Secretariat of the Convention on Biological Diversity. This summary was carried out by research scientists from the Université Paris-Sud, the *Universidade de Lisboa* and *Universidade de Évora* au Portugal, the IRD, the *Departamento de Biodiversidad y Biología Evolutiva* in Madrid, Spain, from the Netherlands Environmental Assessment Agency, the PNUE-WCMC, Imperial College London and the University of East Anglia in the United Kingdom, Stockholm University in Sweden, the *Universidad Nacional Autónoma de México* in Mexico, University of Maryland, the Hawaii Pacific University, from the Joint Global Change Research Institute, *The Nature Conservancy* and from the Pew Environment Group in the United States, the Secretariat of the Convention on Biological Diversity and the University of British Columbia, Canada and CSIR Natural Resources and Environment in South Africa.
3. http://www.fondationbiodiversite.fr/

http://en.ird.fr/the-media-library/scientific-news-sheets/358-what-future-for-biodiversity-scenarios-for-action

http://www.alphagalileo.org/ViewItem.aspx?ItemId=88517&CultureCode=en

Sinking organic materials produce carbon dioxide



An aquatic aggregate of one centimeter diameter from Lake Constance, Germany (courtesy of Hans-Peter Grossart, IGB, Leibniz-Institute of Freshwater Ecology and Inland Fisheries)

Max-Planck-Gesellschaft

Researchers from the Max Planck Institute for Marine Microbiology in Bremen, Germany and the Massachusetts Institute of Technology (M.I.T.) in Cambridge, Massachusetts have found a remarkable effect while studying how marine particles sink, which could affect the way scientists assess global carbon fluxes. Their question - How fast does organic material and debris clumped together forming porous particles settle to the sea floor? Microbes colonizing these particles degrade the organic matter and release carbon dioxide back to the water. The downward velocity of the particles determines the amount of carbon exported to the deep sea. The results from this study are now presented in the Proceedings of the National Academy of Sciences (DOI: 10.1073/pnas.1012319108).

Structured like sponges, the marine particles are porous aggregates that are mostly void and made of water to 95% or more. Because the world's oceans are stratified due to temperature and/or salinity, water density increases with depth. On their way down to the deep ocean, marine aggregates can reach a depth where they approach neutral buoyancy, stopping in their descent until the exchange of low-density water and heavier ambient water allows settling to resume. Kolja Kindler, a scientist at the Max Planck Institute for Marine Microbiology and the Massachusetts Institute of Technology, points out that although thin layers of marine aggregates have often been observed in nature, this effect has been previously neglected in particle transport models.

In this study by Kindler and colleagues, the results from laboratory experiments and a mathematical model demonstrate this effect for the first time. As the particles are impermeable to flow, the only means of

exchanging water is by diffusion. As a result, the larger the size of the aggregates, the more time they spend in the stratified layer.

Arzhang Khalili from the Max Planck Institute for Marine Microbiology says, "Large marine aggregates may have a longer residence time in the water column than previously expected. This shows that we should revisit current approaches to particle settling to include the effect of porosity, if we want to improve our estimate of the carbon flux in the ocean."

“The deeper we look at microscale phenomena in the ocean, the more we discover that they are the processes that really govern how the Oceans work. Our chances of developing a sustainable approach to how we interact with and use the Oceans hinge on how well we can understand processes at these small scales” adds Roman Stocker from the Massachusetts Institute of Technology.

http://www.mpi-bremen.de/en/Carbon_Fluxes_in_the_Oceans.html

http://www.alphagalileo.org/ViewItem.aspx?ItemId=91727&CultureCode=e