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Maya man: No future for archaeology without ethics

- 02 June 2010 by **Michael Bawaya**

Magazine issue 2762.

"We cannot ignore the humanitarian crises that surround us in the developing world" (Image: Jerry Rabinowitz)

You have worked at Cancuén, in northern Guatemala, for over 10 years. Do you believe the Maya's fabled collapse began here?

No, the Maya collapse did not begin at this site nor at any other specific place. However, Cancuén, which was a major city with a huge royal palace, is critical to understanding the process of collapse, which was not a single, sudden phenomenon, but a series of events that took place over 250 years.

What caused the collapse of the Maya?

Between AD 700 and 1050, the Maya kingdoms collapsed one by one, in some cases due to war, but also from overpopulation, environmental issues or drought. Beneath those causes were deeper structural problems that had built up over several centuries. The massive investments in architecture, art and war that made the Maya so remarkable were also symptoms of the problems created by the rivalry of kings, the growing royal and noble classes, and the expensive ceremonies and military competitions that they generated. The economic and political system had become archaic and uncompetitive with other states. Catastrophe was inevitable.

Why was Cancuén so important?

Cancuén's destruction in AD 800 was pivotal because it was a strategic site for the whole Maya world. After it collapsed the western trade routes were shut down and people migrated elsewhere. Both factors had a domino effect, accelerating the fall of the other Maya kingdoms.

You preach the gospel of ethical archaeology. What do you mean by that?

Ethical archaeology means using archaeology and the publicity it generates to help impoverished people living near the sites. For example, when the excavation has finished, these people should benefit from managing site parks, tourism and other related activities.

You have said that ethics are more important than discovering royal palaces. Why?

Discovering royal palaces contributes to scientific knowledge but it doesn't help the people who live nearby, such as the modern descendants of the Maya. When the archaeologists finish their projects, they leave in their wake a social disaster of unemployment which leads to looting and then deforestation.

Do you think the future of archaeology depends on an ethical approach?

Yes. We cannot ignore the humanitarian crises that surround us in the developing world. The future of my field is really about collaborative work - training and educating those who live around the sites. We must save the ruins, but also the forests in which they are located and the people who live there. This must be the way forward or there will be no future for those sites or for archaeology.

Does this approach benefit you?

I have made major discoveries because the local Maya have told me where to excavate. They have also helped me recover stolen monuments.

Profile

Arthur Demarest is head of the Institute of Mesoamerican Archaeology at Vanderbilt University in Nashville, Tennessee, and excavated the Mayan royal palace in Cancuén

Movie version?

Demarest has had a colourful career. At one point he received death threats and had to carry out his excavations under armed guard after having worked with the Guatemalan equivalent of the FBI in their work to recover important Mayan artefacts.

So it's no surprise that he has been likened to Indiana Jones. If you feel you've heard that somewhere before, we've compiled a line-up of archaeologists who have been likened to Indy. Find out more in our gallery *Would the real Indiana Jones please stand up?*

http://www.newscientist.com/article/mg20627624.800-maya-man-no-future-for-archaeology-without-ethics.html

What makes the sound of vuvuzelas so annoying?

- 17:54 14 June 2010 by **Trevor Cox**

Better played by an expert (Image: Clive Rose/Getty)

Love 'em or loathe 'em, the blaring plastic trumpets have become the hallmark of matches at the 2010 World Cup. We asked Trevor Cox, president of the UK Institute of Acoustics and an acoustic engineer at the University of Salford, UK, to explain their appeal – or otherwise

How do vuvuzelas make their sound?

The vuvuzela is like a straightened trumpet and is played by blowing a raspberry into the mouthpiece. The player's lips open and close about 235 times a second, sending puffs of air down the tube, which excite resonance of the air in the conical bore. A single vuvuzela played by a decent trumpeter is reminiscent of a hunting horn – but the sound is less pleasing when played by the average football fan, as the note is imperfect and fluctuates in frequency. It sounds more like an elephant trumpeting. This happens because the player does not keep the airflow and motion of the lips consistent.

But that din sounds nothing like a trumpet or an elephant.

When hundreds of the vuvuzelas are played together, you get the distinctive droning sound. People in the crowd are blowing the instrument at different times and with slightly varying frequencies. The sound waxes and wanes. The overall effect is rather like the sound of a swarm of insects.

Why are they so loud?

The loudness can be explained by the bore shape, which is roughly conical, and flares. As well as creating sound at a frequency of 235 hertz, the instrument generates harmonics – sound at multiples of the fundamental frequency. We have measured strong harmonics at 470, 700, 940, 1171, 1400 and 1630 hertz.

A flared instrument has louder higher-frequency harmonics than a cylindrical one. The flared instrument is perceived as louder because the higher harmonics are at frequencies where our hearing is most sensitive. This is partly why the conical saxophone sounds louder than the cylindrical clarinet.

Since it produces 116 decibels at 1 metre, prolonged exposure to the vuvuzela poses a risk to hearing, according to a study by the Department of Communication Pathology at the University of Pretoria, South Africa. Listen to just one instrument for 7 to 22 seconds and you exceed typical permitted levels for noise at work. A whole crowd produces even higher levels, and measurements at a training match have shown temporary hearing loss among spectators.

Is it annoying because it is loud?

Experiments on other noise sources show that louder sounds are more annoying. Our hearing is an early-warning system: we listen out for sudden changes in the sounds around us which might indicate threats, and ignore benign, persistent noise. When noise becomes as loud as a vuvuzela, however, it becomes impossible to habituate to the sound.

What else about the sound makes it annoying?

The droning quality makes it more annoying – the fact it has a distinct pitch or note. Investigations into many noise annoyance problems have demonstrated this. Indeed some noise standards and regulations have corrections to allow for the additional annoyance from such sound. Droning sounds are harder to ignore and more alerting than broadband noise such as the hiss of a badly tuned radio. This might be because tones can carry useful information in the vowel sounds of speech. But it might also relate to threat detection – because predator sounds like a lion's roar has tonal components – but I'm speculating.

What can be done to make it less annoying, especially on TV and the radio?

Broadcasters have to balance how much crowd sound to use compared to the commentators' voices. If they make the crowd too quiet then the game lacks atmosphere, so they can't turn it off altogether. If you are watching the match on a computer, you could try this, from the Centre for Digital Music at Queen Mary University of London. Otherwise, you might just have to try and accept the sound as being part of the background. Lack of control over a noise source has been shown to increase its perceived annoyance. So your best bet might be to crack open another beer and try your best to enjoy the atmosphere.

http://www.newscientist.com/article/dn19041-what-makes-the-sound-of-vuvuzelas-so-annoying.html

Language lessons: You are what you speak

- 01 June 2010 by **Christine Kenneally**

Magazine issue 2762.

Following inbuilt rules (Image: Charles Gullung/Getty)

LANGUAGES are wonderfully idiosyncratic. English puts its subject before its verb. Finnish has lots of cases. Mandarin is highly tonal.

Yet despite these differences, one of the most influential ideas in the study of language is that of universal grammar. Put forward by Noam Chomsky in the 1960s, it is widely interpreted as meaning that all languages are basically the same and that the human brain is born language-ready, with an in-built program that is able to decipher the common rules underpinning any mother tongue. For five decades this idea has dominated work in linguistics, psychology and cognitive science. To understand language, it implied, you must sweep aside the dazzling diversity of languages and find the common human core.

But what if the very diversity of languages is the key to understanding human communication? This is the idea being put forward by linguists Nicholas Evans of the Australian National University in Canberra and Stephen Levinson of the Max Planck Institute for Psycholinguistics in Nijmegen, the Netherlands.

They believe that languages do not share a common set of rules. Instead, they say, their sheer variety is a defining feature of human communication - something not seen in other animals. And that's not all. Language diversity is the "crucial fact for understanding the place of language in human cognition", Levinson and Evans argue.

In recent years, much has been made of the idea that humans possess a "language instinct": infants easily learn to speak because all languages follow a set of rules built into their brains. While there is no doubt that human thinking influences the form that language takes, if Evans and Levinson are correct, language in turn

shapes our brains. This suggests that humans are more diverse than we thought, with our brains having differences depending on the language environment in which we grew up. And that leads to a disturbing conclusion: every time a language becomes extinct, humanity loses an important piece of diversity.

Since the theory of universal grammar was proposed, linguists have identified many language rules. Although these are supposed to be universal, there are almost always exceptions. It was once believed, for example, that no language would have a syllable that begins with a vowel and ends with a consonant (VC), if it didn't also have syllables that begin with a consonant and end with a vowel (CV). This universal lasted until 1999, when linguists showed that Arrernte, spoken by Indigenous Australians from the area around Alice Springs in the Northern Territory, has VC syllables but no CV syllables.

Other non-universal "universals" describe the basic rules of putting words together. Take the rule that every language contains four basic word classes: nouns, verbs, adjectives and adverbs. Work in the past two decades has shown that several languages lack an open adverb class, which means the number of adverbs available is limited, unlike in English where you can turn any word into an adverb, for example soft into softly. Others, such as Lao, spoken in Laos, have no adjectives at all. More controversially, some linguists argue that a few languages, such as Straits Salish, spoken by indigenous people from north-western regions of North America, do not even have distinct nouns or verbs. Instead they have a single class of words to encompass events, entities and qualities.

Even apparently unassailable universals have been found wanting. This includes recursion, the ability to infinitely embed one item in a similar item, such as "Jack thinks that Mary thinks that... the bus will be on time". It is widely considered to be a characteristic that sets human language apart from the communications of other animals. Yet Dan Everett at Illinois State University recently published controversial work showing that Amazonian Pirahã does not have this recursive quality (*Language*, vol 85, p 405).

The more we learn about languages, the more apparent the differences become (see "Tower of Babel"). While most linguists have somehow lived with these anomalies, Evans and Levinson believe they cannot be ignored. "The haul of clear and empirically impeccable universals, after decades of searching, is pitiful," Evans notes. He and Levinson argue that the idea of universal grammar has sent researchers down a blind alley. We should embrace linguistic diversity, they say, and try to explain the forms that languages actually take. To that end, they published a paper outlining their theory in *Behavioral and Brain Sciences* last year (vol 32, p 429). Everett has described it as "a watershed in the history of linguistic theory".

If languages do not obey a single set of shared rules, then how are they created? "Instead of universals, you get standard engineering solutions that languages adopt again and again, and then you get outliers," says Evans. He and Levinson argue that this is because any given language is a complex system shaped by many factors, including culture, genetics and history. There are no absolutely universal traits of language, they say, only tendencies. And it is a mix of strong and weak tendencies that characterises the "bio-cultural" hybrid we call language.

According to the two linguists, the strong tendencies explain why many languages converge on common patterns. A variety of factors tend to push language in a similar direction, such as the structure of the brain, the biology of speech and the efficiencies of communication. Widely shared linguistic elements may also build on a particularly human kind of social reasoning. For example, the fact that before we learn to speak we see the world as a place full of things causing actions (agents) and things having actions done to them (patients) explains why most languages deploy these categories.

Origins of diversity

Weak tendencies, in contrast, are explained by the idiosyncrasies of different languages. Evans and Levinson argue that many aspects of the particular natural history of a population may affect its language. For instance, Andy Butcher at Flinders University in Adelaide, South Australia, has observed that Indigenous Australian children have by far the highest incidence of chronic middle-ear infection of any population on the planet, and that most Indigenous Australian languages lack many sounds that are common in other languages, but which are hard to hear with a middle-ear infection. Whether this condition has shaped the sound systems of these languages is unknown, says Evans, but it is important to consider the idea.

Levinson and Evans are not the first to question the omnipotence of universal grammar, or UG, but no one has distilled these ideas quite as convincingly and given them as much reach. As a result, their arguments have generated widespread enthusiasm, particularly among those linguists who are tired of trying to shoehorn their findings into the straitjacket of "absolute universals". To some, it is the final nail in UG's coffin. "Recent strategies like saying that not all language must have all components of UG - with no explanation of the variation - just immunise UG from falsification," says Michael Tomasello, co-director of the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany. A developmental psychologist with particular interest in language acquisition, Tomasello has been a long-standing critic of the idea that all languages conform to a set of rules. "Universal grammar is dead," he says.

Steven Pinker of Harvard University, who is the author of *The Language Instinct*, agrees with many points made by Evans and Levinson, including the fact that the standards for a "universal" have not been rigorous enough; that language arises from the co-evolution of genes and culture; and that it is very important to document the diversity of languages. Still, Pinker argues that all humans do share an innate set of mechanisms for learning language. He accepts that the extent to which different languages use these mechanisms may be shaped by that culture's history, but still believes there are many universals that underlie all languages.

Others claim that just because we have not yet worked out exactly what constitutes a universal in language, doesn't mean they don't exist. Tecumseh Fitch at the University of Vienna in Austria says that from the outset Chomsky's own definition was quite sophisticated. "In introducing the term 'UG', Chomsky made it clear that these features are highly abstract and not [the same as] absolute surface universals," he says.

"If universal means a 'bias that can be violated' then I'm happy to use universal in that special sense," says Evans. "I don't think that's the sense in which it was originally intended. But if that's what UG ends up morphing into, then fine, we can move on to more interesting questions."

Diversity in mind

Among the most important of these is what the Evans-Levinson approach says about our species. The diversity of human language sets it apart from the communication systems of all other animals, which tend to be the same for any group in any species, no matter where on the globe they live. True, some animals, including songbirds and higher primates, do have a range of learned expressions that can vary from one population to another, but none is remotely as diverse as human language. Evans and Levinson attribute our linguistic exuberance to the plasticity of the human brain, and they say it changes how we should think about human thought.

The standard modern metaphor for cognition is the "toolbox", with humans sharing some tools with other animals while having others that are exclusive to us. For Evans and Levinson, cognition is more like "a machine tool, capable of manufacturing special tools for special jobs... like calculating, playing the piano, reading right to left, or speaking Arabic". In this view, the brain of a child does not arrive pre-programmed

with abstract linguistic rules. Instead, its initial setting is much simpler: the first job of the brain is to build a more complicated brain. This it does using any input that it gets, including language. This could mean that speakers of very different languages have quite different brains, says Levinson.

Each of the world's 7000 or so languages contains its own unique clues to the mysteries of human existence

Taking diversity at face value also gives linguists an opportunity to re-examine old dogmas. For example, it is assumed that all languages are equally easy to learn, yet this has never been tested. Evans believes that given the number of variable factors that shape languages, there might well be differences in how quickly infants reach particular linguistic milestones depending on the idiosyncrasies of their mother tongue. "We need to revisit this idea," he says.

Another classic dogma is that we all master the fundamental structure of our native language by early childhood. Indeed, one of the most compelling aspects of the UG-language-instinct idea was that it seemed to explain how infants do this with such ease. However, it turns out that in some languages there are some aspects that are not mastered until later in life, such as the triangular kin terms of the Indigenous Australian language, Bininj Gun-wok. These situate the speaker, listener and a third party relative all at once. For example "al-doingu" means "the one who is my mother and your daughter, you being my maternal grandmother". And this is not an oddity; there are hundreds of such structures in the language. The speakers of Bininj Gun-wok only begin to acquire this part of the language in their twenties.

Focusing on language diversity also highlights the tragedy of language extinction. In the old model, all languages are merely variations on the same underlying theme. In the new model, however, each of the world's 7000 or so languages contains its own unique clues to some of the mysteries of human existence. "Observations about animal species, distinctness, behaviour and ecological relationships which are captured in the vocabulary of some languages distil millennia of close observation by the speakers of those languages," says Evans. For example, some languages spoken in Arnhem Land, in Australia's Northern Territory, have words for five species of bee not yet described by science. "A typical language in [that area] will contain a veritable library shelf of ethnobiology that is on the verge of being lost without us ever knowing what books were there," says Evans.

In the diversity of the world's languages we find facts about ancient human history, the path of languages through time, and deep knowledge of the planet. Seen in this light, languages and their speakers offer a scientific bonanza to anyone trying to understand human evolution, behaviour and cognition.

Read more: UNESCO interactive atlas of the world's languages in danger

Tower of Babel

After half a century of trying to find a common pattern among all languages it is increasingly clear that they are not the same.

- Some languages have 11 distinct sounds with which to make words, while others have 144. Sign languages have none. As sounds that were once thought impossible are discovered, the idea that there is a fixed set of speech sounds is being abandoned.

- Some languages use a single word where others need an entire sentence. In English, for example, you might say "I cooked the wrong meat for them again". In the Indigenous Australian language Bininj Gun-wok you would say "abanyawoihwarrgahmarneganjginjeng". The more we know about language processing, the less likely it seems that these two structures are processed in the same way.

- Even plurals are not straightforward. The Kiowa people of North America use a plural marker that means "of unexpected number". Attached to "leg", the marker means "one or more than two". Attached to "stone", it means "just two".

- Some major word classes are not found in all languages. English, for example, lacks "ideophones" where diverse feelings about an event and its participants are jammed into one word - as in "rawa-dawa" from the Mundari language of the Indian subcontinent meaning "the sensation of suddenly realising you can do something reprehensible, and no one is there to witness it".

Christine Kenneally is a science writer and author of The First Word: The search for the origins of language (Viking Adult, 2007)

http://www.newscientist.com/article/mg20627621.000-language-lessons-you-are-what-you-speak.html

Entangled photons available on tap

- 18:00 02 June 2010 by **Marcus Chown**
- For similar stories, visit the **Quantum World** Topic Guide

The creation of an "entanglement gun" brings the prospect of a light-based quantum computer a step closer. The ability of entangled photons to spin in two different senses will allow quantum computers to encode a 0 and a 1 simultaneously, allowing even a small quantum computer to outperform the fastest supercomputer for some tasks.

A team from Toshiba Research Europe in Cambridge, UK, and the University of Cambridge made the entanglement gun from a "quantum dot", formed by a patch of indium arsenide semiconductor no more than 10 nanometres across. When an 80-megahertz alternating current passed through the quantum dot it trapped two negatively charged electrons and two positive "holes". On each cycle of the current, the electrons and holes combined to eject a pair of entangled photons.

We created a train of entangled photons "spat out as if from a gun", says Mark Stephenson of Toshiba. "And we did it with an electric current, which is easy to manipulate."

Unreliable conversion

Entangled photons have previously been made using a crystal to split laser light into photon pairs. The trouble with such "parametric down conversion" is its unpredictable nature. "Sometimes you get two pairs of photons, sometimes one, sometimes zero," says Stephenson. "That's not exactly reliable if you want an error-free quantum computer."

The work is an important development says Richard Warburton of the University of Basel in Switzerland. "Other sources of entangled photon pairs are all optically rather than electrically driven, and they don't always give you what you want. The really neat thing about the new semiconductor device is that you can get the entangled photons when you want them, simply by applying a voltage pulse to the device."

Journal reference: *Nature*, DOI: 10.1038/nature09078

http://www.newscientist.com/article/dn18990-entangled-photons-available-on-tap.html

First 'chameleon particle' spotted after changing type

- 16:05 01 June 2010 by **Anil Ananthaswamy**

It is the chameleon of the subatomic world, but after many years of searching, direct evidence of a neutrino changing from one type into another has been found.

Neutrinos are thought to "oscillate" between three types: electron, tau and muon. But nobody has seen one after it has transformed.

For three years, a source at CERN in Switzerland has been firing billions of muon neutrinos towards the OPERA experiment beneath the Gran Sasso mountain in Italy, 730 kilometres away.

Detecting the appearance of a tau neutrino amidst the barrage of muon neutrinos is extremely difficult. "You have to be sensitive to even one single neutrino that has been transformed," says OPERA spokesman Antonio Ereditato at the University of Bern in Switzerland.

Serious cracks

Now physicists at OPERA say they are 98 per cent confident that they have detected a tau neutrino in the beam. This confirms serious cracks in the standard model of particle physics, which says neutrinos are massless. Neutrinos can only oscillate if they have mass.

Previous evidence for oscillation was indirect. In 1998, physicists found that some muon and electron neutrinos, which had been produced in the atmosphere and sun, had disappeared en route to the Super-Kamiokande detector in Japan, which cannot detect tau neutrinos.

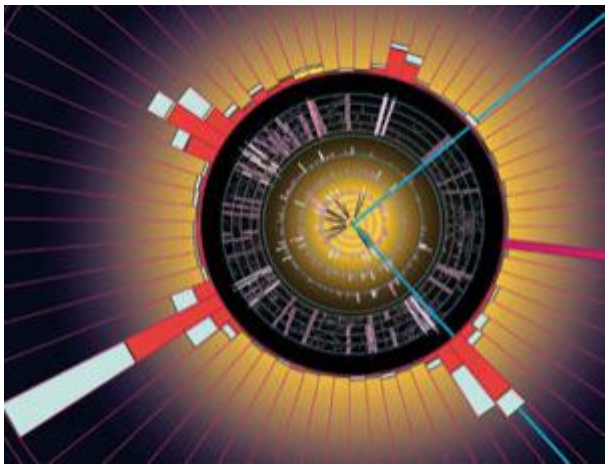
But other less likely explanations, such as neutrino decay, could not be entirely ruled out. Ereditato draws a parallel over such disappearances: "It's like a murder. You have the murder scene, but now we have found the first part of the body."

http://www.newscientist.com/article/dn18986-first-chameleon-particle-spotted-after-changing-type.html

Matter: The next generation

- 01 June 2010 by **David Shiga**

Magazine issue 2762.



Smashing time (Image: Kerrcom Multimedia)

TWO teams working at the Tevatron particle smasher in Batavia, Illinois, have found hints of a new generation of fundamental particles - to add to the three generations we already know about. What's so special about these new particles?

If they really do exist, they might explain a long-standing puzzle - how the universe avoided self-destruction in its earliest moments after the big bang.

First a rundown on what we know already. Each of the three known generations of matter contains two types of fundamental particle - quarks and leptons. First generation leptons include the familiar electron and neutrino (see images, right).

The first generation of matter can explain everything we encounter in everyday life. Atomic nuclei are composed of protons and neutrons, which are in turn composed solely of "up" and "down" quarks.

The second and third generations were introduced to explain the dozens of varieties of short-lived, subatomic particles spotted in the debris of particle smashers. Each of these two generations contains a pair of quarks - much heavier than those of the first generation - as well as muons and taus, heavy versions of the electron. They also each have their own version of the neutrino.

New generations of matter have tended to show up every 30 or 40 years - the last time was in 1975, when the tau was discovered. "We've seen three generations, why not four?" says Amarjit Soni of Brookhaven National Laboratory in Upton, New York. A fourth generation would be "a very simple continuation of the trend we've seen", he says.

Now hints of this fourth generation have turned up in data from the Tevatron accelerator, which smashes together protons and antiprotons.

In March, researchers at the CDF detector at the Tevatron finished combing through the collision debris created there between March 2002 and March 2009. They were looking for hints of a fourth-generation quark, which would be heavier than those in the other three generations. That would explain why it hadn't been seen in past experiments - the heavier a particle is, the more energy is needed to forge it, and collisions in previous experiments involved too little energy to produce such a massive beast.

A heavy fourth-generation quark would unleash a lot of energy as it decayed, producing very energetic muons, among other things. The other three generations of matter also produce these decay products, and calculations suggest these three generations should account for two decay events at the highest energy measured in the experiment. But the CDF team saw eight - a surplus that hints at a fourth-generation quark.

Hints of a new quark have turned up in the decay products of the Tevatron particle smasher

The excess is small enough to be a statistical fluke, so the team is not claiming to have seen signs of a fourth generation. "Extraordinary claims require extraordinary evidence, and we definitely don't have that," admits John Conway of the University of California at Davis, one of the study's authors.

No fluke

Not everyone is ready to dismiss the excess, however. Stephen Martin of Northern Illinois University in DeKalb, who was not involved in the study, says, "It's interesting enough that we'll be paying attention to future analyses and hoping. It would be very exciting if there was a [fourth-generation] quark."

Though the significance of the CDF excess is debated, fresh evidence from Tevatron's other main detector, DZero, shows another possible hint of a fourth generation that is harder to dismiss.

A new analysis of proton-antiproton collisions in DZero found the decay products were unexpectedly skewed - slightly more muons were created than antimuons, their antimatter counterparts (arxiv.org/abs/1005.2757).

"If it is confirmed, it's an extremely important discovery," says Soni. "It has very important repercussions for all of particle physics."

This result is at odds with the standard model of particle physics, the best theory we have so far to describe the subatomic world. The model predicts a much smaller difference between the number of matter and antimatter particles produced in collisions, about 1/40th of what DZero actually saw. A new and unknown influence seems to be at work.

Some physicists have previously pointed out that a fourth generation of particles could skew the matter-antimatter balance in the sort of process observed at DZero.

How might this happen? The weird rules of quantum mechanics permit virtual particles to briefly pop into existence, and if fourth-generation quarks were to arise this way in DZero, they could interfere with the normal sequence of events by which particles in the experiment decay. For example, pairs of quarks that include third-generation "bottoms" normally go through a series of reactions that produce muons and anti-muons. A fourth-generation quark could interfere with this process, upsetting the normal balance between matter and antimatter production and skewing the results in favour of matter.

If the anomaly at DZero is the result of fourth-generation particles, the implications would be profound. For decades, physicists have puzzled over the fact that the universe as we know it exists at all.

According to the standard model, matter and antimatter should have condensed in nearly equal amounts from the energy available in the early universe. Since matter and antimatter annihilate each other on contact, most of both "species" would have been quickly destroyed, leaving a barren sea of radiation almost completely devoid of the matter needed to make stars, galaxies and planets. Clearly that didn't happen, so something must have boosted production rates for matter, leaving an excess to survive the orgy of annihilation and give rise to the universe.

A fourth generation of particles could explain how matter survived to form stars and galaxies

If fourth-generation quarks are responsible for upsetting this balance, then we would not exist without them. "To me, this is the single most important motivation for the existence of [the fourth generation]," says George Hou of the National Taiwan University in Taipei. By a mere extension from three to four generations, he adds, we may have enough asymmetry to explain how matter survived annihilation in the early universe.

Though the DZero asymmetry fits with the existence of a fourth generation, it does not prove it. It is also possible to generate matter-antimatter asymmetry in theories that attempt to explain particle physics by introducing hidden extra dimensions, as well as in supersymmetry - a theory in which each particle in the three known generations of matter, as well as those that carry forces, has a heavier partner.

Fourth-generation particles could also help explain the origin of the dark matter that seems to make up most of the universe's mass. Key to this idea is a heavy neutrino. Like the neutrinos in all the other generations of particles, this one does not interact with the electromagnetic force, making it transparent to light and hence invisible.

While the other three known neutrinos are too lightweight to account for a significant fraction of dark matter, heavier fourth-generation neutrinos might be able to clump together and form the seeds of galaxies.

Exciting as the idea is, it is not watertight. For one, a heavy neutrino would ordinarily decay in a fraction of a second into a lighter version from another generation, so no heavy neutrinos from the early universe should have survived to form the dark matter we think exists today. Physicists would have to come up with a way to explain how a heavy neutrino stayed stable for billions of years since the big bang.

Luckily the Large Hadron Collider at CERN should be able to clarify things. It is now colliding particles with a combined energy of 7 teraelectronvolts, dwarfing the Tevatron's 2 TeV collisions. Given the extra power, it should not take long for the LHC to spot a fourth-generation quark with a mass of around 450 GeV. "The LHC is going to be able to definitively test this," says Martin.

An important milestone along the way will be spotting the heaviest particle that is already known – a third-generation quark called the top, which has a mass of 170 GeV. The LHC looks on track to spot the top within a few months, Conway says, and then it should not take much longer to see if the CDF excess is more than a fluke.

A positive discovery would be a win for the fourth-generation theory, says Hou. "It would truly turn the world upside down."

http://www.newscientist.com/article/mg20627622.700-matter-the-next-generation.html

DNA replication... without life

- 27 May 2010 by **Kate McAlpine**
- Magazine issue 2762.

Providing a perfect setting for life to replicate (Image: University of Delaware/JGI/DOE)

THE precursor of life may have learned how to copy itself thanks to simple convection at the bottom of the ocean. Lab experiments reveal how DNA replication could have occurred in tiny pores around undersea vents.

One of the initial steps towards life was the first molecule capable of copying itself. In the open ocean of early Earth, strands of DNA and loose nucleotides would have been too diluted for replication to occur. So how did they do it?

Inside many undersea hydrothermal vents, magnesium-rich rocks react with sea water. Such reactions create a heat source that could drive miniature convection currents in nearby pores in the rock, claim Christof Mast and Dieter Braun of Ludwig Maximilian University of Munich, Germany. They propose that such convection could concentrate nucleotides, strands of DNA, and polymerase, providing a setting that would promote replication.

Sea water inside pores on or near a vent's chimney may undergo thermal convection because the water at the wall of the pore closest to the vent's heat source would be warmer than the water near the furthermost wall, say Mast and Braun. If the pore contained strands of DNA, nucleotides, and polymerase they would ride upward in the warm current. The DNA strands would also be "unzipped" in the heat, splitting into two strands that each serve as templates for eventual replication.

All these components would then tend to shift away from the rising warmer region. In air, particles typically shift into a colder current because they are more likely to be pushed away by warmer, more energetic molecules than those on the cooler, calmer side. The researchers reckon a similar process would occur in the fluid in the vents.

Over time, the DNA templates, polymerase and nucleotides would collect at the bottom of a pore. Once there, they could become concentrated enough for the polymerase to bind new nucleotides to the single-strand DNA templates, replicating the original DNA (see diagram).

To test this theory, Mast and Braun put these ingredients into tubes 1.5 millimetres long. They used a laser to heat one side of the water and create thermal convection. Sure enough, they found that the DNA doubled every 50 seconds (*Physical Review Letters*, vol 104, p 188102).

But how would any replicated DNA have then moved between pores to recombine with new templates, producing a variety of configurations? Fatty acids in the water may have provided a shuttle service, says Braun. Last year, a team at Harvard University found that fatty acids driven by convection will form membranes. Such membranes could trap the concentrated genetic material and transport it, he says (*Journal of the American Chemical Society*, DOI: 10.1021/ja9029818).

"The work shows that DNA can be both concentrated and replicated under a very simple set of conditions," says Nick Lane at University College London.

The work shows that DNA can be both concentrated and replicated under a very simple set of conditions

http://www.newscientist.com/article/mg20627623.000-dna-replication-without-life.html

Creative Debate Among Sculptors, Not Too Loud

By ROBERTA SMITH

Artistically speaking, West Chelsea — land of several hundred art galleries — is a tower of Babel spread on the horizontal. On any given day, scores of different visual languages are being spoken at once, often in raised voices. Arguments made by one show for one aesthetic position are immediately, sometimes violently, countered by the show next door. The effect can be cacophonous and confusing, although the other extreme is probably more disconcerting: when too many shows are talking alike.

Perhaps most interesting are those instances when a few shows speak enough, but not too much, of the same language to have an engaging debate. That's happening this week among exhibitions of three younger artists working primarily in three dimensions — shows that focus on sculpture and its ostentation in terms of means of production, use of materials and methods of display.

Their efforts offer pointed commentary on the medium, particularly in its most cash-dependent forms: large-scale public sculpture and pricey portable objects that involve complex techniques, skilled artisans, expensive materials and demanding maintenance regimens. Each artist here takes a do-it-yourself, low-budget approach involving found, inexpensive materials and objects, which they simply but deliberately — and at times ingeniously — work, rework or combine. Wit is a common denominator, and in all cases works on paper amplify the cross talk. Otherwise, these artists go their separate ways.

In his second solo show in New York (and at the Zach Feuer Gallery), Johannes VanDerBeek embraces traditional sculptural subjects in nontraditional ways and in cheap materials, displaying a facility and historical awareness that have never been quite as overt, whimsical or physically inventive. The exhibition, titled "Another Time Man," has about six distinct bodies of work — it's actually a series of capsule shows — that range across the ages. This is implied by the first large work you'll see, a partition titled "The Big Stone Flatscreen With Static." It is cobbled together from pieces of cut-out cardboard, painted fuzzy black and white

on one side and smeared on the other with a gray material called Celluclay. It's television versus cave painting.

One group of works, displayed within a shimmering but flimsy curved wall painted silver, are fashioned from tin cans that have been sliced open, bent, stacked in various ways, welded together and tinted with spray paint; they flit effortlessly among Cubism, Futurism, Modern architecture, totemic figures, tramp art, Calder and toys. Life-size sculptures made of wire mesh offer ghostly depictions of an American Indian, a frontier woman and a hippie as vanished characters, implying some kind of historical continuum. Darkly colored slabs of textured metal could be remnants of an ancient culture or just Rust Belt castoffs, signs of more recent obsolescence; either way, they are aluminum foil colored with ink and pastel and incised with a ballpoint pen.

Eeriest of all are several found aluminum display boxes on pedestals whose interiors, looped with dead neon tubing, have been gingerly spray-painted and outfitted with arresting masks collaged from magazine images — talking heads, Roman portraits or ancient spirits conjured up around the campfire. Mr. VanDerBeek's vision is darker than you think.

In his physically slightest work, he distracts us with grids of paper towels, stained and splashed with paint: sweet, sophisticated nothings of considerable pictorial power. His next target may be abstract painting.

More exclusively focused on — and dismayed by — the present, Josephine Meckseper continues her meditation on American consumerism in her second solo show at the Elizabeth Dee Gallery. This time she offers a kind of chrome monochrome environment in which the references ricochet among Modernist sculpture, the automobile as the No. 1 object of American male desire and various references to the fairer sex, which might be described as desire No. 2.

Ms. Meckseper's dazzling surfeit of reflective surfaces takes the animal fascination with shiny and runs with it. "Americanmuscle" updates Duchamp's bicycle wheel with a chrome car wheel on a mirrored pedestal. Other ready-mades, hanging from chrome display stands and racks, include a tail light, chains of different sizes, fox tails and rabbits' feet. Gender differences are acknowledged in the display of a nylon stocking and crude approximations of designer handbags made from metal mesh and chain, sometimes with a car logo attached, using a bit of tar- or crude-oil-like substance. "Brillo" consists of a chrome treelike counter display stand, each of whose nine small platforms holds a metal pot-scouring pad, as if it were a precious object, perhaps a feminist hood ornament.

Repeated uses of enlarged watch faces from Cartier ads in wall pieces and papier-mâché forms may be a comment on the work of the key appropriation artist Richard Prince and his extensive use of car culture. Elsewhere, a small photograph of the burning Deepwater Horizon rather heavy-handedly suggests the self-destructive implications of consumerism, as does a small and erratic video of cracked glass — a car windshield or store window.

Haim Steinbach's Neo-Geo sculptures of the mid-1980s, and the more dour, redneck tack taken by Cady Noland in the late 1980s are influences here. But Ms. Meckseper is no stranger to the store display case; here she creates an environmental one in which we are both pliable consumers and available commodities.

If a kind of Americana prevails in those two shows, Siobhan Liddell turns more decisively toward Europe in "Ordinary Magic," her outstanding fourth show at the CRG Gallery. Ms. Liddell has always been interested in making the most of fragile, ephemeral materials, with colored string and thread, wire and especially paper high on the list. Miró would seem to be the dominant influence here, although Richard Tuttle and Alan Shields, the 1970s master of tie-dye and the sewing machine, can't be ruled out.

This show is dominated by a series of exquisitely modest structures, most involving jewel-colored paper, often hand-painted. All rest on tables cobbled together from mismatched pieces of wood that contribute to the works' charm. There is a sexual undertone to the title of "Pierced Pink Pyraminds in the Round on the Square," while the honeycombed structure suggests a kind of architectural model on holiday, masquerading as a Mardi Gras float. "Blue and Gold Fold" is simply a small square of shiny gold foil, slightly peaked to reveal the paper's blue underside; it might refer to similar, larger floor pieces by Roni Horn and Felix Gonzalez-Torres. The tabletop piece "Ordinary Magic" presents a handmade disco ball about to be inundated or perhaps seduced by a multicolored wave in glazed ceramic that exudes a freer sense of abandon.

Ms. Liddell works with many of these same materials in collages on linen, with elegant Dada results. But the outstanding work on the wall here is a large, untitled piece where expanses of small cut-out paper — white on one side and green on the other — create a raised surface that evokes leaves, fur and scales while resolving itself into a large plant form. O.K., it's not sculpture, but it is consistent with the conviction, palpable in all three shows here, that art is far more a matter of imagination and ingenuity than of materials and money.

Johannes VanDerBeek's "Another Time Man" runs through June 12 at Zach Feuer Gallery, 530 West 24th Street, Chelsea; zachfeuer.com. Josephine Meckseper runs through June 26 at Elizabeth Dee, 545 West 20th Street, Chelsea; elizabethdeegallery.com. Siobhan Liddell's "Ordinary Magic" runs through Saturday at CRG Gallery, 535 West 22nd Street, Chelsea; crggallery.com.

http://www.nytimes.com/2010/06/02/arts/design/02sculpture.html?ref=arts

Louise Bourgeois, Influential Sculptor, Dies at 98

By HOLLAND COTTER

Louise Bourgeois, the French-born American artist who gained fame only late in a long career, when her psychologically charged abstract sculptures, drawings and prints had a galvanizing effect on the work of younger artists, particularly women, died on Monday in Manhattan, where she lived. She was 98.

The cause was a heart attack, said Wendy Williams, managing director of the Louise Bourgeois Studio.

Ms. Bourgeois's sculptures in wood, steel, stone and cast rubber, often organic in form and sexually explicit, emotionally aggressive yet witty, covered many stylistic bases. But from first to last they shared a set of repeated themes centered on the human body and its need for nurture and protection in a frightening world.

Protection often translated into images of shelter or home. A gouged lump of cast bronze, for example, suggested an animal's lair. A tablelike wooden structure with thin, stiltlike legs resembled a house ever threatening to topple. Her series of "Cells" from the early 1990s — installations of old doors, windows, steel fencing and found objects — were meant to be evocations of her childhood, which she claimed as the psychic source of her art.

But it was her images of the body itself, sensual but grotesque, fragmented, often sexually ambiguous, that proved especially memorable. In some cases the body took the abstract form of an upright wooden pole, pierced by a few holes and stuck with nails; in others it appeared as a pair of women's hands realistically carved in marble and lying, palms open, on a massive stone base.

Among her most familiar sculptures was the much-exhibited "Nature Study" (1984), a headless sphinx with powerful claws and multiple breasts. Perhaps the most provocative was "Fillette" (1968), a large, detached

latex phallus. Ms. Bourgeois can be seen carrying this object, nonchalantly tucked under one arm, in a portrait by the photographer Robert Mapplethorpe taken for the catalog of her 1982 retrospective at the Museum of Modern Art. (In the catalog, the Mapplethorpe picture is cropped to show only the artist's smiling face.)

That retrospective brought Ms. Bourgeois, in her early 70s, the critical and popular acclaim that had long eluded her. In 1993 she represented the United States in the Venice Biennale. In an art world where women had been treated as second-class citizens and were discouraged from dealing with overtly sexual subject matter, she quickly assumed an emblematic presence. Her work was read by many as an assertive feminist statement, her career as an example of perseverance in the face of neglect.

Ms. Bourgeois often spoke of pain as the subject of her art, and fear: fear of the grip of the past, of the uncertainty of the future, of loss in the present.

"The subject of pain is the business I am in," she said. "To give meaning and shape to frustration and suffering." She added: "The existence of pain cannot be denied. I propose no remedies or excuses." Yet it was her gift for universalizing her interior life as a complex spectrum of sensations that made her art so affecting.

Louise Bourgeois was born on Dec. 25, 1911, on the Left Bank of Paris, the second of three children born to Louis and Josephine Bourgeois. Her parents, financially comfortable, owned a gallery that dealt primarily in antique tapestries. A few years after her birth the family moved out of Paris and set up a workshop for tapestry restoration in Choisy-le-Roi. Ms. Bourgeois remembered as a child drawing fragments of missing images to help in the repairs.

She often spoke of her early, emotionally conflicted family life as formative. Her practical and affectionate mother, who was an invalid, was a positive influence. Her father's domineering disposition, as well as his marital infidelities (he had a 10-year affair with the children's English governess), instilled a resentment and an insecurity that Ms. Bourgeois never laid to rest.

Her nightmarish tableau of 1974, "The Destruction of the Father," for example, is a table in a stagily lighted recess, which holds an arrangement of breastlike bumps, phallic protuberances and other biomorphic shapes in soft-looking latex that suggest the sacrificial evisceration of a body, the whole surrounded by big, crude mammillary forms. Ms. Bourgeois has suggested as the tableau's inspiration a fantasy from childhood in which a pompous father, whose presence deadens the dinner hour night after night, is pulled onto the table by other family members, dismembered and gobbled up.

Similarly, for a 1994 exhibition titled "Louise Bourgeois: Locus of Memory, Works 1982-1993," she created a single sculpture and suite of drawings in which the central image was a spider, a creature she associated with her mother, a woman of ever-changing moods.

Drawn in orange and flesh-pink gouache, it here stalked across the page and there shrunk to the size of a pea. As an immense sculpture of soldered metal tubing, it loomed ominously over the viewer but was delicate enough to quiver and sway at a touch. Fragility and fierceness were, in fact, the twin poles of Ms. Bourgeois's art.

Often there was a precise association in her work. After she had created a number of vertical spirals that seemed to twist in space, she evoked childhood memories of the tapestry business and her family: "When a tapestry had to be washed in the river, it took four people to hoist it out and twist it. Twisting is very important for me. When I dreamt of getting rid of the mistress, it was by twisting her neck."

At the age of 20, she entered the Sorbonne to study mathematics and geometry, disciplines that she valued for their stability. “I got peace of mind,” she later said, “only through the study of rules nobody could change.” But she left to enroll in a succession of art schools, and counted Fernand Léger among her teachers.

In 1938 she married Robert Goldwater, an American art historian noted for his pioneering work in the field then referred to as primitive art. They moved to New York City that same year, and Ms. Bourgeois attended the Art Students League, where she studied painting with Vaclav Vytlacil and also produced sculpture and prints.

She knew many of the European surrealists then arriving as refugees in New York (she later dismissed them as “smart alecks”), but the artists to whom she felt closest were the American painters who would come to be known as Abstract Expressionists.

Ms. Bourgeois had a solo show of paintings in New York in 1945 and her first exhibition of sculpture — an installation of tall, polelike figures that she intended as abstract portraits of family members and friends — four years later at the Peridot Gallery, at which time she gave up painting for good.

She enjoyed some professional success as a sculptor thereafter (she participated in the Whitney Museum of American Art’s Annual Exhibition almost yearly until 1962). But a significant shift in her career came in 1966, when she was included in an exhibition at the Fischbach Gallery in New York, “Eccentric Abstraction,” organized by the critic Lucy Lippard.

Ms. Bourgeois’s long involvement in the nascent feminist movement, about which she had passionate but ambivalent feelings, began at this time. In the following year she made her first of many trips to the marble works in Carrara and Pietrasanta, Italy, where she produced dozens of major marble pieces over several years.

After her husband’s death in 1973, she began teaching at the School of Visual Arts and elsewhere, including Columbia University, Cooper Union, New York Studio School and Yale University, which awarded her an honorary Doctor of Fine Arts degree in 1977. She also received an honorary doctorate from Pratt Institute in Brooklyn in 1993.

By the mid-1970s, with shifts in art-world trends, her reputation was steadily growing. Although she had been given only four one-woman shows in 30 years after her debut as a sculptor in 1949, from 1978 to 1981 she had five in New York alone. Her retrospective at the Museum of Modern Art the following year, the first retrospective of a woman at the museum, secured her place as an influential figure. Her reputation grew stronger in the context of the body-centered art of the ’90s, with its emphasis on sexuality, vulnerability and mortality.

Ms. Bourgeois’s first European retrospective was organized by the Kunstverein in Frankfurt in 1989. In 1993 she was chosen to represent the United States at the Venice Biennale. Her exhibition, organized by Charlotta Kotik of the Brooklyn Museum of Art and titled “Louise Bourgeois: The Locus of Memory, Works 1982-1993,” later traveled to the Brooklyn and to the Corcoran Gallery of Art in Washington.

A second international retrospective was organized by the Tate Modern in London and the Centre Pompidou in Paris in 2007 and traveled to New York, Los Angeles and Washington the following year. The Museo Nacional Centro de Arte/Reina Sofia in Madrid and the State Hermitage Museum in St. Petersburg mounted retrospectives.

She also was in four Whitney Biennials, the first in 1973 and the most recent in 1997, and a number of major international shows, including Documenta and the Carnegie International.

A survey of her prints was organized by the Modern in 1994, and a survey of her drawings by the University Art Museum at the University of California, Berkeley, in 1995. At her death, two films about her had been completed. She was represented by the Cheim & Read Gallery in Chelsea.

Ms. Bourgeois was named Officer of the Order of Arts and Letters by the French minister of culture in 1983. Other honors included the Grand Prix National de Sculpture from the French government in 1991; the National Medal of Arts, presented to her by President Bill Clinton in 1997; the first lifetime achievement award from the International Sculpture Center in Washington; and election as a fellow of the American Academy of Arts and Sciences.

Certainly her personal style contributed to her mystique. Petite in size, gruff of voice and manner, outspoken but suspicious of interviewers, she spent much of her time either in her home in Chelsea or in her studio in Brooklyn, where she worked with Jerry Gorovoy, her assistant since 1980.

Ms Bourgeois is survived by two sons, Jean-Louis, of Manhattan, and Alain, of Brooklyn; two grandchildren; and a great granddaughter. Her son Michel died in 1990.

A lifelong insomniac, she often stayed up drawing or writing in her journal, in the same plain, epigrammatic style in which she spoke. (Her writings and interviews were published under the title "Destruction of the Father/Reconstruction of the Father" by the MIT Press in 1998).

"I have a religious temperament," Ms. Bourgeois, a professed atheist, said about the emotional and spiritual energy that she poured into her work. "I have not been educated to use it. I'm afraid of power. It makes me nervous. In real life, I identify with the victim. That's why I went into art."

http://www.nytimes.com/2010/06/01/arts/design/01bourgeois.html?ref=design

Breaking Loose From the Sober-Sided

By ALICE RAWSTHORN

LONDON — If you had to list the things that are most important in design right now, they would be idealistic, serious and public spirited. Cracking the environmental crisis. Wrestling with social problems. Tackling humanitarian issues. Turning scientific discoveries and technological advances to our advantage.

They're all worthy objectives, which have produced some extraordinarily inspiring design projects, with more to come. But there's also a more indulgent side of design — creating things that aren't necessarily world-changing, but are beautiful, luscious, sensual or fun. Here are some examples of design projects that are super-desirable and, in one way or another, make our lives more pleasurable. **Marc Newson's speedboat** Let's begin with the big one, the stunning $1.5 million speedboat developed by the Australian designer Marc Newson with Riva, the famous boatyard on Lake Iseo in northern Italy. Conceived as his version of Riva's 10-meter-long, or 33-foot, Aquariva speedboat, it is to be made in a limited edition of 22 and to be unveiled in an exhibition opening in September at the Gagosian Gallery in New York.

"When you think of small speedboats, inevitably you think of Riva, and particularly of the Aquarama, the Aquariva's predecessor which was the most glamorous boat of the 1950s and 1960s," said Mr. Newson. "It was beautifully made in a particular style that was very, very identifiable. I wanted to reinterpret the Aquariva in my own style, with cues from the Aquarama." His boat shares the shape of those Rivas, narrowing and inverting toward the back, with a similar layout, including the shallow sundeck above the engines. But he has finessed everything else to make it simpler and sleeker, often importing ideas from his work in automotive and aerospace design. The windscreen is made from a single sheet of glass. The instrument panel is streamlined. The handles, hooks and holds are made from anodized aluminum and, wherever possible, disappear from view when not in use. The deck is covered in Micarta, an industrial resin, rather than traditional mahogany.

"So much of my work is about simplification and elimination," Mr. Newson explained. "Once you've done that the design starts to emerge. I wanted to hark back to the time before boats became such complex pieces of machinery."

The Bouroullec brothers' lamp If I could have left the Milan Furniture Fair last month with one "souvenir" in my luggage, it would have been the Lighthouse, a lamp designed by the French brothers Ronan and Erwan Bouroullec for the British company, Established & Sons, using glass made at the Venini workshop in Venice.

"Our starting point was to find a good way of showing the beauty of Venini's craftsmanship, the delicacy of the glass and its color," said Ronan Bouroullec. "We decided to do that by creating a clear contrast between the sensuality of the hand-blown glass shade to the very strict, straight base of the lamp. It's an interesting balance." Two colors were chosen for the shade, a pale gray that the Finnish designer Tappio Wirkkala used at Venini in the 1950s, and a soft amber. The glass shade perches on top of the base, which comes in marble or stone with black anodized aluminum fittings. "Everyone was very nervous about that, but we knew it would work," Mr. Bouroullec said. "It's like a basketball spinning on a finger."

Rockstar Games's Western If, like me, you spent much of your childhood bouncing on a sofa while watching Westerns on television, pretending that you were an intrepid cowgirl (or cowboy) riding your faithful horse, you'll love "Red Dead Redemption," the new Western-themed video game designed by Rockstar Games.

Fun though those Westerns were, this game is better, because you feel as though you've been catapulted back to the U.S.-Mexican border in the 1910s where the tortured anti-hero, John Marston, a reformed outlaw, is struggling to save his family — and soul — while being blackmailed by crooked federal agents into betraying his former comrades. Rockstar, which is best known for the hyper-violent, hyper-stylish "Grand Theft Auto" games, invested more than $80 million on hiring hundreds of designers, animators, illustrators and computer programmers to make the elaborately constructed digital world of "Red Dead Redemption" seem genuine.

Once there, you can live out your Wild West fantasies by treating yourself to as daunting (or otherwise) an adventure as you wish. You could choose to gallop across miles of desert on a trusty steed, dodge bullets, capture outlaws, catch rattlesnakes, practice sharpshooting, rescue frightened settlers from gruesome fates, search for treasure, play poker in a saloon, watch the sun set, or foil the villainous feds.

Graphic Thought Facility's book There's nothing quite as beguiling as a beautiful book, and one of the best I have seen lately is the catalog devised by the British graphic design studio Graphic Thought Facility for the "Crash" exhibition at the Gagosian Gallery in London.

"Crash" was a homage to the British novelist J.G. Ballard, who died last year. It combined the work of artists who had inspired his writing, including Francis Bacon, Edward Hopper and Andy Warhol, with pieces by Douglas Gordon, Mike Nelson, Rachel Whiteread and other contemporary artists influenced by him.

The inspirations for the catalog were the snapshots taken by Mr. Ballard of his Ford Zephyr car after a crash. One photo is inserted into an emerald green plastic pouch on the front of the cover, and another into a sapphire blue pouch on the back. The cover is made from the pale pink laminated foam that's usually hidden inside padded plastic folders. The pages are bound by a metal fastener often used on the same folders, and are dyed in vibrant colors mixed specially for the book. Each color bounces off — and accentuates — the others. "This was an opportunity to make a catalog as quite an extreme object," said Paul Neale, co-founder of GTF. "The challenge was to create something beautiful from nasty, modern colors and materials on the edge of bad taste."

http://www.nytimes.com/2010/05/31/arts/design/31iht-design31.html?ref=design

Materialism in Paint and in Culture

By KEN JOHNSON

Death and transcendence always have been the pole stars of Richard Prince's art. His photographs of cowboys in gorgeous landscapes pirated from Marlboro ads are shadowed by lung cancer and heart disease. The pictures of biker molls swing between erotic love and soul-killing misogyny. The joke paintings? They career from human comedy to mind-numbing vulgarity. The muscle cars? From chariots of the gods to profane vehicles of male vanity and ecological destruction.

The formula continues in "Tiffany Paintings," his new, utterly predictable and crushingly obvious series of canvases at Gagosian Gallery. Each medium-large painting has a copy of a Tiffany jewelry ad from The New York Times silk-screened in the upper right corner like a postage stamp. The rest is covered by a generic field of sensuously brushed, subtly modulated color evoking tension between cosmic space and the raw materialism of paint. Looking closely, you discover that the paint thins out in places to reveal underlying obituaries from The Times, mostly of famous artists: the Pop artist Tom Wesselmann, the young bohemian Dash Snow, the architect Charles Gwathmey, Syd Barrett of Pink Floyd and others. Also there are articles about worldly problems like AIDS and war.

As do Andy Warhol's car crash and electric-chair paintings, Mr. Prince's works set up a collision in the viewer's mind between the aesthetics and spiritual aspirations of Modernist painting and the desolating finitude of terrestrial reality. The Tiffany ads implicitly equate paintings with high-class baubles. It's the old commercialization-of-art problem — the supposed death of art, in other words. The series also refers to Truman Capote, the writer who veered from the bittersweet romance "Breakfast at Tiffany's" to the harsh reality of "In Cold Blood" and, finally, to talk-show celebrity — i.e., the death of the author.

All of this seems so neatly calculated that it is hard to believe that Mr. Prince has any personal stake in trying to reconcile the sacred and the profane. If his play with the semiotics of painting, consumerism and journalism were more surprising, that wouldn't matter, but as it is, these works feel stale.

For more of Mr. Prince's sour satire, there's "T-Shirt Paintings: Hippie Punk" at a new, as yet unfinished storefront on the Bowery opened by Salon 94. The show presents a series of paintings made on T-shirts stretched over frames like traditional canvases. The proletarian garment par excellence — identified particularly with the young, rebellious American male — the T-shirt also serves as a surface on which its wearer may advertise his affinities and attitudes. Here it is a canvas for Mr. Prince to reprise his own well-worn repertory of images, ideas and styles.

On some he has brusquely painted abstract patterns of circles and X's. Drawings of a dog and flowers lifted from his young daughter's oeuvre adorn others. A copy of a tabloid article about a young female teacher convicted of sexual improprieties with a high school student, autographed by the offender, is printed on one. Buttons punctuating colorfully stained shirts express sentiments like, "Was today really necessary?"

The guitar god Jimi Hendrix makes an appearance, bar-code labels for Led Zeppelin CDs are taped onto some and the Black Panther Party's prowling big-cat logo is stenciled on others. There are the familiar jokes, like the one about the psychiatrist who is now doing his patient's stand-up act, and a photographic image of Bob Crane, the star of "Hogan's Heroes," shooting a picture of himself and a young woman in flagrante delicto.

A bottom-trolling mandarin and collector of low-brow memes, Mr. Prince reflects mockingly on the futility of rebellion in a society that turns every expression of the young and the restless into a fungible commodity. He delights in popular idiocy — O.K., who doesn't? — but his mean, superficial skimming of demotic culture and his knee-jerk, though sometimes warranted, contempt for the pretensions of fine art make Jeff Koons seem like a paragon of spiritual generosity.

"Tiffany Paintings" is on view through June 19 at Gagosian, 980 Madison Avenue, at 77th Street; (212) 744-2312, gagosian.com. "T-Shirt Paintings: Hippie Punk" continues through June 26 at Salon 94 Bowery, 243 Bowery, at Stanton Street, Lower East Side; (212) 979-0001, salon94.com.

http://www.nytimes.com/2010/05/28/arts/design/28gagosian.html?ref=design

A Gathering of Women With Cameras

By HOLLAND COTTER

Progress is a suspect word when applied to art.

But not always. In 1995, the painter Elizabeth Murray organized a group exhibition at the Museum of Modern Art. It was one of the museum's series of "Artist's Choice" shows, with contents drawn from the permanent collection. Ms. Murray was the first woman to participate in the series. She chose 100 or so pieces by some 70 artists and sardined them into tight quarters off the lobby. The artists she picked had one thing in common: they were all women. The show, "Modern Women," was a MoMA first.

Now, 15 years later and nearly three years after Ms. Murray's death, the museum's gender demographics have changed significantly. This spring there are two permanent collection shows devoted almost entirely to female artists: "Pictures by Women: A History of Modern Photography" and the smaller "Mind and Matter: Alternative Abstractions, 1940s to Now." They coincide with the publication of a big, deep, feisty book of essays, several years in the making, called "Modern Women: Women Artists at the Museum of Modern Art."

In addition, the much-noticed Marina Abramovic retrospective is still on view (through Monday), as is a terrific installation piece, "Mirage," by Joan Jonas. A trim Lee Bontecou minisurvey runs through the summer, as does a Maya Deren film program.

Add a handful of single works by women strategically installed through the premises — a Louise Bourgeois sculpture introduces the grand sweep of European Modernism on the fourth floor; one of Lee Lozano's hammerhead paintings commands the fourth-floor public space — and the curatorial rethinking sparked by Ms. Murray's show becomes clear.

MoMA's photography collection has always been strong in female artists, sufficiently strong for "Pictures by Women: A History of Modern Photography" to almost live up to the sweeping promise of its title.

The show — 200 works by 120 artists — starts with a botanical print by the British photographer Anna Atkins from around 1850, when photography barely had a history, it was still so new. Because the curators — Roxana Marcoci, Sarah Meister and Eva Respini, all from the department of photography — have ordered the exhibition by date, we get a solid dose of late Victoriana in the opening room, with pictures by Julia Margaret Cameron and Gertrude Kasebier.

Cameron was British; Kasebier American. Both were partial to mother-and-child tableaus, with Kasebier taking time out for some déjeuner-sur-l'herbe high jinks. First extolled and then disparaged by the almighty Alfred Stieglitz, Kasebier, who photographed for a living (Cameron didn't need to), knew something about the vagaries of career politics, which were entangled with gender politics.

Like many photographers at that early stage, she was learning on the job, about everything. So was her contemporary Frances Benjamin Johnston. In Johnston's stirring, disturbing "Hampton Album" pictures, you can sense an artist testing the ethical dimensions of picture-taking, in her case the dilemma of how to look at race. She never quite figured it out, and her work remains poised between addressing and ignoring the issue.

In much of this early photography, we see the world through a kind of romantic humidity, a softening haze suggesting innocence of vision. But in the new century, the haze lifted; the focus grew razor sharp, as it is in Tina Modotti's still life of bullets; in Ilse Bing's funny, furtive doppelgänger self-portrait; and in Margaret Bourke-White's pictures of blast furnaces in Detroit. They look like industrial power-portraits.

The show has some superb portraits from the 1920s and '30s. True, Martha Graham does most of the work in Imogen Cunningham's picture of her. Any photographer shooting the dancer's face, with its expression of migraine-anguish, would have come off looking good. But only one person could have done full justice to the visage of Claude Cahun (born Lucy Schwob), and that was Cahun herself. Dressed in a man's suit, her head shaved, she looks at the camera with slack-jawed suspicion even in her own self-portrait.

By the late 1930s, we are far from Cahun's Paris. We're on the wind-strafed roads of Depression-era America with Dorothea Lange, meeting migrant mothers and ruined daughters. Then decades later (but in the same gallery), we hit the streets of New York with Helen Levitt and take in the city's high-color squalor through her unflappable curbside eyes.

Generous helpings of Levitt, Lange, Diane Arbus and Nan Goldin serve to vary the show's busy pace, though some of the sharpest experiences come in one-picture encounters: with Marketa Luskacova's murky, Brothers Grimmsian portrait of village bellringers in Slovakia; Jeanne Moutoussamy-Ashe's glancing impression of a racially bifurcated South Africa; Mary Beth Edelson's all-female Last Supper; and Gundula Schulze-Eldowy's shot of herself being attacked — and what's going on here? — by a furious woman in Berlin.

No matter what the content, all these pictures are political, because in each of them a woman was behind the camera, and at the moment she snapped the shutter, she was doing something women had only recently begun to do: use technology to select and control an image of the world.

To control images — shoot, edit, print them — was, and is, an intrinsically political act. No matter what the image, you're making a proprietary claim on reality: this is how it is; this is important; this is mine. For that reason, scenes of backyard suburban life by photographers like Mary E. Frey, Margaret Moulton, Sheron Rupp, Melissa Shook and Judith Joy Ross are every bit as radical as the overtly topical works of Barbara Kruger, Howardena Pindell and — one of the show's youngest artists — Rachel Harrison.

In compendious roundups like the one at MoMA, you're basically left to extract guiding themes of your own. Along with politics, I kept picking up on a family vibe, not "Family of Man" humanism; more like family of women realness, a sense of networks of intimacy between subjects within pictures (often women); between subjects and photographers; between photographers and their own image. And, again, it has been only a short time since women were permitted, had the means, to create realistic self-portraits.

Ms. Murray spoke of her 1995 "Modern Women" as a self-portrait, a way to define herself as an artist and as a person through other artists. From MoMA's collection she chose figures of the 1950s and '60s — Grace Hartigan, Joan Mitchell, Ms. Bontecou — who were role models for her at a time when art by women was hard to find.

She picked contemporaries like Eva Hesse and Louise Fishman, who were there when she arrived in New York. She picked patron saints (Anni Albers, Ms. Bourgeois), fabulous sinners (Frida Kahlo) and just plain friends.

And the installation that resulted really did have a personality, one bristling with varied sensibilities but bound and grounded by shared, long-slighted histories. The effect was very moving. I remember, because I wrote about the show. As a rule, I'm reluctant to reread what I write and I've never knowingly quoted myself, but let me repeat the final sentences of that review here:

" 'Modern Women' is, of course, a rough draft of an encompassing show still to be undertaken, and no one understands better than Ms. Murray the risks of isolating art that has already had a marginal existence. As it happens, the ghetto walls surrounding women's art are steadily being dismantled from within. In offering even a glimpse of the riches they hold, Ms. Murray has done the right thing, done it well and pushed art another step forward."

For me, all that is still true. May those walls continue to shake, split and crumble as we move — progress — into the future. And let's remember an artist, who happened to be a modern woman, who struck a blow for those riches, changed the big picture and made history.

"Pictures by Women: A History of Modern Photography" remains on view through March 21 in the Edward Steichen Photography Galleries at the Museum of Modern Art, moma.org; contemporary photographs from the show are in the museum's Robert and Joyce Menschel Gallery through Aug. 30.

http://www.nytimes.com/2010/05/28/arts/design/28women.html?ref=design

Two Architects Have a Meeting of the Minds at a Texas Museum

By NICOLAI OUROUSSOFF

It's fair to ask if Renzo Piano was fully sane when he agreed to design the addition to Louis Kahn's Kimbell Art Museum.

Kahn occupies a privileged place within the pantheon of America's great architects, and the Kimbell in Fort Worth, completed in 1972, is his masterpiece. Adding to the pressure, major museum expansions were increasingly coming under fire as wasteful expressions of gilded-age hubris. Mr. Piano is likely to be vilified by both architecture fans and art world purists no matter what he comes up with.

It's true that Mr. Piano's design, which will be officially unveiled on Thursday, is not as transcendent a work of architecture as the original Kimbell. Nor does it quite live up to his own masterpiece, the 1987 Menil Collection building in Houston. But Mr. Piano has managed to find that magical and elusive balance between respecting a great work and adhering to one's own aesthetic convictions. Unlike some of his contemporaries, who might have sought to play up the generational divide, Mr. Piano, who worked for Kahn early in his career, builds his design on the touching, if idealistic, notion of a civilized conversation across the ages.

Kahn's mythic stature in American architecture is matched only by that of Frank Lloyd Wright; and even Wright is less likely to be spoken of with such reverence. The architectural historian Vincent Scully, Kahn's most ardent promoter, once claimed that he was "the hinge on which Modernism turned." His pure geometric forms were infused with an aura of silence, and they had as much to do with Roman precedents as with the late Modernist period he worked in. Far from mental abstractions, they were meant to be touched; their solemn surfaces of concrete, stone or brick carried the weight of history.

The Kimbell in particular — a low building consisting of five parallel vaulted galleries that can be divided with a system of temporary partitions — seems to reach back through the 20th century all the way to antiquity. But what makes it a truly extraordinary building is its relationship to light. Kahn wanted light to spill down into each gallery through an uninterrupted central slot that ran the entire length of each vaulted ceiling, an approach that seemed to defy the laws of structure.

The spine of a vault is crucial to its support; when it is removed, in theory, the vault should collapse. Kahn's solution was to embed post-stressed tension cables inside the concrete on either side of the vault, making them self-supporting. A curved aluminum reflector was suspended underneath the slot, so that sunlight was reflected back up onto the ceiling's interior, washing down its surface to illuminate the artworks and give the rooms a mystical serenity.

When the Kimbell first proposed an addition, in the late 1980s, the notion provoked a national outcry. The scheme, by Romaldo Giurgola, would have significantly extended Kahn's vaults at either end of the existing building, as if the original had been designed for assembly line production rather than as a self-contained composition. (An old professor of mine compared the approach to extruding sausage.)

Mr. Piano's addition, which is scheduled to break ground this summer, is set 90 feet to the west of Kahn's building, on what is currently a vast lawn dotted with trees. Roughly the same proportions as its neighbor, it is set directly on axis with Kahn's front entry. Two nearly identical gallery spaces flank a glass-enclosed lobby; a second structure, tucked behind this one and partially underground, houses an auditorium, a library and more galleries.

Mr. Piano invested a great deal of creative energy fine-tuning the relationship between his building and the old one, which will face each other across a shallow reflecting pool. Most visitors will arrive through a new parking garage buried underneath this pool and ride an elevator or take one of two broad staircases up to the front of the addition.

In a nod of respect to Kahn, Mr. Piano has oriented both the stairs and the elevator to the east, so that as you emerge at ground level, your first view is of the vaulted arcades of the Kimbell's main entry facade rather than of his own building. From there you turn back into the addition or proceed along a more drawn out and ceremonial route around the reflecting pool and into the original museum.

As with all such additions, there are some painful trade-offs. The main entry to Kahn's museum is a perfect sequence of outdoor spaces: the few shallow steps up from the lawn, the lines of oak trees, the twin arcades fronted by narrow reflecting pools. To anyone who has walked this route the sense of inner quiet is unforgettable; and that experience will now be partly lost.

On the other hand, the placement of Mr. Piano's addition corrects one of the Kimbell's few flaws, which had to do with Kahn's misreading of Texas car culture. Although he expected visitors to enter across the lawn in front of his building, most enter from the back, where the parking is, and miss out on one of the most beautiful aspects of Kahn's design. Mr. Piano reorients the approach to where it should be.

His respect for Kahn's masterwork, in which one can feel Mr. Piano reworking Kahn's ideas over and over in his head, is obvious in the interiors as well. Approaching from the new reflecting pool, visitors will be able to look straight through the glass walls of the addition's lobby to a strip of garden running behind, and beyond that to the glass-walled, 295-seat auditorium — a visual sequence that offers a richly layered counterpoint to Kahn's outdoor entry. Inside, the layout of the main galleries on either side of the lobby mirrors Kahn's plan.

And by partly burying the auditorium, library and secondary galleries in back, underneath a mound of grass, Mr. Piano keeps his building from dominating the site. Even the choice of material — ethereal glass as opposed to Kahn's concrete and travertine — suggests deference, making the addition a ghostly twin of the original.

The scariest challenge of the project, surely, was trying to create a roof structure that could hold up against Kahn's vaults. Mr. Piano too is celebrated as one of the great masters of light; the curved louvers of the Menil

Collection have been studied as attentively by architects as the Kimbell's roof structure. Here, working with the engineer Guy Nordenson, Mr. Piano creates a system of twinned wood beams supported on concrete pillars. A complex system of fabric scrims, glass panels and metal louvers rests on top of this frame, creating a highly refined light-regulating machine.

We'll have to wait until the building is complete to know if its light will be as gorgeous as that in the original Kimbell. For now the biggest criticism is likely to be about whether Mr. Piano is being too worshipful of Kahn's genius. Just as Kahn's gods were the builders of antiquity, Mr. Piano's are the visionaries of the last century, Kahn among them, and that's certainly evident here. But then again, if you're going to worship anybody, why not Kahn?

http://www.nytimes.com/2010/05/27/arts/design/27kimbell.html?ref=design

Sacred and Secular Mix in Turkey's Museums

By EDWARD ROTHSTEIN

ISTANBUL — If you stand in the center of the Hagia Sophia here and gaze upward at what is one of the world's tallest domes, you can be staggered by the overlapping layers of ruination and grandeur in this Church of Holy Wisdom. And I don't just mean the scaling paint, the scaffolding promising overdue restorations, the haunting mosaics disclosed under layers of plaster.

For a millennium after its construction in the sixth century, this was the world's largest cathedral, the most prominent monument to Byzantine Christianity. And it still manages to seem delicate and weighty, introspective and commanding — quite an amazing accomplishment, given the centuries of religious conquest and plunder that have stripped it of nearly all its trappings.

The crusaders of the 13th century were so offended by the cathedral's alien Eastern Christianity that they looted its treasures. After functioning as a Roman Catholic cathedral for a short time, it again became a Byzantine church. Then in 1453, after the conquest by the Turks, Sultan Mehmed II turned the church into a mosque; later rulers erected minarets that still give the exterior a strange ambiguity. Even now, enormous calligraphic roundels in Arabic impose themselves on its cavernous space, affirming that if this is a house of God at all, the commanding spirit is Islam.

Finally, in 1934, by order of the founder of the secular Turkish Republic, Mustafa Kemal Ataturk, the mosque was turned into a museum, though the incomplete restoration suggests that after almost 80 years, it is still a work in progress.

These were not innocent transformations, and few structures here remain as solid and firm as this one, weighted down by more than 1,500 years of battles, bloodshed and commingling influences. Something similar, of course, always happens in the wake of religious wars; the great mosque of Córdoba, in Spain, for example, was transformed into a Roman Catholic cathedral after the Christian reconquest in the 15th century.

But maybe because in Istanbul transitions have been so violent and go back so far (and not just in this building), and maybe, too, because I visited the city recently, just as debates over Turkey's identity as a secular state were heating up, everything here seems to shimmer with unsteadiness. You can see all the layers at once. Nothing is allowed to become comfortably familiar. And right now, the forces of secularism and Islam are in contention.

Walk down this city's main pedestrian mall on Istiklal Caddesi, and eventually you seem to be strolling through a cosmopolitan European shopping area with upscale stores and restaurants, or negotiating crowds like a theatergoer in Times Square. But pass the mosques around prayer time in the neighborhoods of Fatih or Balat, and secularism seems like an alien fantasy.

In some cases, like the museum that was a mosque that was a church, these forces overlap. In other areas — like right now, in Turkish politics, in which debates about the nature of the judiciary and prosecutions of military figures are being led by the governing Islamic-oriented party — they clash. For an outsider, the threads intertwine with almost byzantine complexity.

I get this feeling, too, from reading the Nobel Prize-winning Turkish novelist, Orhan Pamuk. In his novel "Snow," a poet is stranded by a blizzard in a Turkish border village in the 1990s, trying to make sense of what he finds. There have been a spate of suicides of young women, at least some of whom have killed themselves because their secular schools have outlawed Islamic headscarves; meanwhile, an Islamist is running for town mayor. There are Islamic radicals who are fearsome, ruthless, and there are secularists who are also fearsome, ruthless. The conspiracy theories by the secularists match those of the Islamists, and both may be true. Mr. Pamuk keeps things slippery.

Though there is something almost too facile in Mr. Pamuk's establishment of equivalence, this may be close to the way things look, at least here, partly because secularism has a different set of implications in Turkey.

Usually, in the West, we think of secular life almost as a negative thing. It comes from the bracketing off of religious belief, or by transcending it altogether. Secularism's origins are in the Enlightenment; its dominant conviction is that Reason rather than Faith should reign in the public sphere.

But that isn't really the nature of secularism in Turkey. Until the early 20th century, so intimate was the connection between political and religious power that when Ataturk founded the republic in 1923, he imposed secularism almost as a religious doctrine. The concept of a secular republic had to be forcibly developed from the ruins of an Ottoman Empire, whose sultans were Islamic warriors. At the same time, the secularism of the modern republic had to embrace the Islamic history of that empire.

You can see the nature of the problem in the museums of Topkapi Palace, where the sultans once lived. In one gallery there are sacred relics once viewed only by the royal family and its guests. The labels tell us we are looking at hairs from Muhammad's beard, the staff that Moses used to strike a rock in the desert, King David's sword and a turban worn by Joseph. Secularism has to be more powerful than it is here to contend with such objects (let alone examine them for authenticity).

And secularism here was a form of militarism: the veil was prohibited in schools and in the government. Religious services and sermons were controlled. And the military became the arm of secular authority. Democracy was trumped by secularism.

In that sense, the most powerful, double-edged tribute to Turkish secularism may not be the commerce of Istiklal, or the nearby art galleries, but the enormous Military Museum, a building whose cabinets are stocked with body armor, scimitars, revolvers and 20th-century weaponry. More than a thousand years of Turkish

history are told in the form of military history, and the narrative winds around an imposing building that was the military academy where Ataturk himself studied. The exhibitions begin with an inspirational quotation from Ataturk: for more than 7,000 years, it portentously declares, “have these lands been the Turkish cradle”; now, out of “thunder and lightning and the sun” emerges, triumphant, “the Turk.”

The museum is nothing less than an attempt to shape a modern mythology in which Turkish history becomes part of a single coherent tradition culminating in the modern secular state.

This effort to shape a tradition accounting for the triumph of the Turk may also be the reason for the way the 1915 massacres of Armenians are treated here. Though the killings predated the republic and were clearly related to religious differences, the interpretation in the Military Museum makes it an issue of state.

In the Hall of Armenian Issue With Documents, we read that there had been an era when Armenians had demonstrated the principles of “Tolerance, Affection, and Justice,” the basics of “traditional” Turkish rule. But then, in the 19th century, the Armenians turned hostile. An “Armenian terrorist organization” killed “thousands of innocent Turks.” The gallery is full of photographs meant to provide evidence not of the Turkish massacres of Armenians, but of the Armenian massacres of Turks — signs, supposedly, that the Armenians had abandoned the doctrines of tolerance embodied by the secular state.

This sometimes perverse association of militarism and secularism must have also led to a compensatory association of Islam with liberalism, which has been tapped into by the current governing party (and, sentimentally, by some in the West). But this is a precarious association.

There was undoubtedly a tradition of tolerance of minorities in Islamic Istanbul under the sultans, though it was exercised only in the presence of varying degrees of deference and demands. But why is it so difficult to recognize this? The Jewish Museum of Turkey here seems deliberately to ignore qualifications; it opened in 2001 under the auspices of a foundation established to celebrate 500 years of tolerance and harmony between Turks and Jews. Many of the Jews in Istanbul (once one of the largest urban Jewish population centers in the world) were exiles from the 1492 expulsion from Spain and Portugal.

The displays in this small museum repeatedly stress the welcome Jews found here, and the religious freedom “provided by both the Ottoman Empire and the Turkish Republic.” Panels celebrate the triumphs of Turkish Jews in civil society. For more than 500 years, it seems, no shadows are worthy of mention. But this is far too eagerly sweeping and wildly out of sync with the empire’s bloody history and its sultanic power.

The very presence of the museum inspires some skepticism on this point. It is housed in an old synagogue, not because of any imposed idea of secularism, but because whatever remains of the Jewish community here has dwindled. In recent years Islamist terror has struck: attacks against other city synagogues have killed dozens and wounded hundreds. And though the museum is near one of Istanbul’s main thoroughfares, it is almost impossible to find. It is in a small alley in a neighborhood dominated by hardware stores and marine equipment.

At the end of that alley, there is a little sign that says, without elaboration, “Museum,” with an arrow. The sign is mounted on a closed white booth housing an armed guard.

More information about the Hagia Sofia, the Military Museum and the Topkapi Palace is at http://english.istanbul.gov.tr. More information about the Jewish Museum of Turkey is at www.muze500.com.

http://www.nytimes.com/2010/05/26/arts/design/26museums.html?ref=design

Virus Ravages Cassava Plants in Africa

By DONALD G. McNEIL Jr.

MUKONO, Uganda — Lynet Nalugo dug a cassava tuber out of her field and sliced it open.

Inside its tan skin, the white flesh was riddled with necrotic brown lumps, as obviously diseased as any tuberculosis lung or cancerous breast.

“Even the pigs refuse this,” she said.

The plant was what she called a “2961,” meaning it was Variant No. 2961, the only local strain bred to resist cassava mosaic virus, a disease that caused a major African famine in the 1920s.

But this was not mosaic disease, which only stunts the plants. Her field had been attacked by a new and more damaging virus named brown streak, for the marks it leaves on stems.

That newcomer, brown streak, is now ravaging cassava crops in a great swath around Lake Victoria, threatening millions of East Africans who grow the tuber as their staple food.

Although it has been seen on coastal farms for 70 years, a mutant version emerged in Africa’s interior in 2004, “and there has been explosive, pandemic-style spread since then,” said Claude M. Fauquet, director of cassava research at the Donald Danforth Plant Science Center in St. Louis. “The speed is just unprecedented, and the farmers are really desperate.”

Two years ago, the Bill and Melinda Gates Foundation convened cassava experts and realized that brown streak "was alarming quite a few people," said Lawrence Kent, an agriculture program officer at the foundation. It has given $27 million in grants to aid agencies and plant scientists fighting the disease.

The threat could become global. After rice and wheat, cassava is the world's third-largest source of calories. Under many names, including manioc, tapioca and yuca, it is eaten by 800 million people in Africa, South America and Asia.

The danger has been likened to that of Phytophthora infestans, the blight that struck European potatoes in the 1840s, setting off a famine that killed perhaps a million people in Ireland and forced even more to emigrate.

That event changed the history of all English-speaking countries.

Compared with amber waves of grain or the blond tresses of a field of ripe corn, cassava is an inglorious workhorse of a crop, a few spindly red stems sprouting from a clutch of brown tubers. It is filling but not very nutritious; it even contains trace amounts of cyanide, which must be removed by grinding and fermenting.

But subsistence farmers depend on it because it's "very drought-tolerant and very bad-management-tolerant," said Edward Charles, a team leader for the Great Lakes Cassava Initiative, a six-country consortium based in Kenya and supported by the Gates Foundation. For example, he said, even when farmers are too weak from malaria to weed, their crops survive.

Also, the tubers can be left underground for up to three years, so if drought kills a corn or bean crop, the farmer's family can still fend off starvation. But the plant falls prey to more than 20 pests and diseases.

Dr. Fauquet fears brown streak will cross the Congo Basin to Nigeria, the world's biggest grower, because farmers sell cuttings to one another and border controls are nonexistent or can be evaded with bribes.

He is optimistic it will not cross the ocean into Thailand, Brazil, Indonesia or China because there is no world trade in the cuttings and few direct flights to Asia or South America. (Whiteflies, which are thought to spread the virus, have been known to stow aboard planes.)

However, he noted, mosaic virus did spread to India from Africa somehow. And Dai Peters, the Cassava Initiative's director, noted that a mealybug that damages Brazilian cassavas has leapfrogged the globe to infect Thai fields, too.

Even if the brown streak virus is contained in Africa, Dr. Fauquet said, donors may eventually be forced to spend billions of dollars on food aid to prevent starving populations from going on the move, which could set off ethnic fighting.

Donations by the Gates Foundation, the United States Agency for International Development and a foundation run by Monsanto, the crop technology company, have totaled about $50 million thus far, but compared with the threat, "that's a droplet in the ocean," Dr. Fauquet said.

The largest Gates grant, $22 million, went to Dr. Peters's initiative, which is overseen by Catholic Relief Services, an American charity. Working with the national agricultural laboratories of six countries, it combines American computer technology, African rural self-help initiatives and research started a century ago by British colonialists.

Right now, there is no cassava strain in Africa immune to brown streak, so the initiative is essentially buying time, teaching farmers to recognize diseased crops, asking them to burn them and offering them clean cuttings so they can get one or two harvests before the virus strikes again.

They are hoping for a lucky break, like the success they are finally having against banana wilt, another virus that attacked a different East African staple food.

In that case, the solution was relatively simple, said Chris A. Omongo, an entomologist at the National Crops Resources Research Institute in Namulonge, Uganda.

Since bees and dirt spread the virus, farmers were taught to nip the purple male flower buds off each stalk and to clean their tools and boots before entering their banana patches.

(The virus was jokingly called "banana AIDS," because it, too, spread along the Uganda-Tanzania highways and rivers. Banana beer was shipped in jerry cans with the fat purple flowers used as stoppers.)

Some wild and some foreign cassava strains do appear resistant to brown streak, Dr. Fauquet said, but they lack the taste and consistency that Africans like. (Some cassava strains are grown just for flour, for industrial paste or for the food enhancer MSG.)

Dr. Fauquet's lab is trying to splice genes from them into African varieties. Because of the extensive safety testing required for new plants produced that way, the process will take at least five years, he estimated.

Here in Uganda, because there are so few government agricultural agents, the Cassava Initiative is building its own parallel network. Its agents have no power to destroy a crop or seize a truckful of diseased cuttings. But they do have rugged minicomputers with software to help them teach farmers to recognize the disease. They can also pinpoint a suspect field's GPS location, take photographs and send them from any Internet cafe.

To help farmers work together, the initiative also helps them form savings clubs, giving everyone a steel cash box and guidance.

Members put in a few dollars each week, and offer loans of $50 or $100 for money-generating projects like buying a flock of hens or brick-making molds. At year's end, they divide the profit, which can be hefty since the interest rate is 120 percent.

Mrs. Nalugo keeps the cash box for her local savings club, and she may have to borrow from it this year. If her cassava crop had been healthy, she estimated, she could have sold it for $500.

Instead, she said, "the loss is pushing us back — we will have to buy food."

However, she is a smart farmer. She had learned the symptoms of brown streak from Elijah Kajubi, the initiative's local agent.

When her plants were only knee-high, she said, "I became suspicious, so I planted beans, too."

http://www.nytimes.com/2010/06/01/science/01cassava.html?ref=science

Exploring Music's Hold on the Mind

By CLAUDIA DREIFUS

Three years ago, when Oxford University Press published "Music, Language, and the Brain," Oliver Sacks described it as "a major synthesis that will be indispensable to neuroscientists." The author of that volume, Aniruddh D. Patel, a 44-year-old senior fellow at the Neurosciences Institute in San Diego, was in New York City in May. We spoke over coffee for more than an hour and later by telephone. An edited and condensed version of the conversations follows.

Q. YOU DESCRIBE YOURSELF AS A NEUROSCIENTIST OF MUSIC. THIS HAS TO BE A NEW PROFESSION. HOW DID YOU COME TO IT?

A. I've been passionate about two things since childhood — science and music. At graduate school, Harvard, I hoped to combine the two.

But studying with E.O. Wilson, I quite naturally got caught up with ants. In 1990, I found myself in Australia doing fieldwork on ants for a Ph.D. thesis. And there, I had this epiphany: the only thing I really wanted to do was study the biology of how humans make and process music.

I wondered if the drive to make it was innate, a product of our evolution, as Darwin had speculated. Did we have a special neurobiological capacity for music, as we do for language and grammar? So from Australia, I wrote Wilson that there was no way I could continue with ants. Amazingly, he wrote: "You must follow your passion. Come back to Harvard, and we'll give it a shot."

Wilson and Evan Balaban, a birdsong biologist who taught me about the neurobiology of auditory communication, mentored me through my thesis, which was called "A Biological Study of the Relationship Between Language and Music." When I defended it in 1996, this was unusual scholarship. The neurobiology of music wasn't yet a recognized field.

Q. WHEN DID IT GO MAINSTREAM?

A. Not too long after that. By the late 1990s, all of neuroscience was being transformed by the widespread use of imaging technologies.

Because it became possible to learn how the brain was affected when people engaged in certain activities, it became acceptable to study things previously considered fringy. Today you have the neuroscience of economics, of music, of everything.

I published a paper in 1998 that really surprised people. It was the first imaging study showing what happens when the brain processes musical grammar as compared with what happens when it processes language. From what we learned, this was occurring in an overlapping way within the brain. And this was a clue that the neurobiology of music could give us a new path to access and perhaps even heal some language disabilities.

Q. HOW WOULD THAT WORK?

A. One example. There's a neurologist in Boston, Gottfried Schlaug, who uses music therapy to return some language to stroke victims. He has them learn simple phrases by singing them. This has proved more effective than having them repeat spoken phrases, the traditional therapy. Schlaug's work suggests that when the language part of the brain has been damaged, you can sometimes recruit the part that processes music to take over.

Music neuroscience is also helping us understand Alzheimer's. There are Alzheimer's patients who cannot remember their spouse. But they can remember every word of a song they learned as a kid. By studying this, we're learning about how memory works.

Q. RECENTLY, YOU'VE BEEN WORKING WITH A SULFUR-CRESTED COCKATOO NAMED SNOWBALL. WHAT PROMPTED THE COLLABORATION?

A. Before I encountered Snowball, I wondered whether human music had been shaped for our brains by evolution — meaning, it helped us survive at some point. Well, in 2008, a colleague asked me to view a YouTube video of a cockatoo who appeared to be dancing to the beat of "Everybody" by the Backstreet Boys!

My jaw hit the floor. If you saw a video of a dog reading a newspaper out loud, you'd be pretty impressed, right? To people in the music community, a cockatoo dancing to a beat was like that. This was supposed to be, some said, a uniquely human behavior! If this was real, it meant that the bird might have circuits in its brain for processing beat similar to ours.

Q. WHAT DID YOU DO WITH THIS INSIGHT?

A. I phoned up the bird shelter in Indiana where Snowball lived and talked to the director who told me his story. A man had dropped him off with a CD and the comment, "Snowball likes to dance to this." One day, Irena Schulz, the proprietor, played "Everybody" to amuse the abandoned creature. And Snowball began to move. Irena then made the YouTube video, which immediately went viral. Millions saw it.

"Let's design an experiment to see if this is real," I proposed to Irena, who had a science background herself. We took the Backstreet Boys song, sped it up and slowed it down at 11 different tempos, then videoed what Snowball did to each. For 9 out of the 11 variations, the bird moved to the beat, which meant that he'd processed the music in his brain and his muscles had responded. So now we had the first documented case of a nonhuman animal who, without training, could sense a beat out of music and move to it.

Q. YOU SAY THAT SNOWBALL CHANGED YOUR THINKING. HOW?

A. Before Snowball, I wondered if moving to a musical beat was uniquely human. Snowball doesn't need to dance to survive, and yet, he did. Perhaps, this was true of humans, too?

Since working with Snowball, I've come to think we could learn more music neuroscience by studying the behaviors of not just parrots, but perhaps dolphins, seals, songbirds — also vocal learners.

We eventually published the Snowball research in Current Biology. A group at Harvard published a paper right alongside ours in which they surveyed thousands of YouTube videos to see if there were other animals spontaneously moving to a beat. They found about 12 or 13 parrots. No dogs. No cats. No horses.

What do humans have in common with parrots? Both species are vocal learners, with the ability to imitate sounds. We share that rare skill with parrots. In that one respect, our brains are more like those of parrots than chimpanzees. Since vocal learning creates links between the hearing and movement centers of the brain, I hypothesized that this is what you need to be able to move to beat of music.

Q. IS IT DIFFICULT TO FIND MONEY FOR THIS TYPE OF RESEARCH?

A. It easier than it used to be. One of the founders of this field, Dr. Robert Zatorre, before 2000, he never used the word music in a grant application. He knew it would get turned down automatically because people thought this was not scientific. Instead, he used terms like "complex nonlinguistic auditory processing."

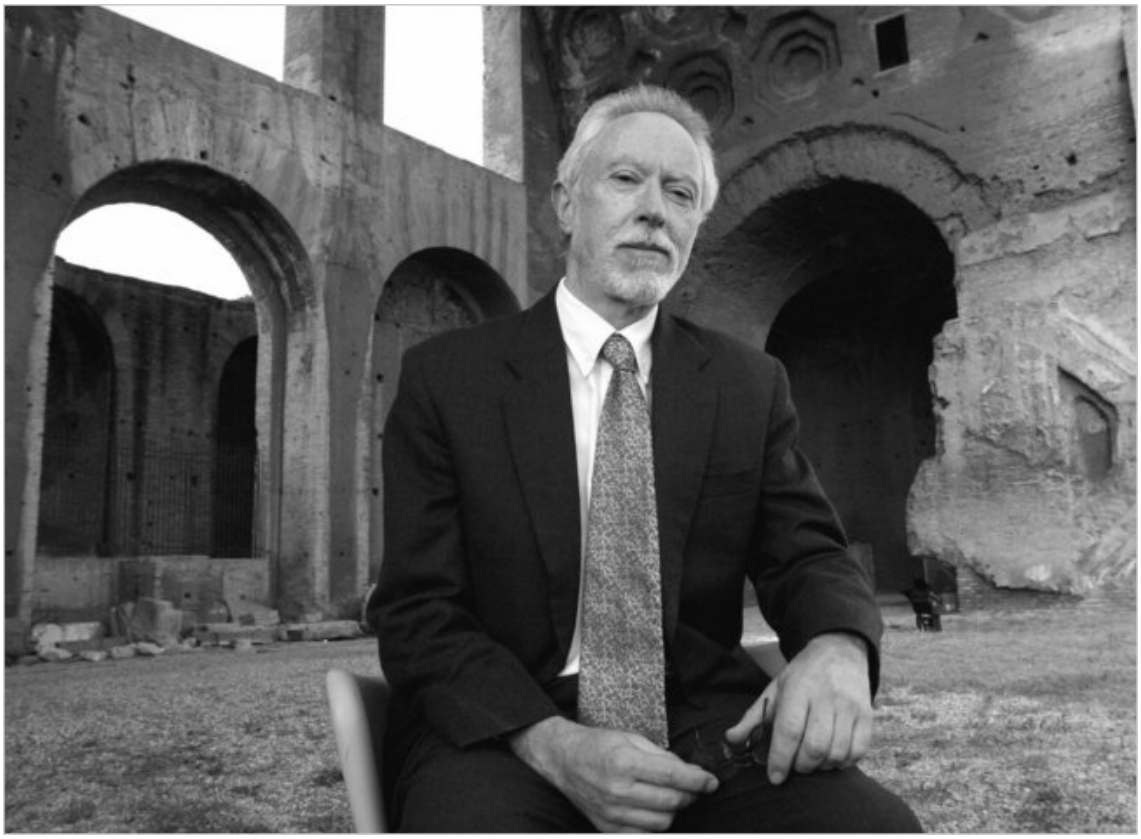
But in recent years, it's become O.K. to say: I study music and the brain.

http://www.nytimes.com/2010/06/01/science/01conv.html?ref=science

The Censor and the Censored, Linked by Literature

By ALAN COWELL

PARIS



WHEN Big Brother regimes crumble, they sometimes leave an unintended paper trail, a pathway into the dark tradecraft of oppression.

After the fall of the Berlin Wall in 1989, for just one example, many Germans discovered from files kept on them that children or spouses had spied on them for the Stasi secret police. And in Romania, Doru Pavaloiae, an economist, learned that a man he thought of as a friend, a popular singer in his hometown, was an informer — code name: Minstrel — for the feared Securitate.

Such epiphanies would scarcely be possible if repressive regimes were not seized with an obsession to accumulate raw data on their citizens — the bytes of betrayal, the grist of control.

Hence, the snoopers' reports on whom people meet with, talk to, sleep with — on how their hearts beat and their minds roam. At the International Tracing Service in Bad Arolsen, Germany, files left behind by the Nazis at 51 concentration camps and prisons fill almost 50 million pages, documenting the minutiae of terror.

But sometimes, depending on the country, the story is more nuanced — not genocide or crude repression but a more subtle chronicle, the fine shadings of control.

So it was for the South African-born writer and Nobel laureate J. M. Coetzee, as an audience at the American University in Paris learned recently when he spoke of his experiences to students, faculty members and at least one American icon — the poet Lawrence Ferlinghetti, 91, who was also, coincidentally, visiting Paris.

"Until I was 50 years old my books could be read by my fellow South Africans only after they had been approved by a committee of censors," Mr. Coetzee, 70, told his listeners. But it was only around 2008 that an academic researcher offered to show him files he had unearthed relating to three of the author's works from the 1970s and early 1980s.

In those years, apartheid pervaded the land, prescribing where people lived and worked, where they were born and buried, how they traveled, whom they loved: a law called the Immorality Act made miscegenation a crime. Yet one file, concerning Mr. Coetzee's "In the Heart of the Country" (1977), seemed to find a way of bypassing those pseudo-moral strictures, noting that "although sex across the color line is described," the book "will be read and enjoyed only by intellectuals."

In "Waiting for the Barbarians" (1980), another censor concluded, 22 instances of writing might be found undesirable, but the book's sexual content was "not lust-provoking." And "Life and Times of Michael K." (1983), a third censor opined, "contains derogatory references to and comments on the attitudes of the state, also to the police and the methods they employ in the carrying out of their duties."

Invariably, the censors ruled against suppression.

In a way, this was the kind of ambiguous surveillance portrayed in the German movie "The Lives of Others," in which an agent with headphones comes to sympathize with the victims of his eavesdropping.

These South African censors were scholars — academic peers who, Mr. Coetzee came to suspect, listened to Mozart on the hi-fi as they read Austen and Trollope at home and thought of themselves "as doing a good job."

One secret reader, Mr. Coetzee recalled, invited him to tea "and we had a long discussion" about literature. "I had not the faintest idea that she was one of my censors."

At the time, Mr. Coetzee was a professor of English literature in Cape Town. "The intellectual community was not large," he said. "The fact remains that I was rubbing shoulders in daily life with people who in secret were making judgments about whether or not I was going to be allowed to be published and read in South Africa."

The censors were part of a much broader, more sinister system — the quasi-benevolent pole of a spectrum whose other extremities brought violence, assassination and almost casual brutality to apartheid's adversaries.

Listening to Mr. Coetzee, a reporter in the audience recalled his own, more modest experience of unsuspected surveillance, exposed by South Africa's Truth and Reconciliation Commission in the post-apartheid 1990s.

In public testimony, the reporter's name figured on a list of people who had paid supposedly secret visits to an activist named Matthew Goniwe in the small, segregated township of Cradock shortly before he and three comrades were murdered by an apartheid-era hit squad in 1985.

The discovery provoked a sharp realization of folly: How could the reporter, conducting interviews for a magazine article, have ever imagined that conversations in the activist's home would not be bugged? Or that my amateurish tactics — hiding on the floor of minivans, dodging plainclothes security men — would not be fully chronicled in some manila file?

And yet, in a serendipitous counterpoint, one of South Africa's most illustrious human rights advocates, George Bizos, recalled the other day how a similar paper trail had undone Mr. Goniwe's self-confessed killer — a former security policeman who went before the Truth and Reconciliation Commission to seek amnesty after Nelson Mandela came to power.

A single notation on a scrap of paper from the police files, Mr. Bizos said, served to contradict a critical element in the officer's depiction of events surrounding Mr. Goniwe's death, undermining his entire case for clemency. Amnesty was denied.

South Africa, of course, was never just cops and robbers, good and bad, black and white.

The apartheid rulers yearned to be seen as spiritually and juridically part of a remote, Western society rather than of a continent they depicted as cruel and barbaric. If a censor noted that a work would be read only by "intellectuals," the assumption seemed to be that such people would not choose to bring down the state.

The secret readers, Mr. Coetzee said, saw themselves as "unsung heroes of a kind."

"The censors reading my books regarded themselves as guardians of the Republic of Letters, too," Mr. Coetzee told his audience. "In their eyes, they were on my side."

http://www.nytimes.com/2010/05/30/weekinreview/30cowell.html?ref=books

Brush teeth to 'prevent' heart disease

Page last updated at 1:54 GMT, Friday, 28 May 2010 2:54 UK

By Emma Wilkinson Health reporter, BBC News

Dentists recommend brushing twice a day

People who fail to brush their teeth twice a day are putting themselves at risk of heart disease, research suggests.

The Scottish study of more than 11,000 adults backs previous research linking gum disease with heart problems.

The researchers said more work is needed to confirm if poor oral health directly causes heart disease or is a marker of risk.

A charity added that oral hygiene was just one factor in good heart health.

It is known that inflammation in the body, including in the mouth and gums, has an important role in the build up of clogged arteries, which can lead to a heart attack.

But this is the first time that researchers have looked at whether the frequency of teeth brushing has any bearing on the risk of developing heart disease.

Continue reading the main story

If you don't brush your teeth, your mouth can become infected with bacteria which can cause inflammation

Judy O'Sullivan British Heart Foundation

Data, published in the British Medical Journal was collected on lifestyle behaviours, such as smoking, physical activity and oral health routines.

Participants were also asked how often they visited the dentist and how often they brushed their teeth.

Then nurses collected information on medical history and family history of heart disease, took blood pressure and blood samples.

Overall, six out of 10 people said they visited the dentist every six months and seven out 10 reported brushing their teeth twice a day.

Over the eight-year study there were 555 "cardiovascular events" such as heart attacks, 170 of which were fatal.

Taking into account factors that affect heart disease risk, such as social class, obesity, smoking and family history, the researchers found those with the worst oral hygiene had a 70% increased chance of developing the condition compared with those who brush their teeth twice a day.

Those with poor oral hygiene also tested positive in blood samples for proteins which are suggestive of inflammation.

Cause and effect

Study leader Professor Richard Watt, from University College London, said future studies will be needed to confirm whether the link between oral health behaviour and cardiovascular disease "is in fact causal or merely a risk marker".

Judy O'Sullivan, senior cardiac nurse at British Heart Foundation, said: "If you don't brush your teeth, your mouth can become infected with bacteria which can cause inflammation.

"However, it is complicated by the fact that poor oral hygiene is often associated with other well known risk factors for heart disease, such as smoking and poor diet."

She added: "Good personal hygiene is a basic element of a healthy lifestyle.

"But if you want to help your heart, you should eat a balanced diet, avoid smoking and take part in regular physical activity."

Professor Damien Walmsley, scientific adviser to the British Dental Association, added it was still unclear whether there was a definite cause and effect between oral hygiene and heart disease.

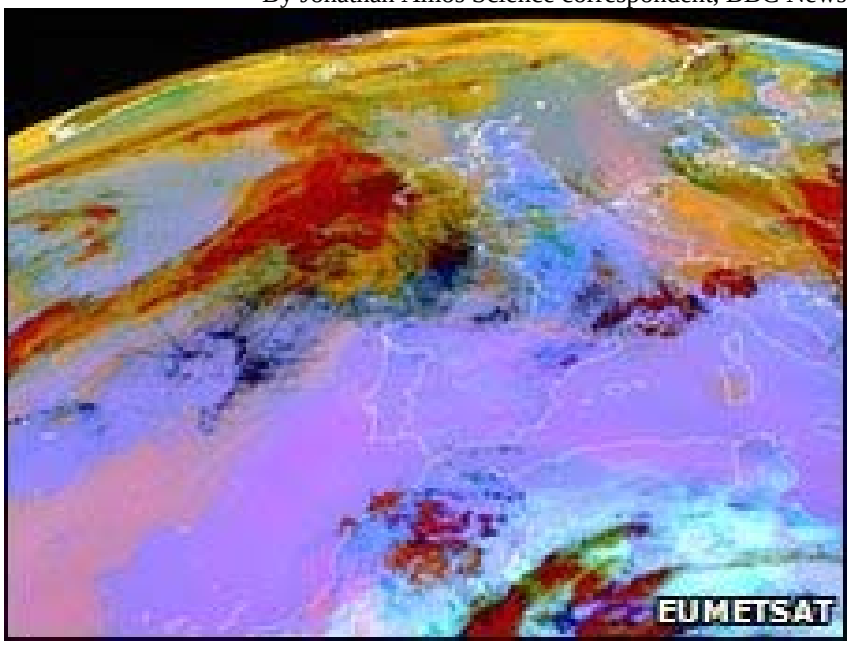
"Whatever the true position is, we can say with certainty that if people brush teeth twice a day with fluoride toothpaste, visit the dentist regularly and restrict sugary snacks to mealtimes; that this will go a long way towards keeping the teeth and gums in a healthy state for life."

http://news.bbc.co.uk/2/hi/health/10176410.stm

'Space laser tech needed' to measure volcanic ash

Page last updated at 16:50 GMT, Saturday, 29 May 2010 17:50 UK

By Jonathan Amos Science correspondent, BBC News



The existing sensors did a "good job" of tracking volcanic ash

Europe requires space-borne laser instruments that can provide information on the vertical scale of volcanic ash clouds.

That was one thought to come out of a meeting of some 50 experts gathered this week in Frascati, Italy, to assess Iceland's Eyjafjallajokull eruption.

Such information can be used to work out ash concentration and thus determine the risk to aircraft engines.

The US Calipso lidar was shown to be very effective in returning this data.

Currently, the European Space Agency (Esa) has two lidar (light detection and ranging) missions of its own in preparation.

ADM-Aeolus and Earthcare will be launching later this decade. Neither has been driven by the needs of volcanic ash monitoring. Aeolus will study the wind; Earthcare will profile normal weather clouds.

Nonetheless, like the American Calipso spacecraft, their technology - they fire pulses of light into the atmosphere and catch the backscatter from particles - can be used very effectively to determine the thickness of drifting ash plumes.

If the vertical profile is combined with the known extent of the plume, a concentration can be calculated.

The airlines at this time are working to a safe limit of four milligrams of ash per cubic metre of air.

The performance of current space sensors and the wish-list for future technologies were discussed during a two-day meeting at Esa's Esrin Earth-observation centre.

The space agency organised the gathering jointly with Eumetsat, which operates Europe's weather satellites.

The summit brought together representatives of civil aviation authorities, ground-based and in-situ observation experts, modellers and satellite remote-sensing experts. The European Commission was also involved.

The outcome of the discussions will be summarised in a white paper that will make some recommendations on future action.

The necessity of space lidar instruments is sure to be featured in the paper, said Dr Ken Holmlund, the head of Eumetsat's meteorological observations division.

"Esa will look into its future missions now to see if there is some tweaking that can be done or some additional instrumentation or further improvements that should be taken onboard," he told BBC News.

"And from a Eumetsat perspective, this really emphasises the crucial role of the Meteosat Third Generation mission which is now being debated. This was a clear message for me that for future volcanic monitoring, you really need good observations from geostationary orbit; and for Europe, it will be MTG or nothing."

The 3.5bn-euro MTG is one of Europe's flagship space endeavours of the coming decade.

It will replace the current Second Generation spacecraft that return 15-minute updates on the state of weather systems over Europe.

METEOSAT - BIGGER, BETTER

- Europe's 1st imaging satellite (800kg) was launched in 1977; it had just three channels
- Today's 2nd generation imager has 12 channels; it's a 2-tonne class spacecraft
- The planned 3rd generation imager will be a 3-tonne satellite; it will have 16 channels
- MTG adds a second platform: a sounding satellite (above) to see the layers in the atmosphere

Consortium wins big weather prize

MTG will incorporate more advanced technologies, including sensors capable of making highly detailed measurements in the infrared and ultraviolet/visible parts of the spectrum.

A glimpse of MTG's capability was seen in the IASI and GOME-2 instruments on Eumetsat's Metop spacecraft that returned remarkable atmospheric composition data during the recent Eyjafjallajokull event.

As a polar orbiting spacecraft, however, Metop sees Europe approximately only once a day.

Derivatives of IASI and GOME-2 will go on MTG but in its geosynchronous orbit will have the advantage of being able to stare constantly at Europe.

In the short term, Dr Holmlund said, there was an acknowledgement that much more could be done with existing sensors and data to provide better information to the national Volcanic Ash Advisory Centres (VAACs) which issue the atmospheric warnings to the aviation sector.

What was clear from the Eyjafjallajokull episode was the requirement not just to describe conditions, but to put some hard numbers on them, too. There was a need to develop new quantitative products, he argued.

"Until now the data from the various missions have been used in isolation," he told BBC News. "We should try more to look at multi-mission approaches, bringing together all the available data in a more effective way to make better products.

"What was demonstrated during this workshop was that the advice that has been given out by the VAACs has been very, very accurate in most cases; and this has been confirmed by aircraft measurements.

"There were a lot of [aircraft measurement] campaigns going out from France, the UK and Germany, and in most cases the ash was confirmed to be where the satellite data saw it and the modelling had predicted it to be. We did a pretty good job."

EU officials calculated recently that the losses to Europe's air and tourism sectors as a result of flight disruption caused by the volcanic eruption in Iceland could exceed 2.5 billion euros.

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http://news.bbc.co.uk/2/hi/science_and_environment/10186406.stm

How fast can a word become legit?

By Erin McKean | May 30, 2010

How fast can a word enter the language?

A couple of weeks ago, an apparently totally made-up new word seemed to set the land-speed record for the jump from "early use" to "inclusion in a dictionary." On May 12, the word *malamanteau* showed up in the Web comic xkcd, where it was defined as "a neologism for a portmanteau created by incorrectly combining a malapropism with a neologism."

It's not the clearest definition ever written, but the idea is that a malamanteau blends one or more not-quite-right words to create a completely new one. Examples include the classic *misunderestimated*, *bewilderness* (as in "lost in the bewilderness"), and *insinuendos* (*innuendo + insinuation*).

The comic in which it appeared — self-described as a "webcomic of romance, sarcasm, math, and language," and beloved by Web geeks — showed the word *malamanteau* as the subject of a Wikipedia page, with the caption: "Ever notice how Wikipedia has a few words it really likes?"

And just like that, we were off. In a sterling example of life imitating art, a Wikipedia page for *malamanteau* was speedily created — and just as rapidly deleted for "not being a real word," but not before generating thousands of words of discussion as to its "realness," "notability," and general usefulness or lack thereof.

I'm a regular reader of xkcd (even its name appeals to wordy people — it was deliberately chosen by the author, Randall Munroe, to be an unpronounceable and meaningless four-letter word). So when I saw *malamanteau* show up in the comic strip, the very first thing I did was head to Wordnik, the collaborative online dictionary that I run. I wasn't disappointed: By the time I got there, the word already had its own entry, complete with reference to its appearance in xkcd and examples of malamanteaux (the preferred plural). The word quickly made it to the Urban Dictionary, too, although the first meaning there, where users vote on their favorite meanings of words, is slightly different. There, it's "a word defined to infuriate Wikipedia editors." Time from the word's debut in a comic strip to appearance in a dictionary: less than half a day.

True, for many English speakers, use in a Web comic and inclusion in a couple of online dictionaries are not enough to establish *malamanteau* as a "real" word. But whether you consider *malamanteau* to be a real word or an elaborate joke, it is a classic example of the kind of word that people argue about when they argue about what makes a word real.

Some people feel that words made up, on purpose, as jokes can never be real — that they always keep their second-class status. Others feel that words need to "cure" for some unspecified period of time, cooling their heels in the English-language waiting room, until they're admitted to the list of things generally accepted as words.

But if we leave the circumstances of its birth aside, *malamanteau* already has a number of the qualities we associate with real words. It has a clearly defined meaning (leaving aside the Wikipedian-irritant one), and seems to be fairly useful (we all recognize the real-world phenomenon that it attempts to describe). It has been used, or at least looked up, by thousands of people — on May 12 it made the top 10 list on Google Trends, and the word has been looked up more than 1,800 times on Wordnik.

Why then the knee-jerk "not a real word" reaction of so many people to *malamanteau*? Since online dictionaries are effectively limitless in scope, it's not like *malamanteau* is taking up space that would be better used for other words. And it's not crowding out a worthier word, as there wasn't already a well-known term for this phenomenon. Its comic-strip origins may cast a shadow on its credibility, but comics have given us a number of new words — *brainiac*, *goon*, and *skunkworks* were all either coined or popularized in comics.

And it's not even as new as its detractors claim. It has appeared once before, in 2007, when it was proposed by a commenter on the website Metafilter as a term for language errors such as *flustrated* (for *flustered + frustrated*) and *misconscrewed* (for a blend of *misconstrued* and *screwed*, as in "I misconscrewed it up"). The commenter, Steve Goldberg, a Philadelphia musician, also suggested *portmanpropism* as an alternative. But until xkcd gave it a boost this month, neither one showed any signs of catching on.

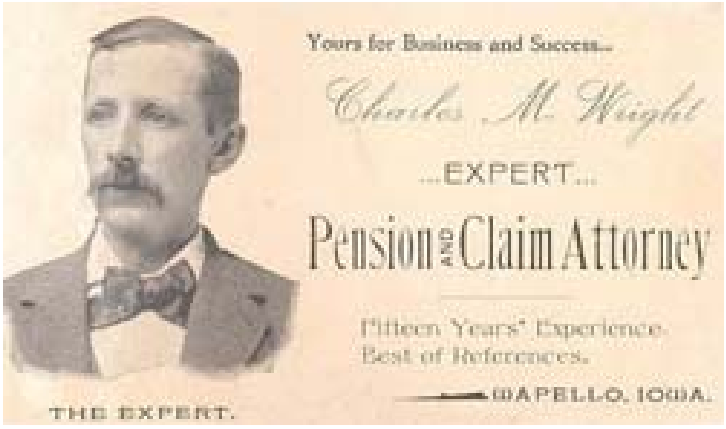
So: Is *malamanteau* a "real" word? It may depend on what you consider real — does a word's "realness" comes from its use, or from its pedigree? For some, *malamanteau* will only become real when it's used, unconsciously, by someone who's never heard of xkcd. Every old word was a new word once, and at some point "silly word prank" may yet turn into "etymology." It's possible that day will never come, but until then, I say, if it acts like a word, we might as well let it be one.

Erin McKean is a lexicographer and founder of Wordnik.com. E-mail her at erin@wordnik.com.

http://www.boston.com/bostonglobe/ideas/articles/2010/05/30/one_day_wonder/

Take My Card...Please!

Forget a profile pic; what does your business card say about you?
By Greg Beato



On a warm spring evening in 1922, M. Sturtz — a burglary insurance broker who lived on Manhattan's Upper West Side — left her apartment for a few minutes to run an errand. While she was gone, a pair of thieves gained entry through a dumbwaiter, locked the doors and windows from the inside, and proceeded to make off with everything of value in the place, including the contents of a toy safe belonging to Mrs. Sturtz' 8-year-old daughter Josephine. In their wake, the thieves left a hand-written business card on a table in the center of the apartment. "Expert crooks," it read across the center. "Services at reasonable rates," it advised in the upper left hand corner. "Specialties: Pocketpicking, flim-flamming, second story work, black-jacking and robbing babies' banks a specialty," it concluded in a lower corner.

The thieves refrained from including their names, their address, their phone number, and yet who would argue that their card should not be the model for every business card? It instantly conveyed their style, their humor, their cruelty. It established them as men of their word. (They did in fact rob babies' banks.) It no doubt left a lasting impression on Mrs. Sturtz.

Long before *Second Life* avatars, long before Facebook profiles, long before AOL screen names, human beings were flattening their complex corporeality into idealized representations of identity. In 15th-century China, in 17th-century Europe, name cards, visiting cards, and trade cards — the predecessors to today's 2" x 3.5" business cards — gave people their first chances to construct virtual selves.

At a time when there was no such thing as drivers' licenses, Social Security cards, street addresses, telephone numbers, and various other means of cataloging humanity, the cards that private citizens created to establish and reinforce their identities played an obviously utilitarian role. But they were always metaphorical entities, too, offering clues to their bearer's temperament and taste, certifying a person's value through aesthetics rather than more tangible credentials. "It creates and establishes an impression of business strength, business ability, and business dignity unattainable by any other means," boasts a 1910 advertisement for a packet of detachable business cards housed in a leather case. With the right business card, you could be anyone: In the 1920s, Al Capone carried one that listed his profession as "secondhand furniture salesman."

As a communications form, the business card is characterized by severe physical limitations and adamantly observed conventions. Its canvas measures a mere 2 inches by 3.5 inches. There is basic information — name, job title, contact info — you're expected to include, and if you do include it, that can be enough. In 1991,

business card collector Richard Pantano sent letters to 280 of America's most powerful CEOs in which he asked them for their cards. Nearly half of them, including Lee Iacocca and Bill Gates, complied, but Pantano told *The Boston Globe* that most of the cards he received were "very conservative-looking," featuring simple typography on plain white card stock. Chalk it up to corporate egalitarianism or the ostentatious understatement of the rich and powerful if you must, but ultimately it was a black mark against free enterprise — our most successful, dynamic titans of commerce had cards better suited to a graphically challenged communist.

Others have taken a more ambitious approach to the form. Take, for example, 19th-century lawyer Charles M. Wright. In the tiny space of his business card, he tells us his name, occupation, and general location. He shows us what he looks like, he lets us know that he's been at his trade for a while now, and he promises us a successful outcome if we engage his services. He establishes himself as both an "expert" and "the expert." If all this sounds a little boastful, well, consider the clean, orderly feel of Wright's card even with all he's said about himself. Consider that the card, with its portrait and the seven different typefaces the card employs, could not have come cheaply. Clearly Wright is just as competent and prosperous as his card suggests he is.

Those of us who seek to immortalize our most essential — or aspirational — selves in similar fashion are fortunate to live in a golden age of business card creation. Currently, most print-based industries are gripped by a weird, bleakly comic paradox: Digital design and production technologies have evolved to the point where it is relatively cheap and easy to create visually stunning newspapers, magazines, and cereal boxes, and yet who wants to read any of that stuff on paper anymore? The business card industry benefits from the same advances in design and production, but provides a format more attuned to our attenuated attention spans. If you've got time to read a tweet, you've got time to read a business card.

Not surprisingly, many of today's cards fetishsize their materiality. You can get ones made from brass, steel, copper, wood veneer, chocolate, even laser-etched beef jerky. Cards printed on a letterpress — or even better, a vintage letterpress —leave a visible indentation in the card that creates a sculptural look akin to bas relief (especially when no ink is used). Facebook profiles get revised as often as Heidi Montag's face, such cards suggest. Tweets fade into the ether and avatars are put out to pasture, but real paper business cards, these sturdy facsimiles of ourselves on custom-duplexed cardstock with metallic ink and die-cut rounded corners, are going to last forever, tacked onto bulletin boards, tucked away in wallets, stuffed into filing cabinets, dumped into landfills and yet taking up space in the world, stunning evidence of our superior discernment and professionalism that generations yet unborn will marvel at the same way we marvel at the cardstock ghost of Charles M. Wright. • *25 May 2010*

Greg Beato writes regularly about pop culture for Las Vegas Weekly *and* Reason *magazine, where he is a contributing editor.*
http://www.thesmartset.com/article/article05251001.aspx

Best Friends
A photo essay.
By Andrea Modica

Best Friends
By Lyle Rexer

In *Camera Lucida*, Roland Barthes remarks somewhat enigmatically that in order to be a photographic portrait, a face must first compose itself into a mask. What does he mean, that the face must somehow perform for us in order to be recognized? Can we look at another person and experience that person as uncoded information — without a past, without presuming or jumping to conclusions about their present? Don't all portraits *presume* in order to give us some version of the person? Why look at them if not for that? Is it possible to let the person be, let the pure enigma of their being emerge? Surely that should be the advantage of photography, that it allows each human subject a complete autonomy.

These are questions that Andrea Modica's portraits raise for me. The series "Best Friends," which seems so simple on the surface, multiplies the questions behind a series of masks. Stylistically, or let's say motivically, Modica is in very good company. These portraits have a special lineage that includes August Sander, Judith Joy Ross, and Mike Disfarmer, among others. They pursue what we might call the truth of the type, in Modica's case the type being the psychic double. Think of Sander: Can anyone look intrinsically like "an artist" or "a tailor," since these are merely social designations and (we like to believe) completely changeable? Just let the butcher win the lottery and see whether he stays a butcher. And yet, perhaps Sander's project was more about composing that face and figure in front of the camera so that the mythic and familiar could play off against the utterly foreign, distinctive, and unknown. This was and is the pleasure of Sander's portraits, that they are historically and culturally "typical" yet independently particular. Such a response accords with the Bechers' attitude toward their typological projects, from water towers to gas works. Each was generically determined but in their eyes embodied the mystery of same-but-different, of the individual and the template. They thought of them as portraits.

The psychic double: This is the mask Modica adopts for her subjects, mostly teenagers, themselves not yet fully formed. Again, by mask I mean that construction of the subjects that allows the viewer access to them in a socially coded, historically intelligible way. So, we know a lot about this period in young people's lives now, how they bond by affinities, on the one hand toward mirrors, and on the other toward opposites, which are a different kind of mirror. Two Asian girls adopt exactly the same frontal pose; possibly they are the same person with a different dress and hairstyle. This is contrasted with the thin blonde turned sideways to the camera holding the waist of a more substantial dark-haired girl, who faces us directly. It appears to be a study in the relation of dominance and submission, or dependence and provision. There are complications, however, slippages of the mask.

The boys are somewhat harder to read. Their doubling gives away less. One Calvin and Hobbes pair illustrates the theory of opposites: A heavy-set teenager — dressed in the preppy garb of topsiders, khaki shorts, button-down shirt, and a tie — sports an expression straight out of a John Belushi routine. He is flanked by his trim, handsome and more defensive companion, who, as occurs in other photographs, does not face the camera head on. The boys tend not to touch each other, certainly not embrace, and to adopt attitudes suggesting they have something to prove to the camera, as we might expect, given that the photographer is a woman, or less directly, that the camera's gaze is perceived as feminine. But we also read their expressions through a media lens, particularly that created by the episode of Columbine High School. It is difficult in our culture to adopt a neutral attitude toward teenage male friendship. There is an anxiety that has nothing to do with sexuality and everything to do with social pathology, rebellion, and violence.

We could describe the relations among the girls as umbilical. They embrace, entwine arms, hold hands, share, merge. "Best friend" appears in the photographs as a feminine term, symbolized for me by a photograph in which the two subjects are connected by the shared earphones of an iPod. It's like they are listening to each other. The one who faces the camera is physically more mature; the other, half turned, has the pudgy, unformed body of a boy. What are they telling each other through those earpieces about their different desires and imaginings? Do they use each other to live, and to hide from living? No wonder that so many of the photographs convey the impression that the young subjects actually look alike, when they don't at all.

If this were an earlier time, we might make a reference to the scene in Ingmar Bergman's *Persona*, in which the images of Liv Ullman and Bibi Anderson merge. But behind the apparent play of identities in these portraits, we keep glimpsing what can't be masked or, in Barthes' lexicon coded, not essential selves but the visual intransigence of photographic subjects. They are simply there before us in a photographic way, tempting us — or me at least — not with stories of an elsewhere that is their past and future lives, but with the fascination of how they look. I note how big the hands are of one boy and how hairy his forearms. And of course his friend's rooster-comb hair cut, which I don't understand at all. Two Italian girls seem to be posed next to a jail cell (surely high school can't be like that?) and the one who hangs back, looking intently at her bolder, more confrontational friend, is slightly cross-eyed. Most compelling to me are the two girls in striped jerseys, both with hair pulled to the side in a cascading pony tail. The one on the right has closed her eyes, making it somehow impossible for a viewer to "read" the picture. The standard relationship of viewer and viewed has been cancelled while our (my) gaze remains fixed.

Like Thomas Struth in his family portraits, Modica gives us familiar information, but behind that stand subjects that can't be assimilated to our gaze, can't be used up as subjects. We like to say that photographs of people confer a kind of immortality — this is how they will appear forever, long after they themselves have changed and gone. But the immortality is of another kind entirely. It is the immortality of a pure image, whose inexplicable neutrality and unbreachable independence unendingly solicit avid acts of looking. • *18 May 2010*

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Lyle Rexler is a New York–based independent writer and critic. His books include Photography's Antiquarian Avant-Garde (2002) and How to Look at Outsider Art (2005); he edited A Couple of Ways of Doing Something (2006).

http://www.thesmartset.com/article/article05181001.aspx

Always Searching
Some find their meaning, others squander any hope for it. I want to be the former.
By Jessa Crispin

There have been Sundays, in bed, in a hotel room, hungover or not, wherein my prospects for getting out of bed seem slim, what with the television right there, and the remote control so near my head. Despite hundreds of channels and the free HBO — generally just showing something directed by Ron Howard over and over and over again — I will stop on Joel Osteen or Rick Warren or some other reprehensible creature in a mega church of some sort. On those Sundays, it's hard to feel the repulsion I usually have for such views. It's the perfect hair and the shiny, shiny teeth. These men are always telling me that God has plans for me. "Oh, Joel Osteen," I say out loud to the television. "Tell me what those plans are."

- ***Meaning in Life and Why It Matters* by Susan Wolf. 160 pages. Princeton University Press. $24.95.**
- ***The Silences of Hammerstein* by Hans Magnus Enzensberger. 402 pages. Seagull Books. $29.**

He never says. There is big talk about giving yourself over to something bigger than yourself, contributing, community, whatever. He is sympathetic to my longings, but won't tell me what God wants me to do. Something bigger than myself could mean, I guess, saving elephants from poachers or protesting an abortion clinic. Be specific! Bastard, I think. Whatever it is that God wants, I'm sure it probably involves putting on pants and getting out of bed, and so I consider it. But if I stay long enough, listening, Osteen will tell me that as a woman, my family is bigger than myself, and raising children and being a helpmeet to my husband counts. "I tried that!" I tell him. Well, not really. Sort of. It was discussed. There was a boy I considered marrying 10 years ago, who said I would not have to work. He would Provide. It wasn't his fault that the word "provide" makes me break into hives and move to another city. With all of Osteen's talk about wives nurturing and men Providing, I start to wonder if he has heard of Ruth von Mayenburg. For some reason, I doubt it.

In her memoir *Blue Blood and Red Flag*, Mayenburg recounts an evening in 1930 in Germany, as she was readying herself to hitch her life to a respectable, rich young man. Named Axel (this was Germany, after all). But as she was dressing for dinner, a man knocked on her door.

It was my neighbor from the next room, Kurt Baron von Hammerstein-Equord, General and Chief of Army Command... He immediately went to the heart of the matter: he would think it a misfortune if Axel and I were to marry. He liked the lad, felt somehow partly responsible for his further fate; I was not the right woman for him. I should think the matter over carefully and also consider that I myself would not be happy in such a tradition-conscious German-national atmosphere. "You are much too headstrong. A lively, impetuous spirit."

Sometimes you just need it spoken out loud, to hear it from another source to realize how true it is. Marriage in 1930 Germany would have destroyed Mayenburg. An endless life of baby-making and dinner hosting and not asking questions. Mayenburg did not simply not marry Axel. She became a major for the Red Army, engaging in espionage in Berlin during the war and feeding the information back to Russia. In *The Silences of Hammerstein*, Hans Magnus Enzensberger describes her life as full of "the best hotels, the champagne breakfast, the sleeping cars, the hunting parties, the casinos, the good addresses in Berlin's west end, the elegant yellow spring costume in your suitcase..." Who knows how one manages to go from being on the verge of marrying a man named Axel to wearing a signet ring "with the cyanide capsule under the gold lid." Joel Osteen sure doesn't.

I gravitate to books with titles like *Meaning in Life*, the latest being Susan Wolf's. These books are mostly nice antidotes to those insufferableables who once dabbled in Wicca and now really love Rumi and tell college graduates to "Follow Your Bliss!" (look, they hand silk-screened it onto a handy little t-shirt so you won't forget!). Wolf thinks following your bliss is useless. People are passionate about a lot of stupid things. It's not a great mantra. Meaning, I think, comes from doing a full accounting of your limitations and assets, your passions and your weaknesses, your belief system and your fears, and then rubbing up against the things that cause you to panic, like an allergy skin scratch test, and find out what your reactions are. Once you figure out how you can contribute to the greater good, once you're able even to define that, you take that information and pour yourself into one direction. Regardless of discomfort or regrets or what-ifs. (And then doing that over and over again, until death.) That does not fit on a T-shirt. That to me is more important than bliss, which would really just lead me back into bed, maybe with a bowl of corn flakes, or maybe I would become like an elderly widower, and just Wait for Death. Or become Alice James.

There is no historical figure who fills me with as much frustration as does Alice James. Whiny, petulant, bratty, arrogant, useless Alice James. And yet I cannot stop reading about her. She is one of those figures Susan Wolf refers to, the people who have no meaning of their own, and are only given meaning by outsiders. Her taking-to-her-bed for her entire life, feigning illness, suffering from illness, and bringing illness upon herself has become a metaphor, an example of lost potential, a feminist symbol. And yet I hate her and I want to pull her hair. She squandered so much. She had the love of two devoted brothers of means who doted on her and took her to Paris and offered to support her. Yet she rejected them. She started to recover her ill health when she gained a teaching position, and yet she quit and went back to her bed. Her illnesses were cleverly timed to go off whenever anyone stopped paying attention to her. Or when she discovered that work is hard.

What makes her life so meaningless — rather than just typically sad and sick — is the willfulness of her disease, and the great talent of her writing. She had a sharp wit — a letter of hers is quoted in *Becoming William James*, in reference to her face, "My features I have long since ceased to question as the work of an inscrutable wisdom." In a letter she describes a man as sitting "on the edge of the sofa tight and compact, like a neat little parcel drawn up at Metcalfs." With her gimlet eye, sense of humor, and fearlessness, you can imagine her rewriting her brother Henry James' books with a bluestocking sensibility. Your heart cries out for those lost novels. Mostly her gift is spent writing bitchy things about other women, like her reasons why she considers herself vastly superior to George Eliot. She was suicidal from puberty on, never learning the lessons of her brothers William and Henry, or what Wolf sums up as, "What gives meaning to our lives gives us reasons to live, even when we do not care much, for our own sakes, whether we live or die." And now that is the meaning her life carries: how meaninglessness is so easy to fall into, and how no one is going to drop a meaningful life into your lap. You fight for it over and over again.

Mostly the reason I hate her is because a big chunk of her lives inside of me. I wonder if someone had allowed me to take to my bed the way they did Alice — she was, after all, not turned out to the street by frustrated parents, instead they pitied her and sent for an endless stream of doctors — or had I married the Provider, would I have fallen into the same trap? Or would I have, on the eve of my wedding, turned into Ruth von Mayenburg, defected to Russia and traveled the world with micro-cameras hidden in my hair? It's hard to say exactly, but on these horrible Sunday mornings I do eventually make it out of bed, into the shower, and back into the world. Almost always. • *20 May 2010*

Jessa Crispin is editor and founder of Bookslut.com. She currently resides in Berlin, but spent many years in Chicago.

http://www.thesmartset.com/article/article05201001.aspx

Celebrity Product Endorsements on the Brain

Brain-scan research suggests celebrity faces evoke specific happy memories, and those positive feelings rub off on the products they endorse.

By Tom Jacobs

Researchers say brain-scan technology proves that positive emotions we have about a celebrity spokesperson get transferred from the personality to the product. (YouTube)

For some of us, the increasingly popular practice of celebrity product endorsements is puzzling. What difference does it make if Brad Pitt recommends a particular pen, or Sally Field a certain cereal? Unless the famous spokesperson has a specific area of expertise — say, Tiger Woods endorsing a set of golf clubs — why would anyone care?

A new study suggests the answer involves superstar-specific happy memories stored in our cerebral cortex. Using brain-scan technology, researchers found those positive emotions get transferred from the personality to the product, producing a more positive impression of the item in question and, presumably, a greater probability of purchasing it.

Writing in the *Journal of Economic Psychology,* a research team led by Mirre Stallen of Erasmus University, the Netherlands, describe an experiment featuring 23 Dutch women. Using functional magnetic resonance imaging technology, the researchers observed which areas of their brains were stimulated as the participants looked at a series of slides.

The images were of either a female celebrity or a non-famous female face. (The stars and unknowns were matched for attractiveness, to guard against any bias for the better-looking person.) In some of the slides, the faces appeared alongside a photograph of a specific brand of shoe.

As the women watched the image of the celebrity alongside the footwear, “we observed specific activity in the orbitofrontal cortex,” the researchers report. “In particular, we found enhanced activity in the medial part of the orbitofrontal cortex, which supports the hypothesis that celebrities give rise to positive emotions, as the medial orbitofrontal cortex has consistently been associated with the encoding of subjective liking of stimuli.”

This pattern of brain activity was not activated when the subjects viewed the famous faces alone. This suggest the brain "did not simply process the presence of a famous face during the presentation of the celebrity-object pairings, but instead encoded the presentation of an object in the context of fame."

According to Stallen and her colleagues, these results suggest "the perception of a celebrity face results in the retrieval of explicit memories" — say, of a fun night out with friends, during which you enjoyed the actor's latest movie. "The positive affect that is experienced during the retrieval of these memories may subsequently be transferred to the product associated with the celebrity," they write.

This helps explain why Woods lost almost all of his endorsement contracts in the wake of last year's sex scandal. The great golfer no doubt still evokes positive memories of exciting tournaments, but to many, his image also arouses less-pleasant recollections. Presumably those negative emotions would also be transferred to the product in question.

So the next time you're tempted to buy a weed whacker endorsed by Wayne Newton, ponder whether you're really being driven by vague but happy memories of your last visit to Vegas. Chances are those feelings will be replaced by less-agreeable emotions as you attempt to decapitate the dandelions.

http://www.miller-mccune.com/business-economics/celebrity-product-endorsements-actually-work-16431/

Anti-Smoking Ads Can Be Counterproductive

By Tom Jacobs

Fear is effective. So is disgust. But combining them is too much — at least when it comes to public service announcements aimed at getting people to stop smoking.

In a new study to be published in an upcoming issue of the journal *Health Communication*, University of Missouri researchers examined the effect of a variety of anti-tobacco ads. Using electrodes placed on viewers' facial muscles, they measured their physiological response to a series of 30-second spots.

Some of the ads focused on fear, noting that smoking has been strongly linked to lung cancer and heart diseases. Others featured unpleasant graphic imagery such as blood and bodily organs. A third category featured both a fear message and repugnant imagery.

The researchers found that both the fear-based and disgust-heavy ads increased viewers' attention and memory. However, ads combining the two factors decreased attention and memory.

"When fear and disgust are combined in a single television ad, the ad might become too noxious for the viewer," said lead author Glenn Leshner, co-director of the Psychological Research on Information and Media Effects Lab at the Missouri School of Journalism. He and co-author Paul Bolls said they hope this insight will help in designing more effective anti-smoking messages.

"We noticed several ads in our collection of anti-tobacco public service announcements that contained very disturbing images, such as cholesterol being squeezed from a human artery, a diseased lung or a cancer-riddled tongue," Leshner said. "Presumably, these messages are designed to scare people so that they don't smoke. It appears this strategy may backfire."

http://www.miller-mccune.com/blogs/mediator/anti-smoking-ads-can-be-counterproductive-4105/

Hex Appeal

Witches are overwhelming the courts in the Central African Republic. And that may be a good thing.

By Graeme Wood

IMAGE CREDIT: ISTVAN BANYAI

SNAKING AROUND the outer wall of the courthouse in Mbaiki, Central African Republic, is a long line of citizens, all in human form and waiting to face judgment. It's easy to imagine them as the usual mix of drunks, reckless drivers, and check-bouncers in the dock of a small American town. But here most are witches, and they are facing criminal punishment for hexing their enemies or assuming the shape of animals.

By some estimates, about 40 percent of the cases in the Central African court system are witchcraft prosecutions. (Drug offenses in the U.S., by contrast, account for just 12 percent of arrests.) In Mbaiki—where Pygmies, who are known for bewitching each other, make up about a tenth of the population—witchcraft prosecutions exceed 50 percent of the case load, meaning that most alleged criminals there are suspected of doing things that Westerners generally regard as impossible.

I went to the front of the witch line and asked Abdulaye Bobro, the chief judge, what the punishment was for casting spells. Bobro spoke in an articulate French baritone so rich with authority that I could imagine him flourishing as a crafty small-town defense lawyer, a Central African Atticus Finch, if he were not on the bench.

Bobro's magisterial bearing was undiminished by his inglorious chambers, which are roughly the size of the reinforced-glass cubes gas-station clerks inhabit in bad neighborhoods. I asked him if he could explain how he reached judgments in witchcraft cases, and he cracked open his filthy, plastic-bound copy of the penal code. Without consulting the table of contents, he found the section on PCS, or the "practice of charlatanism and sorcery," and let me read along as he quoted from memory the section that dictates a decade or more in jail and a nominal fine for engaging in witchcraft. In practice the penalties were significantly less, because the town had insufficient funds to maintain a jail. But Bobro supported the law's preservation, perhaps because it gave him so much authority.

The classic study of witchcraft in Africa occurred among the Azande, who inhabit the eastern edge of the Central African Republic. The anthropologist Edward E. Evans-Pritchard found that the Azande attributed a staggering range of misfortunes—infected toes, collapsed granary roofs, even bad weather—to meddling by witches. Nothing happened by chance, only as an effect of spell-casting by a wicked interloper. That sentiment remains widespread among Central Africans, who demand that the law reflect the influence of witchcraft as they understand it. The standard legal concept of force majeure, under which a defendant cannot be held liable for an "act of God," is thus rendered meaningless.

Foreign human-rights groups have noticed that many of the targets of prosecution are vulnerable types (like Pygmies, or even children), and nongovernmental organizations that exist to encourage the rule of law are embarrassed that the "law" in this case resembles the penal code of 17th-century Salem.

In response, the Central African parliament is considering striking the clause outlawing witchcraft from its books. The parliament is in Bangui, the capital, which sees far fewer witchcraft cases per capita. Even so, most lawyers I consulted there favored keeping the law intact, although they admitted that it fits uneasily in a modern legal system. "The problem is that in a witchcraft case, there is usually no evidence," said Bartolomé Goroth, a lawyer in Bangui, who recently defended (unsuccessfully) a coven of Pygmies who had been accused of murder-by-witchcraft in Mbaiki. Goroth said the trials generally ended with an admission of guilt by an accused witch in exchange for a modest sentence. I asked how one determined guilt in cases where the alleged witches denied the charges. "The judge will look at them and see if they act like witches," Goroth said, specifying that "acting like a witch" entailed behaving "strangely" or "nervously" in court. His principal advice to clients, he said, was to act normally and refrain from casting any spells in the courtroom.

Goroth argued that the legal system could not ignore a social fact as firmly embedded as witchcraft is in the republic. And every other lawyer I met not only supported its criminalization, but seemed to believe in the reality of shape-shifting and killing with magic spells. More than one pointed to the elbow when referring to witchcraft, indicating the site in the body where sorcery is said to reside.

I visited Mbaiki's sole foreign nongovernmental organization, an Italian group called COOPI that exists to promote human rights and the rule of law. The two employees there were both educated Central Africans; the Italian running the office had gone home for a holiday, leaving them in the steaming office with her purring computer and a small stack of Italian books, a translation of *The Celestine Prophecy* on top.

They acknowledged that the rights of the accused are violated regularly in witchcraft prosecutions, because the charge carries enormous pressure to confess. But they, too, supported keeping the laws on the books, for pragmatic reasons: if people thought witches could hex with impunity, mobs would simply seize the alleged offenders, bring them to a pit, and bury them alive. One said, "If we do not apply laws against PCS, we will apply *lex talionis.*" That is, the rule of an eye for an eye, as preached in the Bible.

http://www.theatlantic.com/magazine/archive/2010/06/hex-appeal/8103/

Masahisa Fukase's 'Ravens' chosen Best Photography Book of the last 25 years

The British Journal of Photography asked five experts to pick their top five photography books of the last quarter-century.

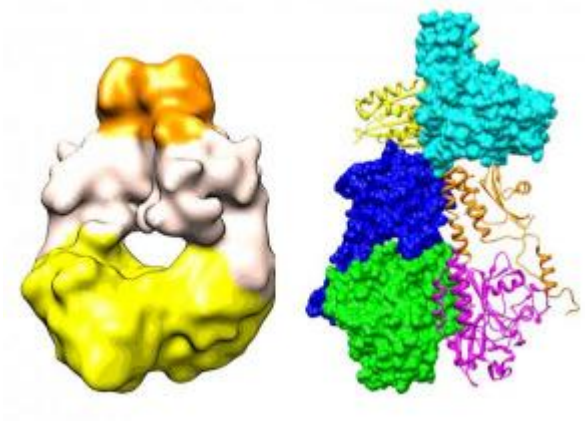
Masahisa Fukase's *Karasu* (Ravens), first published in 1986 by Sokyu-sha, was the winner. The photographs for this "obscure masterpiece" were taken during train journeys back to his birthplace in northern Japan following his divorce from his wife. Most were taken through the train's window.

Many see the dark, ominous imagery as an "allegorical critique of modern industrialised society" as well as a visual meditation on mourning.

The first American edition of *Karasu* was published by Bedford Arts in 1991, under the title *Solitude of Ravens*, and in 2008 the Rat Hole Gallery in Tokyo published a limited edition of 1000 copies.

Five years after the publication of the book Fukase fell down a flight of stairs in a bar and has been in a coma ever since. His ex-wife, the impetus for the book, continues to visit him in the hospital twice a month.
http://www.bookpatrol.net/2010/05/masahisa-fukases-ravens-chosen-best.html?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+BookPatrol+%28Book+Patrol%29

Scientists Decipher Structure of Nature's 'Light Switch'



Left: The newly derived 3D map of a bacterial phytochrome dimer, produced using cryo electron microscopy. Right: By fitting x-ray crystal structures of several homologous fragments into this map, scientists have created an atomic model of the whole structure. The two monomers making up the complete structure -- one shown as a "ribbon" diagram, the other using a space-filling display -- dimerize in parallel with the two polypeptides intimately twisting around each other. (Credit: Image courtesy of DOE/Brookhaven National Laboratory)

ScienceDaily (June 1, 2010) — When the first warm rays of springtime sunshine trigger a burst of new plant growth, it's almost as if someone flicked a switch to turn on the greenery and unleash a floral profusion of color. Opening a window into this process, scientists at the U.S. Department of Energy's (DOE) Brookhaven National Laboratory and collaborators at the University of Wisconsin, Madison, have deciphered the structure of a molecular "switch" much like the one plants use to sense light.

Their findings, described online in the *Proceedings of the National Academy of Science*, the week of May 31, 2010, help explain how the switch works and could be used to design new ways to modify plant growth.

Previous studies showed that the light-sensing structure, called a phytochrome, exists in two stable states. Each state is sensitive to a slightly different wavelength, or color, of light -- from red to "far red," which is close to the invisible infrared end of the light spectrum. As the phytochrome absorbs photons of one wavelength or the other, it changes shape and sends signals that help plants know when to flower, produce chlorophyll, and grow.

"The phytochrome is almost like nature's light switch," said Brookhaven biophysicist Huilin Li, who is also an associate professor at Stony Brook University and a lead author on the study. "Finding out how this switch is flipped on or off by a signal as subtle as a single photon of light is fascinating."

As with all biological molecules, one key to the phytochrome's function is its structure. But scientists trying to get a molecular-level picture of a phytochrome have a formidable challenge: The phytochrome molecule is too dynamic to capture in a single image using techniques like x-ray crystallography. So, scientists have studied only the rigid and smaller pieces of the molecule, yielding detailed, but fragmented, information.

Now using additional imaging and computational techniques, the Brookhaven researchers and their collaborators have pieced together for the first time a detailed structure of a whole phytochrome.

Li and his collaborators studied a phytochrome from a common bacterium that is quite similar in biochemistry and function to those found in plants, but easier to isolate. Plant biologist Richard Vierstra of the University of Wisconsin provided the purified samples.

At Brookhaven, Li's group used two imaging techniques. First, they applied a layer of heavy metal dye to the purified phytochrome molecules to make them more visible, and viewed them using an electron microscope. This produced many two-dimensional images from a variety of angles to give the researchers a rough outline of the phytochrome map.

The scientists also froze the molecules in solution to produce another set of images that would be free of artifacts from the staining technique. For this set of images, the scientists used a cryo-electron microscope.

Using computers to average the data from each technique and then combine the information, the scientists were able to construct a three-dimensional map of the full phytochrome structure. The scientists then fitted the previously determined detailed structures of phytochrome fragments into their newly derived 3-D map to build an atomic model for the whole phytochrome.

Though the scientists knew the phytochrome was composed of two "sister" units, forming a dimer, the new structure revealed a surprisingly long twisted area of contact between the two individual units, with a good deal of flexibility at the untwisted ends. The structure supports the idea that the absorption of light somehow adjusts the strength or orientation of the contact, and through a series of conformation changes, transmits a signal down the length of the molecular interface. The scientists confirmed the proposed structural changes during photo-conversion by mutagenesis and biochemical assay.

The scientists studied only the form of the phytochrome that is sensitive to red light. Next they plan to see how the structure changes after it absorbs red light to become sensitive to "far red" light. Comparing the two structures will help the scientists test their model of how the molecule changes shape to send signals in response to light.

This research was supported by Brookhaven's Laboratory Directed Research and Development program, the National Institutes of Health, the National Science Foundation, and a grant from the University of Wisconsin College of Agricultural and Life Science.

One of ten national laboratories overseen and primarily funded by the Office of Science of the U.S. Department of Energy (DOE), Brookhaven National Laboratory conducts research in the physical, biomedical, and environmental sciences, as well as in energy technologies and national security. Brookhaven Lab also builds and operates major scientific facilities available to university, industry and government researchers. Brookhaven is operated and managed for DOE's Office of Science by Brookhaven Science Associates, a limited-liability company founded by the Research Foundation of State University of New York on behalf of Stony Brook University, the largest academic user of Laboratory facilities, and Battelle, a nonprofit, applied science and technology organization.

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **DOE/Brookhaven National Laboratory**.

http://www.sciencedaily.com/releases/2010/05/100531155423.htm

Better Animal-Free Test for Chemicals That Can Cause Contact Dermatitis

A fast, simple, inexpensive method has been developed for determining whether chemicals in consumer products and workplaces may cause skin allergies in people (Credit: iStockphoto/Heike Kampe)

ScienceDaily (June 1, 2010) — Scientists are reporting development of a fast, simple, inexpensive method for determining whether chemicals in consumer products and workplaces may cause skin allergies in people -- a method that does not involve use of animals.

Their study appears in ACS' *Chemical Research in Toxicology*, a monthly journal.

Itai Chipinda and his colleagues note the existence of public sentiment against the use of animals to determine whether ingredients in consumer soaps, shampoos and other consumer products, and workplace chemicals, may cause skin sensitization and contact dermatitis. Chemicals cause dermatitis by bonding to proteins in the skin, and then aggravating the immune system so that redness, irritation, itching, and other symptoms occur.

Existing chemical tests use substances like glutathione that mimic skin proteins and bond to allergy-causing ingredients. None, however, are suitable for use in detecting the critical early stages of skin sensitization, the scientists say.

Instead of glutathione, Chipinda and his team developed a test with nitrobenzenethiol as the skin protein surrogate. When used on 20 different chemicals known to cause skin irritation, the test produced positive results. It produced negative results when used to test substances that usually do not produce skin sensitization.

"This simple, rapid and inexpensive absorbance-based method has great potential for use as a preliminary screening tool for skin allergens," the report states.

Story Source:

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

Journal Reference:

1. Itai Chipinda, Risikat O. Ajibola, Moshood K. Morakinyo, Tinashe B. Ruwona, Reuben H. Simoyi, Paul D. Siegel. **Rapid and Simple Kinetics Screening Assay for Electrophilic Dermal Sensitizers Using Nitrobenzenethiol**. *Chemical Research in Toxicology*, 2010; 23 (5): 918 DOI: 10.1021/tx100003w

http://www.sciencedaily.com/releases/2010/05/100526124717.htm

What Happens When We Get Angry?

When we get angry, the heart rate, arterial tension and testosterone production increases, cortisol (the stress hormone) decreases, and the left hemisphere of the brain becomes more stimulated. (Credit: Image courtesy of Plataforma SINC)

ScienceDaily (June 1, 2010) — When we get angry, the heart rate, arterial tension and testosterone production increases, cortisol (the stress hormone) decreases, and the left hemisphere of the brain becomes more stimulated. This is indicated by a new investigation lead by scientists from the University of Valencia (UV) that analyses the changes in the brain's cardiovascular, hormonal and asymmetric activation response when we get angry.

"Inducing emotions generates profound changes in the autonomous nervous system, which controls the cardiovascular response, and also in the endocrine system. In addition, changes in cerebral activity also occur, especially in the frontal and temporal lobes," Neus Herrero, main author of the study and researcher at UV, explains.

The researchers induced anger in 30 men using the version that has been adapted to Spanish of the procedure "Anger Induction" (AI), consisting of 50 phrases in first person that reflect daily situations that provoke anger. Before and immediately after the inducement of anger they measured the heart rate and arterial tension, the levels of testosterone and cortisol, and the asymmetric activation of the brain (using the dichotic listening technique), the general state of mind and the subjective experience of the anger emotion.

The results, published in the journal *Hormones and Behavior*, reveal that anger provokes profound changes in the state of mind of the subjects ("they felt angered and had a more negative state of mind") and in different psychobiological parameters. There is an increase in heart rate, arterial tension and testosterone, but the cortisol level decreases.

Asymmetries of brain activity

Nonetheless, "by focusing on the asymmetric brain activity of the frontal lobe that occurs when we experience emotions, there are two models that contradict the case of anger," the researcher highlights.

The first model, 'of emotional valence', suggests that the left frontal region of the brain is involved in experiencing positive emotions, whilst the right is more related to negative emotions.

The second model, 'of motivational direction', shows that the left frontal region is involved in experiencing emotions related to closeness, whilst the right is associated with the emotions that provoke withdrawal.

The positive emotions, like happiness, are usually associated to a motivation of closeness, and the negative ones, like fear and sadness, are characterised by a motivation of withdrawal.

However, not all emotions behave in accordance with this connection. "The case of anger is unique because it is experienced as negative but, often, it evokes a motivation of closeness," the expert explains.

"When experiencing anger, we have observed in our study an increase in right ear advantage, that indicates a greater activation of the left hemisphere, which supports the model of motivational direction," Herrero points out.. In other words, when we get angry, our asymmetric cerebral response is measured by the motivation of closeness to the stimulus that causes us to be angry and not so much by the fact we consider this stimulus as negative: "Normally when we get angry we show a natural tendency to get closer to what made us angry to try to eliminate it," he concludes.

Every emotion is unique

This is the first general study on emotions and more specifically on anger that examines all these different psychobiological parameters (cardiovascular, hormonal response and asymmetric activation response of the brain) in a single investigation to study the changes caused by the inducement of anger. In addition the results of the study are along the same lines as previous investigations and defend what has been noted by Darwin: that the emotions, in this case anger, are accompanied by unique and specific (psychobiological) patterns for each emotion.

Story Source:

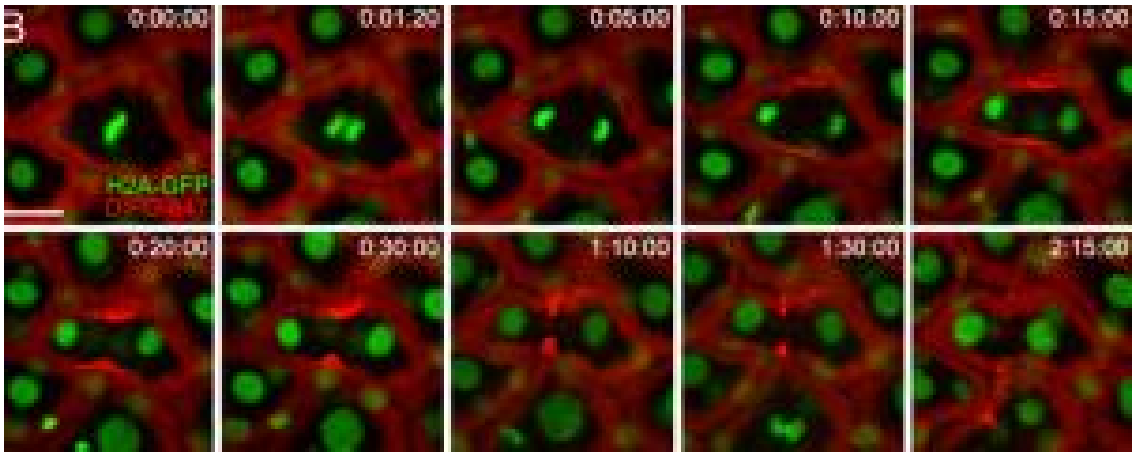
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Plataforma SINC**, via AlphaGalileo.

Journal Reference:

1. Neus Herrero, Marien Gadea, Gabriel Rodríguez-Alarcón, Raúl Espert, Alicia Salvador. **What happens when we get angry? Hormonal, cardiovascular and asymmetrical brain responses**. *Hormones and Behavior*, 2010; 57 (3): 276 DOI: 10.1016/j.yhbeh.2009.12.008

http://www.sciencedaily.com/releases/2010/05/100531082603.htm

Imaging Probes Attached to Sugar Molecules in the Embryos of Zebrafish



Time-lapse monitoring of zebrafish embryos during cell division after the embryos were microinjected with azido sugars, allowed to develop for 10 hours, then reacted with DIFO. Top right of each image shows elapsed time (h:min:sec). Red marks the DIFO signal around the cell membrane, green identifies cell nuclei. (Credit: Image from Bertozzi group)

ScienceDaily (June 1, 2010) — Researchers with the U.S. Department of Energy's Lawrence Berkeley National Laboratory (Berkeley Lab) and the University of California (UC), Berkeley, have successfully attached imaging probes to glycans -- the sugar molecules that are abundant on the surfaces of living cells -- in the embryos of zebrafish less than seven hours after fertilization. Glycans are key regulators of the processes that guide cell development, and zebrafish are a top vertebrate model organism of embryogenesis. This new technique enables scientists to study the physiological changes cells undergo during embryogenesis without invading and doing damage to the embryos.

The team of researchers led by Carolyn Bertozzi, a Berkeley Lab-UC Berkeley chemical biologist and leading authority on glycobiology, used a combination of glycan metabolic labeling and copper-free click chemistry to record the earliest images ever of glycan activity on embryonic cells. The images were obtained during a stage of development in which many of the cells were still in the "multipotent stem cell" state, meaning they had yet to differentiate into specific tissue types.

"We know from earlier studies of developmental biology that glycan structures can change a lot during the early stages of embryogenesis," Bertozzi says. "With this new technology, we hope to witness some of those changes in the glycome in real time and to understand better how cell surface glycans might contribute to the decisions that stem cells make about their destiny."

Bertozzi is the director of Berkeley Lab's Molecular Foundry, a faculty scientist with Berkeley Lab's Materials Sciences and Physical Biosciences Divisions, and the T.Z. and Irmgard Chu Distinguished Professor of Chemistry as well as a professor of Molecular and Cell Biology at UC Berkeley, and an investigator with the Howard Hughes Medical Institute (HHMI).

She is also the principal investigator and corresponding author on a paper published in the Proceedings of the National Academy of Science (PNAS) that describes this latest glycan imaging research. The paper is titled "Visualizing enveloping layer glycans during zebrafish early embryogenesis." Co-authoring the paper with Bertozzi were graduate students Jeremy Baskin, Karen Dehnert and Scott Laughlin, and Sharon Amacher,Associate Professor of Molecular and Cell Biology at UC Berkeley.

Embryogenesis is the process by which a fertilized egg develops into a fetus. It starts with a single zygote cell that multiplies through rapid division (mitosis) into stem cells that subsequently differentiate into the specific types of cells that make up organs and tissues. Biologists need non-invasive imaging techniques to capture in detail such developments at the molecular as well as the cellular levels. Glycans play a central role in the signaling that takes place between cells during embryogenesis, which makes them appealing targets for molecular imaging. However, prior to Bertozzi's research, glycans were difficult to visualize using the standard tools of molecular imaging.

In 2007, Bertozzi and her research group announced the first copper-free variant of a chemical reaction known as "click chemistry," one of the most proficient methods for attaching probes to biological molecules. Conventional click chemistry requires a copper catalyst to accelerate the reaction of alkynes with azides -- functional groups featuring three nitrogen atoms that can be integrated into biomolecules by metabolic labeling. However, because of copper's toxicity, the original click chemistry reactions could only be used on fixed cells or cells in a test-tube. Bertozzi and her group extended click chemistry to living cells and organisms by developing a difluorinated cyclooctyne or DIFO reagent that reacts with azides at physiological temperatures, eliminating the need for the toxic catalyst.

"It is a two-step chemical strategy for labeling glycans with imaging agents *in vivo*," Bertozzi says. "It entails metabolic labeling with synthetic azido sugars that hijack glycan biosynthesis, followed by covalent chemical tagging of the azide-labeled glycans with a compound bearing both an azide-reactive group, such as DIFO, and an imaging probe."

Two years ago, Bertozzi and her group used their copper-free click chemistry technique to image cells in live zebrafish embryos, which by virtue of being transparent, are popular for scientists studying embryogenesis. Those studies revealed dramatic differences in cell-surface expression, intracellular trafficking patterns, and tissue distributions of glycans at different stages of zebrafish larval development.

"However, we were unable to detect labeled glycans in zebrafish embryos earlier than 24 hours post-fertilization," Bertozzi says. "Because many important developmental events including cell migration, tissue morphogenesis, and cell differentiation occur in the first 24 hours of zebrafish embryogenesis, and glycan biosynthesis is also known to occur within that 24 hour period, we sought to develop methods that would enable us to image the glycans early during embryogenesis."

For this study, Bertozzi and her co-authors microinjected embryos with azido sugars at the one-cell stage, allowed the zebrafish to develop, and then detected the metabolically labeled glycans with the copper-free click chemistry technique. This enabled them to image certain types of glycans as early as seven hours post-fertilization. In addition, they used a complementary, non-metabolic labeling technique to target a class of glycans that carry sialic acid, giving them simultaneous but independent ways to image two distinct classes of glycans.

Time-lapse and multicolor imaging experiments highlighted differences between the O-glycans and sialylated glycans in the cells during the gastrulation and segmentation periods of embryogenesis. The results revealed a dramatic re-organization of cell-surface glycans during mitosis, highlighted by their rapid migration to the cleavage furrow of mitotic cells. A cleavage furrow is the indentation that forms in a mother cell, marking the position where it will divide into two daughter cells.

"As the saying goes, a picture is worth a thousand words," says Jeremy Baskin, the lead author on this new PNAS paper who is now doing post-doctoral research at Yale University."In our case, the glycan imaging technology led directly to the observation that membrane-associated glycans traffic laterally within the plasma

membrane to the cleavage furrow during cell division. Down the road, we hope to learn the precise molecular structures of the glycans involved in this process and what roles they play."

Baskin says the ability of this click chemistry technique to provide visualization of specific molecules in cells is an important first step toward an eventual understanding of the function of these molecules.

"By perturbing the system using genetic or pharmacological means and then observing any changes in glycan localization and behavior through imaging," he says, "we may be able to understand the many functions of glycans in embryogenesis and many other physiological processes, including diseases."

Bertozzi says she and her colleagues are following up their glycan imaging studies of zebrafish embryos with mechanistic studies that will help determine what role the labeled glycans might play in the process of cell division.

"There are other applications of glycan imaging in mice that we also are aggressively pursuing," she says, "such as tumor imaging, in addition to studies of how glycans change during embryogenesis."

This research was funded in part by grants from the National Institutes of Health.

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **DOE/Lawrence Berkeley National Laboratory**.

Journal Reference:

1. J. M. Baskin, K. W. Dehnert, S. T. Laughlin, S. L. Amacher, C. R. Bertozzi. **Visualizing enveloping layer glycans during zebrafish early embryogenesis**. *Proceedings of the National Academy of Sciences*, 2010; DOI: 10.1073/pnas.0912081107

http://www.sciencedaily.com/releases/2010/05/100528131035.htm

New Skeletons from the Age of Dinosaurs Answer Century-Old Questions About Prehistoric Reptile Typothorax

Paleontologists are finally revealing what Typothorax really looked like, how large it was, how it walked, and myriad other questions. Typothorax is also one of the last large herbivores to evolve in the Late Triassic, before dinosaurs would come to dominate the planet. (Credit: Image courtesy of Society of Vertebrate Paleontology)

ScienceDaily (May 31, 2010) — More than 100 years ago paleontologist E. D. Cope of "Dinosaur Wars" fame found a few fragmentary bones of a reptile in the deserts of New Mexico. He named the reptile *Typothorax*. A century later *Typothorax,* which belongs to a group of reptiles called aetosaurs, remained something of a mystery, known mainly from pieces of armor, a few limb bones, and some sections of tail.

Now, thanks to two remarkably complete skeletons discovered by volunteers and described in the latest issue of the *Journal of Vertebrate Paleontology*, paleontologists are finally revealing what *Typothorax* really looked like, how large it was, how it walked, and myriad other questions. *Typothorax* is also one of the last large herbivores to evolve in the Late Triassic, before dinosaurs would come to dominate the planet.

Reminiscent of giant armadillos, aetosaurs were widespread during Late Triassic times (230 -- 200 million years ago). The largest species of aetosaur grew up to 5 meters long, although the two new specimens, representing a species called *Typothorax coccinarum*, were smaller growing up to 2.5 meters long. All were covered by a protective armor of overlapping bony plates, but some species sported massive spikes protecting the neck region -- an additional deterrent to any hungry predator. Fragments of the characteristic bony armor are well known to paleontologists, but complete specimens of any aetosaur are very rare and none were known for *Typothorax* prior to the discovery of these specimens. The ornamentation on the plates varies from species to species and paleontologists have long recognized them as a diverse and important group of plant eaters living alongside some of the earliest dinosaurs. However, because of the rarity of more complete material they remain something of an enigma. Now we can say a lot more about these strange creatures which

Dr. Andy Heckert, the lead author of the study and a geology professor at Appalachian State University, regards as an "animal designed by a committee combining a crocodile with a cow and armadillo."

The two new discoveries from New Mexico are providing scientists with a clearer picture of their way of life. "We now know that some previously established ideas about these animals were mistaken," said Heckert. "For the first time we can get a realistic estimate of the size of these animals, and at only 2.5m [~7 feet) and about 100kg (225 lb) they are not as large as previously thought. We also know that some of the bony spikes that were thought to run down the sides of the armor actually surrounded the cloaca." The new specimens show that the body was completely enclosed in bony armor even to the extent of having a series of tiny overlapping plates extending down each leg, and onto the hands and feet. The front limbs apparently sprawled, but the hind limbs were much larger and upright. "I doubt professor Cope would have ever imagined this animal quite this way," said Heckert, "one really interesting feature is that the front half of the skeleton is so slender we probably would have thought it belonged to a juvenile if it weren't articulated to the rest."

The new specimens are also providing exciting new information about the way these animals moved. Fossil skeletons with complete hands and feet are so rarely preserved that it is very difficult to confidently match a skeleton to the maker of any particular trackway. However, the exquisitely preserved feet in the new specimens demonstrate for the first time that trackways known as *Brachychirotheriu*m were almost certainly made by *aetosaur*s. "*Brachychirotheriu*m tracks are known from various localities around the world, and they are an almost perfect match to the arrangement of bones in the aetosaur foot," said Dr. Spencer Lucas, curator at the New Mexico Museum of Natural History, where the specimens are now on display, and another member of the team. "We now know that the front legs of aetosaurs sprawled to the sides, but their back legs were more robust and pillar-like." With their short and stubby necks, blunt-nosed skulls, and small leaf-shaped teeth, these distant relatives of crocodiles may also have grubbed around in the soil looking for succulent roots.

Both specimens were found by volunteers at the New Mexico Museum of Natural History and Science. The first, by Paul Sealey in the late 1980s, and the second by retired U.S. Air Force major Scott Sucher on the so-called Badlands Ranch in 2005. Several students from Appalachian State University got their first taste of paleontological excavation helping excavate the second specimen in 2006, and another volunteer, Bill Ortman, spent years cleaning and gluing the second specimen back together to make this research possible "The important contribution of amateurs to our science cannot be underestimated," said Lucas. "As the Badlands erode we look forward to many more exciting new finds that will contribute to our understanding of the world at this important time in its history."

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Society of Vertebrate Paleontology**.

Journal Reference:

1. Heckert, A. B., S. G. Lucas, L. F. Rinehart, M D. Celeskey, J. A. Spielmann, and A. P Hunt. **Articulated skeletons of the aetosaur Typothorax coccinarum Cope (Archosauria: Stagonolepididae) from the Upper Triassic Bull Canyon Formation (Revueltian: early-mid Norian), eastern New Mexico, USA**. *Journal of Vertebrate Paleontology*, Volume 30, No. 3 DOI: 10.1080/02724631003763524

http://www.sciencedaily.com/releases/2010/05/100528125635.htm

Air Traffic Poised to Become a Major Factor in Global Warming, Scientists Predict

Airplanes, a source of carbon dioxide emissions, are poised to become a major factor in global warming in the future, according to new predictions. (Credit: iStockphoto/Ramon Berk)

ScienceDaily (May 31, 2010) — The first new projections of future aircraft emissions in 10 years predict that carbon dioxide and other gases from air traffic will become a significant source of global warming as they double or triple by 2050.

The study is in ACS' *Environmental Science & Technology*, a semi-monthly journal.

Bethan Owen and colleagues note that aviation is not now one of the main drivers of global warming, with international aviation (source of 60 percent of carbon dioxide emissions from aircraft) not even included in the Kyoto Protocol. Global air traffic currently contributes to between 2 and 3 percent of carbon dioxide emissions -- the main "greenhouse" gas linked to global warming.

The scientists' computer model forecast that emissions of carbon dioxide will likely double or triple within the next 50 years. By 2100, carbon dioxide emissions could increase by up to seven times the current levels, they say.

"Even though there have been significant improvements in fuel efficiency through aircraft technology and operational management, this has been outweighed by the increase in air traffic," the study states.

Story Source:

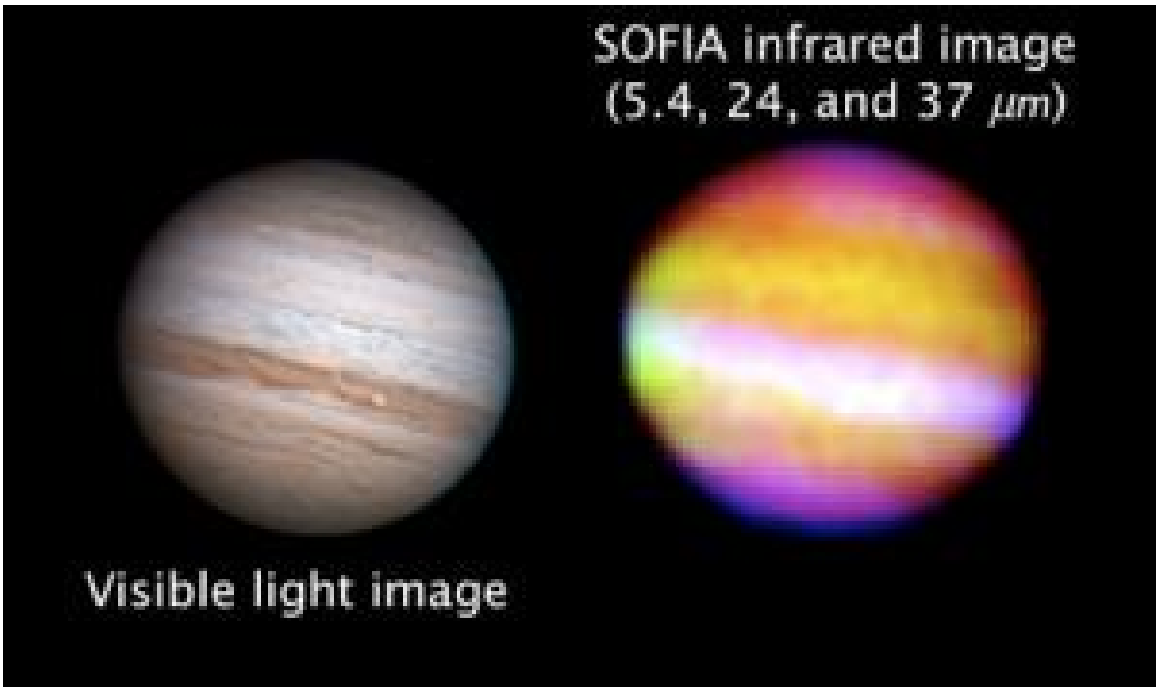
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **American Chemical Society**, via EurekAlert!, a service of AAAS.

Journal Reference:

1. Bethan Owen, David S. Lee, Ling Lim. **Flying into the Future: Aviation Emissions Scenarios to 2050**. *Environmental Science & Technology*, 2010; 44 (7): 2255 DOI: 10.1021/es902530z

http://www.sciencedaily.com/releases/2010/05/100526124715.htm

NASA's Airborne Infrared Observatory Sees 'First Light'



This composite infrared image of Jupiter was made by Cornell University's FORCAST camera during the SOFIA observatory's "first light" flight. A recent visual-wavelength picture of approximately the same side of Jupiter is shown for comparison. (Credit: Anthony Wesley)

ScienceDaily (May 31, 2010) — The Stratospheric Observatory for Infrared Astronomy (SOFIA), a joint program by NASA and the German Aerospace Center, achieved a major milestone May 26, with its first in-flight night observations.

"With this flight, SOFIA begins a 20-year journey that will enable a wide variety of astronomical science observations not possible from other Earth and space-borne observatories," said Jon Morse, Astrophysics Division director in the Science Mission Directorate at NASA Headquarters in Washington. "It clearly sets expectations that SOFIA will provide us with "Great Observatory"-class astronomical science."

The highly modified SOFIA Boeing 747SP jetliner fitted with a 100-inch diameter reflecting telescope took off from its home base at the Aircraft Operations Facility in Palmdale, Calif., of NASA's Dryden Flight Research Center. The in-flight personnel consisted of an international crew from NASA, the Universities Space Research Association in Columbia, Md., Cornell University and the German SOFIA Institute (DSI) in Stuttgart. During the six-hour flight, at altitudes up to 35,000 feet, the crew of 10 scientists, astronomers, engineers and technicians gathered telescope performance data at consoles in the aircraft's main cabin.

"Wind tunnel tests and supercomputer calculations made at the start of the SOFIA program predicted we would have sharp enough images for front-line astronomical research," said SOFIA project scientist Pam Marcum of NASA's Ames Research Center in Moffett Field, Calif. "A preliminary look at the first light data indicates we indeed accomplished that."

The stability and precise pointing of the German-built telescope met or exceeded the expectations of the engineers and astronomers who put it through its paces during the flight.

"The crowning accomplishment of the night came when scientists on board SOFIA recorded images of Jupiter," said USRA SOFIA senior science advisor Eric Becklin. "The composite image from SOFIA shows heat, trapped since the formation of the planet, pouring out of Jupiter's interior through holes in its clouds."

The highly sensitive Faint Object infraRed CAmera for the SOFIA Telescope (FORCAST) used for these initial observations was operated in flight by its builders, a team led by Cornell's Terry Herter. FORCAST captures in minutes images that would require many hour-long exposures by ground-based observatories blocked from a clear infrared view by water vapor in the Earth's atmosphere. SOFIA's operational altitude, which is above more than 99 percent of that water vapor, allows it to receive 80 percent or more of the infrared light accessible to space observatories.

The SOFIA program is managed at Dryden. Ames manages the SOFIA science and mission operations in cooperation with USRA and DSI.

For more information about SOFIA, visit: http://www.nasa.gov/sofia

For information about SOFIA's science mission, visit: http://www.sofia.usra.edu

To see video of SOFIA in flight, visit: http://www.dfrc.nasa.gov/Gallery/Movie/SOFIA/HTML/EM-0095-29.html

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Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **NASA**.
http://www.sciencedaily.com/releases/2010/05/100530213407.htm

How Whales Have Changed Over 35 Million Years

Humpback whale. (Credit: iStockphoto/Josh Friedman)

ScienceDaily (May 31, 2010) — Whales are remarkably diverse, with 84 living species of dramatically different sizes and more than 400 other species that have gone extinct, including some that lived partly on land. Why are there so many whale species, with so much diversity in body size?

To answer that, UCLA evolutionary biologists and a colleague used molecular and computational techniques to look back 35 million years, when the ancestor of all living whales appeared, to analyze the evolutionary tempo of modern whale species and probe how fast whales changed their shape and body size. They have provided the first test of an old idea about why whales show such rich diversity.

"Whales represent the most spectacularly successful invasion of oceans by a mammalian lineage," said Michael Alfaro, UCLA assistant professor of ecology and evolutionary biology, and senior author of the new study, which was published this month in the early online edition of *Proceedings of the Royal Society B* and will appear at a later date in the journal's print edition. "They are often at the top of the food chain and are major players in whatever ecosystem they are in. They are the biggest animals that have ever lived. Cetaceans (which include whales, as well as dolphins and porpoises) are the mammals that can go to the deepest depths in the oceans.

"Biologists have debated whether some key evolutionary feature early in their history allowed whales to rapidly expand in number and form," Alfaro said. "Sonar, large brains, baleen (a structure found in the largest species for filtering small animals from sea water) and complex sociality have all been suggested as triggers for a diversification, or radiation, of this group that has been assumed to be rapid. However, the tempo -- the actual rate of the unfolding of the cetacean radiation -- has never been critically examined before. Our study is the first to test the idea that evolution in early whales was explosively fast."

One explanation for whale diversity is simply that they have been accumulating species and evolving differences in shape as a function of time. The more time that goes by, the more cetacean species one would expect, and the more variation in body size one would expect to see in them.

"Instead, what we found is that very early in their history, whales went their separate ways from the standpoint of size, and probably ecology," Alfaro said. "This pattern provides some support for the explosive radiation hypothesis. It is consistent with the idea that some key traits opened up new ways of being 'whale-like' to the earliest ancestors of modern cetaceans, and that these ancestors evolved to fill them. Once these forms became established, they remained."

Species diversification and variations in body size were established early in the evolution of whales, Alfaro and his colleagues report.

Large whales, small whales and medium-sized whales all appeared early in the history of whales, with the large whales eating mostly plankton, small whales eating fish and medium-sized whales eating squid.

"Those differences were probably in place by 25 million years ago at the latest, and for many millions of years, they have not changed very much," said the study's lead author, Graham Slater, a National Science Foundation-funded UCLA postdoctoral scholar in Alfaro's laboratory. "It's as if whales split things up at the beginning and went their separate ways. The distribution of whale body size and diet still corresponds to these early splits."

"The shape of variation that we see in modern whales today is the result of partitioning of body sizes early on in their history," Alfaro said. "Whatever conditions allowed modern whales to persist allowed them to evolve into unique, disparate modes of life, and those niches largely have been maintained throughout most of their history.

"We could have found that the main whale lineages over time each experimented with being large, small and medium-sized and that all the dietary forms appeared throughout their evolution, or that whales started out medium-sized and the largest and smallest ones appeared more recently -- but the data show none of that. Instead, we find that the differences today were apparent very early on."

Killer whales are an exception, having become larger over the last 10 million years, Alfaro and Slater said. Killer whales are unusual in that they eat mammals, including other whales.

"If we look at rates of body-size evolution throughout the whale family tree, the rate of body-size evolution in the killer whale is the fastest," Slater said. "It came from the size of a dolphin you would see at SeaWorld about 10 million years ago and grew substantially."

Whales range in size from the largest animal known to have ever existed, the blue whale, which is more than 100 feet long, to small species that are about the size of a dog and can get caught in fishermen's nets, Slater said.

Alfaro and Slater do not find evidence for rapid whale diversification, but extinctions may have made it difficult to detect early rapid diversification.

Whales are about 55 million years old, but the first group of whales to take to water is extinct, Alfaro said. Different hypotheses have been proposed to explain the rapid appearance and diversification of modern whales, which coincided with the extinction of the primitive whales.

Before the extinction of the dinosaurs 65 million years ago, there were large marine reptiles in the oceans that went extinct. When the earliest whales first went into the oceans some 55 million years ago, they had essentially no competitors, Alfaro and Slater noted. These primitive whales ranged in size from several feet to 65 feet long and looked similar to land animals, Slater said. They all fed on fish; the earliest whales did not dive deep down to catch squid.

Alfaro's laboratory uses many techniques, including the analysis of DNA sequences, computational techniques and the fossil record to analytically test ideas about when major groups appear and when they

become dominant. He and his research team integrate information from the fossil record with novel computational methods of analysis.

"We are interested in understanding the causes of biodiversity," Alfaro said.

"If we really want to understand species diversity, the number of species in any given group and how the variation in body size came to be, this paper points out that we will need to rely on more of a collaboration between paleontologists and molecular biologists to detect possible changes in the rate at which new species came into existence," Slater said.

The analytical tools for integrating the fossil data with the molecular data are just being developed, said Alfaro, whose research is bridging the divide.

Co-authors on the Proceedings of the Royal Society B study are Samantha Price, a postdoctoral scholar at UC Davis, and Francesco Santini, a UCLA postdoctoral scholar in Alfaro's laboratory.

The research is federally funded by the National Science Foundation (NSF) and by the NSF-funded National Evolutionary Synthesis Center.

Story Source:

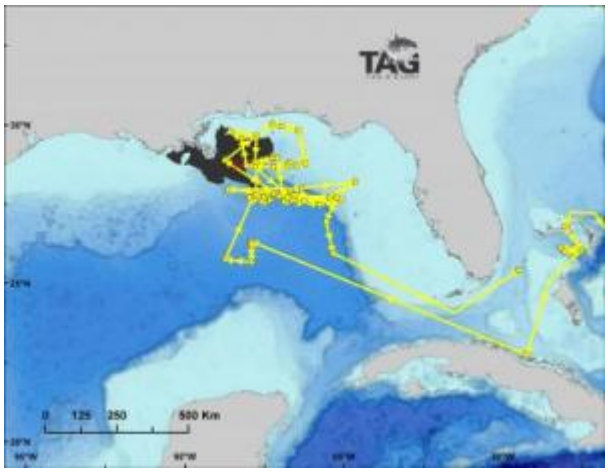
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **University of California - Los Angeles**. The original article was written by Stuart Wolpert.

Journal Reference:

1. G. J. Slater, S. A. Price, F. Santini, M. E. Alfaro. **Diversity versus disparity and the radiation of modern cetaceans**. *Proceedings of the Royal Society B: Biological Sciences*, 2010; DOI: 10.1098/rspb.2010.0408

http://www.sciencedaily.com/releases/2010/05/100528211150.htm

Spawning Habitat of Bluefin Tuna in Gulf of Mexico: Critical Area Intersects Deepwater Horizon Oil Spill



This shows the track (yellow line) and daily positions (dots) of a giant bluefin tuna electronically tagged off Canada on October 25, 2008 -- which spent the period from March 23-May 24, 2009, in the Gulf of Mexico. The track is overlaid on the area of the Deepwater Horizon oil spill as of May 24, 2010 (black). Peak spawning of bluefin tuna occurs in this area during April and May. (Credit: Tag-A-Giant Foundation and Stanford University)

ScienceDaily (May 31, 2010) — Electronic tagging and fisheries catch data have revealed pronounced differences in preferred habitat of Atlantic bluefin tuna and yellowfin tuna in the Gulf of Mexico, despite their close ancestry, according to a new study published today in the peer-reviewed journal *PLoS ONE*. Bluefin tuna return to the same regions of the Gulf of Mexico during spring months to spawn. The bluefin are selecting a particular habitat along the slope waters of the Gulf of Mexico, which has unique oceanographic properties that are predictable and can be seen from satellites. Yellowfin tuna are more widely distributed throughout the warm Gulf waters and occupy the region throughout the year.

"The bluefins' habitat requirements are relatively exact so we can predict with reasonable accuracy where bluefin tuna are likely to be spawning at any given time based on oceanographic data continually being gathered by satellites and weather buoys," said lead author Steven Teo of the University of California at Davis. "This is in stark contrast to yellowfin tuna, which exhibit much more generalized environmental preferences." The fidelity to breeding areas over time detected in this study is reminiscent of salmon returning to their natal stream to spawn.

Bluefin tuna are among the most valuable fish in global markets. The International Commission for the Conservation of Atlantic Tunas (ICCAT, http://www.iccat.int) currently manages the Atlantic bluefin tuna as two distinct populations, with western Atlantic spawners of the Gulf of Mexico forming a distinct population genetically from the eastern spawners of the Mediterranean Sea. The western Atlantic stock has suffered a significant decline in spawning stock biomass since 1950, and a 20-year rebuilding plan has failed to revive the population or the North American fishery. The failure of the Gulf of Mexico spawning population to rebuild, as well as the scope of illegal and under-reported catches -- particularly in the Mediterranean Sea -- are of such major concern that the species was recently considered by the United Nations for endangered species listing in March of 2010.

Targeted bluefin fishing has been banned in the Gulf for over twenty years, but bluefin continue to be captured accidentally on pelagic longlines, often resulting in mortality. The study shows that bluefin tuna are

captured in the Gulf of Mexico from January through June each year, and the highest pelagic longline catch rates are in April and May, during the bluefin spawning season.

The authors compared environmental preferences and spatio-temporal distributions of bluefin and yellowfin tuna as revealed by pelagic longline catch rates and scientific tagging cruise conducted by the Stanford University and Monterey Bay Aquarium team coupled with oceanographic data sets. Drawing on these data, a model was developed to determine the relative probability of catching bluefin and yellowfin tuna at a given place and time. This model showed that there are two major hotspot regions within the Gulf where bycatch occurs -- one in the eastern Gulf of Mexico to the north of the Loop Current, and the other in the western Gulf of Mexico. Both regions are along the slope where the shallow continental shelf depth changes rapidly to the deep sea. It is within these hotspots that bluefin tuna prefer to spawn in circular, swirling water masses called "cyclonic eddies." These eddies are more productive and slightly cooler than surrounding warm Gulf ocean currents. Yellowfin tuna, however, are much more widely dispersed throughout the Gulf of Mexico throughout the year.

These findings indicate that it would be possible to utilize spatial management techniques to protect western Atlantic bluefin tuna on their breeding grounds in the Gulf of Mexico without compromising the yellowfin tuna fishery, which could be carried out in other areas during the critical bluefin tuna breeding times.

Unfortunately, these findings also give cause for concern in light of the recent Deepwater Horizon oil spill. "Both catch data and electronic tags indicate the Gulf of Mexico along the continental shelf is the preferred habitat of this majestic fish. I think it is amazing how precisely we can predict where the bluefin are. Unfortunately their spawning habitat overlaps the Deepwater Horizon oil accident site, and the timing of the spill coincides with the time when we expect them to be there spawning" said senior author Dr. Barbara Block of Stanford University.

Funding for this study was provided by the Lenfest Ocean Program, the Tag-A-Giant Foundation, the David and Lucile Packard Foundation, the Monterey Bay Aquarium Foundation, the National Oceanographic and Atmospheric Administration and the Disney Foundation.

For more information, visit www.tagagiant.org.

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Stanford University - Hopkins Marine Station**, via EurekAlert!, a service of AAAS.

Journal Reference:

1. Steven L. H. Teo, Barbara A. Block, Sharyn Jane Goldstien. **Comparative Influence of Ocean Conditions on Yellowfin and Atlantic Bluefin Tuna Catch from Longlines in the Gulf of Mexico**. *PLoS ONE*, 2010; 5 (5): e10756 DOI: 10.1371/journal.pone.0010756

http://www.sciencedaily.com/releases/2010/05/100528210726.htm

Out of the shadows: our unknown immune system

- 02 June 2010 by **Linda Geddes**, Baltimore
- Magazine issue 2763.

Shadow role (Image: Peter Maschkan/Millennium Images, UK)

DELIBERATE infection with a blood-sucking worm seems an odd way to treat multiple sclerosis (MS). Yet more surprising is what this experiment may tell us about a "shadow" branch of our immune system. Completely unknown until recently, this is pointing to new ways of treating a host of complex diseases.

A couple of recent studies suggest that parasitic infection dampens inflammation and reduces relapse rates in people with MS, in which the body's own cells are attacked by the immune system as if they were "foreign". So Cris Constantinescu at the University of Nottingham, UK, and his colleagues plan to place tiny hookworm larvae on the skin of 32 people with MS, allowing the worms to burrow down and infect the volunteers.

The team won't just be looking for a reduction in volunteers' symptoms though. They will also be watching to see if the parasites boost numbers of a set of newly discovered immune cells, known as regulatory B cells (B regs).

B regs are sending shockwaves through the immunology community. Until recently it was assumed that B cells' main role was to make antibodies at the behest of T-cells. These master regulators enhance or suppress an immune attack depending on the situation, as well as carrying out immune attacks in their own right (See diagram). It was therefore thought that T-cells are at fault when the body attacks itself in autoimmune diseases, such as MS, asthma, diabetes and rheumatoid arthritis - and when it fails to route out disease agents, such as cancer cells.

Now it seems that T-cells are not the immune system's only regulators. Experiments suggest that under some circumstances, B regs regulate T-cells, providing a shadow role for B cells.

"Diseases we've traditionally thought to be mediated by T-cells might actually be regulated by B cells," says Kevan Herold of Columbia University in New York. Boosting B regs might therefore provide new opportunities for treating autoimmune diseases, while inhibiting B regs it could be a new way to treat cancer.

Animal studies are already suggesting that the approach might work in one type of asthma. In a study published in May, Padraic Fallon of Trinity College, Dublin, and his colleagues isolated B regs from the spleens of mice infected with the parasite *Schistosoma mansoni*. When they transferred the B cells into mice primed to develop asthma, this either reduced their symptoms or stopped them developing asthma in the first place (*The Journal of Allergy and Clinical Immunology*, DOI: 10.1016/j.jaci.2010.01.018).

"These are major regulators of the immune system in allergic disease," Fallon concludes. B regs seemed to work by releasing a chemical called IL-10 into the lungs, drawing in regulatory T- cells (T regs), which in turn inhibited immune attacks.

IL-10 played a similar role in a subset of B regs, which Thomas Tedder at Duke University School of Medicine in Durham, North Carolina, calls B10 cells. His team found that transferring these cells into mice with a disease similar to multiple sclerosis reduced the severity of disease.

Tedder has also identified similar cells in humans. "We can stimulate them and we can isolate them, but they're fairly rare," he says. He presented both findings in May at the annual American Association of Immunologists meeting in Baltimore, Maryland.

The race is now on to identify drugs that might boost B regs in people with autoimmune diseases or suppress them in people who have cancer.

The race is on to identify drugs that might boost regulatory B cells in people with autoimmune diseases

One clue that such an approach might work comes from studies of rituximab, which kills B cells. First prescribed for the treatment of B cell lymphoma, a type of cancer, the drug has also reduced symptoms in people with diabetes, MS and rheumatoid arthritis. Rituximab most likely knocked out all the B cells to start with, and then, for some reason only the B regs grew back, which helped suppress autoimmunity, suggests Frances Lund of the University of Rochester Medical Center in New York (*Nature Reviews Immunology*, DOI: 10.1038/nri2729).

In individuals with cancer, however, it might be desirable to suppress B regs. Preliminary evidence suggests that as well as keeping autoimmunity in check, B regs also help dampen the immune system's natural ability to recognise and destroy tumours.

Tedder's team has already created antibodies that can deplete B10 cells - but not other B cells - in mice, and says he has similar antibodies that may selectively deplete human B10 cells - although he hasn't yet tested them in people.

Arya Biragyn of the US National Institute of Aging, and his colleagues, also announced at the Baltimore meeting that they have identified a separate set of B regs that cancer seems to recruit in order to avoid detection by the immune system. Destroying these cells might make let's hope you have deep pockets cancer immunotherapies work better.

"Even if you transiently wipe out B cells during immunotherapy, this should give you very potent anti-tumour responses against hidden tumour cells," Biragyn says.

Working out how parasitic worms trigger B reg activity might suggest additional ways to do this - and to boost B regs. Indeed, Fallon has identified several molecules released by parasitic worms that seem to trigger B regs.

Until such drugs are developed, parasites might be the best way to boost B regs. Severe hookworm infection can cause malnutrition, internal bleeding and anaemia, but in a mild and controlled infection, the dangers are minimal, says Constantinescu, though there may be some itchiness as the worms go through the skin.

Watch the 'clock' in our immune cells

THE discovery of a "shadow" set of immune processes suggests new ways to fight disease. So does evidence that immune cells have circadian clocks, making them more active at certain times of the day.

The majority of asthma attacks occur at night or in the early morning, while people with rheumatoid arthritis, an inflammatory disease, report more joint pain and stiffness in the early morning. To see whether this is because immune cells are governed by circadian rhythms, Xiaojia Wang at the Brody School of Medicine in Greenville, North Carolina, and her colleagues turned to mast cells, which help drive allergies, asthma and anaphylaxis, a potentially fatal allergic response, by releasing chemicals that boost inflammation.

They found that five "clock genes", known to control the rhythmic switching of genes in non-immune cells, were also expressed in a rhythmic pattern in mast cells taken from mice, as was the receptor for a molecule key to activating mast cells in response to allergens. The results were presented in May at a meeting of the American Association of Immunologists in Baltimore, Maryland.

A circadian clock also seems to operate in macrophages - immune cells that engulf pathogens and drive inflammation. Achim Kramer at the Institute for Immunoimaging in Berlin, Germany, and his colleagues have shown that around 8 per cent of mouse macrophage genes are under the control of this clock (*Proceedings of the National Academy of Sciences*, DOI: 10.1073/pnas.0906361106).

If human immune cells have similar clocks, drugs against immune disorders could be given at the times when their target is most available, a strategy known as chronotherapy.

http://www.newscientist.com/article/mg20627633.300-out-of-the-shadows-our-unknown-immune-system.html?DCMP=NLC-nletter&nsref=mg20627633.300

Binge drinking rots teen brains

- 17:11 02 June 2010 by **Andy Coghlan**

Too much, too young (Image: Danny Joint/PYMCA/Rex Features)

Post-mortems of binge-drinking adolescent monkeys have produced the best evidence yet that heavy drinking at an early age can do lasting damage to the brain.

The worst damage was to stem cells destined to become neurons in the hippocampus, the brain area responsible for memory and spatial awareness.

Monkey and human brains develop in the same way, so the finding suggests that similar effects may occur in human teenagers. It thus reinforces the rationale for anti-alcohol policies in the US and elsewhere which aim to raise the age at with people start to drink.

Starting young

Chitra Mandyam of the Scripps Research Institute in La Jolla, California, and colleagues gave four rhesus macaque monkeys citrus-flavoured alcoholic drinks for an hour a day over a period of 11 months. Two months later the animals were killed, and their brains were compared with those of monkeys that had not consumed alcohol.

The bingeing monkeys had 50 to 90 per cent fewer stem cells in their hippocampus compared with the controls. "We saw a profound decrease in vital cells," Mandyam says.

"What is important for the public to know is that this type of drinking can kill off stem cells." This loss could result in damage to memory and spatial skills, she adds.

Lasting effects

Mandyam thinks that this degeneration could have long-term effects and provide a mechanism for why bingeing teens are more likely to develop alcohol dependence as adults.

A new policy to combat under-age drinking was launched earlier this month by the American Academy of Pediatrics (AAP). It is based on results from earlier studies which showed that 41 per cent of children who start drinking regularly at 12 years of age develop lifelong dependency, compared to 11 per cent of people who start drinking at 18.

"The findings support the US Surgeon General's efforts to delay drinking initiation among young people," says Ellen Witt of the US National Institute on Alcohol Abuse and Alcoholism in Bethesda, Maryland. "It's also important to recognize that binge drinking may produce adverse consequences on the brain regardless of age."

Journal reference: *Proceedings of the National Academy of Sciences*, DOI: 10.1073/pnas.0912810107)

http://www.newscientist.com/article/dn18999-binge-drinking-rots-teen-brains.html

Mouse vaccine raises prospect of cancer prevention

- 02 June 2010
- Magazine issue 2763.

PREVENTION is the goal of most vaccines. Not so vaccines against cancer, which rally the immune system to fight an existing disease. That approach might change now that a protein has been found that stops mice developing breast cancer.

Vincent Tuohy of the Cleveland Clinic in Ohio and colleagues took a protein made by cancerous, breast cells, and injected it into mice engineered to develop breast cancer. This primed their immune systems to attack tumour cells and prevented cancer (*Nature Medicine*, DOI: 10.1038/nm.2161). As the protein is made by healthy lactating cells, too, such a vaccine might one day prevent cancer in non-lactating women.

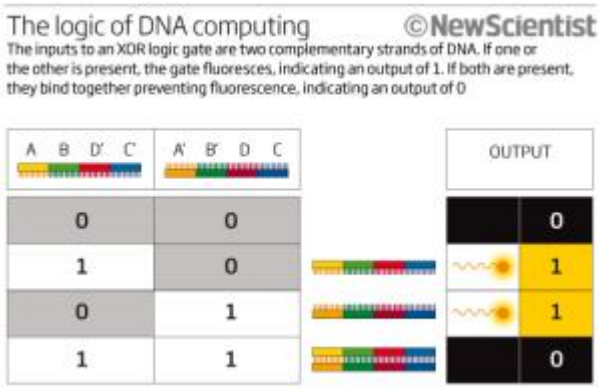
A protein made by cancerous breast cells prevented cancer in engineered mice

That would be a first. Prostate cancer vaccine Provenge extends life but hasn't yet stopped cancer arising, while cervical cancer vaccines prime the immune system against a cancer-causing virus, not cancer itself.

http://www.newscientist.com/article/mg20627633.000-mouse-vaccine-raises-prospect-of-cancer-prevention.html

DNA logic gates herald injectable computers

- 11:03 02 June 2010 by **Kate McAlpine**
- Magazine issue 2763.



The logic of DNA computing

DNA-based logic gates that could carry out calculations inside the body have been constructed for the first time. The work brings the prospect of injectable biocomputers programmed to target diseases as they arise.

"The biocomputer would sense biomarkers and immediately react by releasing counter-agents for the disease," says Itamar Willner of the Hebrew University of Jerusalem, Israel, who led the work.

The new logic gates are formed from short strands of DNA and their complementary strands, which in conjunction with some simple molecular machinery mimic their electronic equivalent. Two strands act as the input: each represents a 1 when present or a 0 when absent. The response to their presence or absence represents the output, which can also be a 1 or 0.

Take the "exclusive OR" or XOR logic gate. It produces an output when either of the two inputs is present but not when both are present or both are absent. To put the DNA version to the test, Willner and his team added molecules to both the complementary strands that caused them to fluoresce when each was present in isolation, representing a logical 1 as the output. But when both were present, the complementary strands combined and quenched the fluorescence, representing a 0 output.

Simultaneous calculations

One of DNA computing's advantages is that it allows calculations to be carried out in parallel, if different types of logic gates are represented by different ingredients. The team tested this process by tossing the XOR ingredients into a test tube, along with those for two other gates, to produce the first few steps involved in binary addition and subtraction.

The team was also able to create logic gates that calculate in sequence. The trick here is to make the output from the first gate a new DNA string that can be used as the input for a second gate and so on. Such "cascading gates" allow for more complex calculations: the entire set of steps required for addition and subtraction, for example, or to deliver a multi-step drug treatment.

Previous DNA-based computers tended to slow down at each step as the DNA strands were used only once, and so became depleted with time. One significant advance claimed by Willner and his team is that their DNA strands reform after each step, allowing long sequences of calculations to be carried out easily for the first time.

Even a single logic gate could have useful medical applications, Willner says. His group built and tested a gate designed to reduce the activity of the blood-clotting enzyme thrombin, which can lead to brain damage following a head injury. The gate acts as a switch that is triggered by the presence of thrombin. Part of the gate consists of a DNA strand connected to a molecule that binds to thrombin. If thrombin is present, this molecule is released, otherwise it stays bound and inert. Such a smart drug could be injected into the bloodstream in advance and would only switch on when needed (*Nature Nanotechnology*, DOI: 10.1038/nnano.2010.88).

Another problem with earlier DNA computers is that they use enzymes to manipulate the DNA, and so function only in certain chemical environments that cannot easily be reproduced inside the body. Willner's team use DNA-like molecules to do this job.

"Being enzyme-free, it has potential in future diagnostic and medical applications," says Benny Gil of the Weizmann Institute of Science in Rehovot, Israel. He is impressed with the new gate system but recognises that it will take years of research and development to bring "smart drugs" to medicine.

http://www.newscientist.com/article/dn18989-dna-logic-gates-herald-injectable-computers.html

'Precision missile' to block bitter tastes

- 10:00 01 June 2010 by **Caitlin Stier**

A bitter-blocking chemical could take the aftertaste out of artificial sweeteners and make unpleasant-tasting medicines easier to swallow.

Jay Slack, a molecular biologist at Givaudan Flavors Corporation in Cincinnati, Ohio, and colleagues have discovered a tasteless compound, called GIV3727, that acts like a precision missile – only blocking the specific bitter taste receptors triggered by the artificial sweeteners saccharin and acesulfame K.

It is the first bitter-blocking compound to directly target bitter taste receptors, says Slack, which means it should not interfere with other tastes if added to foods with bitter aftertastes.

"Chewing gum, yogurt – really any food or beverage product that has these sweeteners in them would be potential targets," he says.

Making use of up to 25 different receptors to carry out its sensing function, bitter is a complex taste. It probably evolved as a means of keeping us away from toxic plants.

Molecular pocket

Previously, a number of substances, including table salt, were known to counteract our bitter taste perception. However, there were problems with these compounds: we didn't know how they worked; they were not specific for bitter taste; or they were not flavourless.

To identify a targeted bitter blocker to inhibit saccharin's aftertaste, Slack and colleagues applied the screening method used in drug discovery. They genetically engineered kidney cells to express the bitter receptors that saccharin and acesulfame K bind to, so that they lit up when a compound wasn't bound to the receptors. Success was shown when the cells remained dim. This set-up led them to GIV3727.

The compound works by fitting into the same molecular "pocket" that saccharin and acesulfame K bind to. But the team suspect that when saccharin and acesulfame K bind, this activates the bitter taste receptor, whereas when GIV3727 binds, it doesn't.

GIV3727 could be mixed with these sweeteners to offset the aftertaste, says Slack. The US Food and Drug Administration has already approved it for use as a food additive.

Go down, medicine

The compound could have broader applications. Tests have shown that GIV3727 also blocks four other bitter receptors not activated by these sweeteners.

However, Slack cautions that the compound is unlikely to dampen all bitter flavours. But others in the field are eager to see whether it could dampen the taste of some antibiotics, which can be so bitter that children can't swallow them.

An understanding of how GIV3727 works might also lead to the identification of new ways to modulate bitter taste and other receptors used in taste perception.

"There's an important need for new and better bitter blockers and this has been reflected in the amount of effort people have put into this area," says Dennis Drayna, a researcher at the National Institute on Deafness and Other Communication Disorders in Bethesda, Maryland, who has previously looked at the genetics behind our ability to taste sweetness.

"My guess is that other organisations will see this result and will start screening efforts of their own. I think it's going to become the model of how industry is going to do this kind of business in the future."

Journal Reference: *Current Biology*, DOI 10.1016/j.cub.2010.04.043

http://www.newscientist.com/article/dn18980-precision-missile-to-block-bitter-tastes.html

Drug could get into the autistic mind

- 01 June 2010 by **Celeste Biever**
- Magazine issue 2762.

CAN people with autism take a pill to improve their social skills? For the first time, drugs are being tested that could address the social difficulties associated with autism and other learning disorders by tackling some of the brain chemistry thought to underlie them.

The only drugs currently prescribed to people with autism seek to dampen aggression and anxiety. The new drugs, now in the very early stages of clinical testing, address some of the classic symptoms of autism.

"People may learn more, learn to speak better, learn social skills and to be more communicative," says Randall Carpenter of Seaside Therapeutics in Cambridge, Massachusetts, which is testing one of the drugs.

Geraldine Dawson, chief science officer at the charity Autism Speaks and a psychiatrist at the University of North Carolina at Chapel Hill, is equally enthusiastic about the prospect of a new class of drugs. "For the first time we are seeing drugs that could tackle core autism symptoms," she says.

For the first time we are seeing drugs that could tackle the core symptoms of autism

The Seaside trial is aimed at a learning disorder called fragile X, which is associated with autism. People with fragile X carry a mutation in a gene involved in strengthening brain connections associated with salient experiences. Stronger brain connections allow people to distinguish these events from background noise, making this a key process in learning.

Carpenter and his colleagues are testing a drug called arbaclofen, which seems to reverse the effect of the mutation. At the International Meeting for Autism Research in Philadelphia, Pennsylvania, on 23 May, they presented initial results suggesting that the drug may improve the social skills of people with fragile X and autism, including improved communication and general sociability, and fewer outbursts.

Seaside's trial is not the only attempt to alter the brain chemistry of people with autism. The hormone oxytocin, also known as the cuddle chemical, helps us connect social contact with feelings of pleasure, and some people with autism produce less of it. Several teams are looking into boosting oxytocin to relieve symptoms of autism.

At the Philadelphia meeting, a team led by Evdokia Anagnostou, a child neurologist at Bloorview Research Institute in Toronto, Canada, reported that people given the hormone twice daily for six weeks were more likely to be better at recognising emotions and at social functioning, and had a better quality of life than others given a placebo.

Trying to alter the brain chemistry thought to underlie autistic behaviour has never been done before in this way, says Uta Frith of University College London. "If they succeed it would be marvellous." But she cautions that the drugs have not yet been shown to work better than behavioural interventions and that most causes of autism are still deeply mysterious.Carpenter points out that behavioural interventions don't work for everyone, and both approaches could be useful. "If we come up with an effective treatment, parents are going to embrace that."

http://www.newscientist.com/article/mg20627622.800-drug-could-get-into-the-autistic-mind.html

Down's eyes are clue to Alzheimer's disease

- 30 May 2010
- Magazine issue 2762.

EYE tests could one day be used for the early detection of Alzheimer's disease, thanks to the discovery of a link between the amount of a characteristic protein in the brain and levels of the same protein in the eye.

Virtually everyone with Down's syndrome goes on to develop symptoms of Alzheimer's. When Lee Goldstein of Boston University School of Medicine and colleagues examined lens and brain tissue during post-mortems of people with Down's, they found that brain levels of amyloid protein correlated with those in the eye (*PLoS One*, DOI: 10.1371/journal.pone.0010659).

Clumps of amyloid protein in the brain are associated with Alzheimer's in the rest of the population, so Goldstein suggests that scanning people's eyes might be a non-invasive way to diagnose Alzheimer's, before other symptoms become apparent.

http://www.newscientist.com/article/mg20627623.400-downs-eyes-are-clue-to-alzheimers-disease.html

Meltdown: Why ice ages don't last forever

- 24 May 2010 by **Stephen Battersby**

Magazine issue 2761.

Immense ice sheets have grown and shrunk many times (Image: Ashley Cooper/SpecialistStock/SplashdownDirect/Rex Features)

BACK in 1993, a boy playing football near Nanjing, China, suddenly fell through the ground. He had inadvertently found a new cave, later named Hulu, which has turned out to be a scientific treasure chest. Besides two *Homo erectus* skeletons, it contains stalagmites that have helped solve one of the greatest mysteries in climate science: why the ice ages came and went when they did.

For more than 2 million years, Earth's climate has been oscillating wildly. Immense ice sheets slowly advance across northern lands, then suddenly melt away to leave the planet basking in a relatively brief period of warmth before the ice creeps back again. Climate scientists have long suspected that these glacial cycles are triggered by changes in our planet's orbit. Yet while this theory has had many successes, it fails to explain one critical fact: why the ice ages end every 100,000 years or so. "It's a big problem," says Larry Edwards of the University of Minnesota in Minneapolis.

Edwards is part of a group of researchers who may finally have the answer, thanks to Hulu and other nearby caves. If their conclusions are right, then the greatest ice sheets of the past were remarkably vulnerable, melting away when there was just a glimmer of extra sunlight. But what have stalagmites in China got to do with the vast ice sheets that covered much of Europe and Siberia, and North America?

By the middle of the 19th century, it was clear that there had once been a "Great Ice Age". The evidence was everywhere, from ice-carved landscapes to vast deposits of glacial debris. In fact, some geologists argued that there had been not just one ice age but as many as four. The question was, why?

Theories abounded. In 1864, James Croll, a Scottish jack-of-all-trades who had taught himself physics, proposed that periodic changes in Earth's orbit change the amount of sunshine reaching the planet at various times of the year. Less sunshine in winter, he argued, would lead to snow accumulating. As ice sheets began to grow, the Earth would reflect more heat, amplifying the effect of the orbital changes and leading to ice ages. There were other positive feedbacks too, he suggested, such as changes in ocean currents.

While it gradually became clear that Croll was wrong about the timing of the ice ages, his orbital theory was revived early in the 20th century by a Serbian engineer called Milutin Milankovitch. Unlike Croll, Milankovitch focused on how orbital changes affect the amount of summer sunshine in the far north. Colder winters make no difference to ice sheet growth, he reasoned, but colder summers do. If the snow that falls during winter does not melt completely in the summer, ice sheets will grow; when summer melting gains the upper hand, ice sheets will shrink.

Milankovitch cycles

Milankovitch spent decades doing painstaking calculations to work out the effects of the three main orbital cycles. For instance, the tilt of Earth's axis increases and decreases every 41,000 years, making summers hotter and winters colder (see diagram).

Milankovitch's work was largely ignored until the 1960s and 1970s, when researchers began working out a detailed time line of the ice ages, based on isotope ratios in shells in ocean sediments. Water containing a lighter variety of oxygen evaporates more easily than that containing heavy oxygen, so when vast amounts of snow are locked away in ice sheets, the ratio of heavy oxygen-18 to lighter oxygen-16 in ocean water increases. Isotope measurements of marine sediments showed that there had been not just four ice ages, but dozens. What's more, the waxing and waning of ice sheets usually coincided with orbital changes, a discovery hailed as proof of Milankovitch's theory.

This was far from the end of the story, though. We now know that the polar ice caps started to form around 30 million years ago, as carbon dioxide levels fell. Around 2.5 million years ago, as it got colder still, a cycle began in which more extensive ice sheets repeatedly spread across the northern hemisphere and then retreated. At first, these ice ages were relatively minor and occurred roughly every 41,000 years - just as you would expect based on the changing tilt of Earth's axis.

But then, a little less than a million years ago, the pattern changed. A series of much more severe ice ages began that lasted 100,000 years. That is a big mystery, because although the shape of the Earth's orbit alters slightly over periods of 95,000 and 125,000 years, this has a far weaker effect on the seasons than the other orbital cycles. Why would the deepest ice ages be driven by the smallest changes in summer sunshine?

Faced with this conundrum, some researchers began to explore alternatives to the mainstream orbital theory. One idea is that Earth sometimes passes through interplanetary dust clouds that cut off some of the sun's heat. Or perhaps our star could be periodically getting brighter and dimmer.

Studies of ice cores from Antarctica, however, were starting to point in a different direction. The cores showed there was a close correlation between temperature and the levels of greenhouse gases in the atmosphere. This suggested a partial answer to the 100,000-year problem: small changes in sunshine might be greatly amplified by rises in CO_2 levels. But there was too much uncertainty about the timing of events to say what caused what.

To find out what really happened, researchers need accurate dates, especially for the ends of the ice ages. "I've been after the timing of these terminations for 25 years," says Edwards. While marine sediments and ice cores record the sequence of events, it is difficult to date those events precisely.

Edwards started by looking at coral. As tropical corals grow only in shallow water, they can reveal how the oceans rose and fell with the ice ages. And coral skeletons contain traces of uranium, which gradually decays into thorium, so ancient corals can be dated by measuring the ratio of uranium to thorium.

Edwards and others found sudden surges in sea level marking the last two terminations. But they couldn't look further back because they couldn't find pristine samples of older corals. And with only two terminations to go on, it is hard to establish any clear links between ice ages and orbital cycles.

In the mid-1990s, Edwards and his student Jeff Dorale turned to another kind of limestone clock: stalagmites. These grow over ten of thousands of years as dripping water deposits calcium carbonate on a cave floor, and as with coral each layer can be precisely dated from its uranium and thorium content.

The next trick was to find caves with sufficiently old and well-preserved stalagmites. After the two skeletons of *Homo erectus* were found in Hulu cave, Yongjin Wang of Nanjing Normal University was sent to date the fossils. In the process he found stalagmites tens of thousands of years old. Wang met Hai Cheng, a colleague of Edwards, and together they found a curious message in the rock.

The cave code

The stalagmites hold indirect clues to the climate in the form of oxygen isotopes, which record the strength of the summer monsoon. Water containing heavy oxygen condenses more easily, so the moisture-laden air of the monsoon loses most of its oxygen-18 as it moves inland. By the time it reaches central China, the rains are low in oxygen-18, and the stalagmites there record this depletion. But as the last ice age was ending, 11,000 to 17,000 years ago, the oxygen-18 content of the stalagmites increased - a sign that summer monsoon rains were much weaker than usual.

Wang then went looking for a cave with older stalagmites. He struck lucky at nearby Linzhu cave, despite a rather unusual hazard. "Bats stole our guide rope," says Wang. "The cave has many branches, and we lost our way out." When his team did eventually escape, around midnight, they brought out samples that held a much longer climate record. And stalagmites from another nearby cave called Sanbao provided even more precise dates.

Bats stole our guide rope. The cave has many branches, and we lost our way

These Chinese cave records show that the monsoons failed during all the last four terminations. "It is amazing how well they are linked," says Edwards. The reason must be, as long suspected, that the melting of the ice sheets alters ocean circulation, producing drastic regional changes in climate. This link also means the timing of events during the past four terminations can be pinned down, allowing Edwards and his team to align the records from marine sediments, ice cores and caves, and compare these paroxysms in Earth's climate with the changes in summer sunlight (see diagram).

In between each ice age termination, the graph of summer sunshine wobbles up and down a few times due to the combined effect of all the orbital changes. The wobbles get weaker, and then shortly after the sunshine curve begins to rise from the fourth or fifth dip, the ice age ends. "We see exactly the same thing in all four terminations," says Edwards. "It suggests that the ice sheets are very sensitive to changes in insolation."

But hang on - if all it takes is a fairly small increase in summer sunlight to melt the ice sheets, why don't they melt every time there's more sunshine instead of waiting for the fourth or fifth wobble?

A clue comes from the sawtooth pattern of ice ages. Apart from a few fits and starts, the ice sheets keep on growing during a glacial period, reaching their greatest size just before a termination. This pattern suggests that there is something about being big that makes an ice sheet's existence precarious.

One weakness may be weight. The bigger ice sheets grow, the lower the continental crust beneath them sinks. At lower altitudes the air temperature is higher, which would increase melting. And as the crust sinks, much of the ice sheet will end up below sea level. Ice sheets resting on the seabed - like the West Antarctic ice sheet today - are far more vulnerable to warming. Being somewhat buoyed up, for instance, the ice can flow more easily and thus disintegrate faster.

This much was already suspected, but the latest work points to another frailty of big ice sheets. While earlier studies suggested that CO_2 levels start rising thousands of years before the ice sheets begin to melt, according to Edwards's team the two begin simultaneously. The difference is crucial, because it means the melting of the ice sheets could cause the rise in CO_2. The mechanism might be the change in ocean circulation.

Whenever the Laurentide ice sheet covering North America starts melting, vast amounts of water and ice pour into the North Atlantic. We know this because at the end of the ice ages, debris dropped by melting icebergs appears in marine sediments. This fresh water will reduce the density of the surface layer, stopping it sinking and thus shutting down the Atlantic overturning circulation - the great ocean current that carries heat north, then sinks and flows back along the bottom of the ocean.

In the popular imagination - thanks to Hollywood - the shutdown of this current leads to a global ice age, but in fact the main effect is a redistribution of heat. If less heat is carried north, the southern oceans warm. Since CO_2 is less soluble in warm water, this leads to the release of CO_2 (see "Blame the corals").

So the new evidence points to a coherent story. Ice sheets build up until they near the brink of stability, at which point a modest rise in summer sunshine is enough to tip them over the edge. As the ice sheets melt, fresh water is released into the Atlantic, shutting down ocean circulation and pumping CO_2 into the atmosphere. As long as the combined effect of extra summer sunshine and rising CO_2 outweighs the regional cooling produced by the shutdown of ocean circulation, the ice keeps melting, pouring more fresh water into the Atlantic. And the melting of a really large ice sheet keeps ocean circulation shut down for a long time, eventually pumping so much CO_2 into the atmosphere that the ice sheets melt away in just a few thousand years.

Other climate scientists are impressed with the results. "Their work in dating the cave record is phenomenal," says Peter Huybers of Harvard University. "It is wonderful to have these constraints, and it gives us reassurance that the timing of climate events coincides with orbital changes."

There are still plenty of loose ends, though. Most troubling, perhaps, are coral samples from Tahiti. If the dating of these samples is correct, sea levels began to rise a few thousand years earlier than the Chinese cave date for the ice age termination around 130,000 years ago.

Such inconsistencies have led some researchers to suspect that there is yet more complexity to uncover. "There is a lot of evidence that orbital cycles drive climate, but the precise linkage is still unclear," says Gideon Henderson of the University of Oxford, who worked on the Tahiti corals. He thinks the focus on sunshine during northern summers may be too narrow. "People tend to look only at the insolation at 65 degrees north in summer, but there are lots of other ways the distribution of solar energy could affect climate. It could be in the tropics or the southern hemisphere."

Changing pace

Another puzzle is why the length of climate cycles suddenly changed from 41,000 years to 100,000. It may be connected to the overall reason behind ice ages: the gradually falling levels of CO_2 in our atmosphere. When the ice ages began, the climate may still have been warm enough that a little extra sunshine was enough to

melt the ice sheets every time the Earth's axial tilt swung towards a maximum. As CO_2 and temperatures kept falling, we may have passed another threshold beyond which the change in the tilt was no longer enough to melt all the ice, so the ice ages started skipping one or two "beats", only melting when they had become bloated and unstable. "But we still don't really understand this," Edwards admits.

Plenty of minor puzzles remain - enough to keep palaeoclimatologists busy for another century or two - but the latest evidence is all very much in Milankovitch's favour. Indeed, even Croll has been vindicated to some extent: it's clear that positive feedbacks play a huge role.

While orbital variations will continue to have a minor effect on climate, the epoch of ice ages is almost certainly over. With CO_2 levels of 380 parts per million and climbing, the climate is currently on course to become like that of the Miocene 10 to 15 million years ago, long before the ice age cycle began, when it was 6 °C warmer and sea level was up to 40 metres higher. If the planet flips into a different climate regime rather than eventually returning to its pre-industrial state, the ice may never reconquer Europe and North America.

Blame the corals

There is no doubt that carbon dioxide is a major player in the coming and going of the ice ages. When the planet starts warming as ice ages end, atmospheric CO_2 levels start rising, amplifying the effects of orbital changes. What is less clear is where the extra CO_2 comes from.

CO_2 is less soluble in warm water, so the warming of oceans would lead to its release. The change in solubility cannot fully explain the rises in CO_2 at the ends of ice ages, though. It appears there are several sources, perhaps including a rather surprising one: coral. The formation of corals' carbonate skeletons releases CO_2, and a rise in sea level will lead to a burst of reef building, as existing reefs grow upwards and as corals colonise shallow waters where land has been submerged. So according to the "coral reef hypothesis", up to half of the rise in CO_2 during ice age terminations might be due to coral growth.

This idea was proposed more than a decade ago, but has won little support because the rise in CO_2 was thought to precede the rise in sea level. "Since we conclude that they do shift together, the coral reef mechanism could be involved," says Larry Edwards of the University of Minnesota in Minneapolis (see main story). "In our scenario, the possible mechanisms (including the coral reef mechanism) fit together in a plausible sequence, which starts with a simple trigger of insolation rise initiating the demise of the ice sheets."

Stephen Battersby is a freelance writer based in London

http://www.newscientist.com/article/mg20627610.900-meltdown-why-ice-ages-dont-last-forever.html

Shape-shifting islands defy sea-level rise

- 02 June 2010 by **Wendy Zukerman**

Magazine issue 2763.

Not drowning but growing? (Image: George Steinmetz/Corbis)

AGAINST all the odds, a number of shape-shifting islands in the middle of the Pacific Ocean are standing up to the effects of climate change.

For years, people have warned that the smallest nations on the planet - island states that barely rise out of the ocean - face being wiped off the map by rising sea levels. Now the first analysis of the data broadly suggests the opposite: most have remained stable over the last 60 years, while some have even grown.

Paul Kench at the University of Auckland in New Zealand and Arthur Webb at the South Pacific Applied Geoscience Commission in Fiji used historical aerial photos and high-resolution satellite images to study changes in the land surface of 27 Pacific islands over the last 60 years. During that time, local sea levels have risen by 120 millimetres, or 2 millimetres per year on average.

Despite this, Kench and Webb found that just four islands have diminished in size since the 1950s. The area of the remaining 23 has either stayed the same or grown (*Global and Planetary Change*, DOI: 10.1016/j.gloplacha.2007.11.001).

Webb says the trend is explained by the islands' composition. Unlike the sandbars of the eastern US coast, low-lying Pacific islands are made of coral debris. This is eroded from the reefs that typically circle the islands and pushed up onto the islands by winds, waves and currents. Because the corals are alive, they provide a continuous supply of material. "Atolls are composed of once-living material," says Webb, "so you have a continual growth." Causeways and other structures linking islands can boost growth by trapping sediment that would otherwise get lost to the ocean.

All this means the islands respond to changing weather and climate. For instance, when hurricane Bebe hit Tuvalu in 1972 it deposited 140 hectares of sedimentary debris onto the eastern reef, increasing the area of the main island by 10 per cent.

Kench says that while the 27 islands in his study are just a small portion of the thousands of low-lying Pacific islands, it shows that they are naturally resilient to rising sea levels. "It has been thought that as the sea level goes up, islands will sit there and drown," he says. "But they won't. The sea level will go up and the island will start responding."

It's been thought that as the sea level goes up, islands will sit there and drown. But they won't

John Hunter, an oceanographer at the University of Tasmania in Australia, says the study is solid, and good news for those preparing evacuations. The shifting shape of the islands presents a challenge, however. Even on islands where the total land mass is stable or grows, one area may be eroded while another is being added to. It's not possible to simply move people living in highly urbanised areas to new land, says Naomi Biribo of the University of Wollongong in New South Wales, Australia.

Webb and Kench warn that while the islands are coping for now, any acceleration in the rate of sea-level rise could overtake the sediment build up. Calculating how fast sea levels will rise over the coming decades is uncertain science, and no one knows how fast the islands can grow.

Barry Brook, a climate scientist at the University of Adelaide in Australia and a supporter of the 350 campaign - which calls for the most stringent global emissions targets in the hope of saving low-lying states from sea-level rise - points out that sea-level rise is already accelerating. But, while he was initially surprised by the findings, he agrees with Webb and Kench's analysis. "It does suggest that islands have been able to adapt to sea-level rises," he says. And Biribo, who lives on the Pacific island of Kiribati, says: "It gives me that sense that we can still live on this island."

Good news, but the warnings stand

At its highest point, Tuvalu stands just 4.5 metres out of the Pacific. It is widely predicted to be one of the first islands to drown in the rising seas caused by global warming. Yet Arthur Webb and Paul Kench found that seven islands in one of its nine atolls have spread by more than 3 per cent on average since the 1950s. One island, Funamanu, gained 0.44 hectares, or nearly 30 per cent of its previous area.

Similar trends were observed in the neighbouring Republic of Kiribati. The three major urbanised islands in the republic - Betio, Bairiki and Nanikai - increased by 30 per cent (36 hectares), 16.3 per cent (5.8 hectares) and 12.5 per cent (0.8 hectares), respectively.

Yet warnings about rising sea levels must still be taken seriously. Earlier this year, people living on the low-lying Carteret Islands, part of Papua New Guinea, had to relocate. Kench says anecdotal reports that the islands have been submerged are "incorrect", saying that instead erosion has changed the shape of the islands, forcing people to move.

http://www.newscientist.com/article/mg20627633.700-shapeshifting-islands-defy-sealevel-rise.html

Cars could run on sunlight and CO_2

- 14:46 02 June 2010 by **Helen Knight**

Here comes the sun (Image: Sandia National Laboratories)

Greenhouse-gas-pumping cars are, let's face it, never going to be green. But innovative sunlight-powered fuel production techniques could inch motor vehicles towards carbon neutrality.

Experimental solar-powered reactors have shown they can create the building blocks for synthetic liquid fuels. They've got a way to go, but these projects could take a big chunk out of net carbon dioxide emissions without the need for major changes to either vehicles or refuelling infrastructure.

A team at Sandia National Laboratories in Albuquerque, New Mexico, is developing a technique to create some of the ingredients for synthetic fuels from carbon-containing gases. Their cerium-oxide-based system can convert CO_2 into carbon monoxide, and can also turn water into hydrogen.

Heliocentric orbits

The machine, called the Counter Rotating Ring Receiver Reactor Recuperator (CR5) consists of two chambers separated by rotating rings of cerium oxide. As the rings spin, a large parabolic mirror concentrates solar energy onto one side, heating it to 1500 °C and causing the cerium oxide there to release oxygen gas into one of the chambers, whence it is pumped away.

As the ring rotates further it takes the deoxygenated ring off the heat and allows it to cool before it swings round to the other chamber. CO_2 is pumped into the second chamber, causing the cooled cerium to steal back an oxygen molecule, producing carbon monoxide and cerium oxide.

The process also works with water instead of CO_2, with the reaction this time producing hydrogen.

Experiments late last year with a 14-ring reactor have demonstrated that the process can produce carbon monoxide, although the failure of certain parts meant the device did not operate continuously for more than a few seconds at a time.

Bigger and better

The team is now working to improve reliability while building a bigger reactor with 28 rotating rings. That will enable it to process more CO_2 and water, says James Miller, a combustion chemist at Sandia.

Once the reactor is producing a steady stream of hydrogen and carbon monoxide, the gases can be converted into a synthetic liquid fuel using a technique such as the Fischer-Tropsch process developed in Germany in the 1920s. In this process the two gases are heated in the presence of an iron-based catalyst to produce hydrocarbon fuels.

Initially, the team plan to use CO_2 captured from power-plant exhaust flues to produce their synthetic fuel.

Ultimately, however, they hope to use CO_2 extracted directly from the air, although they are not developing their own carbon-capture technique to do so. "That is a huge challenge in itself, and we opted to focus on one hard problem at a time," says Miller.

Cunning with calcium

Such challenges haven't deterred Aldo Steinfeld and his team at the Swiss Federal Institute of Technology, Zurich. They have a system which is already sucking CO_2 out of the atmosphere to feed a synthetic fuel process.

The team's reactor again uses a large parabolic mirror to concentrate solar heat onto a chamber – this time containing calcium oxide. Once it reaches 400 °C, air is pumped into the chamber, and the heat causes the calcium oxide to react with CO_2 to form calcium carbonate.

Next, the calcium carbonate is then heated again, this time to 800 °C, at which point it releases a pure stream of CO_2 and reverts back to calcium oxide.

This stream of CO_2 is piped into a second reactor. Here, a solar concentrator is used to heat zinc oxide to 1700 °C, causing it to release oxygen molecules, leaving metallic zinc. The temperature is then lowered and CO_2 and steam are pumped in, which react with the pure zinc to form syngas, a mixture of hydrogen and carbon monoxide, – and zinc oxide once again. The team has previously experimented with a 10-kilowatt prototype, and is planning to test a 100-kilowatt version early next year.

Finding ways to use the sun's energy to create fuel should be one of the highest-priority areas for clean-energy technology research, says Ken Caldeira of the Carnegie Institution of Washington at Stanford University in California. "This area holds out the promise for technologies that can produce large amounts of carbon-neutral power at affordable prices, which can be used where and when that power is needed," he says.

"It is one of the few technology areas that could truly revolutionise our energy future."

http://www.newscientist.com/article/dn18993-green-machine-cars-could-run-on-sunlight-and-co2.html

Did early hunters cause climate change?

- 29 May 2010
- Magazine issue 2762.
-

IT'S not just for the last century that humans have been messing up the climate. It may have been going on for thousands of years.

When hunters arrived in North America and drove mammoths and other large mammals to extinction, the methane balance of the atmosphere could have changed as a result, triggering the global cool spell that followed. The large grazing animals would have produced copious amounts of methane, a potent greenhouse gas, from their digestive systems. They vanished about 13,000 years ago.

Felisa Smith at the University of New Mexico in Albuquerque has calculated that when these animals were around they would have emitted 9.6 megatonnes of methane annually. Ice core records show atmospheric methane levels plunged from about 700 parts per billion to just 500 ppb at the time of their extinction. Disappearance of methane emissions from the extinct species is a possible cause, Smith says (*Nature Geoscience*, DOI: 10.1038/ngeo877).

"It is conceivable that this drop in methane contributed to the Younger Dryas cooling episode," says Smith. This would mean humans have been changing global climate since well before the dawn of civilisation.

http://www.newscientist.com/article/mg20627623.300-did-early-hunters-cause-climate-change.html

Bacteria help to clean up Deepwater Horizon spill

- 17:40 27 May 2010 by **Debora MacKenzie**

Humans get a helping hand in clean-up operation (Image: Petty Officer 3rd Class Patrick/U.S. Coast Guard)

Zoom in on the Deepwater Horizon oil slick and you will find a motley community of critters hard at work breaking down the oil: bacteria.

At the annual meeting of the American Society for Microbiology in San Diego, California, this week, Jay Grimes of the University of Southern Mississippi in Hattiesburg reported that over the past few years, researchers have found that dozens of different kinds of marine bacteria have a healthy appetite for oil.

He said that water samples from the Gulf of Mexico are showing signs that marine bacteria are already pitching in to help with clean-up efforts, and that populations of these bacteria in this area are likely to boom as they feast on the oil from the Deepwater Horizon disaster.

Among these are members of the Vibrio family, which includes the species that causes cholera. Grimes cautions that there is no evidence that this species is one of those that breaks down oil, although other Vibrios that cause human infections do.

"The Vibrios use breakdown products of oil," says Rita Colwell of the University of Maryland in College Park. "When [the oil from Deepwater Horizon] reaches the estuary, Vibrios very likely will increase."

Feasting bacteria

Colwell says that the greatest risk of bacterial infection in the Gulf comes from Vibrio fish pathogens and other species that commonly infect shellfish. Some of these can cause disease in humans.

Grimes's research department had the only research vessel, the R/V Pelican, on the scene until BP sent one in this week. It brought back samples of oil droplets that already had Vibrios clustered around them. Low oxygen levels were also detected near patches of oil, a sign that bacteria are feasting.

Crucially, R/V Pelican happened to be in the area when Deepwater Horizon blew up. That means the team could immediately collect water samples to test for bacterial populations from areas that were threatened by the spill but had not yet been contaminated. The work is on-going and will be vital in future studies of how the spill has changed local ecosystems.

"Now we plan to see how the microbial community evolves when you give it oil," says Grimes. He hopes to screen bacteria from oil-affected water for the DNA of oil-eating enzymes, and use this to determine their species.

"This blowout could permanently reshuffle the microbial community in the Gulf," Grimes says. In previous research he found that Vibrio became the dominant type of marine bacteria off the south-eastern US as oil tanker traffic increased after the 1970s.

Long-term threat

For now the oil mainly threatens larval fish clinging to the underside of mats of seaweed. "I hope most of the oil will stay out to sea," says Grimes. "It may kill a year's production of fish, but if it hits the coastal marshes, it could be there for a decade." At particular risk are coastal salt marshes.

Ultimately, the tiny bacteria which Grimes and his colleagues are poring over will finish the Deepwater clean-up operation. Speaking at the San Diego meeting, Ron Atlas of the University of Louisville, Kentucky, said that the oil-eating microbes already present in seawater will be enough to get rid of any oil that is not physically removed by the clean-up crews – except for insoluble, tarry material that poses little toxic risk.

Atlas, who managed the "bioremediation" of the 1989 Exxon Valdez spill in Alaska, says the bacterial process will be helped if fertiliser is added to the water, as then the oil-eaters will have the nitrogen and phosphate they need to grow.

Fertiliser has already been used to aid the bacterial breakdown of oil that has hit the shore, but it could also help bacteria in the open sea if it is added to the detergents that are being used to disperse the oil. The fertiliser lodges in the surface of the oil droplets created by the detergents, he says – right where the bacteria can use them.

http://www.newscientist.com/article/dn18971-bacteria-help-to-clean-up-deepwater-horizon-spill.html

Sailing ships could harvest fuel from the oceans

- 17:35 27 May 2010 by **Helen Knight**

Scaling them up could power the planet (Image: Sunset/Rex Features)

A fleet of sailing ships could harvest energy from the wind blowing over the vast tracts of ocean too far from the shore for wind turbines, a scheme unveiled last month claims.

The ships would turn wind power into hydrogen, which would be stored on board, to be unloaded later and used to generate electricity.

The idea comes from Max Platzer and Nesrin Sarigul-Klijn at the University of California, Davis. "Our proposal makes ocean wind energy available for exploitation – a huge energy reservoir because the oceans cover 70 per cent of the globe," Platzer says. It "offers the opportunity to make a decisive contribution to the solution of the energy and climate crisis".

Generators in tow

The ships would tow hydropower generators consisting of two wing-like underwater blades that would be made to oscillate by the force of the water as they plough through it. This motion would turn a crankshaft connected to a generator. The electricity this produces could then be used to split seawater into hydrogen and oxygen.

Sailing ships can reach speeds of up to 25 knots (46 kilometres per hour). A ship with 400 square metres of sail, operating in a strong, force 7 wind of 15 metres per second, could generate up to 100 kilowatts of electrical power, Platzer and Sarigul-Klijn calculate. They also say it should be possible to build larger ships capable of generating up to 1 megawatt. With enough ships, the energy needs for the entire planet could be met this way, Platzer says.

"Obviously, this is a roundabout way of generating electricity instead of converting wind or water flow energy directly into electricity using stationary windmills or hydroturbines," Platzer says. This will clearly lead to some losses, but he calculates that the electricity can be converted into hydrogen and back again with about 30 per cent efficiency.

Concentrated energy

Extracting energy from flow of water rather than directly from air has advantages, as the power density is much higher. Platzer says the water flow through the underwater generator has a power density of 36 kilowatts per square metre – far more than the 1.2 kilowatts per square metre typical of air blowing through a rotating wind turbine. The more concentrated energy means that the equipment needed to harvest it can be smaller.

Stephen Salter, an engineer at the University of Edinburgh, UK, who in the 1970s invented the "nodding duck" wave power device, says the idea looks sound.

Platzer and Sarigul-Klijn presented their paper at an American Society of Mechanical Engineers energy sustainability conference in Phoenix, Arizona, on 19 May.

http://www.newscientist.com/article/dn18970-sailing-ships-could-harvest-fuel-from-the-oceans.html

Stellar explosion sends shrapnel our way

- 31 May 2010
- Magazine issue 2762.

Picking up the pieces - the IceCube facility at the South Pole (Image: Forest Banks/NSF)

AN EXCESS of high-energy particles hitting Earth may be shrapnel from a stellar explosion 800 light years away.

In the 1930s, it was suggested that supernovae can accelerate galactic cosmic rays. The shock waves from such stellar explosions, or the magnetic fields of the superdense neutron stars left behind, were thought to be able to boost particles from the explosion and surrounding region to very high energies. "But there's been absolutely no evidence for it whatsoever," says Francis Halzen of the University of Wisconsin in Madison, lead scientist for the IceCube detector at the South Pole.

IceCube detects showers of muon particles that cascade towards the Earth when high-energy cosmic rays hit our atmosphere. After analysing the distribution of around 4.3 billion muons detected between June 2007 and March 2008, the IceCube team has found a small but clear excess of cosmic rays coming from the direction of the constellation Vela, hinting that the relatively close Vela supernova remnant may be responsible (arxiv.org/abs/1005.2960). "This may be the first strong indication we have" in support of this theory, says Halzen.

http://www.newscientist.com/article/mg20627623.900-stellar-explosion-sends-shrapnel-our-way.html

Bletchley Park WWII archive to go online

Page last updated at 2:57 GMT, Saturday, 5 June 2010 3:57 UK

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By Dhruti Shah BBC News

Pictures of Benito Mussolini and Adolf Hitler will be accessible

Millions of documents stored at the World War II code-breaking centre, Bletchley Park, are set to be digitised and made available online.

Electronics company Hewlett-Packard has donated a number of scanners to the centre in Milton Keynes so volunteers can begin the ground-breaking task.

Many of the records at the once-secret centre have not been touched for years.

During the war, it was home to more than 10,000 men and women who decoded encrypted German messages.

The centre hopes that once the work starts, previously untold stories about the role Bletchley Park played in the war, will be revealed.

'Trail'

The first phase of the project is expected to take at least three years.

Simon Greenish, chief executive officer of the Bletchley Park Trust, said the plan was for the centre's entire archive to be digitised.

He said: "We've been wanting to do this for a while. It was first discussed five years ago, but we have just never had the funds.

"If I ever manage to secure £10,000 then that goes towards buying a new roof as this project just has not had the attention it deserves.

"But for the first time we hope we will be able to put everything into the public domain."

He said since the archive is so big nobody knows exactly what each individual document stored there contains.

However, the information they expect to dig out will definitely include communication transcripts, communiques, memoranda, photographs, maps and other material relating to key events that took place during the war.

He said: "We have many boxes full of index cards, which have lots of different messages on them. But this will be our chance to follow a trail and put the messages together so we can find out what they really mean.

"We found a card talking about 4,400 tonnes of mercury being transferred from Spain - we will be searching for further messages explaining what happened and why this was done."

He said the archive had tremendous potential and once it was online, people would find it easier to trace documents related to certain subjects within minutes - something that takes days to do now.

Pictures set to go online in the archive include ones of Adolf Hitler shortly after surviving an attempt to assassinate him. They had been taken by his official photographer Heinrich Hoffmann.

It is quite clear there was a lot of correspondence going on between these countries

Simon Greenish Bletchley Park Trust

"I'm looking toward to finding the cards relating to rubber and ball bearings and how the Germans gathered these materials.

"The Germans developed synthetic rubber as they found it hard to get natural rubber. They also needed lots of ball bearings for the war effort, which is why the allied forces attacked a lot of ball bearing factories."

He said there were records in the archive which showed countries such as Spain, Switzerland and Sweden were perhaps not as neutral as they were portrayed.

"It is quite clear there was a lot of correspondence going on between these countries," he said.

He said the volunteers had already unearthed records showing countries including Spain dealing in diamonds with the Japanese and other German allies.

He said more information about the double agent Garbo - a Spaniard whose real name was Juan Pujol Garcia - was likely to come out once the work on the archive began.

Garbo, who has been described as World War II's "greatest double agent", persuaded the Nazis that the allied forces were planning their D-Day operation in Calais rather than Normandy.

He said he was also expecting more information about the fuel the Germans were discovered to be sending to Pennemuende, a small village close to the Baltic Sea.

He said: "We didn't know anything about it initially, but then because of the message that Bletchley Park decoded, the allies sent a reconnaissance aircraft and they found out that rockets - weapons of terror - were being developed there. The RAF then attacked the site."

He said the documents were all important as just one obscure message could have led to thousands of lives being saved.

Laura Seymour, from Hewlett-Packard, said her company contacted Bletchley Park in September 2009 after learning of its plight.

The company donated a number of scanners and people to provide technical expertise to the charity.

Ms Seymour estimated the cost to HP was in the tens of thousands but said it was a project that was worth being involved in.

Mr Greenish believed the archive would be an important research tool and could even attract more people to the site. It would also ensure the preservation of the fragile hard copies.

Currently most of the documents are too difficult to view or handle and few have access to them. But Bletchley Park hopes that its new archive will one day be a different type of gateway to the past.

http://news.bbc.co.uk/2/hi/uk/10239623.stm

Smart clothes offer emotional aid

Page last updated at 09:50 GMT, Friday, 4 June 2010 10:50 UK

The garment connects to the web using a smartphone

Smart clothes could soon be helping their wearers cope with the stresses of modern life.

The prototype garments monitor physiological states including temperature and heart rate.

The clothes are connected to a database that analyses the data to work out a person's emotional state.

Media, including songs, words and images, are then piped to the display and speakers in the clothes to calm a wearer or offer support.

Created as part of an artistic project called Wearable Absence the clothes are made from textiles woven with different sorts of wireless sensors. These can track a wide variety of tell-tale biological markers including temperature, heart rate, breathing and galvanic skin response.

Data is gathered passively and used to trigger a response from a web-based database previously created by the wearer. The clothes connect to the web via a smartphone.

When the wearer is detected as being in a particular emotional state, the database will send media to the clothes to help try to change a person's mood

To accomplish this, the clothes are fitted with display made of LEDs and have speakers built in to the hood. The display can show scrolling text or simple images and the speakers can replay music, sounds or pre-recorded messages from friends or family.

Developed by Barbara Layne from Concordia University in Canada and Janis Jefferies from Goldsmiths College's Digital Studios, the prototype garments were shown at the Congress of the Humanities and Social Sciences held in Montreal from 28 May - 3 June.

Earlier work by Professor Layne created jackets that knew when their owners were touching and changed the messages being displayed on the LED displays sewn into them.

http://news.bbc.co.uk/2/hi/technology/10236143.stm

One-shot radiotherapy 'success against breast cancer'

Page last updated at 16:09 GMT, Saturday, 5 June 2010 17:09 UK

The probe is inserted into the breast

A single dose of radiation during surgery is just as effective as a prolonged course of radiotherapy for breast cancer, a study suggests.

Doctors have tested the technique, which involves a single shot of radiotherapy to a tumour site, in more than 2,000 patients.

It could save the UK £15m a year, the researchers said.

Cancer Research UK said The Lancet study could have a "huge impact" for patients.

The researchers said using the one-stop procedure would be more convenient for patients and cut waiting lists.

Treatment to surgically remove cancerous breast tissue is the starting point of treatment for thousands of women in Britain each year.

Radiotherapy is already a very effective treatment, so improving that even further is an exciting prospect

Kate Law Cancer Research UK

That is often followed up with weeks of radiotherapy to the whole breast to kill any remaining cancer cells.

But with the new technique, doctors use a mobile radiotherapy machine that can be inserted into the breast to target the exact site of the cancer.

Led by a UK team, but carried out in nine countries, the four-year trial in women over 45 showed similar rates of disease recurrence regardless of the treatment used.

There were six cases of the disease returning in those who had the new single-dose technique and five cases in those undergoing a prolonged course of radiotherapy.

But the single dose during surgery avoids potential damage to organs such as the heart, lung, and oesophagus, which can occur during radiation to the whole breast, the researchers said.

The frequency of any complications and major toxic effects was similar in the two groups.

University College London Hospitals (UCLH) oncologist Prof Jeffrey Tobias, who enrolled the first patient on the trial at the former Middlesex Hospital in London with oncologist Jayant Vaidya, said: "I think the reason why it works so well is because of the precision of the treatment. It eradicates the very highest risk area - the part of the breast from which the tumour was removed."

Meanwhile, Mr Vaidya, who is also a UCLH oncologist, said the new treatment "could mean that many more women could conserve their breasts".

Josephine Ford, 80, was diagnosed with breast cancer in February 2008 and was successfully treated with this form of treatment three months later.

She said this approach "simplified everything and made the process less traumatic".

And she added that it made her life "so much easier" since she "didn't have to come back to the radiotherapy department on a daily basis for five or six weeks".

'Exciting prospect'

While optimistic about the results, the researchers stressed the findings were only applicable to women with a similar type of breast cancer as those in the trial.

But they added: "Treatment of patients with breast cancer accounts for about a third of the workload of radiotherapy departments in some parts of the world and contributes substantially to the unacceptable waiting lists seen in many oncology departments worldwide.

"In countries such as the UK where the waiting list for postoperative radiotherapy could rapidly diminish with use of targeted intraoperative radiotherapy, we estimate savings of around £15m a year."

Kate Law, director of clinical research at Cancer Research UK, said: "Radiotherapy is already a very effective treatment, so improving that even further is an exciting prospect.

"Further follow-up of these women will be needed to confirm whether this strategy not only makes the most of the therapy's power but also minimises any long-term side effects."

http://news.bbc.co.uk/2/hi/health/10239478.stm

Low-dose HRT patches better than pills for stroke risk

Page last updated at 23:27 GMT, Thursday, 3 June 2010 0:27 UK

By Emma Wilkinson Health reporter, BBC News

HRT can be given through patches

Hormone replacement therapy (HRT) may be safer when given as low-dose patches than as pills, research suggests.

A Canadian and German study of the records of 75,000 patients between 1987 and 2006 found patches containing low doses of oestrogen carry a lower risk of stroke than oral HRT therapy.

The risk rose with high-dose patches, the British Medical Journal reports.

Current advice is to take the lowest effective dose of HRT for the shortest time necessary.

HRT is commonly prescribed to relieve the symptoms of the menopause.

It contains oestrogen, levels of which drop during the menopause leading to hot flushes, low sex drive, mood changes, bone thinning and night sweats.

Some types of HRT also contain progesterone.

We'd be interested to see the results of further studies into how the administration of HRT can affect someone's stroke risk

Andrea Lane Stroke Association

However in recent years studies have raised concerns about an increased risk of breast cancer, heart attacks and strokes associated with use of HRT.

Writing in the British Medical Journal, German and Canadian researchers said some evidence had shown that when it comes to stroke risk the type of HRT preparation may be important.

Using patient records from a general practice research database, they found 15,710 women aged 50-79 who had a diagnosis of stroke and compared them with 59,958 "control" patients.

The results showed that there was no increased risk of stroke in women using low-oestrogen-dose patches compared with women who did not use HRT.

But with high-dose patches there was an increased risk of up to 88%.

Those who used oral HRT had a 25-30% increased risk of stroke compared with those who used none, regardless of what dose of oestrogen they took or whether it was combined with progesterone.

However, that increased risk was not found in patients who took oral HRT for less than one year.

The overall risk of stroke associated with HRT is small and the vast majority of those who had a stroke in the study were not taking it.

Among those that were on the medication and had a stroke, 76 were on low-dose patches, 27 on high-dose patches, 293 on low-dose pills and 325 on high-dose pills.

Further research

The researchers concluded that although the results do not yet represent "definitive evidence" to promote the use of the patches over tablets, the study should encourage further research to help doctors prescribe the best option.

Andrea Lane, spokesperson for The Stroke Association said: "Past research has shown that HRT can carry a small risk of stroke, particularly in older women when long-term oestrogen treatment is involved.

"This study is interesting as it suggests that HRT skin patches, which contain low levels of the female hormone, oestrogen, will not increase a woman's risk of stroke.

"We'd be interested to see the results of further studies into how the administration of HRT can affect someone's stroke risk."

She added that anyone concerned about taking HRT should consult their GP or another health professional.

http://news.bbc.co.uk/2/hi/health/10229129.stm

The Way We Design Now

By ALLISON ARIEFF

 Allison Arieff on design and architecture.

It's strange to think that just a few years ago, it felt as if design schools and studios nationwide must have been holding special screenings of "The Graduate." Down the aisles of Target, in the pages of Dwell and the showrooms of SoHo, there was nary a natural material in sight: the future was plastic.

'Garbino' trashcan for Umbra.

"Plastic was the material that I naively knew was the material of our contemporary world, even at the age of 10," the designer Karim Rashid said in a 2006 interview. Rashid has certainly been plastic's most high-profile ambassador, using it for everything from dish-soap containers to the (then) ubiquitous $7 "Garbino" trashcans that made him famous. Many other designers were similarly enamored with the way plastic could become any color or shape, and though products made from the material were offered at all price ranges, plastic delivered on the popular premise of good design for all because it could be used to create on the cheap.

Though our connected culture would be lost without it, plastic assumes a radically different role in the design world: its most high-profile usage of late comes not in throwaway consumer goods but rather in the form of the 12,500 plastic bottles (that's about the same number consumed every 8.3 seconds in the United States) used to build the Plastiki, a wind-blown, solar-powered boat currently sailing from San Francisco to Australia, stopping at environmental hot spots like the roughly Texas-sized North Pacific Garbage Patch or Pacific Gyre along the way. The goal of the Plastiki voyage is to encourage people to re-think waste: according to Project Aware, 15 billion pounds of plastic are produced in the U.S. every year, for example, but only 1 billion pounds are recycled.

It would be overstating things to say that Plastiki is helping chart a new course for design, but the vessel and the voyage do provide a nice departure point for discussing the place the discipline finds itself today. Though the expedition leader, David de Rothschild, has in many ways been the face of Plastiki, the project as a whole speaks to the reality of collaboration versus individual creation. The Plastiki site acknowledges a team including diver, documentarian, boat builder and solar array designer. Designers like Philippe Starck may have turned their attention to things like wind turbines now, but most design efforts these days, whether for

iPods or affordable apartments, seem to be very much the product of teams. Coming off an era where designers assumed the role of artist/auteur, that's a big shift.

Oxford Centre for Vision in the Developing World, left; Starkey Laboratories, Inc., center; Karin Eriksson, right. From left: Self-adjustable prescriptive eyewear created by Joshua Silver; minimalist hearing aid designed by Stuart Karten; universal-design glassware by Karinlevy Design.

Plastiki, in engaging with a host of environmental technologies and issues, also mirrors a broad cultural shift in design's focus. Design now exists less to shape objects than to produce solutions. Instead of creating a desire and designing an object to fulfill it, a designer spotlights a problem or need and solves it. The latter has not completely displaced the former, but it has become the prevailing discourse. So it's fitting that the newest edition of the Cooper Hewitt Design Triennial questions the purpose — and future — of the discipline with an exhibit called "Why Design Now?"

The Triennial, which opened in mid-May, assuages any fears surrounding the capabilities of natural materials. In fact, inventiveness around unremarkable stuff from sunflowers to banana stems has resulted in numerous greener alternatives to plastic on display here, including Bananaplac, an alternative to hardwood and Formica, produced from banana fibers extracted when the fruit is harvested; AgriPlast, made from field grass and polystyrene; Kraftplex, a 100 percent biodegradable fiberboard made from sustainably harvested soft wood fibers, water, pressure and heat; and Flax, a natural fiber typically used to make linen but transformed by designer Francois Azambourg into high-performing recyclable furniture like the Lin94 Chair. But new materials are always being introduced, and their inclusion here is just a small part of a much larger story.

"Why Design Now?" is an important show because design is in a strange place. One always hears talk about the need to not reinvent the wheel; well, the design community — some of it, anyway — has realized the need to stop reinventing the chair. This is not to suggest that design should fully move away from making things — and indeed, the Cooper Hewitt show is chock full of smartly conceived, necessary objects like the AdSpecs, low-cost corrective eyeglasses with lenses the user can adjust to his or her own individual prescriptions; the Modular Prosthetic Limb System, created by a multi-disciplinary team culled from more than 30 American, Canadian and European organizations, and the Zon hearing aid by Stuart Karten Design, a minimalist accessory rendered so elegantly as to erase any need for self-consciousness on the part of the wearer. There are thoughtful, beautiful ones as well, like Karinelvy Design's blown glass Gripp glasses, so graceful one might not even notice they were designed to function for anyone, even people with limited hand function, and Alabama Chanin's hand-sewn garments that favor local commerce over overseas production.

The show actively engages with the question designers both emerging and established must ask today: If not objects, what? It's a dilemma closely mirroring that of the larger American economy, which has been shifting steadily from manufacturing to service. In response, design schools are scrambling to offer curricula that moves away from what Jon Kolko describes as "the Bauhaus, form-giving stuff." Kolko, founder of the Austin Center for Design, a newly formed educational institution that "exists to transform society through design and design education," believes that our recession-weary era is absolutely ready for this sort of work to thrive. "All the travesty and direness is making all the right things happen," he says. "Kids today don't care about the big house, the big salary. At the heart of their value system is 'I want to make a difference.'"

With an eye to contributing to the greater good, practitioners might design a game, a process, procedure or experience. For example, Emily Pilloton founded the non-profit design collective Project H (the "h" stands for humanity, habitats, health and happiness) after a demoralizing stint designing doorknobs. The 28-year-old now designs projects like the Learning Landscape, which takes a creative approach to math education by installing a public sculpture-like grid of half-submerged tires as a setting for math games. Another example might be Participle, which bills itself as a public service design firm, and has developed and prototyped new services to help combat social isolation and loneliness among the elderly.

In showcasing the work of Pilloton and many of her peers, this year's version of the Triennial feels very much of a piece with another Cooper Hewitt exhibit presented in 2007, "Design for the Other 90%" (now on view at the National Geographic Society Museum, Washington, D.C., through September). The low-cost innovations in health, shelter, energy and transport for the 5.8 billion people globally with little or no access not only to most products and services but also to food, shelter or clean water have become the sort of things young designers want to engage with today. (Though creating smart business models for this work may be the most challenging of design projects they could undertake.) "Why Design Now?" might well have been called "What Should Designers Do Now?"

http://opinionator.blogs.nytimes.com/2010/06/02/the-way-we-design-now/

Rereading 'The Man Who Loved Children'

By JONATHAN FRANZEN

There are any number of reasons you shouldn't read "The Man Who Loved Children" this summer. It's a novel, for one thing; and haven't we all secretly sort of come to an agreement, in the last year or two or three, that novels belonged to the age of newspapers and are going the way of newspapers, only faster? As an old English professor friend of mine likes to say, novels are a curious moral case, in that we feel guilty about not reading more of them but also guilty about doing something as frivolous as reading them; and wouldn't we all be better off with one less thing in the world to feel guilty about?

To read "The Man Who Loved Children" would be an especially frivolous use of your time, since, even by novelistic standards, it's about nothing of world-historical consequence. It's about a family, and a very extreme and singular family at that, and the few parts of it that aren't about this family are the least compelling parts. The novel is also rather long, sometimes repetitious and undeniably slow in the middle. It requires you, moreover, to learn to read the family's private language, a language created and imposed by the eponymous father, and though the learning curve is nowhere near as steep as with Joyce or Faulkner, you're still basically being asked to learn a language good for absolutely nothing but enjoying this one particular book.

Even the word "enjoying": is that the right word? Although its prose ranges from good to fabulously good — is lyrical in the true sense, every observation and description bursting with feeling, meaning, subjectivity — and although its plotting is unobtrusively masterly, the book operates at a pitch of psychological violence that makes "Revolutionary Road" look like "Everybody Loves Raymond." And, worse yet, can never stop laughing at that violence! Who needs to read this kind of thing? Isn't the nuclear family, at least the psychologically violent side of it, the thing we're all trying to escape from — the infernal reactor into which, when outright escape is not an option, we've learned to stick our new gadgetry and entertainments and after-school activities like graphite rods, to cool the reaction down? "The Man Who Loved Children" is so retrograde as to accept what we would call "abuse" as a natural feature of the familial landscape, and a potentially comic feature at that, and to posit a gulf between adults and children far wider than their differing consumer tastes. The book intrudes on our better-regulated world like a bad dream from the grandparental past. Its idea of a happy ending is like no other novel's, and probably not at all like yours.

And then there's your e-mail: shouldn't you be dealing with your e-mail?

It will be 70 years this October since Christina Stead published her masterpiece to lackluster reviews and negligible sales. Mary McCarthy wrote an especially caustic notice for The New Republic, finding fault with the novel's anachronisms and imperfect grasp of American life. Stead had in fact arrived in the United States less than four years earlier, with her companion, William Blake, an American Marxist and writer and businessman who was trying to obtain a divorce from his wife. Stead had grown up in Australia and fled the country decisively in 1928, at the age of 25. She and Blake had lived in London, Paris, Spain and Belgium while she was writing her first four books; her fourth, "House of All Nations," was a gargantuan, impenetrable novel about international banking. Soon after she arrived in New York, Stead undertook to clarify her feelings about her unbelievable Australian childhood by way of fiction. She wrote "The Man Who Loved Children" on East 22nd Street, near Gramercy Park, in less than 18 months. According to her biographer, Hazel Rowley, Stead set the novel in Washington, D.C., at the insistence of her publisher, Simon & Schuster, which didn't think American readers would care about Australians.

Anyone trying to revive interest in the novel at this late date will labor under the shadow of the poet Randall Jarrell's long and dazzling introduction to its 1965 reissue. Not only can nobody praise the book more roundly and minutely than Jarrell already did, but if an appeal as powerful as his couldn't turn the world on to the book, back in the day when our country still took literature halfway seriously, it seems highly unlikely that anybody else can now. Indeed, one very good reason to read the novel is that you can then read Jarrell's introduction and be reminded of what outstanding literary criticism used to look like: passionate, personal, fair-minded, thorough and intended for ordinary readers. If you still care about fiction, it might make you nostalgic.

Jarrell, who repeatedly linked Stead with Tolstoy, was clearly taking his best shot at installing her in the Western canon, and in this he clearly failed. A 1980 study of the 100 most-cited literary writers of the 20th century, based on scholarly citations from the late 1970s, found Margaret Atwood, Gertrude Stein and Anaïs Nin on the list, but not Christina Stead. This would be less puzzling if Stead and her best novel didn't positively *cry out* for academic criticism of every stripe. Especially confounding is that "The Man Who Loved Children" has failed to become a core text in every women's studies program in the country.

At its most basic level, the novel is the story of a patriarch, Sam Pollit — Samuel Clemens Pollit — who subjugates his wife, Henny, by impregnating her six times, and who seduces and beguiles his progeny with endless torrents of private language and crackpot household schemes and rituals that cumulatively serve to make him the sun (he is radiantly white, with yellow hair) around which the Pollit world revolves. By day, Sam is a striving, idealistic bureaucrat in F.D.R.'s Washington. By night and on weekends, he's the hyperkinetic lord of the family's run-down house in Georgetown; he's the great I-Am (Henny's words), the Great Mouthpiece (Henny again), Mr. Here-There and Everywhere (Henny); he's the Sam-the-Bold (his own name for himself) who insinuates himself into every pore of his children's beings. He lets them run naked, he spits chewed-up sandwich into their mouths (to strengthen their immune systems), he's unfazed by the news that his youngest is eating his own excrement (because it's "natural"). To his sister, a schoolteacher, he says, "It's not even right they should be forced to go to school when they have a father like me." To the children themselves he says things like "You are myself" and "When I say, 'Sun, you can shine!' doesn't it shine?"

To a wild degree, Sam makes his children accessories of and to his narcissism. There isn't a more hilarious narcissist in all of literature, and, in good narcissistic fashion, while Sam imagines himself a prophet of "world peace, world love, world understanding," he remains happily blind to the squalor and misery of his circumstances. He is a perfect instance of the Western-rationalist male boogeyman stalked by a certain kind of literary critic. Through the fine accident of being forced to set the novel in America, Stead was also able to map his imperialism and his innocent faith in his own good intentions directly onto those of the city he works in. He is literally the Great White Father, he is literally Uncle Sam. He's the kind of misogynist who adores

femininity in the abstract but feels himself "dragged down to earth — no, into the slime" by an actual flesh-and-blood woman, and who believes that women are too crazy to be allowed to vote. And yet, though monstrous, he isn't a monster. It's Stead's genius to make palpable on page after page the childlike need and weakness at the core of his overbearing masculinity, and to make the reader pity him and like him and, therefore, find him funny. The language he speaks at home, not baby talk exactly, something weirder, is an endlessly inventive cascade of alliteration, nonsensical rhymes, puns, running jokes, clashing diction levels and private references; quotation out of context can't do it justice. As his best friend says to him, admiringly, "Sam, when you talk, you know you create a world." His children are at once enthralled by his words and more sensibly grown-up than he is. When he's ecstatically describing a future form of travel, *projection by dematerialization*, in which passengers "will be shot into a tube and decomposed," his oldest son dryly declares, "No one would travel."

The immovable objects opposed to Sam's irresistible force are Henny and her stepdaughter, Louisa, the child of his dead first wife. Henny is the spoiled, amoral and now operatically suffering daughter of a wealthy Baltimore family. The hatred between husband and wife is heightened by the determination of each not to let the other leave and take the children. Their all-out war, aggravated by their deepening money troubles, is the novel's narrative engine, and here again what saves their hatred from being monstrous — makes it comic instead — is its very extremity. Neurasthenic, worn-out, devious Henny, given to "black looks" and blacker moods, is the household "hag" (her word) who pours reality-based poison into her children's eagerly open ears. Her language is as full of neurotic pain and darkness as Sam's is full of unrealistic love and optimism. As the narrator notes, "He called a spade the predecessor of modern agriculture, she called it a muck dig: they had no words between them intelligible." Or, as Henny says, "He only wants the truth, but he wants my mouth shut." And: "He talks about human equality, the rights of man, nothing but that. How about the rights of woman, I'd like to scream at him." But she doesn't scream it at him directly, because the two of them haven't been on speaking terms for years. She instead leaves terse notes addressed to "Samuel Pollit," and both of them use the children as emissaries.

While Sam and Henny's war takes up the novel's foreground, its less and less secret arc is Sam's deteriorating relationship with his eldest child, Louie. Many good novelists produce entire good *oeuvres* without leaving us one indelible, archetypal character. Christina Stead, in one book, gives us three, of which Louie is the most endearing and miraculous. She is a big, fat, clumsy girl who believes herself to be a genius; "I'm the ugly duckling, you'll see," she shouts at her father when he's tormenting her. As Randall Jarrell noted, while many if not most writers were ugly ducklings as children, few if any have ever conveyed as honestly and completely as Stead does the pain of the experience of being one. Louie is forever covered with cuts and bruises from her bumblings, her clothes forever stained and shredded from her accidents. She's befriended only by the queerest of neighbors (for one of whom, old Mrs. Kydd, in one of the novel's hundred spectacular little scenes, she consents to drown an unwanted cat in the bathtub). Louie is constantly reviled by both parents for her slovenliness: that she isn't pretty is a terrible blow to Sam's narcissism, while, to Henny, her oblivious self-regard is an intolerable seconding of Sam's own ("She crawls, I can hardly touch her, she reeks with her slime and filth — she doesn't notice!"). Louie keeps trying to resist being drawn into her father's insane-making games, but because she's still a child, and because she loves him, and because he really is irresistible, she keeps humiliating herself by surrendering.

More and more clearly, though, Louie emerges as Sam's true nemesis. She begins by challenging him on the field of spoken language, as in the scene in which he's expatiating on the harmonious oneness of future mankind:

" 'My system,' Sam continued, 'which I invented myself, might be called *Monoman* or *Manunity*!'

"Evie [Sam's younger, favored daughter] laughed timidly, not knowing whether it was right or not. Louisa said, 'You mean Monomania.'

"Evie giggled and then lost all her color, became a stainless olive, appalled at her mistake.

"Sam said coolly, 'You look like a gutter rat, Looloo, with that expression. Monoman would only be the condition of the world after we had weeded out the misfits and degenerates.' There was a threat in the way he said it."

Later, as she enters adolescence, Louie begins to keep a diary and fills it not with scientific observations (as Sam has suggested) but with veiled accusations of her father, elaborately enciphered. When she falls in love with one of her high school teachers, Miss Aiden, she embarks on composing what she calls the Aiden Cycle, consisting of poems to Miss Aiden in "every conceivable form and also every conceivable meter in the English language." As a present for her father on his 40th birthday, she writes a one-act tragedy, "Herpes Rom," in which a young woman is strangled by her father, who seems to be part snake; since Louie doesn't know much French grammar yet, she uses a language of her own invention.

While the novel is building to various cataclysms at the plot level (Henny is finally losing her long war), its inner story consists of Sam's efforts to hold on to Louie and crush her separate language. He keeps vowing to break her spirit, claiming to have direct telepathic access to her thoughts, insisting that she'll become a scientist and support him in his altruistic mission, and calling her his "foolish, poor little Looloo." In front of the assembled children, he forces her to decipher her diary, so that she can be laughed at. He recites poems from the Aiden Cycle and laughs at these, too, and when Miss Aiden comes to dinner with the Pollits he takes her away from Louie and talks to her nonstop. After "Herpes Rom" has been performed, ridiculously, incomprehensibly, and Louie has presented Sam with the English translation, he pronounces his judgment: "Damn my eyes if I've ever seen anything so stupid and silly."

In a lesser work, this might all read like a grim, abstract feminist parable, but Stead has already devoted most of the book to making the Pollits specific and real and *funny*, and to establishing them as capable of saying and doing just about anything, and she has particularly established what a problem love is for Louie (how much, in spite of everything, she yearns for her father's adoration), and so the abstraction becomes inescapably concrete, the warring archetypes are given sympathetic flesh: you can't help being dragged along through Louisa's bloody soul-struggle to become her own person, and you can't help cheering for her triumph. As the narrator remarks, matter-of-factly, "That was family life." And telling the story of this inner life is what novels, and only novels, are for.

Or used to be, at least. Because haven't we left this stuff behind us? High-mindedly domineering males? Children as accessories to their parents' narcissism? The nuclear family as a free-for-all of psychic abuse? We're tired of the war between the sexes and the war between the generations, because these wars are so ugly, and who wants to look into the mirror of a novel and see such ugliness? How much better about ourselves we'll feel when we stop speaking our embarrassing private family languages! The absence of literary swans seems like a small price to pay for a world in which ugly ducklings grow up to be big ugly ducks whom we can then agree to call beautiful.

And yet the culture isn't monolithic. Although "The Man Who Loved Children" is probably too difficult (difficult to stomach, difficult to allow into your heart) to gain a mass following, it's certainly less difficult than other novels common to college syllabuses, and it's the kind of book that, if it is for you, is *really* for you. I'm convinced that there are tens of thousands of people in this country who would bless the day the book was published, if only they could be exposed to it. I might never have found my way to it myself had my wife not discovered it in the public library in Somerville, Mass., in 1983, and pronounced it the truest book she'd ever read. Every time I've been away from it for some years and am thinking of reading it again, I worry that I must have been wrong about it, since the literary and academic and book-club worlds make so little of it. (For example, as I'm writing this, there are 177 Amazon customer reviews of "To the Lighthouse," 312 for "Gravity's Rainbow" and 409 for "Ulysses"; for "The Man Who Loved Children," a much more

accessible book, there are 14.) I open the book with trepidation, and then I read five pages and am right back into it and realize that I wasn't wrong at all. I feel as if I've come home again.

I suspect that one reason "The Man Who Loved Children" remains exiled from the canon is that Christina Stead's ambition was to write not "like a woman" but "like a man": her allegiances are too dubious for the feminists, and she's not *enough* like a man for everybody else. The novel's precursor, "House of All Nations," more resembles a Gaddis novel, even a Pynchon novel, than it does any novel by a 20th-century woman. Stead wasn't content to make a separate peace for herself, in a room of her own. She was competitive like a son, not a daughter, and she needed to go back, in her best novel, to her life's primal scenes and beat her eloquent father at his own game. And this, too, is an embarrassment, since, however central competition may be to the free-enterprise system we live in, to cop to it personally and speak of it nakedly is very unflattering (athletic competition being the exception that proves the rule).

Stead, in the interviews she gave, was sometimes frank about how directly and completely autobiographical her novel was. Basically, Sam Pollit *is* her father, David Stead. Sam's ideas and voice and domestic arrangements are all David's, transposed from Australia to America. And where Sam is infatuated with an innocent girl-woman, Gillian, the daughter of a colleague, the real-life David fell for a pretty girl the same age as Christina, Thistle Harris, with whom he briefly had an affair, later lived with and eventually, after many years, married. Thistle was the beautiful acolyte and flattering mirror who Christina herself could never be for David, if only because, although she wasn't fat like Louie, she also wasn't remotely good-looking. (Rowley's biography has pictures to prove it.)

In the novel, Louie's lack of good looks is a blow to her own narcissism. Her fatness and plainness are, arguably, what rescue her from her father's delusions, impel her toward honesty and save her. But the pain that Louie experiences in not being pleasing to anybody's eyes, least of all to her father's, is surely drawn from Christina Stead's own pain. Her best novel feels finally like a daughter's offering of love and solidarity to her father — you see, I *am* like you, I've achieved a language equal to yours, *superior* to yours — which is also, of course, an offering of white-hot competitive hatred. When Louie tells her father that she's never told anybody what her home life is like, the reason she gives is that "no one would believe me!" But the grown-up Stead found a way to make readers believe her. The fully mature writer created a faithful mirror of everything her father and Sam Pollit least wanted to see; and when the novel was published, the person in Australia to whom she sent a copy wasn't David Stead but Thistle Harris. The inscription read: "To dear Thistle. A Strindberg Family Robinson. In some respects might be considered a private letter to Thistle from Christina Stead." Whether David himself ever read the book remains unknown.

Jonathan Franzen's new novel, "Freedom," will be published in September

http://www.nytimes.com/2010/06/06/books/review/Franzen-t.html?nl=books&emc=booksupdateema1

Sex, Lies and Narrow Escapes

By DOUGLAS WOLK

Megan Kelso is best known for elegant, small-scale comics (like "Watergate Sue," serialized in The New York Times Magazine) with a historical or memoiristic bent. So it's surprising and wonderful that **ARTICHOKE TALES** *(Fantagraphics, $22.99),* her first novel-length work, is the sort of world-building fantasy story that comes with a family tree and a map on its endpapers. It's also the sort of fantasy whose characters have artichoke leaves for hair, which means it doesn't have to pass an anthropological stress test.

Kelso's ligne claire artwork is consistently sweet and airy, depicting blobby, dot-eyed characters whose body language says as much as their words. The approach provides a likable surface for a story with much darker and stickier depths, about a land whose cultural heritage is rotting away in the aftermath of a civil war. The foragers of the South and the better-armored fish canners of the North aren't quite shooting arrows and cannons at one another anymore, but they still think of themselves as enemies. When a Southern herbalist finds herself falling for a scrawny Northern soldier boy, stories start coming to light: family history, national history, the folklore and poetry that shape a state's understanding of the natural world. Kelso's observations of the young lovers and their respective peoples amass into larger observations about the ways that politics and sex can, and can't, heal a cultural schism.

Another couple whose relationship is complicated by war is at the center of Kathryn and Stuart Immonen's **MOVING PICTURES** *(Top Shelf, paper, $14.95).* A Canadian art curator and a German officer are brought together by the relocation of the Louvre's treasures during the Nazi occupation of France; they become bitter enemies who are nonetheless sleeping together, each trying not to be the first to show a sign of weakness. Most of the story seems less drawn than peeled and chiseled away from absolute visual and moral darkness. It's filled with uncomfortable silences, and Stuart Immonen's stark, high-contrast black-and-white artwork is full of silhouetted forms and wobbly geometrical squiggles that just barely resolve themselves into ferociously expressive faces or Parisian street scenes. On a few crucial pages, we see Immonen's renderings of the masterpieces that are the catalyst for this small struggle within a much greater one — he draws them in a sketchier, more offhand style — and the story's tone shifts. It suggests how art can be a lifeline to meaning at a moment when nothing seems possible but betrayal.

The premise of **ACTION PHILOSOPHERS! The More Than Complete Edition** *(Evil Twin Comics, paper, $24.95)* isn't particularly novel: brief vitae of philosophical greats from the pre-Socratics to the poststructuralists, with explanations of their ideas. The achievement of the writer Fred Van Lente and the artist Ryan Dunlavey, though, is visualizing them in intensely goofy but intellectually rigorous ways. Sometimes that means extended silly conceits, like Immanuel Kant as a pipe-smoking "epistemological attorney" defending an angry God against charges of nonexistence ("Lies! All lies!" God says. "I've never seen this faculty of cognition before in my life!!"); sometimes it just means working out the funniest possible spin on matters of historical record (technically, Plato was indeed "the stage name of a pro wrestler").

The prolific French cartoonist Lewis Trondheim keeps a public diary in comics form — doodles with casual but impressive watercolors — translated into English as "Little Nothings." (For whatever reason, he draws himself with an ungainly, monobrowed bird's head.) In the third volume, **LITTLE NOTHINGS: Uneasy Happiness** *(ComicsLit/NBM, paper, $14.95),* he figures out how to deal with a mouse in his home, travels to Fiji, feels guilty about wanting an iPhone and so on. It's very gently funny but splendidly assured and evocative of place — if a friend had drawn you a page of it as a letter, you'd treasure it forever.

Over the last few decades, Jim Woodring has been drawing a series of wordless, blissfully cruel slapstick fables, set in a world of grotesque entities and psychedelic minarets: half unshakable nightmare, half Chuck Jones cartoon filtered through the Bhagavad Gita. **WEATHERCRAFT** *(Fantagraphics, $19.99)* throws a spotlight on the venal, piglike creature Manhog, who's often the villain of Woodring's stories. After a series of scourges inflicted by bees, flat-headed monstrosities and a flesh-warping devil, Manhog attains enlightenment or something like it, then rips open the Veil of Maya with his bare hands and avenges a horribly mutated pyramidal chicken, eventually sacrificing his enlightenment again. At least, that's what seems to be going on: Woodring's story flows so smoothly and delightfully from each image to the next that it's easy to ignore that it has its own idea of sense, which may not jibe with anybody else's. For the benefit of the perplexed, he supplies a hilarious set of "frequently asked questions" (and mock-evasive answers) on the book's dust jacket.

YOUNG LIARS: Rock Life *(Vertigo, paper, $14.99),* the third and final collection of David Lapham's bizarre science fiction/crime comic, embraces dream logic in its own way. At first, the series masqueraded as a thriller set in the rock 'n' roll underground, with a cast of outsize, not-quite-believable characters (like a young woman transformed into a pure-id killing machine by a bullet lodged in her head), all of whom were hiding secrets or being drugged and brainwashed. By the time the bad guys were revealed as an army of evil spiders — from Mars, of course — the actual conceit was a little clearer: this is a thriller in which pretty much every character, including the narrators, is not just unreliable but constantly lying. "Rock Life" jettisons all hope of an explanation, declines to clarify what's "real" and what's not, and zooms off toward oblivion (in the form of a time bomb that may or may not exist). Still, Lapham hints that the actual enemy is a homogenizing megastore weaving a web across America, and that his characters' fantasies about a decadent or heroic life might be an escape route from assimilation by the corporate Borg.

Douglas Wolk is the author of "Reading Comics: How Graphic Novels Work and What They Mean." He writes frequently about comics for The Times.

http://www.nytimes.com/2010/06/06/books/review/Wolk-t.html?ref=design

Stagnating Gains for Women in Politics

How can we get more women in public office? For starters, get more to run.

By Nicholas Kusnetz

It's all in the numbers. In order for more women to be a part of the political scene, more women have to run for office. (flickr.com)

As an early start to the 2010 election cycle, January's special election in Massachusetts briefly brought gender into mainstream political discussion. Yes, Scott Brown ran a strong campaing, capitalized on the ire of independent voters and generally outmaneuvered Martha Coakley to secure a comfortable upset victory in the U.S. Senate race, all in ways that had little to do with their genders.

But it was hard to ignore the fact that Coakley is a woman and that Massachusetts has a sad history of electing women to public office.

That contest doesn't necessarily forecast anything in races across the country in various primaries this spring or in November, but it was a reminder of how far we still have to go to approach parity for men and women in American politics. While women candidates may take advantage of voters' desire for change, it's unlikely the balance of congresswomen to men — women make up 17 percent of Congress, with that number having risen only three points over the last decade — will change dramatically this November.

In California, for example, where voters vote Tuesday in party primaries, the Republicans have strong women candidates seeking the GOP nomination for governor and U.S. Senate. But should former Hewlett-Packard

CEO Carly Fiorina wins her party's nod, she'll almost certainly face incumbent Barbara Boxer in the final vote.

An early count by the Center for American Women and Politics lists 216 potential women running in the House and 23 in the Senate. Those levels are largely consistent with numbers throughout the last 20 years. The best year for women candidates in both chambers of Congress was 1992 when 251 ran.

Not surprisingly, it is this number – how many women run for office — that is most important, as women and men win races at the same rate. In 1992, women candidates saw opportunity to run as outsiders after the savings and loan crisis, the hearings for Clarence Thomas' nomination to the Supreme Court, and other scandals, said Jennifer Lawless, director of the Women & Politics Institute at American University. But despite both 2008 and the upcoming elections seeming to offer similar chances, we're not seeing the same result.

"The problem is that women are not running at the rates we'd expect them to given the credentials they have," Lawless said.

So the question some advocates are asking is, how do we get more women to run?

To try to answer that, Sheila Capone-Wulsin and Swanee Hunt are starting the Political Parity Project, which seeks to have more women running in gubenatorial and Congressional races.

"It comes out of the 2008 elections, which were incredibly energizing," said Capone-Wulsin, who used to run the Massachusetts Women's Political Caucus. "And yet women really made no gains."

The central obstacle to getting more women in elected office is the fact that they are less likely to even want to run for office. The difference in media treatment of the two candidates in Massachusetts showed exactly why that's the case, said Hunt, who has been advocating to get more women in politics for decades.

"During the campaign, Martha Coakley was condescendingly referred to as an 'ice queen' and a 'babe,'" Hunt wrote in an e-mail, "yet Scott Brown's nude photo in Cosmopolitan was barely mentioned. This media bias needs to be addressed."

Research has shown that women are less likely to think of themselves as qualified to run and less willing to go through the campaign process, and the researchers attributed this partly to media coverage. Furthermore, these attitudes and differences have changed little in recent years.

Despite the stagnating gains of women in elected office, both Hunt and Capone-Wulsin remain optimistic about November and are looking to a number of open seats where women are running, including seven in the Senate and 20 in the House. Though it is difficult to link gender stereotypes to voting patterns, people who study women in politics say voters tend to see women as agents of change, a fact that could help candidates in an election when approval of Congress is at record lows. Hunt thinks women candidates may have their best shot by pointing out that it is predominantly men who have been running the show.

"Many attribute the economic downturn to the crisis in our financial industry and resent the multimillion-dollar bonuses given to bank employees even after the government bailout," Hunt said. "When Congress held hearings with the heads of those large financial institutions, all were represented by men. Women candidates can succeed with a message of change, accountability and transparency."

Another prominent advocate of women in American politics paints a less rosy picture. Celinda Lake, a pollster and expert on women voters who worked with the Coakley campaign in Massachusetts, was surprised by her findings on voter sentiment there.

“We were pretty startled in the electorate in Massachusetts how little appetite there was in electing a women,” she said.

Lake is hesitant to apply what she found in Massachusetts to other races, but she’s not optimistic. Her work suggests that women candidates often do not run well on economic issues and she worries that will hurt candidates in November.

The United States ranks 86th in the world in terms of representation of women in the national legislature, according to the Center for American Women and Politics, putting it behind Uganda, Spain and Cuba, to name a few. Politically turbulent years like this one offer an opportunity to improve, Lawless said, but only if more women start to run for office.

“If we don’t have candidates that are going to jump at the opportunity,” she said, “there won’t be a change.”

http://www.miller-mccune.com/politics/stagnating-gains-for-women-in-politics-17002/?utm_source=Newsletter112&utm_medium=email&utm_content=0608&utm_campaign=newsletters

Cataviña and the Water-Collecting Cacti

A lush desert — there is such a thing — teaches the value of water management in an almost waterless environment.

By Kristian Beadle

Local rancher, Alfonso, points out some of the colorful and lush desert flora found in Mexico's Valle de los Cirios. (Kristian Beadle)

Voyage of Kiri writer Kristian Beadle is amazed by the lushness of a Mexico desert and learns the real value of water management.

Location: Near the town of Cataviña, central Baja, in one of the most ecologically diverse deserts in the whole world, the Valle de los Cirios.

Conditions: Dark silhouettes of 40-foot-tall *cardon* cacti lay in front of the bright setting sun. The blooming desert was buzzing with bees and hummingbirds, but they are now asleep.

Discussion: Our jaws dropped in amazement as the landscape changed from barren coastal bluffs to a desert with lush flora. Although the word “lush” is usually reserved for green jungles — not dry, bleak deserts — this is no ordinary desert. Despite being water-starved, it is vibrant and colorful — a natural lesson in water management.

This desert begins just south of El Rosario, the last outpost of northern Baja. The highway heads inland for the first time, and with good reason: On this stretch, the coastline along the Pacific and Sea of Cortez has no water. In some places, rain does not fall for years. Inland, the high-desert plains are luckier, getting summer

squalls and occasional winter storms. The result is a rich desert ecosystem covered by the largest protected area in Mexico: the Valle de los Cirios.

El Rosario, the northern frontier of the desert, is known for "good breakfast and coffee"; that is, travelers fuel up early in the morning on bacon and caffeine before the long 300 mile drive across the disierto central. A traveling family heading for the tip of Baja will likely zoom past the desert, probably rubber-necking some of the Dr. Seuss-like plant creations, until even dad admits: "OK, we'll stop for a minute; this is just too much."

The change is dramatic. The monotonous low-lying shrubs are suddenly displaced by a hillside covered in cirios, the unusual "tree" that gives the valley its name. Its thin vertical stalks rise 25 feet out of the flat landscape like leafy tentacles. Further down the road, hordes of cardon cacti take over the hillside. We had seen them before (i.e. the classic Charlie Brown cactus) but not in these vast numbers — the 40-foot sentinels were scattered everywhere. High above their unforgiving sharp spines lay perfect white flowers. They looked like somber bodyguards wearing delicate pearl earrings.

The whole desert was in bloom, not just the cardon cactus. Soft flower buds sprang from the roughest cholla cacti; wildflowers were everywhere. Then approaching the town of Cataviña, the whole landscape became a playground of boulders, spaced with sand patches that created neat trails. A more ideal botanical rock garden is hard to imagine.

While spending the night amidst the cacti, I lay around wondering, how does so much abundance result from such infrequent rainfall?

Two local ranchers, Abel and Alfonso, longtime locals of the Cataviña area, gave us a tour of their backyard the next day. I posed them the question: Why is this region so biologically rich? "*Son las piedras y las lluvias*," they said. It's the rocks and the rain. When the rains come, the granite rocks slow the movement of the water across the land, instead of the water running off quickly. The porous sandy soil (as opposed to clay) generated by the slow erosion of the boulders also accelerates water penetration into the earth. The shade from the boulders, which gives young plants relief from the hot sun, and the desert's location gathering rain from both north and south, are also key elements for the success of this desert.

These ideal geographical characteristics would not be sufficient without specialized biology. All flora and fauna in the desert have evolved to capture downpours very effectively. For example, a mature cardon cactus can collect up to 200 gallons of water in a single storm, with a root system spanning a 50-foot radius. The cardon swells with water after a storm and then shrivels again during a drought.

What if humans were able to collect water so efficiently? Modern cities deal with rainwater and storms like the plague: Get it away from the city limits as quickly as possible. It's no wonder, after all, pavement is not permeable — it doesn't let water percolate into soil so it can build up in dangerous torrents. While storm drains reduce the hazard, the fresh water is lost, often to the ocean, instead of replenishing the water table as it should. The result is increased dependence on water from far away, instead of local renewable sources.

Rainfall is perhaps the world's most overlooked resource. According to Brad Lancaster, author of the do-it-yourself book *Rainwater Harvesting for Drylands*, every inch of rainfall landing on 1,000 square feet (about the size of a large shed, or an 18-foot radius) can yield 600 gallons of water. Just as the cardon cactus stores water after a storm, our homes can be water-rich from rain alone, Lancaster says. He suggests "harvesting rainwater" by redirecting it to water tanks or back into the soil and reusing gray water from sinks and washing for landscape irrigation. Although we will be visiting some extreme exceptions soon, most dry climates can support the water needs of each household through rain alone.

Healthy deserts like the Valle de los Cirios are a storehouse of insights for the world's water crisis. Water is an issue in many places — from the deserts of Baja and California to the melting glaciers of the Himalayas. Rainfall is forecast to become more erratic with climate change. Stronger storms and longer periods of drought will tax water infrastructure. Meanwhile, deserts remain a natural textbook of solutions. They teach us that abundance is possible. We just need to be smart about the water coming from the sky.

Facts

-**Drought and development are related**. A 2002 report by American Rivers says effects of drought are becoming worse due to paving over of cities. Development in Atlanta, Georgia and surrounding counties has lead to 57 to 133 billion gallons of lost rainwater infiltration. If managed onsite this rainwater could support 1.5 to 3.6 million people – and recharge local waterways.

-**Impervious pavement dominates cities**. Some 25 percent of land in Tucson and 60 percent of the land in Los Angeles — two cities in the midst of desert habitats — is covered by impervious concrete and pavement.

-Small dams yield more water than large dams. Studies by a soil and water conservation center in India and an Israeli scientist both conclude that 10 one-hectare dams are more efficient than one 10-hectare dam – in fact, a doubling in dam size reduces water yield by 20 percent, due to evaporation and soil intake; along with costs of water distribution, ecological impacts, and population relocation.

http://www.miller-mccune.com/environment/catavina-and-the-water-collecting-cacti-16904

Observatories in a Remote National Park

A fruitless ascent to collect climate data at an observatory teaches that not all lessons can be viewed through human prisms.

By Kristian Beadle

The mountains at the Sierra San Pedro Martir fall away precipitously and become flat desert, looking east toward the Sea of Cortez. (Kristian Beadle)

High above two coastlines, Kristian Beadle looks for clues about the climate.

Location: Sierra San Pedro Martir, an alpine national park in the middle of the Baja peninsula, at a campsite surrounded by pine trees and chunks of snow, 8,000 feet above sea level.

Conditions: Cold! The sun just set behind the trees and a chill is setting in. The open-air fire is keeping our feet warm.

Discussion: From the top of the astronomical observatory, we could see the outline of the Sea of Cortez to the east and faint glimmers of the Pacific Ocean to the west.

"It has been a little hazy these last two days," said Esteban Valdés, the supervisor at the observatory, as if apologizing for the slightly imperfect climatic conditions. They claim to have the second best visibility in the whole world (behind a location in Chile), with clear night skies at least 80 percent of the year.

I had come searching for climate data taken at the observatory — but I was out of luck, it was not available. Instead we got a tour of the 2.1-meter telescope, which is an impressive piece of glass, but will just be the little brother of the new 6.5-meter telescope being planned on site thanks to co-investments from the French and Chinese.

Across the valley lies another kind of observatory: the *Picacho del Diablo*, (Devil's Peak) the highest point in Baja California, sheer granite slabs rising to a bit over 10,000 feet. Its dramatic shape rises out of the pancake-flat desert to the east and seems to erode into a pine-covered pattern of ridges heading toward the west.

The Sierra San Pedro Martir is supposedly one of the least visited national parks in the country. It is similar to national parks in the U.S., but slightly … quirky, like a teenager that feels awkward in the company of others. Does the park prefer to be alone and sulk in its self-conservation, or does it want company to share its natural wonders? It is still growing up, with a number of signs telling people what to do/not to do but no signs telling us where to go.

Alyssum and I walked through the ponderosa pine forest, following a creek past scattered aspen meadows. The alpine atmosphere was refreshing after the dusty coastline, but there was still something … somber about it. Perhaps it was the lack of animals or the endless rhythm of pine trees? I wondered if there was more beneath the surface than I could see.

Thoughts whizzed in my mind from other places: Bark beetles had killed pine forests in New Mexico, some say due to warming temperatures (keeping larvae alive longer), drought or even fire suppression. Early melting of the snowpack in California's Sierra Nevada, caused by higher annual temperatures, is starting to affect the state's water supply (snow normally melts later in the year, providing water for the dry summer and autumn months). Were any of these lessons applicable here?

In this forest of Baja, high above the two coastlines below, I looked for clues about the climate. The trees were silent, and there was nobody to ask about bark beetles or water supply. Then a bright blue jay chirped to break the silence and flew away with tremendous speed. The creek gurgled and wind started whizzing in various pitches through the trees, like the sounds of approach and departure. Or, if you like, past and future. What will this place be like in 1,000 years? It is not such a long period of time, after all — just 10 people living 100 years.

Even bigger than the astronomical telescopes, and the summit of Picacho del Diablo, this, I realized, is the biggest observatory of all. I let it rest at that.

http://www.miller-mccune.com/environment/observatories-in-a-remote-national-park-16683

Peak Wood: Nature Does Impose Limits

What lessons from the multiple experiences of Peak Wood can today's society learn for addressing global peak oil?

By John Perlin

The lessons learned from the annals of history on peak wood should heighten our awareness of the consequences of the limits of natural resources, but has it? (Cacahouette / flickr.com)

Ed. Note — While the specifics of Peak Oil can be debated, the existence of an inflection point in which petroleum becomes increasingly difficult and expensive to extract is not. A few days ago our Melinda Burns looked at possible scenarios on how the world might cope with Peak Oil. Here, John Perlin, author of A Forest Journey: The Story of Wood and Civilization*, recaps and expands on the cautionary tales he's recounted on how the world has already experienced the age of Peak Wood.*

Constant fuel wood crises taught pre-Colombian Americans in New England the precariousness of accessible wood supplies. Their minimal tool set circumscribed the distance they could gather firewood essential for survival before the task became unbearable. Reliance on stone tools made felling trees and cutting them up laborious. Lacking domesticated animals as well as wheels for carts and sails for ships for hauling added to their burden. Village sites constantly moved to access forests close enough for humans to carry such bulky cargo as it was only a matter of time they cleared the woods nearby

When they encountered the newly arrived Europeans, such as Roger Williams, the founder of Rhode Island, their obsession with "peak wood" would often enter the conversation.

Williams recalled the often-asked question, "Why come the English hither?" And then projecting onto the English their own obsession the indigenous Americans would reply rhetorically, "It is because you want

firing. Having burnt up the wood in one place, [Englishmen] are [forced] to follow the wood, and so, to remove to a fresh, new place for the wood's sake."

The Native Americans' unending search for plentiful wood supplies also led to questioning the reality of Christianity's notion of hell and as a consequence, rejecting Christianity.

As one Jesuit complained, "When [the Iroquois] first heard of the eternal fire and of the burning decreed for the punishment of sin, they withheld their belief, because, as they said, there could be no fire where there was no wood then what forest could sustain so many fires through such a long space of time" as eternity?

The idea of no limits to resources like wood and oil derived from technological advances such as metallurgy, domestication of animals, the wheel and sails for ships. Thanks to such technological advances, humanity began to believe it had moved beyond nature.

In the West, such arrogance began, at least in literature, with Gilgamesh in the Fertile Crescent almost 5,000 years ago.

Gilgamesh was the ruler of a city-kingdom in southern Mesopotamia (now southern Iraq), and a mythologized version of his reign appears what's likely the world's oldest written story, *The Epic of Gilgamesh*. In this story, the ruler wished to construct great palaces and temples to make his city a wonder for all to view. To realize his dream, he had to have at his disposal large amounts of timber. Fortunately for Gilgamesh a great primeval forest grew in the mountains just north of the lowlands we now call the Fertile Crescent. These timberlands occupied such a huge swath of land that no one, not Gilgamesh or anyone else, knew how far they stretched.

When these forests went, the successors of Gilgamesh sailed the Mediterranean for huge trees, found them in Crete, cut the forests down with their metal axes, put the timber in their boats powered by sails and hauled them overland when they arrived on shores of the Middle East.

Civilization continued its march westward in search of wood. In the poet Hesiod's time timber grew throughout Greece. Some 300 years later Plato reminisced how in an earlier period "there was an abundance of wood in the mountains" but "now they only afford sustenance to bees."

So the Greeks, with their ships and bronze axes, eyed the woods of Sicily and Italy. Theophrastus, a botanist and a younger contemporary of Plato, reported that the land of the Latins contained bay, myrtle, wonderful beech, fir and silver fir. The Greeks named one forest just south of Rome "birdless," because the trees there grew so close together that not even birds could enter.

A few miles north of Rome lay a forest, described by the historian Livy as more impenetrable than those in Germany, at that time regarded as wilderness. Two centuries later the Roman philosopher Lucretius watched "day by day the woods retreat farther and farther" from Rome, as farmers cleared the land for cultivation. Three centuries later the deforestation of much of Italy forced the Roman government to establish a fleet of fuel ships, much like oil tankers of today, to scour the Mediterranean lands west and south, especially North Africa and France, for fire wood.

Southern England's woods also attracted the Romans because the ground there yielded iron ore and hardwoods, an excellent fuel for smelting. More than a thousand years later these same woodlands provided building material for England's fleets and fuel for its first industrial revolution that once more produced iron for the nation.

As the English lost its woods to agriculture and industry, the country, once coveted by Rome for its trees, now searched abroad, as had the Romans years before, for necessary commodities.

Sixteenth- and 17th-century entrepreneurs only had to look to Ireland for great woods and thickets to continue producing iron and building casks and ships. By 1641, the English had felled so many trees on the former densely forested island that according to a 1651 survey of its natural resources past and present, a person could now "travel whole days without seeing any woods or trees."

England also sought out the Baltic countries for timber large enough to mast its Royal Navy, which served as the "wooden walls" protecting the kingdom. Centuries of providing England, as well as France and Holland, with its biggest trees took its toll. By the beginning of the 18th century few trees large enough grew in the Baltic.

White pines growing in Britain's New England colony, then judged as the largest trees in the world, took up the slack. The colonists, though, regarded these large trees as ideal for lumber to sell abroad for capital to start up new homestead. By the time of the American Revolution, woods close to population centers on the Eastern Seaboard no longer existed.

(As environmental ecologist Kent Mountford has written in an elegy for the woods of southern Maryland, "Many of the colonists and our founding fathers were perfectly able to read the Greek and Latin accounts, but the lessons went unheeded, and the litany of errors continues.")

As impressive as the Eastern forest had first appeared to Europeans, those venturing west of the Appalachian Mountains and descending into the Ohio Valley "were agreeably surprised on finding nature in a novel and more splendid garb," than ever seen before. The trees made up "a grand assemblage of gigantic beings which carry the imagination back to other times before the foot of the white man had touched the American shore." Indiana, at the beginning of the 19th century, was "one vast forest." Ohio, though, presented "the grandest unbroken forest of 41,000 square miles that was ever beheld."

Cheap lumber and cheap fuel extracted from these forests made possible America's development from the Revolution to the Civil War into a powerful and prosperous nation. Such growth, though, took a terrible toll on the woodlands. By 1877, one observer reported in *The Popular Science Monthly* that "the states of Ohio and Indiana … so recently a part of the great East-American forest, have even now a greater percentage of treeless area" than portions of Europe settled and cultivated for thousands of years.

The author continued, "In the economy of Nature forests perform innumerable functions which no artificial contrivance can imitate," and closed writing, "'Timely prevention,' wrote Dr. Radcliffe, 'not only saves us from diseases, but from those greater evils — the remedies.'"

It became clear that the decimation of the forests from the Atlantic to the Mississippi were going to become just another chapter in humanity's piecemeal destruction of the planet.

Today's assault on the Amazon and other rainforests continues the same sad story. The lure of present profit has driven this relentless war against the world's trees throughout time and all continents. As liberal economists in the 17th century showed, a landowner could expect a profit of a little more than 3 shillings per acre by preserving his woods, whereas by converting it to pasture brought three times that much. It therefore made perfect pecuniary sense to clear the land.

Despite such accounting, Frederick Engels, the social scientist and communist theorist, saw residual issues beyond immediate gain when it came to deforestation.

"What did the Spanish planters in Cuba, who burned down the forests on the slopes of the mountains and obtained sufficient fertilizer from the ashes for one generation of highly profitable coffee trees, care that the heavy tropical rains later washed away the now unprotected upper stratum of the soil and left only bare rock behind?" he asked in his *Dialectics of Nature*.

Engels then added his critique: "In relation to nature, the present mode of production is predominantly concerned only about the first, the most tangible result. Why should one be surprised, then, that the more remote effects of actions directed to this end turn out to be of quite a different character?"

Current events have proven Engels a seer. No one considered that by removing the trees and turning to fossil fuels would now threaten the planet by accelerating climate change. Nor did many stop to think that oil would peak, just as wood has done so many times before.

We should therefore take Engels quite seriously when he admonished his generation and those who came before and those to come, "Let us not flatter ourselves on account of our human victories over nature. For each such victory nature takes its revenge on us. Each victory, it is true, in the first place brings about the results we expected, but in the second and third places it has quite different, unforeseen effects which only too often cancel the first."

http://www.miller-mccune.com/environment/peak-wood-nature-does-impose-limits-16596/

Are You Normal or Finally Diagnosed?

The Diagnostic and Statistical Manual of Mental Disorders is a list that can be abused to the detriment of patients and benefit of drug companies.

By Arnie Cooper

"Direct to consumer" drug advertising ties into one of the most far-reaching criticisms in revising the DSM: the potential to transform normal human behavior into a mental disorder. (bobbieo / istockphoto)

"My dear Sir, take any road, you can't go amiss. The whole state is one vast insane asylum."
— James L. Petigru

Spend just a few minutes watching prime time television with its endless pageant of commercials for antidepressants and anti-anxiety meds and you start to wonder if USA really means the United States of *Affliction*.

Such "direct to consumer" drug advertising ties into one of the most far-reaching criticisms in revising the Diagnostic and Statistical Manual of Mental Disorders: the potential to transform normal human behavior into a mental disorder.

This issue didn't arise with the ongoing revision of the DMS-V. It's long been a concern for psychiatry, which must exist uneasily alongside pharmaceutical companies' hopes of expanding their markets and Americans' desire for take-a-pill quick fixes. But past experiences suggest new diagnoses will reap a harvest of not fully intended consequences of patients larded with labels — and prescriptions.

Christopher Lane, an intellectual historian who has written extensively on psychiatry and culture, detailed the inclusion of "social anxiety disorder" in the DSM-III in his 2007 book, *Shyness: How Normal Behavior Became a Sickness*.

Lane revealed how the 15-member DSM-III task force, in its quest to establish psychiatry as a legitimate science (and riding the wave of drug companies looking to expand their markets for anti-psychotics and tranquilizers), spit out "almost over night" various new disorders, including one for those uncomfortable with social situations.

No longer need shyness be a variant of normal. Now it can be a neurochemical disorder addressable with GlaxoSmithKline's multibillion-dollar marvel Paxil. Before safety concerns and patent expirations raised their ugly heads, antidepressants had become the second-largest selling class of drugs in the United States.

"In this desire to biologize and medicalize, with the idea that every personal crisis or problem is due to a disorder of the brain, we've lost sight of the vast complexity of behavioral responses to external stresses," Lane says. Add to that some possibly dangerous side effects. Along with Prozac and Zoloft, Paxil was found to increase thoughts of suicide, especially among teens, prompting an FDA warning in 2004.

The concern about medication also extends to the proposed "minor cognitive disorder."

One of the "19 worst suggestions" for reformulating the DSM, according to Allen Frances, whose brush war with the revisers was the subject of the first story in this series, would be to pathologize reduced cognitive performance — like forgetting why you walked into the kitchen, something very common in people over 50. "The threshold has been set to include a whopping 13.5 percent of the population … which will result in much unnecessary treatment with ineffective prescription drugs and quack folk remedies," Frances says.

But Darrel Regier, the vice chair of the DSM-V task force and executive director of the American Psychiatric Institute for Research and Education, says being able to differentiate between a normal aging brain and what's pathological is a huge public health issue.

"All of medicine is trying to figure out *how do we know* and *when do we know it*, in terms of our ability to either intervene early or prevent. To challenge that is just nonsense!" he says.

Lane, however, insists that what the APA is doing amounts to mere "guesswork." He sees a similar problem with the proposed "binge eating disorder." In an attempt to differentiate the estimated 3.5 percent of U.S. women and 2 percent of men who occasionally gorge themselves, from those who simply overeat, Lane says the DSM-V is attempting to transform a fuzzy analysis into a clear-cut distinction. Plus, binge eating can be a response to overwhelming personal events like a cancer prognosis.

"When someone receives such a diagnosis, their likelihood of binge eating for weeks at a time increases dramatically due to completely understandable anxiety and fear. If the APA were to proceed with a DSM diagnosis for binge eating, they would be sweeping up all such people within the nets of the mentally ill," Lane says.

Frances warns that such a diagnosis will stigmatize the tens of millions of people who binge eat once a week for three months.

Regier, though, says "the changes in criteria are not going to make a whole lot of difference in who comes in for treatment."

Regier is referring to the widely anticipated incorporation of the "dimensional model" for characterizing a patient's symptoms. Previous DSM's have employed what Lane calls a "rather clumsy five-out-of-eight criteria" checklist. As the DSM-V website says, "While these specific criteria for disorders were a vast improvement over the previous diagnostic guidelines available to diagnose patients with mental disorders, there are real-world problems with this system of diagnosis."

Now, "dimensional assessments" would let clinicians measure a wide range of symptoms that "cross cut" across a variety of disorders, noting both their presence and their severity.

"For instance," to again quote the DSM-V website, "information about depressed mood, anxiety level, sleep quality and substance use would be important for clinicians to know regardless of the patient's diagnosis. Dimensional assessments would allow clinicians to rate both the presence and the severity of the symptoms, such as 'very severe,' 'severe,' 'moderate' or 'mild.' This rating could also be done to track a patient's progress on treatment, allowing a way to note improvements even if the symptoms don't disappear entirely. It would encourage mental health professionals to document all of a patient's symptoms and not just those that were tied to their primary diagnosis."

Unfortunately, this technique has not been proven and is likely to prove exceedingly complex.

Complexity, meanwhile, appears absent in one of the more chastised new proposals: "hyper sexuality disorder." Consider the first criteria: "A great deal of time is consumed by sexual fantasies and urges and by planning for an engaging in sexual behavior."

Lane says: "That's proposed language for DSM-V, 'a great deal of time!' This is a scientific manual. At what point is the APA trying to establish how much sex falls within the realm of the acceptable? I find it very disturbing that they would even contemplate some kind of working definition of what constitutes normal sexual desire. They're setting themselves up as judge and jury on this."

Similar problems exist with what Frances calls "one of the most dangerous and poorly conceived suggestions" for DSM-V, Temper Dysfunctional Disorder with Dysphoria. It will be, he says, "a misguided medicalization of temper outbursts."

TDD is actually intended to correct the crisis of over diagnosis (an increase of 8,000 percent over a decade) of childhood bipolar disorder. Frances says that to avoid misidentifying children with a lifetime diagnosis, the Childhood Disorders Work Group created a diagnosis that is more "state-related," or short term.

"The problem I'm afraid is that it will go the other way. Kids who have more normal type temper tantrums will be diagnosed with this and many may also get meds that have harmful side effects ad complications."

But Regier insists that TDD is *not* a routine temper tantrum. "Human beings have a limited repertoire of how they express emotion. And when temper reaches an extreme, we're talking about a temper dysregulation disorder," he says.

Daniel Carlat, who edits the peer-reviewed Carlat Psychiatry Report (which proudly notes it receives no pharmaceutical industry funding) disputes the critique that the DSM pathologizes human behavior.

"People without any pathology who are normal, who are simply responding in a normal and understandable way to life events are typically not even going to be seen by a psychiatrist. If they're seen by anybody, it'll be

a therapist and they'll be able to talk out their issues and won't be put on medication — except maybe a sleeping pill or something mild from their primary care doctor."

As Carlat writes in his new book, *Unhinged: The Trouble with Psychiatry — A Doctor's Revelations about a Profession in Crisis*, "the DSM has not created pathology where it does not exist.

"But it has done something almost as harmful. It has drained the color out of the way we understand and treat our patients. It has de-emphasized psychological-mindedness, and replaced it with the illusion that we understand our patients when all we are doing is assigning them labels."

The disputes surrounding the DSM can be dizzying, fueling the belief that psychiatry is far from becoming a science. After all, despite meteoric advances in understanding brain chemistry over the last decade, there still are no specific chemical or medical tests to validate any mental disorder.

That said, the controversies presented here center around suggestions contained within a draft document. Three years and much discussion and analysis remain before the proposals are finalized. And even if the most controversial ones end up in the DSM-V, for all the talk about the DSM as gospel, Carlat reminds that the DSM-V is "no more than an elaborate and hopefully accurate list of disorders and diseases."

http://www.miller-mccune.com/health/are-you-normal-or-finally-diagnosed-17073/

Who Benefits? DSM Conflicts of Interest

Conflicts, whether over ties to the pharmaceutical industry or fights over new categories of illness, come with the turf in revising psychiatry's most important reference.

By Arnie Cooper

In revising psychiatry's most important reference, conflicts over conflicts of interest come with the territory. (Roman Milert / istockphoto.com)

"There is no such condition as schizophrenia, but the label is a social fact and the social fact a political event." — R.D. Lang

As psychopharmacology — using drugs to treat mental disorders — has expanded to dominate psychiatry, so too has the *Diagnostic and Statistical Manual of Mental Disorders*' potential to boost the pharmaceutical industry's profits, and in so doing is creating new health problems for some using these meds.

Critics say the symbiotic relationship with pharmaceutical companies will only be exacerbated with the upcoming revision of the manual, known as the *DSM-V*. Consider the proposed Psychosis Risk Syndrome that Allen Frances describes as "the most worrisome of all suggestions," in his Feb. 11 commentary in *Psychiatric Times*. The new category has a lofty goal: weeding out individuals in the early states of schizophrenia, depression or other psychotic illnesses.

"It would be a great idea if we had a specific test that was a good predictor of who will become psychotic. If we had a fairly safe treatment, then it would be the most wonderful idea in the world," he says.

But Frances warns that if the new diagnosis makes it into the *DSM-V*, the influence of drug company marketers on primary care physicians could prescribe antipsychotic drugs like Zyprexa, Abilify and Seroquel needlessly to hundreds of thousands of teenagers and young adults. This would lead not only to the stigma of an inaccurate diagnosis, but a "health hazard in a vulnerable population."

Frances says there's evidence that antipsychotics are recommended much more frequently for people with Medicaid than private insurance.

The meds' side effects, obesity is a notable one, are also a worry. A study published last fall in the *Journal of the American Medical Association* found an average weight increase of 1 to 1.5 pounds a week for patients

taking these kinds of medications, yielding metabolic changes that could result in serious diseases like diabetes and hypertension.

A series from Miller-McCune.com on the controversy surrounding the latest Diagnostic and Statistical Manual of Mental Disorders:
Part I: Infallibility and Psychiatry's Bible (May 25)
Part II: Who Benefits? DSM Conflict of Interests (June 3)
Part III: Are You Normal or Finally Diagnosed? (June 8)

"It seems that in seeking the needle in the haystack, they'd be helping some people, but overall, the harm is so great, I see this as a public health nightmare," Frances says.

Lisa Cosgrove, a clinical psychologist and associate professor at the University of Massachusetts, traces such problems to the three most contentious words facing the *DSM* task force — conflict of interest, or COI.

Cosgrove began investigating conflicts in 2000 when a grad student alerted her to a *DSM* work group's testimony that helped get the drug Serafem approved for premenstrual dysphoric disorder. "A few members of the group were being paid by Eli Lilly," she says, which led her to co-author a 2006 study, "Financial Ties between DSM Panel Members and the Pharmaceutical Industry."

Cosgrove's study didn't establish a definitive causal relationship. She did find that the *DSM* working groups with the greatest financial ties to the pharmaceutical industry were those involved with mood and psychotic disorders, where pharmacological treatment predominates with an extremely profitable antidepressant/antipsychotic drug market.

"We leave it to others to see whether that constitutes a financial COI," she says. As for the latest *DSM*, Cosgrove sees the problem worsening.

In a written debate in the *Psychiatric Times* with the chair and vice chair of the *DSM-V* Task force, David Kupfer and Darrel Regier, Cosgrove and a colleague, Harold Bursztajn, critiqued the APA's "failed" COI policy, pointing out that 70 percent of the task force members reported direct industry ties. That's a 14 percent increase over the previous manual.

"Pharmaceutical companies have a vested interest in the structure and content of DSM, and in how the symptomatology is revised. Even small changes in symptom criteria can have a significant impact on what new (or off-label) medications may be prescribed," they wrote.

Kupfer and Regier dismissed their colleagues' arguments as "guilt by association." In their retort, the two wrote Cosgrove and Bursztajn are assuming "that something has been proved to be wrong, or will be proved to be wrong, about financial relationships between the APA and the pharmaceutical industry."

Frances, for all his disputes with the task force leaders, agrees saying he's "absolutely sure there isn't a conflict of interest to help industry. … I don't believe there's any conscious effort to benefit drug companies or increase research funding."

Legal Implications

Industry influence isn't the only concern plaguing the DSM. An expansion of the sexual disorder pedophilia to include pubescent teenagers known as "hebephilia" is raising the hackles of Allen and others who contend the added diagnosis will create a new group of criminals and constitute a misuse of psychiatry by the legal system.

"Certainly, sex with under-age victims should be discouraged as an important matter of public policy, but this should be accomplished by legal statute and appropriate sentencing, not by mental disorder fiat," Allen writes.

Karen Franklin is a forensic psychologist in the Bay Area specializing in the evaluation and treatment of criminal defendants. She says the push to include hebephilia stems from a burgeoning cottage industry whose goal is to civilly commit sex offender as sexually violent predators.

"In some cases, these guys don't have a mental disorder, so mental disorders need to be invented or else it's unconstitutional to civilly commit them." For Franklin, the attraction to 11- to 14 year-old girls is not pathological but a "variant of normal" and may even be "evolutionarily adaptive."

This is where things get even thornier. Franklin says that just one clinic, The Centre for Addiction and Mental Health in Toronto, is wielding undue influence over the creation of hebephilia as a diagnostic category. "The chair of the sexual disorder task force, Kenneth Zucker, is chief psychologist at the center that did the research, and also the editor of the journal that published it. Two of the study's co-authors serve with him on the journal's editorial board, and one also serves on the DSM sexual disorders task force. So it's like a pipeline. The clinic does the only research that supposedly establishes this new disorder."

Franklin is responding to a paper that disputes her claims about hebephilia. Ray Blanchard, one of the center's clinicians who authored the report and chair of a *DSM-V* Sexual and Gender Identity Disorders sub-group, says the inclusion of hebephilia in the new DSM was intended to "increase the precision of diagnosis, not the number of people being diagnosed."

Zucker says that Franklin is just trying to "dig up dirt" where there is none.

"In small, specialty areas, you need to find experts able to review manuscripts, and, sure, people may know each other, but it's still subject to peer review," he says.

In fact, Zucker, who edits the journal in question, *The Archives of Sexual Behavior*, did publish seven criticisms of Blanchard's paper — including one by Franklin.

"[Franklin] belongs to the school of thought that if you throw enough spaghetti against the wall, some of it is bound to stick," he says.

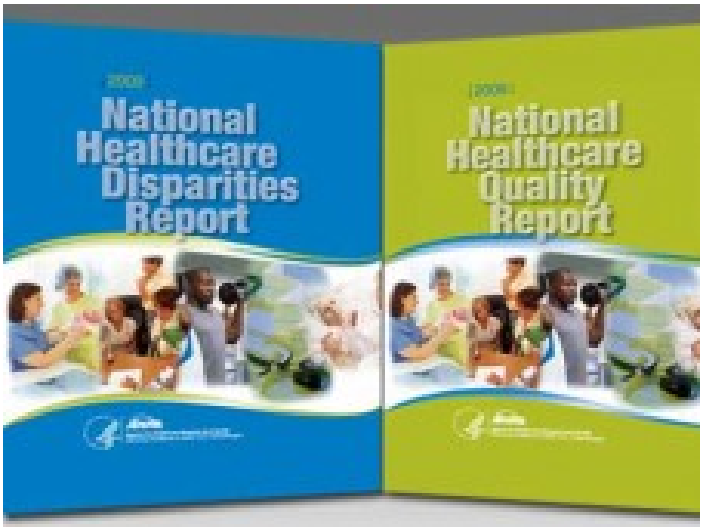
It's no surprise that *New Scientist* writer Peter Aldhous' characterized such sparring as "psychiatry's civil war." These battles may seem arcane to the average person, but the proposed *DSM-V* also introduces several new disorders giving renewed credence to Herb Kutchins' and Stuart Kirk's 1997 book, *Making Us Crazy: DSM: The Psychiatric Bible and the Creation of Mental Disorders*. The DSM, rather than an objective, scientific instrument to help clinicians diagnose mental illness, is for them a tool aimed at pathologizing ordinary human behavior.

http://www.miller-mccune.com/health/who-benefits-dsm-conflicts-of-interest-16774

Quality Health Care Still Lacking For Some

All those nagging issues from a year or so of Miller-McCune health coverage show up in the nation's health report card.

By Barbara Hesselgrave



The Agency for Healthcare Research and Quality's latest "National Healthcare Quality" and "National Healthcare Disparities" reports show that quality health care for the uninsured and minorities is still lacking.

Earlier this year the Agency for Healthcare Research and Quality released its latest *National Healthcare Quality* and *National Healthcare Disparities* reports. But hold the cake and champagne. The opening paragraphs summarize the 457 pages of this annual, congressionally mandated pulse-taking of our U.S. health services with, "We find that health care quality in America is suboptimal," that "disparities related to race, ethnicity and socioeconomic status still pervade the American health care system," and "Americans too often do not receive care that they need or they receive care that causes harm."

"Despite promising improvements in a few areas of health care," agency Director Carolyn M. Clancy was quoted in a release, "we are not achieving the more substantial strides that are needed to address persistent gaps in quality and access."

Lt. Karen Ho of the U.S. Public Health Service and lead staff at the agency's Center for Quality Improvement and Patient Safety, says the latest report, labeled 2009 and released in 2010, is actually data reflecting the health delivery landscape of 2007. According to Ho, the data collection process takes years, and involves a broad Health and Human Services interagency collaboration. Eighteen HHS agencies and offices "collect patient questionnaires, conduct random telephone interviews, survey claims data, review health facilities surveillance data and perform random household sampling surveys." Both the Quality and Disparity reports use the same sets of 200 measures across four dimensions: quality, effectiveness, patient safety, timeliness and patient-centredness.

The report identified insurance status across 35 core measures as a significant factor affecting both quality — services delivered, "in a way that is safe, timely, patient centered, efficient and equitable," — and disparities, "the differences or gaps in care experienced by one population compared with another population."

Uninsured individuals with chronic disease like diabetes were "less likely to get recommended care" and people with asthma "were less likely than those with private insurance to be taking preventive medicine daily or almost daily." Blacks, Hispanics, Asians and American Indians are also less likely to receive recommended care for chronic disease.

A new section addressing health and lifestyle changes was added to include measures of obesity in children and adults, and smoking cessation.

"Childhood obesity is definitely another target as it has such an impact on our population. If parents and providers don't address this at an early age, it becomes harder to address when they're older," Ho says.

However, the report finds that one-third of obese adults and most obese children overall did not receive counseling on weight loss, exercise, or how to eat healthy foods. Children from uninsured, poor, and near-poor households were significantly less likely to get information about exercise and diet from their providers compared to insured households with higher incomes. Similarly, uninsured adult smokers were also less likely to receive smoking cessation counseling.

Other disparities affect racial and ethnic groups like Asians, American Indians/Alaska Natives, Hispanics and blacks, who are experiencing an increase in colorectal cancer deaths, while both the elderly and people living in rural areas face issues in timely accessing of appropriate health services.

But gains are being made, slowly. AIDS-related deaths have fallen, the percentage of young children receiving immunization has increased, and people ages 20-39 and 40 and over had significant increases in completing a course of substance abuse treatment. Communication with doctors has also improved with patients reporting more satisfaction in encounters with their physicians during office visits.

Although a statistically significant increase in "health care-associated infections" was reported, this may be a reflection of better reporting processes of medical errors. The Patient Safety and Quality Improvement Act of 2005 provides a means for health providers and facilities to report medical error without "fear of legal discovery."

The culture of reporting mistakes is still tenuous, but Ho suggests that this new environment, and implementing recommended health information technology systems, will further better reporting and uncover areas that need change to improve quality and reduce disparities.

"The key purpose of the report is to inform policymakers, and also to inform the general public, including providers, of these issues," Ho explains, "and that is the first step working towards quality."

The next report 2010 will summarize data from 2007/08 and will be released next year.

http://www.miller-mccune.com/health/quality-health-care-still-lacking-for-some-16573/

Corruption Leads to More Corruption

A legacy of corruption leads the citizenry more toward resignation and connivance than to activism, a new study looking at Mexico reports.

By Elisabeth Best

A new study of Mexico politics suggests that a history of corruption leads the citizenry more toward resignation rather than activism. (P. Wei / istockphoto.com)

Once upon a time, there was a monarchy. Like many governments, it required a number of people — dukes, knights, lords, etc. — to function. These people were chosen based on their proximity or loyalty to the royal family, which was itself royal because it had more money and land than other families. The members of the court were rewarded for their service to the royal family, and they drew their power from having more money and power than everyone else.

Back in the days of monarchies, government officials who were in with the king (and/or queen) were, to a large extent, allowed to do whatever they wanted, provided they didn't jeopardize their positions with the wrong affairs or conspiracy plots. If those government officials were corrupt — and corruption was pretty much inherent to the system, or if you will, was the system — the only way for anyone to get rid of them, really, was to kill them.

Democracy supposedly changed all that. It allowed people to choose who got power, and, theoretically, get rid of them if they misused it.

So why are so many democratic nations unable to overcome a legacy of corruption?

A new study by Stephen D. Morris and Joseph L. Klesner offers one explanation. The researchers find that corruption leads to — you guessed it — more corruption.

Why? Because it breeds a climate of mistrust. People who don't trust their governments are less likely to participate politically to fix them. Instead of getting fed up, you get wise.

Morris and Klesner arrived at this conclusion using the case study of Mexico, a country known for corrupt government officials at all levels.

Corruption was pervasive under the rule of the Institutional Revolutionary Party, which held power in the country under various names for more than 70 years in a kind of sham democracy that started to crumble in 1988.

Under the Institutional Revolutionary Party, scandals implicated people close to both presidents Jose Lopez Portillo and Carlos Salinas de Gortari, and bribes sustained many law enforcement officers and public officials. However, the party lost the presidency in 2000 with the election of Vicente Fox of the National Action Party; the country now has a multiparty, democratic government.

When politicians run on an anti-corruption platform and win, it would make sense for voters to expect them to actually fight the practice (and not participate in it). After all, they wouldn't have gotten elected if people anticipated more of the same, right?

Wrong. It turns out that even when leaders who promise to eradicate corruption are democratically elected, citizens don't actually expect anything to change.

As recently as 2009, Mexico was ranked 89th on the Transparency International Perception of Corruption Index, behind China (79th), Colombia (75th) and Cuba (61st). The U.S. took 19th, following the U.K. and Japan, tied at 17th; New Zealand was at the top of the list, Somalia at the bottom.

It doesn't look like democracy has done much to give the Mexican people faith in their government.

Morris and Klesner started with two main hypotheses: Corruption will strongly determine levels of interpersonal trust, and corruption will strongly determine levels of confidence in public institutions. They also hypothesized that the opposite would be true; interpersonal trust and confidence in public institutions would determine corruption.

To test their predictions, they used data from the Latin American Public Opinion Project, which included interviews with 1,556 Mexicans age 18 and over from March 2004.

The researchers measured corruption based on whether participants thought various public officials were corrupt or had themselves participated in corruption by paying, soliciting or witnessing payment of bribes to public officials.

They found that while corruption does not affect whether people trust each other, it does affect their faith in institutions. And when people perceived their governments as corrupt, they themselves were more likely to participate in the corruption (likely as a result of an "everyone-else-is-doing-it" attitude).

"Mexicans who distrust political institutions are likely to believe that politicians, public figures and those involved in law enforcement and the judicial system are corrupt," the researchers wrote. "Mexicans who see

corruption among politicians, public figures, judges and the police are likely to distrust all political institutions."

In other words, it's not necessarily surprising that people who see their entire political system as corrupt are less than optimistic that a legitimate alternative exists.

And, as the researchers point out, "If politicians are considered to be corrupt, then their rhetorical promises to crack down on corruption will tend to fall on deaf ears."

They argue that in Latin America specifically, anti-corruption campaigns have their work cut out for them because they are trying to mobilize and incorporate an already distrusting population.

"If people expect politicians to be corrupt and therefore unlikely to do the right thing, anticorruption efforts have to disrupt that cycle," Morris and Klesner write. "In Mexico, people blame politicians and see no way out, but at the same time they use this view to justify their own participation in corruption and unwillingness to do anything about it."

http://www.miller-mccune.com/culture/corruption-leads-to-more-corruption-16868

To Understand Evolution, Try Focusing on Humans

A researcher finds focusing on humans rather than animals helps students grasp some of the fundamental concepts of evolutionary theory.

By Tom Jacobs

To understand the theory of evolution, one researcher believes that you have to look at yourself. Humans are the key to grasping its complexities (Killerb10 / istockphoto.com).

The theory of evolution is one of most familiar in all of science — and one of the most widely misunderstood. Even well-educated people are often fuzzy regarding the mechanics that drive evolutionary change.

Is there a better way to teach both students and the public about this fundamental process? Writing in the online journal *Evolutionary Psychology*, British anthropologist and psychologist Daniel Nettle puts his finger on one major roadblock to understanding and offers a simple but compelling solution.

A researcher with the Newcastle University Institute of Neuroscience, Nettle notes that evolutionary principles are usually illustrated using animals. He proposes that we instead teach evolution using human beings as our main reference point.

He argues that, while we tend to view all members of a particular animal species as fundamentally alike, we have no problem seeing that one person can vary a lot from another — a point is that is essential to grasping the evolutionary process.

The notion that one particular robin might, due to a genetic mutation, be better than other robins at evading capture by cats is difficult to grasp. To us, a robin is a robin is a robin. It's far easier to understand that a specific person could have a unique ability to do something well, take advantage of that talent to build a successful life and ultimately produce children in his or her image.

Nettle tested this proposition in two studies. In the first, 50 university students who watched images flash before their eyes were able to differentiate between two people, or two inanimate objects, far faster than they could differentiate between two members of the same animal species. This hesitation occurred in spite of the fact the animals were often shown in different poses, making their body outlines quite distinct.

In the second study, 123 students were asked to imagine they were Martian anthropologists who had come to Earth to study a specific life form. Some randomly picked an animal, others a group of people (the Malagasy). Each was asked to assess how their chosen species evolved through time.

Those who wrote about humans "tended to think that adaptive change could occur within the same species," Nettle writes, "whereas in the animal version, they were more likely to respond that when the environment changes, a species goes extinct, and a novel species adapted to the novel conditions comes along. There were also trends towards a greater clarity that population change does not require individuals to change during their lifetimes."

Nettle acknowledges this approach won't solve all misunderstandings. For instance, it does not address the common misconception that evolutionary change is "driven by the needs of species." (A random genetic mutation can benefit a species — say, one that subtly alters the shape of a certain type of fish so it can swim faster, catch more prey and ultimately have more offspring — but the species cannot will this into existence.)

He also concedes this approach could increase the already substantial resistance to evolutionary theory, since people are generally more open to thinking of animals than humans as the product of an evolutionary process.

Nevertheless, he concludes, "the results are at least suggestive that thinking about humans might be a good starting point for developing good intuitions about how evolution works." Given the current state of ignorance, it's certainly worth a try.

http://www.miller-mccune.com/education/to-understand-evolution-16603

Full-Time Students, Part-Time Education

Parents and grandparents lecturing the "Me Generation" how easy they have it get research to support their argument (at least when they're talking about college).

By Elisabeth Best

"When I was your age, I had to walk to school. Barefoot. In the snow. And it was uphill — both ways." So begins the stereotypical you-kids-don't-know-how-easy-you-have-it rant.

Ignoring the logistical problems of the uphill-both-ways argument, there's more than a little research suggesting that Grandpa might be right.

One study covered by Miller-McCune.com in October found that leisure time for adolescents in the U.S. has been on the rise since the 1970s, while paid work time, time spent on household chores and time spent doing schoolwork have decreased. On average, girls have gained almost an hour of leisure time per day, and boys' free time has increased by an hour and a half.

A recently published paper from the National Bureau of Economic Research found that the amount of time that "full-time" college students actually spend on school every week has declined, too, from 40 hours per week in 1961 to 27 hours per week in 2003.

Assistant professors of economics Philip S. Babcock and Mindy Marks used data sets dating back to 1961 to determine how much time per week the average college student devoted to class or studying. They found that all students — regardless of race, gender, ability, family background or major — spend less time doing schoolwork today than they used to. This was true for both employed and unemployed students at colleges of every type, size, degree structure and level of selectivity.

Their research suggests that both full-time partiers and part-time workers are spending less time on academic pursuits than their predecessors, as are both Ivy Leaguers and state-school students. Whether today's co-eds major in biochemical engineering or English, they probably have more free time than their parents did during their college days.

The researchers only included respondents who were on track to graduate in four years, so the decline in study time can't be explained by more students adopting the "five-year plan." It also doesn't include the (growing) number of people who start college but never get degrees.

So why is it that today's college experience includes so much free time?

Their data doesn't allow them to draw strong conclusions, the researchers write, but they point to two possible explanations.

The first is an improvement in what they call "education production technologies." This seems plausible: the replacement of the adding machine with the calculator and the typewriter with the computer seem like obvious time-saving advances.

They also suggest that colleges might just be meeting student demand for more free time. College students today might have grown accustomed to more "me time" after spending their high school days loafing around, and colleges need to attract tuition-paying students to survive.

Their findings suggest that the opportunity cost of spending a year in college has decreased, since full-time students are no longer dedicating as much time to school-related pursuits. On the upside, it could make college more attractive and earning money for tuition more feasible. However, if time spent studying is a meaningful indication of how much you're getting out of your education, it could also mean that college degree today means a lot less than it used to.

http://www.miller-mccune.com/education/full-time-students-part-time-education-16764

Want To Get Faster, Smarter? Sleep 10 Hours

by Allison Aubrey

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New studies show that getting enough sleep can improve performance in academics and athletics.

New studies show that getting enough sleep can improve performance in academics and athletics.

June 7, 2010

New research adds to a growing body of evidence showing the perks of a good night's sleep.

A study from researchers at Stanford University finds that extra hours of sleep at night can help improve football players' performance on drills such as the 40-yard dash and the 20-yard shuttle.

"The goal was to aim for 10 hours of sleep per night," says Cheri Mah of the Stanford Sleep Disorders Clinic. At the beginning of the season, Mah found that the players had moderate levels of daytime fatigue, even though they thought they were getting enough rest at night. Seven players were included in the study.

It's not easy to convince college students to add hours of sleep to their schedules each day. "It's a lot to ask," Mah says, but throughout the season she was able to document a significant extension of nighttime sleep.

Early in the season, the players' average 40-yard dash time was 4.99 seconds. But after six weeks of extra ZZZs, the average time dropped one-tenth of a second — to 4.89 seconds.

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"That could mean millions in the NFL," says Dr. Tim Church of the Pennington Biomedical Research Center at Louisiana State University. "A tenth of a second is a huge, huge difference from a performance standpoint."

As the players' performance on drills improved with the extra sleep, their levels of daytime fatigue dropped dramatically. And the scores on vigor tests improved, too.

"It's not a surprise," Church says. He adds that the players' workouts are so extreme and intense that "when you give them a little extra time to recover, you see additional benefits."

It's hard to say how the connection between more sleep and improved physical performance may translate to weekend warriors — or middle-age folks who are just trying to hold onto a nine-minute jogging pace.

The take-home message here, Church says, is that this is just one more example of how sleep makes a difference.

Sleep And Preschool Success

The benefits of adequate sleep extend far beyond what's now being documented on athletic performance. And when it comes to teaching good sleep hygiene, it seems parents can never start too early.

One new study that explored the sleep habits of preschool-age children finds that bedtime rituals and rules play a unique role in the development of 4-year-olds.

"This is a good time to look at things like early learning and brain development," says researcher Erika Gaylor of SRI International, a nonprofit research institute in Menlo Park, Calif.

She analyzed a federal survey of some 8,000 families in which parents were asked a slew of questions about bedtime. The survey was ongoing — from the time their kids were 9 months old through the start of kindergarten. Parents were surveyed several times throughout this period.

The researchers asked questions such as, "What time does your child go to bed?" and "Do you as parents have a rule about bedtime?" Researchers followed up with home visits, during which they conducted one-on-one assessments to measure math and language skills.

"What was really surprising was that having a rule about bedtime was associated with higher scores on language and math skills," Gaylor says.

Children of parents who reported having a rule about bedtime scored about 6 percentage points higher on an assessment of their vocabulary compared with children whose parents did not report a rule about bedtime. They scored 7 percent higher on assessments of early math skills.

They were small but significant differences. And researchers say the study is yet another example of the power of a good night's sleep.

Both of these studies are being presented this week at the annual SLEEP conference, which is a joint venture of the American Academy of Sleep Medicine and the Sleep Research Society.

http://www.npr.org/templates/story/story.php?storyId=127478147&sc=nl&cc=hh-20100607

A Happy Homecoming For Long-Lost Silent Films

by Howie Movshovitz

June 7, 2010

Courtesy of the National Film Preservation Foundation

Silent film comedian Mabel Normand directed and starred in the 1914 film *Won in a Closet.* It is the first surviving film she is known to have directed.

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A Taste Of Silent Film

In *The Sergeant* (1910), a disgraced Army officer redeems himself by rescuing his unit from a surprise Native American attack. This early Western is the first film to be preserved through the American partnership with the New Zealand Film Archive.

After being lost for more than 80 years, it looks like dozens of American silent movies will finally be coming home — from New Zealand.

That country's government and film archive got together with the U.S. National Film Preservation Foundation in San Francisco on Monday to announce the films' return.

The 75 movies are a real rarity — in part because early film was volatile and degraded quickly.

"Only about 20 percent of the films produced in America during the silent era — that is the era of motion pictures before 1929 — survive today in the United States in complete form," says Annette Melville, director of the nonprofit Film Preservation Foundation.

The End Of The Line

Some of these movies might just be sitting in rusting film cans in the dusty attic of a long-dead movie projectionist in, say, New Zealand.

Frank Stark, chief executive of the New Zealand Film Archive, says that's not such a far-fetched idea.

"When you look at a map, especially a flat map, we were at the end of a distribution network. By the time the nitrate films had been shipped probably to Asia, Australia, then on to New Zealand, or whatever the sequence was for a particular film, it was considered largely to have finished its commercial life," Stark says. "The people in the States didn't want to spend the money to ship it all the way back — they're quite heavy, these films, because multiple reels are shipped in metal cans — and I believe they probably in the main issued instructions they should be destroyed or thrown away."

Printed on highly flammable nitrate film stock, the 1923 film *Maytime* has begun to deteriorate. Nitrate film stock was commonly used in filmmaking through the early 1950s.

Printed on highly flammable nitrate film stock, the 1923 film *Maytime* has begun to deteriorate. Nitrate film stock was commonly used in filmmaking through the early 1950s.

Luckily, many of them weren't. Projectionists held on to them, and collectors and all kinds of pack rats treasured the old film reels. Over the years many of the prints wound up in the vaults of the New Zealand national archive, where the highly flammable nitrate film stock could be stored safely.

It was in those vaults that Stark and others found 150 American titles — about 75 of which were in good enough shape to be returned.

A John Ford Jewel

Melville of the National Film Preservation Foundation says one of the most remarkable finds is a lost feature by four-time Oscar-winning director John Ford.

"The feature is called *Upstream* and it dates from 1927, a year from which no other Ford films survive," Melville says. "Only about 15 percent of John Ford's films from the silent era survive today."

Other rediscovered movies include the first film ever directed by 1910s comic sensation Mabel Normand and the formerly lost *Maytime*, starring Clara Bow. The vaults also held more instructional films on things like how to make a Stetson hat or a Fordson tractor.

Victor McLaglen starred as a brave baggage handler who manages to hinder a holdup in *Strong Boy*, a lost feature by director John Ford. The film's promotional trailer was found in a New Zealand archive.

Victor McLaglen starred as a brave baggage handler who manages to hinder a holdup in *Strong Boy*, a lost feature by director John Ford. The film's promotional trailer was found in a New Zealand archive.

But for film historian Shelley Stamp of the University of California, Santa Cruz, those all pale in comparison with the discovery of the missing first reel from director Lois Weber's *Idle Wives.*

"She made hundreds of films and over 40 feature films. In the 1910s, her name was routinely mentioned alongside D.W. Griffith and Cecil B. DeMille — names we still remember now — as one of the great minds

of filmmaking," Weber says. "But her reputation didn't survive — she wasn't as good as DeMille and Griffith were at sort of promoting herself and insuring her historical legacy.

"What interests me about her career is that she believed in the power of cinema to function as what she called kind of like an editorial page of a newspaper. In other words to bring to life some of the key issues of the day in a way that could be digested and thought about by average citizens. She worked at Universal in the teens — she was their top director. She made films on birth control, poverty, drug abuse, capital punishment and really had a vision of a kind of socially engaged cinema."

They're All Important

But Weber's socially conscious cinema isn't the only thing worth remembering from the silent film era. Frank Stark of the New Zealand Film Archive argues that all of the newly rediscovered films are important — that's why the archive kept them in the first place.

"These films, until the research was done, were undifferentiated," he says, "not necessarily celebrated or by famous makers or involving famous performers. We didn't know that and we made our commitment to keep them anyway, against the day when we could find out whether or not that was the case."

Discoveries like this one are what make the archiving all worthwhile.

"What's really, really satisfying is to have that impulse reinforced by these kinds of discoveries," he says, "to feel that we're doing the right thing — and that there is more treasure to be found."

http://www.npr.org/templates/story/story.php?storyId=127530994

The Many Faces (And Sculptures) Of Edward Tufte

by NPR Staff

June 5, 2010

Edward Tufte has a big backyard that stretches for hundreds of acres near Cheshire, Conn. Over the years, he's filled that space with giant metal sculptures as big as the trees.

"I think it was Richard Serra who said that the market for big, outdoor landscape pieces is like the market for Canadian experimental poetry," he says. "So I can never be accused of being market-driven in the art world."

Tufte is an accomplished grand-scale sculptor, but he is perhaps more famous for making charts, graphs and diagrams beautiful. He's been called the "DaVinci of Design" and the "Minister of Information." His books — with titles like *The Visual Display of Quantitative Information* — are widely read by Web architects, scientists and basically anyone else who's interested in presenting data creatively and clearly.

And, the new edition of Microsoft Office will include a Tufte creation: the "sparkline." It's a small graphic, the size of two short words, which can be embedded in text to depict stock markets or baseball stats.

If that weren't enough, Tufte has also been recruited by the White House to join the Recovery Accountability and Transparency Board, to advise and devise ways to track how the $787 billion stimulus package is being spent.

A Gallery For ET

Scott Simon caught up with statistician-turned-sculptor Edward Tufte at ET Modern, his new art gallery in New York.

Scott Simon caught up with statistician-turned-sculptor Edward Tufte at ET Modern, his new art gallery in New York.

Now, the man known as "ET" has just opened a gallery, ET Modern, in New York City's art district. It showcases some of Tufte's smaller pieces. It has the look of what might be a playroom for children — if that playroom were at MIT.

Two grinning aluminum fish, each twelve feet long, swim on wires in separate rooms. Tufte says they were crafted as an homage to Rene Magritte's painting of a fish with a sly smile. Another sculpture, called the *Lunar Lander*, looks like an enormous, playful steel Schnauzer.

"It's candy-apple red. It's meant to go to the moon, so it should look good," he says. "It's made from scrap metal from the Millstone nuclear power plant, so it glows in the dark."

Tufte says he's not sure he could sell some of the pieces in his gallery.

"I have a very big problem selling pieces, because I don't want them to leave," he says. "For a long time, I believed that any successful piece was a tremendous luck-out, and that I'd never be able to do it again ... My fellow artist friends, who are serious with me, told me to grow up."

When The White House Calls...

Tuft credits the combination of his Midwest and Scandanavian heritage plus an Ivy-league professorship for his attraction to public service. "I sincerely believe that to whom much is given, much one should deliver back," he says.

So when the White House called to ask him how they could make government spending easier to track on websites, he advised them to steer clear of what he calls "chartjunk": graphics that look flashy, but actually conceal or distort information.

"Your metaphor should be: You're reporting," he says. Like Google News or *The New York Times*. "You're reporting — that's the model."

That advice helped shape a website, Recovery.gov, which helps track the use of the stimulus package.

"I'm working on things where people can see immediately the 100 biggest projects, the 100 smallest projects, the 100 biggest medical projects, the 100 smallest medical projects," he says. "So it's a way of — in one click — of getting down to the material. And also you can put your zip code in and see the projects."

When asked if his work with the government and with information design has any overlap with his art, Tufte says he does see a commonality. In the end, he wants to try and leave things that are forever — and that "make people see a little differently."

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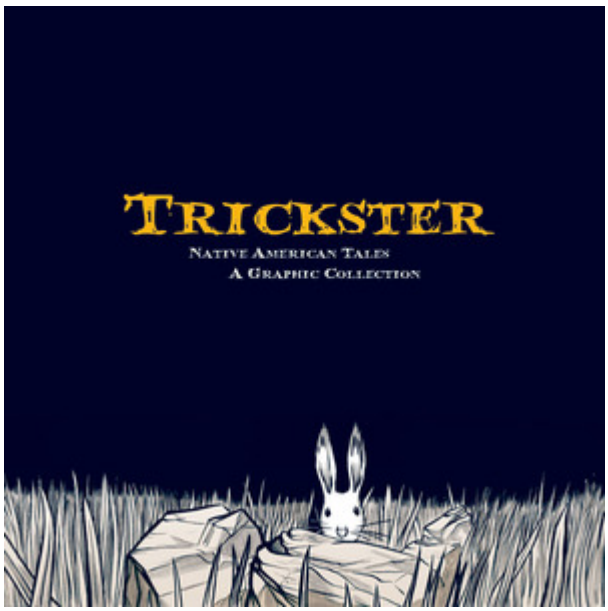
Native American Folk Tales Take A Graphic Turn

by NPR Staff

June 6, 2010



Trickster
Edited by Matt Dembicki
Paperback, 232 pages
Fulcrum Publishing: $22.95

How Wildcat Caught A Turkey

How Wildcat Caught A Turkey: Story by Joseph Stands With Many. Art by Jon Sperry.

The trickster is a being that loves to create chaos. In Native American traditions, it takes many forms and appears in many stories. Now it's taking the form of a graphic novel.

Trickster is the first anthology to illustrate Native American folk tales in comic form. Editor Matt Dembicki tells NPR's Liane Hansen that he got the idea for the book from reading about the mischievous creature.

"I just became fascinated with it," he says. "Coming from a cartoonist's point of view, I started doodling and seeing what I could do."

As he tried to incorporate Native American styles, it dawned on him that this would be "perhaps a really interesting collection."

He collected tales from Native American storytellers and matched them with illustrators. It was an intense project. "It's rather easy to put together a comics anthology if you're working with people who are familiar with comics," he says. But the storytellers were skeptical.

"It wasn't easy convincing everybody," Dembicki says. "Some people really couldn't see it being done this way. Other people had some cultural issues. They were very adamant — these were mostly oral stories; they were told orally, and they should be told orally."

Some storytellers went to their tribe and got approval. "With all the competing media for people's attention, I think they felt they were losing a hold of their storytelling tradition, and they wanted to preserve some of these stories in a different format.

"It wasn't the ideal format for them, but they wanted to make sure that it was there to preserve for their own children, and for everyone else as well."

http://www.npr.org/templates/story/story.php?storyId=127483926

Lingua Globa: How English Became 'Globish'
June 4, 2010

iStockphoto.com

June 4, 2010

How did a mongrel tongue born on a small island in the north Atlantic become the globally dominant language now known as English?

That's a question Robert McCrum tries to answer in his new book, *Globish*, which explores the way English took the world by storm over the course of several centuries. It's a story that begins back in the first millennium, when the language spoken in England wasn't even called "English."

The Britons, who first inhabited the isle of Britain, spoke Celtic languages. Their culture was forever altered when Anglo-Saxon raiders began invading England around 500 A.D., bringing with them their own Germanic speech.

"Although they came as raiders and were warriors when they landed, they soon became farmers and artisans and a kind of pastoral people," McCrum tells NPR's Renee Montagne. Pastoral Anglo-Saxon words — "sheep," "earth," "plow," "dog," "wood," "field" — provide the "building blocks of the language we use today," says McCrum.

But English is much more than just a combination of Celtic and Anglo-Saxon. Nordic invaders from Scandinavia followed the Anglo-Saxons, altering the language of Britain just as those earlier raiders had. And then, in 1066, came the Norman invasion of England (which McCrum calls "the mother of all invasions.")

The French Normans, led by William the Conqueror, crossed the Channel and imposed a French way of life on the English people with what McCrum describes as "tremendous zeal" and "some ferocity." Norman words that survive to the present day, such as "fortress," "siege," "assault" and "prison," indicate the cruelty of the invasion.

But while the Normans used their native French as the language of the court and of literature, English became the language of England's common, conquered people. Compare English words that come from that time — "fire," "work," "strong," "heart" — to French words from that era: "glory," "cordial," "fortune," "guile" and "sacred." As McCrum explains, English disappeared from the written record, but survived "underground on the lips of ordinary people." As a result, the language became democratized very early on.

That democratic character, according to McCrum, is partially responsible for English's eventual global domination. While French imperialists forcefully imposed their own language on foreign countries in a "top-down" manner, English imperialists took a "bottom-up" approach. English would not be "imposed from above by the government" in the colonies, says McCrum. Instead, "the troops would arrive, and the language would flow again from the ordinary people."

It sounds nice and democratic, but McCrum isn't arguing that British Empire was a "benign" or "culturally beneficial" influence. "Clearly, the British Empire has much to answer for," he says. "But at the level of language, the way in which it operated was very effective from the point of spreading English."

Today, English is "everyone's second language," says McCrum. "It is completely global. It is the default position — if one foreigner meets another foreigner and they can't communicate, they are very likely to default to English. And so we might as well know where it came from."

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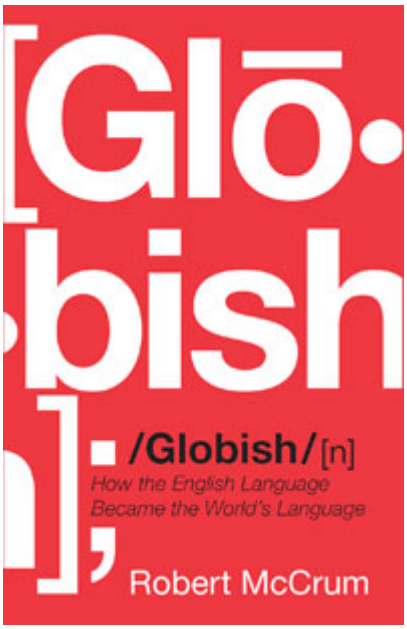
In the Beginning: Four Invasions And A Cultural Revolution

Excerpted from 'Globish: How the English Language Became the World's Language'

by Robert McCrum



Globish: How the English Language Became the World's Language
By Robert McCrum
Hardcover, 331 pages
W. W. Norton & Company
List price: $26.95

I felt an unconscious thrill, as if something had stirred me, half-wakened from sleep. There was something very remote and strange and beautiful behind those words, if I could grasp it, far beyond Ancient English.
— J. R. R. Tolkien

Our story begins with a human sacrifice. Stranger than this, it starts in a Danish swamp. Perhaps strangest of all, we owe this information about the violent origins of the English-speaking world to the Roman historian Tacitus, the author of *Germania*, 'On the Origin and Character of Germany'. The German tribes, wrote Tacitus, love freedom, their women are chaste, and there is no public extravagance; the Tencteri excel in horsemanship; the Suebi 'tie their hair in a knot', and so on. But no picture is perfect. There are, Tacitus continues, seven tribes about whom there is 'nothing noteworthy' to say, except that they worship Nerthus, the goddess Mother Earth, 'a ceremony performed by slaves who are immediately afterwards drowned in the lake'. One of these seven barbarous tribes was 'the Anglii', better known to history as the Angles.

Tacitus turns out to have been a good witness. Peat has a curious property, and the savage rituals of the Anglii have not been entirely forgotten. In 1950, two Danish peat-cutters, working in the neighbourhood of Tollund, unearthed the body of a man. But when the police came, their response was to summon the local archivist, not the coroner, and the investigation quickly took on a historical dimension. These *Moorleichen* (swamp corpses), unmistakably sacrificial victims, still on display in Danish museums, are astonishingly well

preserved. One man has been strangled. Another's throat has been cut: you can see the stubble on his chin. Amid those far-off horrors, speech was dumb in the presence of a cruel death, but if, by some rough magic, you could restore their speech, you would hear a language that distantly echoes our own. These leathery corpses are the remote ancestors of the -English-speaking peoples, and the discovery of their remains is a reminder that, to this day, traces of the English language can sometimes be found in the most surprising places. The other lesson of this snippet from a Dark Age police blotter is that English was originally a foreign tongue. Albion, the ancient word for these islands off the north-west coast of Europe, comes from British roots, Celtic (*albio*) and Gaelic (*alba*), with connotations of 'whiteness' that may invoke Britain's white cliffs. Albion was a place of chalky giants, primitive sorcery, sun worship and sea monsters. Albion is where England and its story begin.

The making of a recognizable Englishness, the painful transition to Anglo-Saxon 'Englaland', is a history of four invasions and a cultural revolution. English, of course, is not unique. French, German and Russian all have obscure and violent origins. But English was slightly different, by virtue of its location. English was a mirror to its island state, an idiosyncratic mixture of splendid isolation and humiliating foreign occupation. On the positive side, the first invasion, by the Romans, connected the island to a European Latin tradition that would linger for more than a thousand years. The second, by the Anglo-Saxons, established an independent vernacular culture. The third invasion, by the Vikings, would inspire a strong sense of national identity. Each contributed to the mongrel character of English culture, a quality that plays well in a multicultural world. Meanwhile, the arrival of Christianity sponsored a cultural transformation whose influence persists to the present day. Finally, all of these upheavals would be trumped by the Norman Conquest, the mother of all invasions. Daniel Defoe, the author of *Robinson Crusoe,* summarizing the first millennium, described 'your Roman-Saxon-Danish-Norman English'. From 55 BC to AD 1066 the traditions of the place evolve, but there was never any doubt of the country's identity: it was an island (properly, an archipelago) whose inhabitants were never further than a hard day's ride from the sea.

The tides and climate of the sea shaped the making of English in countless ways. At the outset, the sea was not just the most effective natural defence known to man and a great natural highway, it also made the tribes it protected separate, proud, watchful and self-conscious. Islanders are not like other people; they have different psychic and physical horizons. It is no accident that the English were the first in Europe to produce a vernacular account of their exploits, the Anglo-Saxon Chronicle. But insularity does not automatically sponsor an appetite for trade. Plenty of island cultures, Japan for example, have cultivated isolation. However, in this story, trade and culture became intimately related. The sea did more than just define the English, it inspired them to become sailors, merchants, explorers and empire-builders. Language and culture reflected this experience and gave English its highly interactive character. The sea linked Liverpool to Dublin and Charleston, Whitby to London and New South Wales, and Bristol to Jamaica, Philadelphia and Calcutta. In the making of an English consciousness, it is impossible to overestimate the importance of the sea. There is, as the historian David Miles has put it, another way of looking at this: ‘The outside world does not bounce off the white cliffs of Dover; rather it washes around them and into the inlets of the Thames, Ouse, Humber and Trent, the Tyne, Forth, Clyde, Dee, Mersey, Severn and Shannon.' All the climactic moments of British history — the Armada of 1588, the battle of Trafalgar in 1805, the battle of Britain, 1940 — owe their significance to one thing: the defence of the realm conducted around the approaches to the English Channel, southern, western or aerial. The first of these historical milestones occurred in the late summer of 55 BC when Rome's all-conquering general, Julius Caesar, launched a seaborne landing on the south coast.

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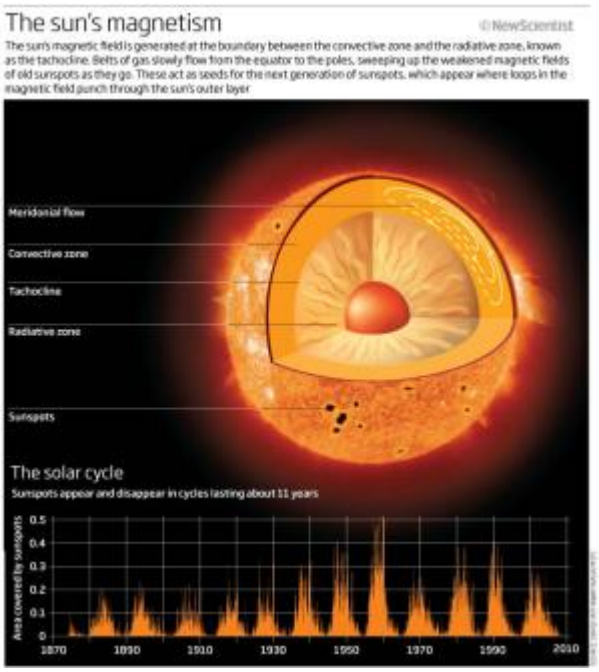
What's wrong with the sun?

- 09 June 2010 by **Stuart Clark**
- Magazine issue 2764.



The sun' magnetism

SUNSPOTS come and go, but recently they have mostly gone. For centuries, astronomers have recorded when these dark blemishes on the solar surface emerge, only for them to fade away again after a few days, weeks or months. Thanks to their efforts, we know that sunspot numbers ebb and flow in cycles lasting about 11 years.

But for the past two years, the sunspots have mostly been missing. Their absence, the most prolonged for nearly a hundred years, has taken even seasoned sun watchers by surprise. "This is solar behaviour we haven't seen in living memory," says David Hathaway, a physicist at NASA's Marshall Space Flight Center in Huntsville, Alabama.

The sun is under scrutiny as never before thanks to an armada of space telescopes. The results they beam back are portraying our nearest star, and its influence on Earth, in a new light. Sunspots and other clues indicate that the sun's magnetic activity is diminishing, and that the sun may even be shrinking. Together the results hint that something profound is happening inside the sun. The big question is what?

The stakes have never been higher. Groups of sunspots forewarn of gigantic solar storms that can unleash a billion times more energy than an atomic bomb. Fears that these giant solar eruptions could create havoc on Earth, and disputes over the sun's role in climate change, are adding urgency to these studies. When NASA and the European Space Agency launched the Solar and Heliospheric Observatory almost 15 years ago,

"understanding the solar cycle was not one of its scientific objectives", says Bernhard Fleck, the mission's project scientist. "Now it is one of the key questions."

Sun behaving badly

Sunspots are windows into the sun's magnetic soul. They form where giant loops of magnetism, generated deep inside the sun, well up and burst through the surface, leading to a localised drop in temperature which we see as a dark patch. Any changes in sunspot numbers reflect changes inside the sun. "During this transition, the sun is giving us a real glimpse into its interior," says Hathaway.

When sunspot numbers drop at the end of each 11-year cycle, solar storms die down and all becomes much calmer. This "solar minimum" doesn't last long. Within a year, the spots and storms begin to build towards a new crescendo, the next solar maximum.

What's special about this latest dip is that the sun is having trouble starting the next solar cycle. The sun began to calm down in late 2007, so no one expected many sunspots in 2008. But computer models predicted that when the spots did return, they would do so in force. Hathaway was reported as thinking the next solar cycle would be a "doozy": more sunspots, more solar storms and more energy blasted into space. Others predicted that it would be the most active solar cycle on record. The trouble was, no one told the sun.

The latest solar cycle was supposed to be the most active on record. The trouble was, no one told the sun

The first sign that the prediction was wrong came when 2008 turned out to be even calmer than expected. That year, the sun was spot-free 73 per cent of the time, an extreme dip even for a solar minimum. Only the minimum of 1913 was more pronounced, with 85 per cent of that year clear.

As 2009 arrived, solar physicists looked for some action. They didn't get it. The sun continued to languish until mid-December, when the largest group of sunspots to emerge for several years appeared. Finally, a return to normal? Not really.

Even with the solar cycle finally under way again, the number of sunspots has so far been well below expectations. Something appears to have changed inside the sun, something the models did not predict. But what?

The flood of observations from space and ground-based telescopes suggests that the answer lies in the behaviour of two vast conveyor belts of gas that endlessly cycle material and magnetism through the sun's interior and out across the surface. On average it takes 40 years for the conveyor belts to complete a circuit (see diagram).

When Hathaway's team looked over the observations to find out where their models had gone wrong, they noticed that the conveyor-belt flows of gas across the sun's surface have been speeding up since 2004.

The circulation deep within the sun tells a different story. Rachel Howe and Frank Hill of the National Solar Observatory in Tucson, Arizona, have used observations of surface disturbances, caused by the solar equivalent of seismic waves, to infer what conditions are like within the sun. Analysing data from 2009, they found that while the surface flows had sped up, the internal ones had slowed to a crawl.

These findings have thrown our best computer models of the sun into disarray. "It is certainly challenging our theories," says Hathaway, "but that's kinda nice."

It is not just our understanding of the sun that stands to benefit from this work. The extent to which changes in the sun's activity can affect our climate is of paramount concern. It is also highly controversial. There are those who seek to prove that the solar variability is the major cause of climate change, an idea that would let humans and their greenhouse gases off the hook. Others are equally evangelical in their assertions that the sun plays only a minuscule role in climate change.

If this dispute could be resolved by an experiment, the obvious strategy would be to see what happens when you switch off one potential cause of climate change and leave the other alone. The extended collapse in solar activity these past two years may be precisely the right sort of test, in that it has significantly changed the amount of solar radiation bombarding our planet. "As a natural experiment, this is the very best thing to happen," says Joanna Haigh, a climatologist at Imperial College London. "Now we have to see how the Earth responds."

The climate link

Mike Lockwood at the University of Reading, UK, may already have identified one response - the unusually frigid European winter of 2009/10. He has studied records covering data stretching back to 1650, and found that severe European winters are much more likely during periods of low solar activity (*New Scientist*, 17 April, p 6). This fits an emerging picture of solar activity giving rise to a small change in the global climate overall, yet large regional effects.

Another example is the Maunder minimum, the period from 1645 to 1715 during which sunspots virtually disappeared and solar activity plummeted. If a similar spell of solar inactivity were to begin now and continue until 2100, it would mitigate any temperature rise through global warming by 0.3 °C on average, according to calculations by Georg Feulner and Stefan Rahmstorf of the Potsdam Institute for Climate Impact Research in Germany. However, something amplified the impact of the Maunder minimum on northern Europe, ushering in a period known as the Little Ice Age, when colder than average winters became more prevalent and the average temperature in Europe appeared to drop by between 1 and 2 °C.

A corresponding boost appears to be associated with peaks in solar output. In 2008, Judith Lean of the Naval Research Laboratory in Washington DC published a study showing that high solar activity has a disproportionate warming influence on northern Europe (*Geophysical Research Letters*, vol 35, p L18701).

So why does solar activity have these effects? Modellers may already be onto the answer. Since 2003, spaceborne instruments have been measuring the intensity of the sun's output at various wavelengths and looking for correlations with solar activity. The results point to the sun's emissions of ultraviolet light. "The ultraviolet is varying much, much, much more than we expected," says Lockwood.

Ultraviolet light is strongly linked to solar activity: solar flares shine brightly in the ultraviolet, and it helps carry the explosive energy of the flares away into space. It could be particularly significant for the Earth's climate as ultraviolet light is absorbed by the ozone layer in the stratosphere, the region of atmosphere that sits directly above the weather-bearing troposphere.

More ultraviolet light reaching the stratosphere means more ozone is formed. And more ozone leads to the stratosphere absorbing more ultraviolet light. So in times of heightened solar activity, the stratosphere heats up and this influences the winds in that layer. "The heat input into the stratosphere is much more variable than we thought," says Lockwood.

Enhanced heating of the stratosphere could be behind the heightened effects felt by Europe of changes in solar activity. Back in 1996, Haigh showed that the temperature of the stratosphere influences the passage of the jet stream, the high-altitude river of air passing from west to east across Europe.

Lockwood's latest study shows that when solar activity is low, the jet stream becomes liable to break up into giant meanders that block warm westerly winds from reaching Europe, allowing Arctic winds from Siberia to dominate Europe's weather.

The lesson for climate research is clear. "There are so many weather stations in Europe that, if we are not careful, these solar effects could influence our global averages," says Lockwood. In other words, our understanding of global climate change could be skewed by not taking into account solar effects on European weather.

Just as one mystery begins to clear, another beckons. Since its launch 15 years ago, the SOHO spacecraft has watched two solar minimums, one complete solar cycle, and parts of two other cycles - the one that ended in 1996 and the one that is just stirring. For all that time its VIRGO instrument has been measuring the total solar irradiance (TSI), the energy emitted by the sun. Its measurements can be stitched together with results from earlier missions to provide a 30-year record of the sun's energy output. What this shows is that during the latest solar minimum, the sun's output was 0.015 per cent lower than during the previous lull. It might not sound like much, but it is a hugely significant result.

We used to think that the sun's output was unwavering. That view began to change following the launch in 1980 of NASA's Solar Maximum Mission. Its observations show that the amount of energy the sun puts out varies by around 0.1 per cent over a period of days or weeks over a solar cycle.

Shrinking star

Despite this variation, the TSI has dipped to the same level during the three previous solar minima. Not so during this recent elongated minimum. Although the observed drop is small, the fact that it has happened at all is unprecedented. "This is the first time we have measured a long-term trend in the total solar irradiance," says Claus Fröhlich of the World Radiation Centre in Davos, Switzerland, and lead investigator for the VIRGO instrument.

If the sun's energy output is changing, then its temperature must be fluctuating too. While solar flares can heat up the gas at the surface, changes in the sun's core would have a more important influence on temperature, though calculations show it can take hundreds of thousands of years for the effects to percolate out to the surface. Whatever the mechanism, the cooler the surface, the less energy there is to "puff up" the sun. The upshot of any dip in the sun's output is that the sun should also be shrinking.

Observations suggest that it is - though we needn't fear a catastrophe like that depicted in the movie *Sunshine* just yet. Back in the 17th century French astronomer Jean Picard made his mark by measuring the sun's diameter. His observations were carried out during the Maunder minimum, and he obtained a result larger than modern measurements. Was this simply because of an error on Picard's part, or could the sun genuinely have shrunk since then? "There has been a lot of animated discussion, and the problem is not yet solved," says Gérard Thuillier of the Pierre and Marie Curie University in Paris, France.

Any dip in the sun's output means that the sun is shrinking. Observations suggest that it is, though they are controversial

Observations with ground-based telescopes are not precise enough to resolve the question, due to the distorting effect of Earth's atmosphere. So the French space agency has designed a mission, aptly named Picard, to return precise measurements of the sun's diameter and look for changes.

Frustratingly the launch, on a Russian Dnepr rocket, is mired in a political disagreement between Russia and neighbouring Kazakhstan. Until the dispute is resolved, the spacecraft must wait. Every day of delay means valuable data being missed as the sun takes steps, however faltering, into the next cycle of activity. "We need to launch now," says Thuillier.

What the sun will do next is beyond our ability to predict. Most astronomers think that the solar cycle will proceed, but at significantly depressed levels of activity similar to those last seen in the 19th century. However, there is also evidence that the sun is inexorably losing its ability to produce sunspots (see "The sunspot forecast"). By 2015, they could be gone altogether, plunging us into a new Maunder minimum - and perhaps a new Little Ice Age.

Of course, solar activity is just one natural source of climate variability. Volcanic eruptions are another, spewing gas and dust into the atmosphere. Nevertheless, it remains crucial to understand the precise changeability of the sun, and the way it influences the various regional patterns of weather on Earth. Climate scientists will then be able to correct for these effects, not just in interpreting modern measurements but also when attempting to reconstruct the climate stretching back centuries. It is only by doing so that we can reach an unassailable consensus about the sun's true level of influence on the Earth and its climate.

266 days without sunspots in 2008
18 billion tonnes of matter thrown into space by a coronal mass ejection

The sunspot forecast

Although sunspots are making a belated comeback after the protracted solar minimum, the signs are that all is not well. For decades, William Livingston at the National Solar Observatory in Tucson, Arizona, has been measuring the strength of the magnetic fields which puncture the sun's surface and cause the spots to develop. Last year, he and colleague Matt Penn pointed out that the average strength of sunspot magnetic fields has been sliding dramatically since 1995.

If the trend continues, in just five years the field will have slipped below the threshold magnetic field needed for sunspots to form.How likely is this to happen? Mike Lockwood at the University of Reading, UK, has scoured historical data to look for similar periods of solar inactivity, which show up as increases in the occurrence of certain isotopes in ice cores and tree rings. He found 24 such instances in the last few thousand years. On two of those occasions, sunspots all but disappeared for decades. Lockwood puts the chance of this happening now at just 8 per cent.

Only on one occasion did the sunspot number bounce back to record levels. In the majority of cases, the sun continued producing spots albeit at significantly depressed levels. It seems that the sunspot bonanza of last century is over.

Stuart Clark's latest book is The Sun Kings (Princeton). He blogs at stuartclark.com

http://www.newscientist.com/article/mg20627640.800-whats-wrong-with-the-sun.html?DCMP=NLC-nletter&nsref=mg20627640.800

Deeper impact: Did mega-meteors rattle our planet?

- 09 June 2010 by **Matt Kaplan**

Magazine issue 2763.

A smashing time (Image: Jayme McGowan)

ON THE west coast of India, near the city of Mumbai, lies a tortured landscape. Faults score the ground, earthquakes are rife, and boiling water oozes up from below forming countless hot springs.

These are testaments to a traumatic history. Further inland, stark mountains of volcanic basalt provide compelling evidence that this entire region - an area of some 500,000 square kilometres known as the Deccan traps - underwent bouts of volcanic activity between 68 and 64 million years ago.

We don't know why. The Deccan traps lie far away from any tectonic plate boundaries, those fractures in Earth's crust through which lava usually forces its way up from the planet's interior. No volcanism on the scale implied by the Deccan traps occurs on Earth now. However, smaller, equally mysterious "hotspots" dot the globe away from plate boundaries - the smoking volcanoes of the Hawaiian islands, for example, or the bubbling geysers of Yellowstone National Park in Wyoming.

Geologists have generally thought that the history of such features can be traced through the slow churnings and contortions of rock under pressure in Earth's mantle. But it seems there is more to it than that. Sometimes volcanic activity needs - and gets - a helping hand from above.

It was in the late 1960s that oil companies prospecting off India's western coast found something odd in the rocks beneath the ocean floor. Sediments laid down on an ocean bed over millions of years generally form rocks resembling a layer cake, with the layers getting older the deeper you delve. That was true in the boreholes drilled off the coast near Mumbai, to a point. But some 7 kilometres down, in a layer of rock deposited 65 million years ago, the neat progression abruptly stopped. Beneath it was a layer of shattered rock, followed by a layer of solidified volcanic lava up to 1 kilometre thick.

Something equally dramatic lurked onshore in the layered lava flows of the Deccan traps. These flows are interrupted by intermediate layers of sedimentary rocks, indicating that the volcanic activity that shook and

remodelled the area from about 68 million years ago was not continuous. It was also not catastrophic; fossils found in the sedimentary layers suggest that dinosaurs had coexisted with this activity reasonably well.

But rooted in layers of lava dating from 65 million years ago - around the time dinosaurs disappeared from Earth's fossil record - are colossal spires of lava of a fundamentally different composition. These spires are up to 12 kilometres high and 25 kilometres across at their base, so that their tips appear as surface hills. The lava they are made of is highly alkaline and rich in iridium, an element rare in the Earth's crust but which commonly occurs in meteorites.

The lava in the Deccan traps is rich in iridium, an element rare in the Earth's crust but which commonly occurs in meteorites

To palaeontologist Sankar Chatterjee of Texas Tech University in Lubbock, all of this was telling a story. In 1992, he recounted it to the world: the entire basin area off the coast of Mumbai, he claimed, was a huge undersea impact crater, some 500 kilometres across, formed when a meteorite 40 kilometres in diameter slammed into Earth 65 million years ago and convulsed its surface. He named the crater Shiva, after the Hindu god of destruction and renewal, and touted it as the big brother of Chicxulub, a crater 180 kilometres across under the Yucatán peninsula in Mexico, which dates to the same time.

This claim was bound to stir controversy. The aftermath of the Chicxulub impact supposedly did for the dinosaurs and many other species that disappeared in a wave of extinctions around that time. If Chatterjee was right, Chicxulub was unlikely to be the whole story.

Most geologists were unconvinced. For a start, the Shiva crater was simply too large. Whereas massive impacts were common in the rambunctious early days of the inner solar system, the absence of recent large craters on Mercury, Venus and Mars strongly suggests that those days are long gone. "These surfaces demonstrate that objects larger than 30 kilometres have not produced impacts in the last three billion years," says planetary geologist Peter Schultz of Brown University in Providence, Rhode Island.

Chatterjee responds that there are still objects of the right size out there, for example the near-Earth object 1036 Ganymed that NASA is monitoring closely, although it is happily not on a collision course with Earth. Moreover, he says that studies off the Indian coast by oil companies in the 1990s revealed gravitational anomalies that add weight to his arguments.

The exact strength of the gravitational pull an object feels at the Earth's surface differs from place to place. It is weaker in areas dominated by low-density granite rocks, for example, and stronger where high-density basalt rocks dominate. If you cross from one side of the posited Shiva crater to the other, the gravity signal weakens towards the centre before reversing and becoming much stronger again towards the proposed rim.

That, says Chatterjee, squares with the idea that a meteorite hit what is now the Mumbai coast from the south-east at an oblique angle of 15 degrees to the horizontal, obliterating the crust entirely and scraping away a portion of the upper mantle, too. The impact would have thrown up a granite peak 50 kilometres high that collapsed back down through a pool of rock below that had been melted in the impact.

That would explain not only the anomalous area of lower gravity under the ocean, but also the odd geology of the Deccan traps. As the granite peak collapsed it too melted, causing the impact crater to overflow and creating enormous melt ponds of alkaline, iridium-rich lava in the charred surroundings. Meanwhile, the shock of the impact caused the moderate Deccan volcanic eruptions, already occurring nearby, to go into overdrive. "A lava trickle became a torrent," says Chatterjee. This torrent of normal lava enclosed the iridium-

rich lava overflow from the impact, producing the stunning enclosed spire architecture seen in the Deccan layers today.

That is at best half an answer: it does not explain where the Deccan volcanic activity came from in the first place. Many palaeoscientists, including Chatterjee, think this was linked to a hotspot currently active under the island of Réunion in the Indian Ocean. This hotspot may well have been beneath the area of the Deccan traps 68 million years ago, before continental drift moved them apart.

Even so, it is a contentious claim: to suggest that impacts can amplify volcanic activity is to give them a far greater influence on Earth's recent geological history than has conventionally been allowed. The effects might not just be volcanic, either. According to Chatterjee's calculations, the force of the impact could have been enough to open up a new rift in Earth's crust to the west of the crater, causing a tiny sliver of western India to migrate out into the sea as new oceanic crust forced its way up. The most obvious sign of such a detached sliver today lies almost 2800 kilometres south of the Indian mainland - the island group of the Seychelles.

Comparison with other impact sites shows that if the Shiva crater exists and if it is as big as proposed, the impact would indeed have released enough energy to have such effects. "The physics of the process is undeniable," says geophysicist Adrian Jones of University College London. Even if the Shiva impact never happened, in a startling twist it seems an impact could well have caused the massive Deccan eruptions.

To understand how that might be requires an abrupt change of scene, to the icy permafrost of northern Siberia. This region contains a huge expanse of volcanic rock just as curious as the Deccan traps - and, at some 2 million square kilometres, roughly four times the size. These Siberian traps contain slabs of lava up to 3 kilometres thick that were formed in a single event 251 million years ago.

For geochemist Asish Basu at the University of Rochester in New York, this was fascinating, not least because the lava's date tallies with the largest mass extinction known, the Permian-Triassic extinction, in which over half the existing animal families died out.

Where did so much lava come from over such a short period? When Basu analysed the chemical composition of the rock to find out, it threw up a surprise. The lava showed abnormally high concentrations of the isotope helium-3, generally a signature of rocks from far down in Earth's interior. "Something was causing the deep mantle to come up, but we did not know what," says Basu.

A hole punched by an impact, perhaps? Basu was aware of Chatterjee's work, and it was tempting to float a connection between two huge unexplained lava flows, each dating from the same time as a mass extinction. So Basu travelled to India to do his helium analysis on the rocks there, too. He came up with the same anomalous result.

For Basu, that only deepened the mystery. For one thing, there was no noticeable impact site anywhere near the Siberian lava flows. For another, he was not convinced that the Shiva site was actually an impact crater.

His brainwave was that it didn't matter. "A big impact anywhere would have shaken the planet and created pressure that might have amplified deep-mantle volcanic activity already in progress," he says. If that was so, whether Shiva was an impact crater or not was irrelevant. An impact anywhere in the world could have been the trigger for the Deccan volcanism; arguably, it could even have been the well-documented Yucatán impact.

Shaken and stirred

Basic physics says that is plausible. "The idea of volcanic activity being primed and increased by energy waves sent through the mantle by impacts elsewhere on the planet is a reasonable one," says Jones. Pressure waves from earthquakes travel extremely well through the inner layers of the Earth: seismographs in Europe and the US routinely pick up tremors thousands of miles away in China, for instance. A superpowerful pressure wave such as one created by a huge impact could well have done enough to rattle volcanic plugs and stir lava domes, activating otherwise mild or dormant volcanism.

A superpowerful pressure wave created by a huge impact from space could rattle volcanic plugs and activate dormant volcanism

To lend credence to the idea, what Basu needed was evidence of a meteorite impact 251 million years ago - not in Siberia, but anywhere. That had him stumped until 2003, when he and his colleagues were handed a 251-million-year-old rock sample from near the Beardmore glacier in Antarctica. Within the rock, they found inclusions with an odd chemical composition that looked for all the world like meteorite fragments. They published a paper detailing the exciting discovery and its possible implication: that the two largest volcanic events in the past billion years could have been caused by meteor impacts (*Science*, vol 302, p 1388).

The claim caused a considerable stir, and many geologists dismissed the Antarctic finding out of hand. "A lot of criticism came because folks figured it wasn't possible for meteorite fragments to last so long," says Eric Tohver of the University of Western Australia in Perth. Meteorites are mostly metal and would usually be expected to rust away into nothingness over 100 million years, even if buried. The fragments must be modern, said the critics, and somehow have infiltrated the sediments.

Undeterred, Basu and his colleagues pressed on with their exploration. In March this year, at a conference of planetary scientists in Houston, Texas, they presented what they consider to be a smoking gun: more meteorite fragments, this time enclosed in clay containing fossils that date them to 251 million years ago. Clay readily absorbs water, drawing off moisture and preventing meteorite fragments from rusting away.

Scepticism remains. "Small meteorites fall from the sky all the time," says Schultz. "Just because these meteorite fragments are the same age as the Siberian lava does not mean they and the Siberian lava flows are related."

As debated as Chatterjee's and Basu's ideas are, the concept that extraterrestrial bodies might have direct geological effects is now more widely accepted. "The idea of impacts causing volcanism is absolutely plausible," says Vicki Hansen, a planetary geologist at the University of Minnesota, Duluth: modelling shows that impacts can readily melt a planet's surface layer where it is relatively thin.

The question is what sorts of volcanic activity that might generate. Might impacts help to explain the hotspots of Hawaii and Yellowstone, for example? Hansen is open-minded, but sceptical. "There can be little doubt that an impact could spawn a type of hotspot given the right conditions," she says. The crust beneath Hawaii, though, seems relatively intact, and the hotspot looks to be the result of a bulge of superheated mantle, or "plume", forcing its way up for reasons unknown. We know less of what underlies Yellowstone; there is no evidence yet that an impact played a significant part there.

With other hotspots it is a different story. The Ontong Java plateau lies beneath the western Pacific, north of the Solomon Islands, and it is a hotspot that was active some 125 million years ago. The upper layers of the mantle are uplifted there, but not as much as under Hawaii. A likely explanation is that an impact fractured the crust, allowing melt from below to rise and spill out as an eruption. The escape of so much melt material

would reduce the density of what was left behind, causing the mantle bulge seen today (*Earth and Planetary Science Letters*, vol 218, p 123).

How long such impact-induced fireworks might have lasted is another area of debate. Tohver thinks not so long - a few hundred thousand years, perhaps a few million. "It is a lot like dropping a spoon into thick pea soup," he says: the initial large disturbance would quickly die down. Schultz agrees, on the basis of studies of other solar system bodies. "Theoretical models concluded that impacts could not trigger sustained eruptions," he says.

Jones begs to differ, arguing that better modelling will show that sustained eruptions can result from impacts. "A major difference between the Earth and our neighbouring planets is that Earth is still very hot and geologically active, so may be much easier to melt with impacts," he says.

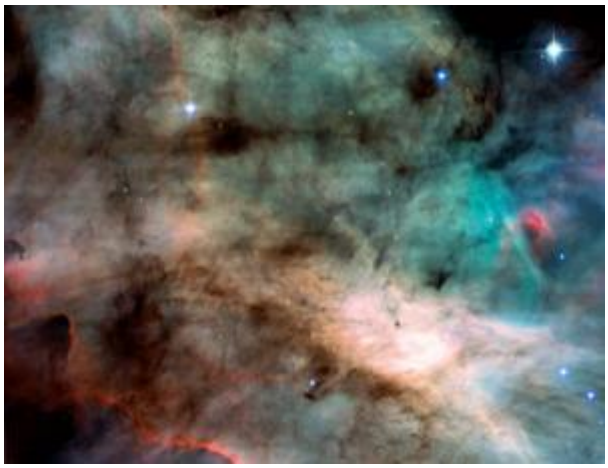
The debate will rage on, but one thing seems certain: accumulating evidence means the days of thinking about geology without considering influences from above are numbered. "Geologists don't typically consider impact hypotheses, perhaps for psychological reasons," says Hansen. "We have been trained to consider things that come from within our planet." Being forced to consider the effects of random meteorite strikes adds another complexity to an already involved subject. But in the end, says Hansen, "We are never going to get anywhere if we keep trying to understand our planet with our hands over our eyes and ears."

Matt Kaplan is a writer based in California and the UK

http://www.newscientist.com/article/mg20627631.300-deeper-impact-did-megameteors-rattle-our-planet.html

Distant gas blob threatens to shake nature's constants

- 04 June 2010 by **Rachel Courtland**
- Magazine issue 2763.



Clouding the picture (Image: NASA/STSCI)

The basic constants of nature aren't called constants for nothing. Physics is supposed to work the same way across the universe and over all of time. Now measurements of the radio spectra of a distant gas cloud hint that some fundamental quantities might not be fixed after all, raising the possibility that a radical rethink of the standard model of particle physics may one day be needed.

The evidence comes from observations of a dense gas cloud some 2.9 billion light years away which has a radio source, the active supermassive black hole PKS 1413+135, right behind it. Hydroxyl radicals in the gas cloud absorb the galaxy's radio energy at certain wavelengths and emit it again at different wavelengths. This results in so-called "conjugate" features in the radio spectrum of the gas, with a dip in intensity corresponding to absorption and an accompanying spike corresponding to emission.

The dip and spike have the same shape, which shows that they arise from the same gas. But Nissim Kanekar of the National Centre for Radio Astrophysics in Pune, India, and colleagues found that the gap in frequency between the two was smaller than the properties of hydroxyl radicals would lead us to expect.

The gap depends on three fundamental constants: the ratio of the mass of the proton to the mass of the electron, the ratio that measures a proton's response to a magnetic field, and the fine-structure constant, alpha, which governs the strength of the electromagnetic force. The discrepancy in the size of the gap thus amounts to "tentative evidence" that one or more of these constants may once have been different in this region of space, Kanekar says.

The change in these constants, if genuine, is tiny. For example, if a change in alpha were solely responsible for the discrepancy, the measurements suggest alpha would have been just 0.00031 per cent smaller 3 billion years ago than today (*The Astrophysical Journal Letters*, vol 716, p L23). But even such a small effect would require "a new, more fundamental theory of particle physics" to explain it, says Michael Murphy of Swinburne University of Technology in Melbourne, Australia.

Measurements by Murphy and colleagues of visible light from distant quasars absorbed by intervening gas clouds have also hinted alpha was smaller in the past. But it was never certain that the light measured all came from the same region. "That's a critical assumption," says Murphy.

"Radio measurements currently appear to be the most promising avenue for a secure detection of fine-structure constant evolution," says Jeffrey Newman of the University of Pittsburgh, Pennsylvania. "I wouldn't call this more than a hint, though. It's the first application of a new technique."

The subtle discrepancy found by Kanekar's team might be caused by "contamination" from light from another patch of gas. Last month, the team began using the Arecibo radio telescope in Puerto Rico to rule this out.

The nuclear option for clocking change

Physical constants could be measured with unprecedented accuracy if atomic clocks go nuclear.

Atomic clocks traditionally rely on the frequency of light needed for electrons to make transitions between different energy states. Measurements of these frequencies have also been used to make ultra-precise determinations of the physical constants, showing that any change in the fine-structure constant, alpha, which governs the strength of the electromagnetic interaction, is no bigger than one part in 10^{17} per year.

Now Wade Rellergert of the University of California, Los Angeles, and colleagues say a clock that uses transitions between energy levels in the nuclei of thorium-229 atoms could potentially improve on that limit by a factor of 100 (*Physical Review Letters*, DOI: 10.1103/PhysRevLett.104.200802). Unlike other atomic nuclei, thorium-229 nuclei boast a transition that can be used to make a clock. This transition is more sensitive to any changes in the fundamental constants, so any shifts in its frequency could reveal changes in alpha or place more stringent limits on any change.

Team members are now working on growing crystals doped with atoms of thorium-229. With these crystals they will be able to make simultaneous measurements on 10 billion more thorium-229 nuclei than using other methods, which could help pin down any deviations in the transition frequency over time, Rellergert says.

http://www.newscientist.com/article/mg20627633.400-distant-gas-blob-threatens-to-shake-natures-constants.html

Fractal haze may have warmed the early Earth

- 23:14 03 June 2010 by **Rachel Courtland**

Laboratory simulations suggest that organic aerosols on Saturn's moon Titan (pictured) are fractal shaped. Fluffy fractal molecules may have blanketed the early Earth, explaining how it stayed warm (Image: NASA/JPL)

A haze of fluffy fractal-shaped particles may have helped protect early life from harmful ultraviolet radiation, a new study suggests. The aerosols could help resolve a long-standing puzzle about how the early Earth stayed warm.

Billions of years ago, the sun emitted up to 30 per cent less light than it does today. That should have made the early Earth too cold to maintain liquid water on the surface until about 2 billion years ago. But geological studies of banded iron formations and other materials that can form in water suggest liquid water pooled on the surface much earlier.

In 1972, Carl Sagan and George Mullen of Cornell University in New York proposed a solution to this "faint young sun paradox". They reckoned a bit of ammonia – a powerful greenhouse gas – could keep the Earth warm enough for liquid water to be present. But the idea was knocked down a few years later when researchers realised that the sun's ultraviolet light would break apart the gas molecules in less than 10 years.

Some 25 years later, Sagan and colleague Christopher Chyba, now at Princeton University, proposed a solution. They suggested that the early Earth, like Saturn's hazy moon Titan, may also have been surrounded by a haze of aerosol particles made of organic molecules.

This haze could have blocked the sun's ultraviolet light, allowing ammonia to survive. But models showed that the shield also would have blocked the sun's visible light, creating an "anti-greenhouse effect" that would have cooled the Earth even more.

Now Eric Wolf and Brian Toon of the University of Colorado at Boulder find that a protective haze could warm the early Earth after all, if the haze is made up of fluffy particles instead of solid ones.

Feedback loop

They propose that sunlight broke apart atmospheric methane and nitrogen molecules that then rejoined to make spherical particles. As these particles fell through the atmosphere, they collided and stuck together at random, bulking up to form loose aggregates with fractal geometries, in which a basic pattern is repeated at different scales.

Previous models assumed the haze particles were made from spheres that merged and formed larger and larger spheres when they collided. Those particles block visible light as effectively as ultraviolet light.

Since the fractal aggregates are full of gaps, they are relatively transparent to visible light. The spherical particles that form them block relatively more ultraviolet waves, making a haze that preserves ammonia to warm the Earth.

If the idea is right, "we would have a strong ultraviolet shield that would protect early Earth and make it a clement place for life to thrive," Wolf told *New Scientist*. Such an atmosphere could also form more complex organic molecules that could provide nutrients for life.

Building blocks of life?

It may have even helped give life its start. In the 1950s, Stanley Miller and Harold Urey zapped gases that also included ammonia and methane with electricity and formed amino acids, the building blocks of proteins.

But since then, the idea of an atmosphere rich in hydrogen – which is needed to make organic molecules such as methane – has fallen out of favour. It is unclear whether geological processes could have released enough methane to create a haze on the early Earth, before life evolved to spew out methane. "The current wisdom is there wasn't a lot of methane outgassing by ancient volcanism, but this is a question we'd like to investigate further," Wolf says.

Is the faint young sun paradox solved? A range of other ideas is still being considered. One recent proposal suggests bigger oceans and fewer clouds may have made the Earth darker and less reflective in the past, allowing it to absorb more sunlight.

It is possible that a combination of different mechanisms might have worked together to counteract the faint young sun, says Christopher Chyba. "My own view is this is a problem that, one way or another, the early Earth figured out how to solve," he says.

Journal reference: *Science* (vol 328, p 1266)

http://www.newscientist.com/article/dn19004-fractal-haze-may-have-warmed-the-early-earth.html

Invisibility cloaks and how to use them

- 14:39 08 June 2010 by **Anil Ananthaswamy**

Promising, but more work needed (Image: Colin Hawkins/Getty)

The "invisibility cloaks" being made in labs today can hide objects when viewed from a wide range of directions and in visible light – both considered implausible developments when the first working invisibility cloak was demonstrated just four years ago. But the technology that makes objects vanish looks set to be more useful for the safety of offshore structures and for unlocking cosmological secrets than for would-be Harry Potter impersonators.

In 2006, John Pendry's team at Imperial College London made the news with a design for a cloak that could steer light around an object to render it invisible. Within months a team led by David Smith of Duke University in Durham, North Carolina, had built such a device using exotic "metamaterials" – materials with unusual electromagnetic properties that are not found in nature.

But that first cloak could only hide two-dimensional objects viewed from specific directions – and only if they were "viewed" using one particular microwave frequency. Producing a cloak to hide objects from visible light, which has a wavelength several orders of magnitude smaller than microwaves – let alone cloaking objects when viewed from any direction – seemed a more remote possibility.

Just four years later that's no longer the case. "While full cloaking has not been achieved, it shows promises in the right direction," says Ulf Leonhardt at the University of St Andrews, UK.

Carpet trick

Last year, physicists at the University of California, Berkeley, and Cornell University in Ithaca, New York, independently built optical-frequency cloaks. These were so-called carpet cloaks, made from silicon, which were placed over the object to be cloaked. The object created a bump in the carpet, but the carpet appears flat when light arriving from a specific direction reflects off the surface.

For now, such technology can cloak only objects with a surface area of a few square micrometres and a few hundred nanometres deep. But "in principle, you can make the [cloaked] object larger and larger", says Thomas Zentgraf, a member of the Berkeley team.

Another limitation of the technology – that it works for specific viewing angles only – is already being overcome. Earlier this year, Tolga Ergin of the Karlsruhe Institute of Technology in Germany and colleagues demonstrated a version of the technology that could hide an object from view from a wider range of directions, bringing 3D cloaking a step closer. They arranged photonic crystals in a woodpile-like stack, filling the gaps between the crystals with varying amounts of a polymer to control the refractive index of the metamaterial. This changed the refractive index to a differing degree across the metamaterial, allowing it to mask a bump in a gold foil over a wide viewing angle of about 60 degrees.

"We are optimistic that we can do this [for any viewing angle] in a few years," says Zentgraf.

Waves and event horizons

But even 2D cloaking technology could have real-world uses. Stefan Enoch at the Fresnel Institute in Marseille, France, and colleagues have shown that metamaterials could guide waves around offshore structures, protecting them from storms or tsunamis.

Meanwhile, metamaterials could also shed light on black holes. In 2008, Leonhardt and his team showed how to mimic an event horizon in the lab.

If the medium through which an electromagnetic wave is propagating is moving as fast as the wave itself, the wave is effectively trapped and cannot escape the medium. This has the same effect as a black hole's event horizon, the point of no return for light: an observer outside an event horizon could see nothing inside, as no light can escape the black hole's gravity to cross the horizon to the universe outside.

To mimic this, Leonhardt's team fired laser pulses into a specially fabricated optical fibre. The pulses were designed to modify the fibre's optical properties, so as the laser pulse travelled along the fibre, the change in the fibre's properties moved along it at the same speed. It was as if a virtual fibre was moving at the speed of light, effectively trapping the light

A black hole emits so-called Hawking radiation, and theory says that Leonhardt's team laboratory analogue should do so too, albeit at levels too small to be easily detected yet. Even Harry Potter's cloak wouldn't be capable of that.

Journal references: The two optical frequency cloak papers: University of California, Berkeley study, Cornell University study; Ergin's 3D cloaking study: *Science*, DOI: 10.1126/science.1186351; Leonhardt's black hole study: *Science*, DOI: 10.1126/science.1153625

http://www.newscientist.com/article/dn19017-innovation-invisibility-cloaks-and-how-to-use-them.html?full=true&print=true

Cory Doctorow: My computer says no

- 07 June 2010 by **Jessica Griggs**

Magazine issue 2763.

All the world's a game (Image: Jonathan Worth)

Disobedient computers, frightened gold farmers and money gone seriously ethereal. ***Jessica Griggs*** *takes a trip to the complex frontier world of technology activist* ***Cory Doctorow*** *as his novel For the Win hits the shelves*

Many people will have never heard about the "gold farming" of your novel. What is it?

Gold farming describes a real-world activity: it's all the things people, mostly in poor countries, do to amass things of worth in the online gaming world. These range from amassing gold to collecting rare, expensive items like weapons or ingredients for a magic spell or stuff that a player can use to get up to the next level in the game. These things are sold to rich players who don't want to have to do the work themselves. Gold farmers are seen as akin to hackers.

When did gold farming start?

First reports were in Central America and Mexico in about 2003. Most of the trade has now moved to China, or at least into the Chinese language. In China, the get-rich-quick story runs like this: find 10 boys who just want to play video games around the clock, stick them in a room with 10 computers and then watch the money roll in.

How is the "gold" in the gamers' world exchanged for hard cash?

One player will meet another and do the exchange, or drop gold at a preassigned location on a server where another player will pick it up. The money exits the game and enters the real world via brokers. One reason for this is linguistic. If you are a kid from Sichuan province who only speaks five words of English it's going to be hard to sell gold to a kid from Los Angeles.

What do gold farmers think about their lot?

The gold farmers are a lot less worried about being exploited in real life than they are about being hunted mercilessly in the game. They encounter an awful lot of racism when they move around in games. Anyone with a Chinese name or talking in Chinese is immediately accused of being a gold farmer. If you are on a server where players can attack each other, people will try to kill you. They did have stories about being exploited, too, but a lot of them are 17 and still can't believe they're being paid to play video games all day.

When do you set the action in *For the Win*?

At a time when 8 out of 10 of the world's top economies are virtual economies. Scarily, in 2001 the game *EverQuest* was ranked 77 in the world - on par with Russia as it was then.

So our financial world is like a game in that it's become ever more ethereal?

We exist in a world in which large parts of our economy already take place in this imaginary realm. The participants are not just the bond traders, they're also the formal exchequers. So all the real-life fiscal games get played out here. Like governments, the game companies can print more money, devalue their currency, be inflationary or deflationary. While these guys think they have total control, down there at the scurrying-in-the-baseboard level are mice nibbling at the wires of their mansions.

Your book seems like a parable about financial bubbles - like the one we just went through.

Absolutely. One of the interesting things about that bubble was that there weren't enough debt instruments - for example, bonds or mortgages - being created through people actually borrowing money, so the folk in the finance houses made synthetic debt instruments that were bets on other debt instruments.

What's your gaming history?

Like anyone born in 1971, I grew up with video games and we had ColecoVision, an Atari and an Apple II Plus. But I wouldn't call myself a hard-core gamer. My wife, on the other hand, was on the first UK *Quake* team. She's my source for games now. On a typical evening in our house she'll kill zombies while shouting into her headset while I blog for two hours and ask her questions about what's going on.

When you're not blogging you're busy being a "technology activist". What does that involve?

A technology activist believes that the underlying architecture of our technology influences, and to a certain extent determines, the politics we practice. So, for example, one of the areas where I'm very worried is in the field of digital rights management.

What does that mean?

Digital rights management, or DRM, is based on the idea that we should design computers that consult an internal policy document written by a third party to check if anything the owner might want to do is a permitted task. If you hit control S or control C to save the work or copy the work, your computer would be able to stop you. I think your computer should never say no, it should always obey you.

I think your computer should never say no, it should always obey you

The DRM files can be on your computer without your knowledge and may hide from you by not showing up in a list of the programs you are running. This is fundamentally broken: it reminds me of my least favourite cinematic science fiction motifs, the self-destructing spaceship where somebody accidentally presses a button and the spaceship starts counting down to oblivion and there's absolutely nothing you can do to stop it.

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You can do anything you want with a book of mine: such as videos, music or other fiction, or you can bind it and print it, but you can't charge money for that and you have to let other people do to your work what you've done to mine, so you have to licence your work under the same terms.

Have people played with your work that way?

Just this morning a kid sent me his own chapter of my previous book, *Little Brother*, that he'd written. And there's a guy in Australia who's got a band that has done an entire CD of songs based on my work.

That's flattering, but how do you benefit?

It's financially sensible in that all of this stuff just amounts to publicity, and the more publicity there is the greater the likelihood that the book while rise to the attention of a potential customer. Obscurity, not piracy, is the biggest problem writers face. In the 21st century, if you are not making art with the intention of it being copied, you are not making contemporary art. From here on, hard drives get smaller and cheaper, networks get easier to use and more and more people know how to use them so copying will just get easier.

Are there moral reasons?

Yes. It is hypocritical to say "don't copy" when everybody I know is a copyist. I'm certainly on the wrong side of copyright law at least once a day for things like pasting articles into emails. I've been an avid copyist all my life, if it wasn't for mix tapes, my entire adolescence would have been celibate! I can't do my job unless I have the source material around so I scan records and photocopy library books I can't take out. It's how we all learn to do stuff. That's how we are, we are descendents of molecules formed a million years ago because they figured out how to replicate themselves. We have a name for things that don't copy themselves: dead.

Profile

Cory Doctorow (craphound.com) is a science fiction author, activist, journalist, blogger and co-editor of Boing Boing (boingboing.net). His best-selling novel *Little Brother*, and new novel *For the Win* are published by HarperCollins. He is the former European director of the Electronic Frontier Foundation and co-founder of the UK Open Rights Group

http://www.newscientist.com/article/mg20627635.700-cory-doctorow-my-computer-says-no.html?full=true&print=true

Deter quantum hackers by hiding the photon keys

- 09 June 2010 by **Kate McAlpine**
- Magazine issue 2764.

SPOTTING a lone messenger in a crowd of decoys is tricky - a concept that might make it possible to improve the security of quantum cryptography.

Quantum links are said to be unhackable because the "key" used to establish a secure channel is encoded into the spin of a photon. If the photon is intercepted, it becomes altered in a detectable way. However, hackers have discovered loopholes that allow them to escape detection, for instance, by intercepting the photons and replacing them with copies.

Now Steve Harris's team at Stanford University in California has developed a photon-hiding system to make the key harder to intercept. They fired a laser at rubidium atoms, causing them to release infrared "signal" photons, each with an average frequency of 377 terahertz. The actual values are scattered 3.5 megahertz on each vside of the average.

These photons are fed into a modulator, which uses a random number generator to increase the variation in their frequencies by another three orders of magnitude, meaning each photon could be anywhere within a 20 gigahertz region of the spectrum. An eavesdropper would then have to scan that entire region to locate all of the key photons. Harris's team then made an eavesdropper's task harder by flooding the region with a sea of decoys, all with the same frequencies as the original key. "A spy will have to pick out the photons from noise of the same frequency, which is very difficult," says Chinmay Belthangady, a member of Harris's team.

A spy will have to pick out the photons from noise of the same frequency, which is very difficult

The intended receiver uses a second modulator connected to the same random number generator to reverse the work of the first modulator. The signal photons are restored to their original narrow band of frequencies, but because the decoys did not pass through the first modulator, they are randomly scattered at the second. When the photons then pass through a filter tuned to the narrow region surrounding 377 terahertz, the decoys are weeded out (*Physical Review Letters*, DOI: 10.1103/PhysRevLett.104.223601).

Altering the frequency of the signal in this way is known as spread-spectrum technology, and this is the first time it has been applied to single photons, says the team. The technique could also be used to improve the robustness of the signal, because any noise is removed at the final filter, says Dan Browne at University College London. "It is certainly possible that it could be used to make quantum cryptography systems more noise-tolerant."

http://www.newscientist.com/article/mg20627645.200-deter-quantum-hackers-by-hiding-the-photon-keys.html

Green machine: It's your eco-friendly funeral

- 09 June 2010 by **Helen Knight**

Magazine issue 2764.

Your final carbon footprint (Image: Vario Images GmbH & Co.KG/Alamy)

Think of it as a last chance to reduce your carbon footprint. Soon there will be a range of greener options for your funeral – from being dissolved in chemicals to freeze-drying.

Shortages of land and changing attitudes mean traditional burials are in decline in many parts of the world. Around 75 per cent of people in the UK are cremated after they die, while in the US the figure has risen from 25 per cent in 2000 to approximately 35 per cent today.

Each cremation produces around 150 kilograms of CO_2, according to a report by the UK's Carbon Trust, a government-funded organisation that helps companies reduce their carbon emissions. Of this, 50 kilograms comes from burning the fuel used, the rest from burning the body and the coffin.

Cremations also produce toxic chemicals: a cubic metre of the exhaust gases can contain as much as 200 micrograms of mercury, largely from dental fillings, according to a review by José Domingo and Montse Mari at Rovira i Virgili University in Tarragona, Spain (*Environment International*, DOI: 10.1016/j.envint.2009.09.006). UK legislation is already in place requiring crematoriums to fit mercury-capturing filters by 2012.

One technology soon to be installed at a rest home in Florida produces less CO_2 and eliminates mercury emissions, according to its developer. Resomation, based in Glasgow, UK, has developed a technique to dispose of a corpse by dissolving it in sodium hydroxide at 180 °C. A gas-fired steam boiler generates the

heat required, and the procedure produces 66 kilograms of CO_2 per body, says Sandy Sullivan, the company's founder. The process has been approved for use in five US states, but not yet in the UK.

A cubic metre of exhaust gas from a cremation can contain 200 micrograms of mercury from fillings

Freeze-drying bodies could reduce emissions even further, says another company, Cryomation, based in Woodbridge, UK. Its technique freezes a body to -195 °C using liquid nitrogen. Once brittle, the frozen body is turned into a powder and any metal removed. The remains are then dried in a vacuum and sterilised, says Richard Maclean of Cryomation. The powder can be buried in a biodegradable box, or composted and scattered as a fertiliser.

The process produces 50 kilograms of CO_2 per body, says the Carbon Trust: heating the remains in the vacuum accounts for 35 kilograms, and producing and transporting the liquid nitrogen accounts for 15 kilograms.

Cryomation, which developed the technology with a team led by David Naseby at the University of Hertfordshire in Hatfield, UK, has already tested a prototype device on pig carcasses. A full-size prototype Cryomator is being built for trials later this year on human corpses.

Ian Hanson at Bournemouth University in the UK, a forensic archaeologist, points out that burying freeze-dried remains still uses up land. "Space would not be an issue if the powder was put to use, but is our society ready for our mortal remains to be utilised as fertiliser, or harrowed into crop fields?"

http://www.newscientist.com/article/mg20627640.101-green-machine-its-your-ecofriendly-funeral.html

Forget noisy blimps… say hello to the Airfish

- 11:10 04 June 2010 by **Paul Marks**

Is it a bird, is it a fish? (Image: IOP/EMPA)

The next time you're at a music festival and see a giant rainbow trout swishing around in the sky, there's just a chance you might not be intoxicated. Instead, it might be materials scientists from Switzerland testing their latest invention: an airship that moves like a fish. Of course, they call it the Airfish.

The 8-metre-long helium-filled prototype glides through air as a fish swims through water – by swishing its body and tail from side to side. As well as moving more gracefully than a conventional blimp, the Airfish is also much quieter and cleaner because it doesn't require the fume-belching engines and noisy propellers normally used for mid-air manoeuvres. As such, TV broadcasters might favour it for capturing aerial footage of music and sports events, the team suggests.

Christa Jordi and colleagues from EMPA, the Swiss federal laboratories for materials testing and research in Dübendorf, replaced traditional airship propellers with long artificial muscles strapped on each side of the blimp. The muscles are made from an acrylic polymer with carbon electrodes deposited on either side: when a high voltage is applied across the electrodes, establishing a strong electric field across the polymer, the electrodes are attracted to each other – physically compressing the material and forcing the Airfish to flex.

Alternate the voltages applied to each polymer muscle and the contractions will make the airship sway like a fish. Put some more membranes either side of its hinged tail, and it can swish it back and forth.

Trout action

"We needed to mimic a fish that's a versatile swimmer, not one that's a specialist in fast acceleration or high manoeuvrability," says Jordi. "So we chose the rainbow trout because it is a bit of a generalist."

The team programmed software to control the power to each muscle and mimic the rhythm of the trout's motion, and ran it on a computer slung alongside lithium-polymer batteries in the gondola beneath the airship.

In tests (see video above) they found that the motion of the body and tail combined made the airship move forward at half a metre per second, with roughly half the speed supplied by each mechanism.

"That's a slow walking speed," says Jordi. "And it's interesting because you might think that all its speed comes from the undulating body – but we showed that's not the case by running the body and tail alone and then together."

She thinks the design's quiet operation has potential for stadia and at gig arenas; other applications could include surveillance or animal observations. But first they need to improve their flying trout's muscles, which currently wear out after a couple of months. They plan to try a hardier polymer made of silicone with silver electrodes instead.

Elegance aloft

Dan Speers, president of Mobile Airships in Brantford, Ontario – a Canadian supplier of blimps used to carry adverts or cameras at outdoor music events – is impressed with the design. "It is a very elegant-looking airship, with a great aerodynamic shape," he says. "Using a system that does not require gasoline is always a plus, as it cuts down on air and noise pollution."

Practically, however, the design faces many problems. "In an arena or stadium-like setting, there are other confounding factors that need to be addressed – such as wind currents," Speers says.

Journal reference: *Bioinspiration & Biomimetics*, DOI: 10.1088/1748-3182/5/2/026007

http://www.newscientist.com/article/dn19006-forget-noisy-blimps-say-hello-to-the-airfish.html

Gulf leak: biggest spill may not be biggest disaster

- 16:14 09 June 2010 by **Peter Aldhous** , **Phil McKenna** and **Caitlin Stier**
- Magazine issue 2764.

Heading for the marshes (Image: Daniel Beltra/Greenpeace); other images show timelines of oil disasters and map of areas at risk in the Gulf

THE Deepwater Horizon blowout is the largest oil spill in US history, but its ecological impact need not be the worst. It all hinges on the amount and composition of the oil that reaches the Gulf of Mexico's most sensitive habitat: its coastal marshes. If they can be protected, the region could bounce back in just a few years.

As *New Scientist* went to press, estimates of the volume of crude so far ejected into the waters of the Gulf ranged from 90 to 195 million litres - dwarfing the Exxon Valdez's 40-million-litre spill in 1989. But the aftermath of previous spills shows that it is not the volume that matters most.

"Very large spills have had minimal impact and small spills have had a devastating impact," says Judy McDowell of the Woods Hole Oceanographic Institution on Cape Cod, Massachusetts, one of the authors of a 2003 National Research Council report that reviewed lessons from previous incidents.

Consider three vastly different spills (see timeline, right). In 1979, the Ixtoc I well off Mexico's Gulf coast spewed 530 million litres of oil into shallow waters - three times the worst current estimates for Deepwater Horizon. Five years later, "we had to look hard to see any lasting effects", says Arne Jarnelöv of the Institute for Futures Studies in Stockholm, Sweden, who led a UN team sent to monitor the area.

The Exxon Valdez spilled far less, 40 million litres, yet Alaska's Prince William Sound is still recovering. And 700,000 litres spilled by the oil barge Florida at West Falmouth on Cape Cod is still affecting species 40 years on. Why such variation? It all comes down to the type of oil and the habitats involved.

The light crude from Ixtoc I made landfall mostly on relatively lifeless sandy beaches, where it quickly degraded into a fairly harmless hard tar. Exxon Valdez's heavy crude immediately coated rocky inlets that were havens for seabirds and other marine life, and the frigid conditions meant it broke down slowly. West Falmouth suffered disproportionately because the refined fuel oil that spilled is especially toxic, and hit sensitive salt marshes.

The impact of Deepwater Horizon will be difficult to predict because there never has been a sustained spill at such a depth. The good news is that the oil has to rise through 1500 metres of water, and is exposed to the elements for days or weeks before hitting the shore. The most toxic components - benzene, toluene, ethyl benzene and xylenes - are likely to dissolve in the water column and become greatly diluted, or evaporate at the surface.

One big uncertainty relates to the intervention, not the spill - in particular the unprecedented use of chemical dispersants at the leaking well head on the sea floor. The deep ocean plumes this helped create are a mix of dispersant, emulsified oil and water. How marine life will be affected is anyone's guess.

What is certain is that the plumes are already overlapping with *Lophelia* corals that live at depths of 300 to 500 metres. Next month, the US Geological Survey plans to send robotic submersibles to three of its study sites that are close by. "These sites could be impacted quite severely," warns Cheryl Morrison, a conservation geneticist at the Leetown Science Center in Kearneysville, West Virginia.

The spill could be disastrous for the endangered bluefin tuna - it coincided with the spawning season and there are fears that up to 20 per cent of this year's larvae may die. "We need all the biodiversity in any year," says Barbara Block of Stanford University's Hopkins Marine Station in Pacific Grove, California.

Up to 20 per cent of the bluefin tuna larvae could die in the spill and it needs all biodiversity in any year

Among coastal habitats, marshes are by far the biggest worry. They are both a crucial wildlife habitat and an important buffer between New Orleans and the hurricane-prone Gulf. The marshes are already eroding at an alarming rate, as a consequence of engineering projects that have constrained the wandering Mississippi and carved out navigation channels. "These marshes are already hanging on by their fingernails," says Denise Reed, a geomorphologist at the University of New Orleans.

Louisiana's salt marshes are both a crucial wildlife habitat and a buffer against hurricanes

Oil in the coastal estuaries and marshes would also pose the biggest threat to commercial fisheries. They serve as nurseries for both shrimp - which accounts for more than half of Gulf of Mexico fisheries by revenue - and the Gulf menhaden, a member of the herring family. Used for bait and processed into animal feed and fish oils, menhaden comprise more than 70 per cent of Gulf fisheries by weight.

The dispersants that could be bad news for the deep sea may create an emulsion in the marshes that does not readily penetrate sediments, suggests Jacqueline Michel, president of Research Planning, a consultancy in Columbia, South Carolina, that is advising on the spill response. With care, she says, this can be removed without causing further damage. On the other hand, lab experiments by John Nyman of Louisiana State University in Baton Rouge indicate that the combination of Louisiana crude and the main dispersant used on the current spill is more toxic to marsh-dwelling invertebrates than oil alone would be.

Ultimately, the best hope of staving off the worst impacts of the spill is to keep the oil out of the coastal marshes. Plans to construct sand berms to bolster the protection by natural barrier islands may help, say research teams working in the marshes. They will have gaps to allow for tidal flows, so success may depend on the aggressive use of booms and skimmers in those gaps. "The best thing we can do is to stop the oil getting into these wetlands," says Reed.

Additional reporting, Caitlin Stier

http://www.newscientist.com/article/dn19016-gulf-leak-biggest-spill-may-not-be-biggest-disaster.html

Snake populations plummet

- 00:01 09 June 2010 by **Kate McAlpine**

Western whip snakes are among the species in decline (Image: Fabio Pupin/FLPA)

Could snakes worldwide be going the same way as frogs and fish? A study of 11 snake species in locations across the UK, France, Italy, Nigeria, and Australia suggests that snake populations may be suffering a widespread decline.

Christopher Reading of the UK Centre for Ecology and Hydrology and an international team aggregated data on snake populations from past studies, including surveys that they carried out themselves. They found that 11 of the 17 populations of snakes studied plummeted between 1998 and 2002, and remained low until the studies ended in 2008 and 2009. Five populations were stable, with one increasing slightly.

The crash was seen in the UK, France, Italy and Nigeria, with females more seriously affected than males. The causes of these steep declines are unknown, but the team believes they reflect a change in the quality of habitats, such as a growing shortage of appropriate ground cover, or less abundant prey. Worryingly, half of the species in parks and reserves suffered sharp declines.

The number of regions for which the researchers have long-term data is limited, so they cannot yet prove that they are witnessing a global decline. "We want to flag up what we think may be happening so that other snake researchers can start looking at their data and see whether they've got similar patterns," says Reading.

Journal reference: *Biology Letters*, DOI: 10.1098/rsbl20100373

http://www.newscientist.com/article/dn19020-snake-populations-plummet.html

Ancient oceans belched stagnant CO_2 into the skies

- 05 June 2010 by **Wendy Zukerman**
- Magazine issue 2763.

At the end of the last ice age, atmospheric carbon dioxide levels shot up by nearly 50 per cent. But where did the CO_2 come from? This long-standing climatic mystery has now been solved.

Climate scientists have suspected - but never been able to prove - that the CO_2 was the result of a huge belch of gas from the oceans. They predicted that the ice age had slowed ocean circulation, trapping CO_2 deep within it, and that warmer temperatures reversed this process.

Signs of stagnant CO_2-rich water have now been discovered 3700 metres beneath the Southern Ocean's seabed, between Antarctica and South Africa.

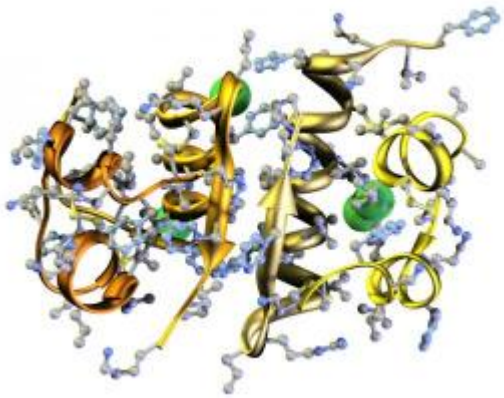
Stewart Fallon of the Australian National University in Canberra and his colleagues collected samples from drill cores of the marine crust of tiny marine fossils called foraminifera. Different species of these lived at the surface and the bottom of the ocean. The chemical composition of their shells is dependent on the water they form in and how much CO_2 it contains.

The team found that species of foraminifera living on the sea floor around the time of the ice age contained more carbon than those that floated at the surface (*Science*, DOI: 10.1126/science.1188605). They also found this discrepancy disappeared around 19,000 years ago, which is also when the ice sheets began to melt.

The findings could help predict how ocean circulation will affect atmospheric CO_2 levels in future, says Will Howard of the University of Tasmania, Australia.

http://www.newscientist.com/article/mg20627634.500-ancient-oceans-belched-stagnant-co2-into-the-skies.html

Molecular Link Between Diabetes and Schizophrenia Connects Food and Mood



Molecular model of human insulin. (Credit: iStockphoto/Martin McCarthy)

ScienceDaily (June 9, 2010) — Defects in insulin function -- which occur in diabetes and obesity -- could directly contribute to psychiatric disorders like schizophrenia.

Vanderbilt University Medical Center investigators have discovered a molecular link between impaired insulin signaling in the brain and schizophrenia-like behaviors in mice. The findings, reported June 8 in *PLoS Biology*, offer a new perspective on the psychiatric and cognitive disorders that affect patients with diabetes and suggest new strategies for treating these conditions.

"We know that people with diabetes have an increased incidence of mood and other psychiatric disorders," said endocrinologist Kevin Niswender, M.D., Ph.D. "And we think that those co-morbidities might explain why some patients have trouble taking care of their diabetes."

"Something goes wrong in the brain because insulin isn't signaling the way that it normally does," said neurobiologist Aurelio Galli, Ph.D.

Galli's group was among the first to show that insulin -- the hormone that governs glucose metabolism in the body -- also regulates the brain's supply of dopamine -- a neurotransmitter with roles in motor activity, attention and reward. Disrupted dopamine signaling has been implicated in brain disorders including depression, Parkinson's disease, schizophrenia and attention-deficit hyperactivity disorder.

Now, Galli, Niswender, and colleagues have pieced together the molecular pathway between perturbed insulin signaling in the brain and dopamine dysfunction leading to schizophrenia-like behaviors.

The researchers developed mice with an insulin-signaling defect only in neurons (they impaired the function of the protein Akt, which transmits insulin's signal inside cells). They found that the mice have behavioral abnormalities similar to those frequently seen in patients with schizophrenia.

They also showed how defects in insulin signaling disrupt neurotransmitter levels in the brain -- the mice have reduced dopamine and elevated norepinephrine in the prefrontal cortex, an important area for cognitive processes. These changes resulted from elevated levels of the transporter protein (NET) that removes norepinephrine and dopamine from the synaptic space between neurons.

"We believe the excess NET is sucking away all of the dopamine and converting it to norepinephrine, creating this situation of hypodopaminergia (low levels of dopamine) in the cortex," Galli explained. Low dopamine function in the cortex is thought to contribute to the cognitive deficits and negative symptoms -- depression, social withdrawal -- associated with schizophrenia.

By treating the mice with NET inhibitors (drugs that block NET activity), the investigators were able to restore normal cortical dopamine levels and behaviors. Clinical trials of NET inhibitors in patients with schizophrenia are already under way, Galli said, and these new data provide mechanistic support for this approach.

The findings also provide a molecular basis for interpreting previous reports of Akt deficiencies in patients with schizophrenia, as revealed by post-mortem, imaging and genetic association studies.

Galli and Niswender suggest that the insulin to Akt signaling pathway is critical for "fine-tuning" the function of monoamine neurotransmitters -- dopamine, norepinephrine and serotonin -- and that it can be impaired in many different ways.

"Dysregulation of this pathway -- because of type 1 diabetes, because of a high-fat diet, because of drugs of abuse, because of genetic variations -- may put a person on the road to neuropsychiatric disorders," Galli said.

Understanding the molecular link between insulin action and dopamine balance -- the connection between food and mood -- offers the potential for novel therapeutic approaches, the researchers said. The mouse model described in the current studies may be useful for testing schizophrenia and cognition-enhancing treatments.

Michael Siuta and Sabrina Robertson are the lead authors of the study. Niswender is an assistant professor of Medicine and Molecular Physiology & Biophysics; Galli is a professor of Molecular Physiology & Biophysics.

The National Institutes of Health and the Vanderbilt University Silvio O. Conte Center for Neuroscience Research supported the research.

Story Source:

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Journal Reference:

1. Siuta MA, Robertson SD, Kocalis H, Saunders C, Gresch PJ, et al. **Dysregulation of the Norepinephrine Transporter Sustains Cortical Hypodopaminergia and Schizophrenia-Like Behaviors in Neuronal Rictor Null Mice**. *PLoS Biology*, 2010; 8 (6): e1000393 DOI: 10.1371/journal.pbio.1000393

http://www.sciencedaily.com/releases/2010/06/100608182645.htm