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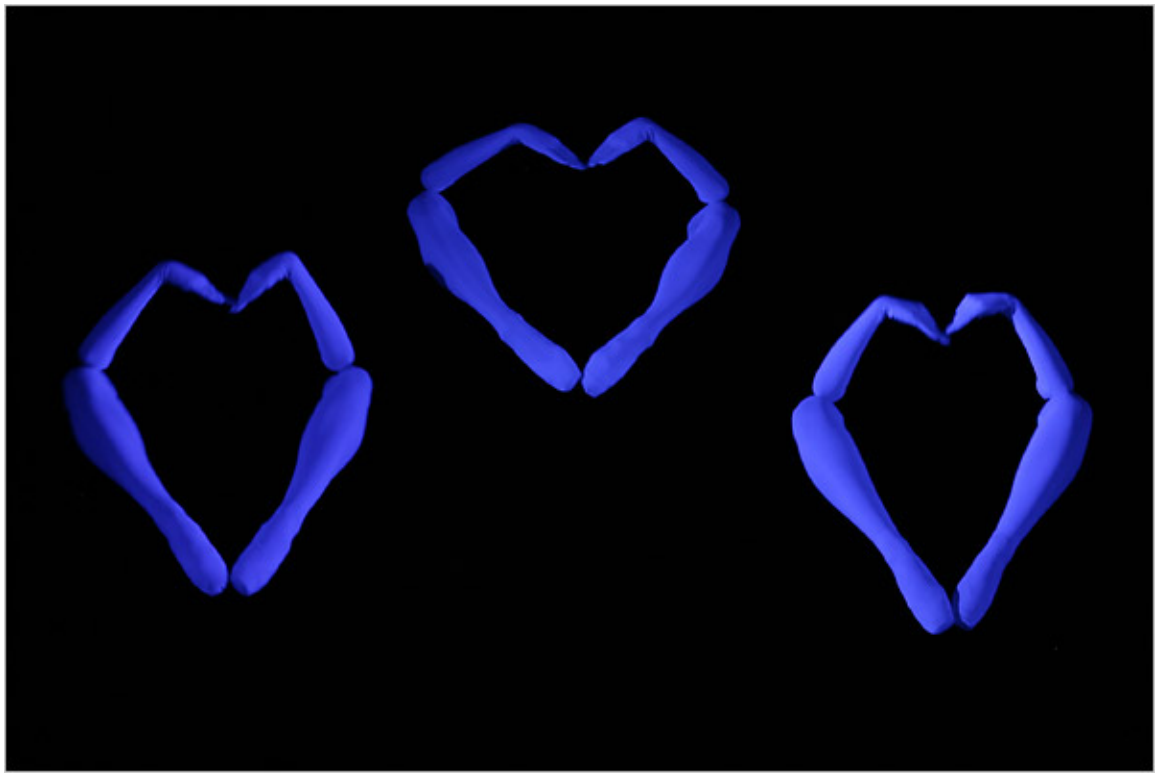
CONTENTS

Three Sides of a Prima Ballerina, Made to Order

By ALASTAIR MACAULAY



Audiences who came of age in the Iron Curtain era still find it astonishing to contemplate a career like Diana Vishneva's. Ms. Vishneva is the prima ballerina of the Maryinsky (Kirov) Ballet in St. Petersburg, Russia, and appears on its foreign tours, dancing not just its old ballets but also its newly acquired Balanchine repertory. She is a leading guest artist with American Ballet Theater in its New York seasons at the Metropolitan Opera House, dancing both ballet classics and mid-20th-century gems by Frederick Ashton and Kenneth MacMillan. Now she is presenting a season of her own at City Center, dancing in a triple bill of ballets created for and around her by more or less eminent choreographers.

Any such career was a mere pipe dream 30 years ago, when Irina Kolpakova of the Kirov was barred from the new choreography of the West, and when Natalia Makarova, by defecting, cut herself off from the Kirov company, whose style she still exemplified. Since the first days of glasnost, other Russian ballerinas — notably Altynai Asylmuratova of the Kirov and Nina Ananiashvili of the Bolshoi (now directing the State Ballet of Georgia, which comes to the Brooklyn Academy of Music next week) — have managed to commute between East and West and between old and new, but none have been able to have their cake and eat it too as much as Ms. Vishneva.

She deserves it. It's hard to think of a more sheerly beautiful ballerina in the world today: the proportions of her body are delectably harmonious, and her porcelain-doll face is both wide-eyed and heart-shaped. And as her program's title, "Beauty in Motion," suggests, her beauty carries through from physique into physicality. She really can be doll-like, and sometimes adopts an air of contrived innocence; or she can be a true child of nature, gorgeously and blithely opening her lovely limbs out into the air like a nymph or sylph; or she can be a polished dynamo whose brilliance and control startle. Always she gives off light.

Though these three ballets must have been intended to display all these facets of her while also displaying her as an exponent of the new, they leave audiences feeling that they're not getting quite enough of her. Of the three, only two bring rewards.

The program is billed as three acts. Act I is Alexei Ratmansky's "Pierrot Lunaire," by far the program's most complex and rewarding work in terms of sheer dance. Schoenberg's atonal 1912 score, still strange and difficult — even now, it sets listeners' teeth on edge — abounds in paradoxes. The masculine title role is sung by a woman (here the mezzo-soprano Elena Sommer, singing the German text with a marked Russian accent), whose voice moves between speech and song. The Pierrot of the songs is both hero and fool; the drama contains excitement and pathos, naïveté and violence, and the mood shifts between delicate refinement and populist liveliness.

Mr. Ratmansky's choreography has a comparable range of paradoxes. It moves between the formal grace of ballet classicism and more deliberately imperfect genres, sometimes in mid-phrase. Its three men and one woman are at times the Pierrot, Harlequin, Cassander and Columbine figures of commedia dell'arte; elsewhere they are all aspects of Pierrot himself. Sometimes Mr. Ratmansky has them moving in four separate but simultaneous solos with marvelous intricacy; sometimes he has them moving together with the lunar fluency of Ashton's "Monotones," only to puncture any such ideal serenity.

It is not principally a Vishneva vehicle; Igor Kolb, Mikhail Lobukhin and Alexander Sergeev are equal contributors. But it shows far more facets of both her and them than the rest of the program (though some of its strained naïveté becomes tiresome to those of us who are not devotees of the Pierrot character). Among its incidental fascinations are that it demonstrates Mr. Ratmansky's skill in choreographing with the ballet vocabulary and, by contrast, his refusal to pigeonhole himself as an academic classicist.

The program's Act II, "F.L.O.W." ("For Love of Women"), choreographed by Moses Pendleton, dips in and out of kitsch. Its first scene is a ballet of illusion for three pairs of hands and feet rendered luminous in blue against a black background. Some of the changing current of imagery is both poetic and funny; too bad some of it is merely cute. None of it need be done by Ms. Vishneva. In the final scene she wears a beaded dress/poncho/veil that spreads outward in different shapes as she spins. This is a nice modern descendant of the kind of dance theater that Loie Fuller initiated in the late 19th century, but it too would make the same impression with a far less remarkable dancer.

The central scene of "F.L.O.W." has Ms. Vishneva horizontal and seemingly nude on a mirrored slope. Now she is a dragonfly on the water's edge; now a child curling back into fetal shape above her own

twin; now one of those Cecil Beaton looking-glass photographs turned into dance; now Narcissus with his/her reflection. Though she never once rises to the vertical stance that is ballet's element, some of the movement shows off her extraordinary lusciousness. She has stretch within stretch, pliancy forever, and a quality of basking, playful luxuriance that powerfully recalls the Makarova of the 1970s (just as Ms. Vishneva's bloom and sweetness elsewhere recall Patricia McBride).

Act III, Dwight Roden's "Three Point Turn," is wall-to-wall neo-academic, pseudo-erotic cliché for three couples (Ms. Vishneva with Desmond Richardson, Maria Shevyakova with Mr. Lobukhin, and Ekaterina Ivannikova with Mr. Sergeev). Everything onstage — the high extensions, the pirouettes, the lunges, the lifts — is big, showy, fakey, with no contrasts in scale.

Everyone onstage dances like hell, and when we get to hell, it will be full of ballets like this. Its loud rock score, by David Rozenblatt, sounds like a refrigerator copulating with a hot tin roof.

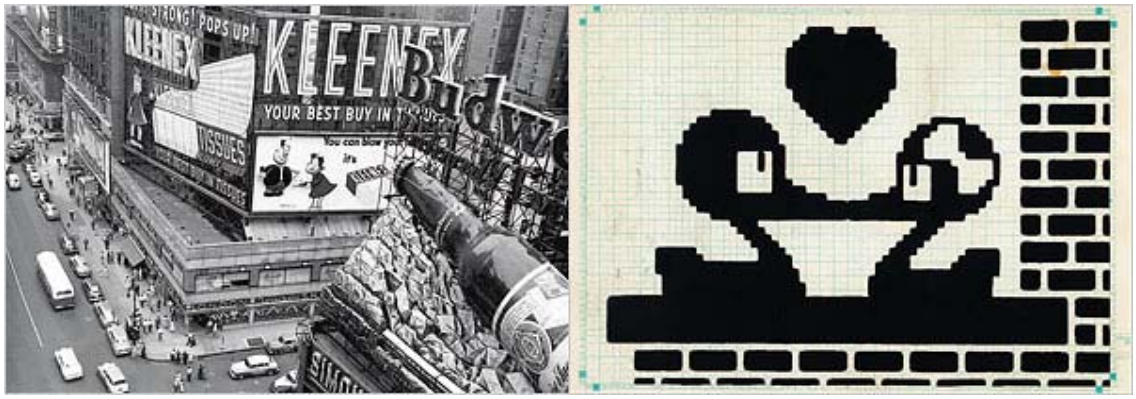
"Beauty in Motion" continues through Sunday at City Center, 131 West 55th Street, Manhattan; (212) 581-1212, citycenter.org.

http://www.nytimes.com/2008/02/23/arts/dance/23beau.html

A scene from "F.L.O.W. (For Love of Women)," by Moses Pendleton, and part of the program "Diana Vishneva: Beauty In Motion" at New York City Center.

Pretty Ugly

Reviews by STEVEN HELLER



Any aficionado of early Mad comics published during the first half of the 1950s, when Mad was still a riotous comic book and not yet a formatted magazine, will recognize the brilliantly perverse parody of a Life magazine cover featuring a portrait of a hideous girl next to the headline "Beautiful Girl of the Month Reads Mad." The artist who concocted this misshapen, bug-eyed, fang-toothed, pimply-faced, spaghetti-haired, pig-nosed monstrosity was Basil Wolverton (1909-78), a Mad mainstay who specialized in things ugly. He created Lena the Hyena, a character who appeared in Al Capp's "L'il Abner" and was known as "the ugliest woman in Lower Slobbovia." And he was the mastermind behind "Powerhouse Pepper," a mock-heroic melodrama, as well as covers for GJDRKZLXCBWQ Comics: A Gallery of Gooney Gags and DC Comics' Mad-like Plop! Always recognizable for unbridled grotesquerie, his art ran the gamut from political satire ("Candid Close-Ups: Hitler") to goofy science fiction ("Rocket Rider") to biblical illustrations (for a decade he wrote and illustrated the Bible story, serialized in The Plain Truth magazine, for the Worldwide Church of God). His epic in this last genre was a gory interpretation of Armageddon, complete with horrific atomic aftermaths. He did, however, also produce posters for Topps, the trading card company. While his penchant for extreme physical exaggeration may not have been to everyone's taste, through Mad he exercised incalculable influence on the history of comics and the perceptions of impressionable preteens, like me. "Gross" was and remains a generational code.

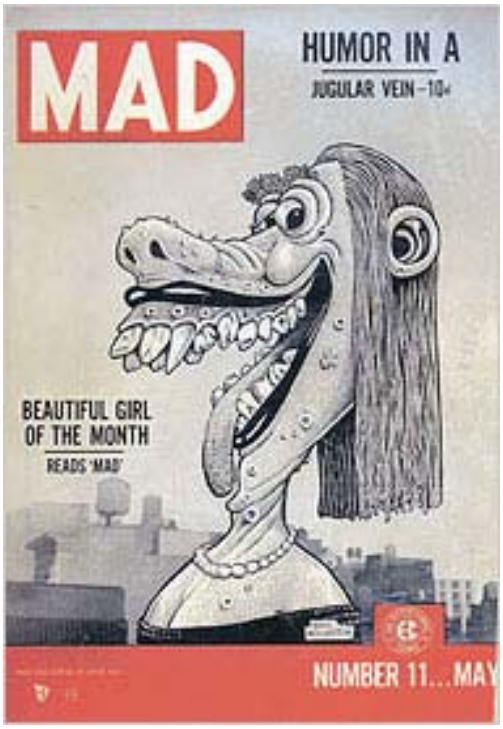
Wolverton's work predates by decades many of the more acerbic comics of the 60s underground commix era, including those of R. Crumb, and is revered by many contemporary comics artists for his graphic lunacy and his matchless facility with pen and ink. His influence is evident not only in Crumb's now canonized comics, but also in contemporary graphic novels by Drew Friedman, Gary Panter, Charles Burns and Peter Bagge. As the L.A. Weekly art critic Doug Harvey writes in the biographical essay in THE ORIGINAL ART OF BASIL WOLVERTON: From the Collection of Glenn Bray (Last Gasp/Grand Central, $35), "Artists from the world of 'fine' or 'high' art, such as ... Kenny Scharf, Peter Saul, Jim Nutt and many others, turned Wolverton's pop-culture monstrosities into museum-worthy artifacts." But he laments that until now Wolverton "has been deemed unworthy of the same treatment."

He was not included in the milestone 2005 "Masters of American Comics" exhibition (sponsored by the Hammer Museum and the Museum of Contemporary Art in Los Angeles), but some of those Wolverton directly influenced were represented. On the other hand, a half-dozen collections of his strips and drawings have been published since the late '80s. Still, he is less known today than other masters of the genre, so this book — made up of the comics artist Glenn Bray's collection of Wolverton's rare original art, some of it previously unpublished — provides welcome evidence of his range. Harvey argues that Wolverton was excluded from the pantheon because "his work has an exhilarating singularity of focus that comes close to inducing nausea" and is at times haunted by a nagging adolescence. But Harvey concludes, "If it makes your sister puke, it's done its job."

The Belgian artist Georges Remi (1907-83), best known as Hergé, creator of "The Adventures of Tintin," is more highly recognized than Wolverton in the comics world. His influence on contemporaries, including the Dutch comics artist Joost Swarte and the French-American illustrator Guy Billout, can be

seen in their use of elegant, simple outlines, stark colors and expressive gestures. But Tintin's impact on popular culture as a whole is still great, not just in Europe but in the United States, owing to books that reached the million sales mark in 1956 and to numerous products marketed today. There is even a restaurant in New York, Petite Abeille, that is decorated entirely in Tintin art.

Much has already been written about Hergé. And Tintin — the boy reporter who decides to wipe out the international opium trade in China and travels to the Soviet Union as well, engaging in dangerous adventures with assorted friends and foes like Snowy (his dog), Captain Haddock, the Thom(p)sons and Cuthbert Calculus — has become a franchise. But in THE ADVENTURES OF HERGÉ, CREATOR OF TINTIN (Last Gasp, $29.95), Michael Farr, formerly a reporter for Reuters and The Daily Telegraph, takes a closer look at this fundamentally private man, Hergé, himself a onetime newspaper journalist. The book is a stunning collection of artifacts, including pre-Tintin drawings, Tintin sketches, newspaper clippings, magazine and book covers (including some for the children's supplement Le Petit Vingtième, in which the comic strip originally appeared in 1929), pictures of puppets (originally created for animated cartoons) and personal photographs; much of the material was unearthed in the archives of the Studios Hergé, where the strip and its offshoots were produced in the later years. A chapter called "Oriental Attraction" reveals Hergé's great love of China and its strong influence on him, which comes through in much of the elemental graphic forms and the plots of his work, including books like "The Blue Lotus" and "Tintin in Tibet."



The amazing feat of creating and propagating the Tintin brand is certainly the focus of this rich illustrated biography, but Hergé was also an accomplished graphic designer and typographer who tried his hand at advertising. His bold pen-and-ink drawings, in the manner of woodcuts or linocuts, show a graphic side rarely seen. Likewise, his interest in abstraction, minimalism and Pop Art (all of which are curiously exhibited in his own work) suggests Hergé was not entirely content being a comics artist. Yet it was his greatest gift.

Every once in a while comics artists were hired to create cartoon images that appeared on electric signs, known as spectaculars, in Times Square. One such luminary was Otto Messmer, creator of Felix the Cat, whose sketches, corresponding to a grid of photoelectric cells in a nearby control room, were turned into what would now be called pixel-dot renderings of cats, mice and ducks. In the '30s and '40s, they were shown on an animation sign on Broadway. These were among the many "spectacular" lighting attractions that contributed to making Times Square an exciting spot for innovative and massive advertisements.

Most of the complex light extravaganzas were produced exclusively for the Great White Way, since there were few other places in the world either zoned for or physically capable of handling the mammoth signs and their high voltage. "The district's electric signs are the most original and memorable part of its streetscape and define it as surely as architecture has defined other public spaces," writes Darcy Tell, an editor at the Smithsonian Institution's Archives of American Art, in TIMES SQUARE SPECTACULAR: Lighting Up Broadway (Smithsonian/Collins, $34.95), a smartly illustrated book that captures the brilliance of the area and the designers who made it shine.

Actually, Times Square's storied light-show legacy depended on one man: Thomas Edison's engineer William J. Hammer was one of the first experts in electrical distribution systems and built the first large electric sign, illuminated at the 1882 Crystal Palace Exposition in London. More important, Hammer invented the commutator switch, or flasher, an automatic motor-driven device that allowed circuits to be

turned on and off in sequence. He also invented rheostats, which dimmed the lights. Tell says "Hammer's innovations opened the way for big animated signs," which of course became the stock in trade of Times Square.

Another pioneer, the businessman Oscar J. Gude, "tried to inject 'artistic' qualities into his billboards." He also fought what Tell calls the "sign wars," which pitted advertisers and civic-betterment groups against each other and ultimately determined whether Times Square would be a high cultural wellspring or a low commercial sinkhole. The result was somewhere in between.

One of the most innovative of the Times Square sign men was Douglas Leigh (1907-99), who prided himself on coming up with unheard-of ideas (leaving the technical aspects to his colleague Fred Kerwer). Drawing on various sources, including old toys, amusement parks, cartoons, stage shows and movies, Leigh developed increasingly elaborate kinetic animations, including, in 1938, the Four Roses whiskey spectacular, which revealed two long-stemmed roses repeatedly growing as the sign was illuminated.

In addition to other famous images, among them the Kleenex, Camel and Bond signs, this book is loaded with rare documentary photos of advertisements, movie marquees and other marvels of Times Square. For example, there's the White Rock ginger ale sign, which featured a clock that changed color every few seconds and lights that appeared to be water pouring from a fountain — a pretty grand illusion back in 1910.

A spectacular of a different kind is the trove of Art Deco architecture still standing in Havana. In the '20s, '30s and '40s, Havana absorbed and copied art moderne emanating from Paris and Berlin, and the American Streamline style was also influential there. The graphics, furniture, architectural ornament, and apartment and hotel buildings created using Deco mannerisms made Cuba one of the modernistic wonders of the world. Although Havana's '50s-era cars and other prerevolutionary artifacts have been thoroughly written about and photographed, there has not been much architectural documentation until now.

HAVANA DECO (Norton, $39.95), by the journalist Alejandro G. Alonso, the art historian Pedro Contreras and the photographer Martino Fagiuoli, is an eye-opening display of a not entirely lost Havana, where, judging from the beautiful images, some of the jewel-like structures have been preserved, if not always rehabilitated. In the chapter "Centro Habana," two apartment buildings, the Casa Suárez and the Edificio Colonial, have seen better days, whereas the Hotel Nacional's facade appears to have been meticulously maintained for its foreign clientele.

The book is organized according to district, but also thematically. A chapter titled "The Cemetery," with exquisite Deco mausoleums, follows the section called "Streamline," which includes structures that are more authentically in that style than are the Art Deco hotels and apartments of Miami Beach. But the most surprising sections are devoted to interiors, including extraordinary bathrooms in the mansion that once belonged to Countess Maria Luisa Gómez Mena and is today the Museum of Decorative Arts. The pièces de résistance are the lounges in the Cine-Teatro América, which rival, even surpass, the beautiful ones in Radio City Musical Hall. Until travel to Havana is more accessible, this book will whet the appetite of every Deco connoisseur.

http://www.nytimes.com/2008/02/24/books/review/Heller-t.html

Adobe Blurs Line Between PC and Web

By JOHN MARKOFF

SAN FRANCISCO — On sabbatical in 2001 from Macromedia, Kevin Lynch, a software developer, was frustrated that he could not get to his Web data when he was off the Internet and annoyed that he could not get to his PC data when he was traveling.

Why couldn't he have access to all his information, like movie schedules and word processing documents, in one place?

He hit upon an idea that he called "Kevincloud" and mocked up a quick demonstration of the idea for executives at Macromedia, a software development tools company. It took data stored on the Internet and used it interchangeably with information on a PC's hard drive. Kevincloud also blurred the line between Internet and PC applications.

Seven years later, his brainchild is about to come into focus on millions of PCs. On Monday, Mr. Lynch, who was recently named the chief technology officer at Adobe Systems, which bought Macromedia in 2005, will release the official version of AIR, a software development system that will power potentially tens of thousands of applications that merge the Internet and the PC, as well as blur the distinctions between PCs and new computing devices like smartphones.

Adobe sees AIR as a major advance that builds on its Flash multimedia software. Flash is the engine behind Web animations, e-commerce sites and many streaming videos. It is, the company says, the most ubiquitous software on earth, residing on almost all Internet-connected personal computers.

But most people may never know AIR is there. Applications will look and run the same whether the user is at his desk or his portable computer, and soon when using a mobile device or at an Internet kiosk.

Applications will increasingly be built with routine access to all the Web's information, and a user's files will be accessible whether at home or traveling.

AIR is intended to help software developers create applications that exist in part on a user's PC or smartphone and in part on servers reachable through the Internet.

To computer users, the applications will look like any others on their device, represented by an icon. The AIR applications can mimic the functions of a Web browser but do not require a Web browser to run.

The first commercial release of AIR takes place on Monday, but dozens of applications have been built around a test or beta version.

EBay offers an AIR-based application called eBay Desktop that gives its customers the power to buy wherever they are. Adobe uses AIR for Buzzword, an online word processing program. At Monday's introduction event in San Francisco, new hybrid applications from companies including Salesforce, FedEx, eBay, Nickelodeon, Nasdaq, AOL and The New York Times Company will be demonstrated.

Like Adobe's Flash software, AIR will be given away. The company makes its money selling software development kits to programmers.

Mr. Lynch and a rapidly growing number of industry executives and technologists believe that the model represents the future of computing.

Moreover, the move away from PC-based applications is likely to get a significant jump start in the coming weeks when Intel introduces its low-cost "Netbook" computer strategy, which is intended to unleash a new wave of inexpensive wireless connected mobile computers.

The new machines will have a relatively small amount of solid state disk storage capacity and will increasingly rely on data stored on Internet servers.

"There is a big cloud movement that is building an infrastructure that speaks directly to this kind of software and experience," said Sean M. Maloney, Intel's executive vice president.

Adobe faces stiff competition from a number of big and small companies with the same idea. Many small developers like OpenLazlo and Xcerion are creating "Web-top" or "Web operating systems" intended to move applications and data off the PC desktop and into the Internet through the Web browser.

Mozilla, the developer of the Firefox Web browser, has created a system known as Prism. Sun Microsystems introduced JavaFX this year, which is also aimed at blurring the Web-desktop line. Google is testing a system called Gears, which is intended to allow some Web services to work on computers that are not connected to the Internet.

Finally, there is Microsoft. It is pushing its competitor to Flash, called Silverlight. Three years ago, Microsoft hired one of Mr. Lynch's crucial software developers at Macromedia, Brad Becker, to help create it. Mr. Becker was a leading designer of the Flash programming language.

The blurring of Web and desktop applications and PC and phone applications is further encouraged by the cellphone industry's race to catch up with Apple's iPhone. The industry is focusing on smartphones, or what Sanjay K. Jha, the chief operating officer of Qualcomm, calls "pocketable computing."

"We need to deliver an experience that is like the PC desktop," he said. "At the same time, people are used to the Internet and you can't shortchange them."

Much software will have to be rewritten for the new devices, in what Mr. Lynch said is the most significant change for the software industry since the introduction in the 1980s of software that can be run

through clicking icons rather than typing in codes. This upheaval pits the world's largest software developer groups against one another in a battle for the new hybrid software applications. Industry analysts say there are now about 1.2 billion Internet-connected personal computers. Market researchers peg the number of smartphones sold in 2007 at 123 million, but that market is growing rapidly.

"There is a proliferation of platforms," Mr. Lynch said. "This is a battle for the hearts and minds of people who are building things."

The battle will largely pit Microsoft's 2.2 million .Net software developers against the more than one million Adobe Flash developers, who have until now developed principally for the Web, as well as a vast number of other Web-oriented designers who use open-source software development tools that are referred to as AJAX.

Microsoft executives said they thought the company would have an advantage because Silverlight has a more sophisticated security model. "Desktop integration is a mixed blessing. There is potentially a gaping security hole," said Microsoft's Mr. Becker. "We've learned at the school of hard knocks about security."

Microsoft's competitors challenge its intent and assert that its goal is retaining its desktop monopoly. "Microsoft is taking their desktop franchise and trying to move that franchise to the Web," said John Lilly, chief executive of Mozilla. He faults the design of Silverlight for being an island that is not truly integrated with the Internet.

"You get this rectangle in a Web browser and it can't interact with the rest of the Web," he said.

He said Mozilla's Prism offers a simple alternative to capitalize on the explosion of creative software development taking place on the Internet. "There are jillions of applications. A million more got launched today. The whole world is collaborating on this."

Up to now, it has been a low-level war between Microsoft and Adobe. Silverlight, for instance, got high marks from developers for its ability to handle high resolution video, but Adobe quickly upgraded Flash last year in response.

"We said, 'Let's put this in right now,' " Mr. Lynch said. With revenue last year of $3.16 billion, Adobe is large enough to fight Microsoft.

Adobe, the maker of Photoshop, Acrobat and other software, also has a strong reputation as a maker of tools for the creative class. "We're one of the best tool makers in the world," said Mr. Lynch, who worked on software design at MicroPro, the publishers of the Wordstar word processor, and at General Magic, an ill-fated effort to create what could be called a predecessor to today's smartphones, before joining Macromedia.

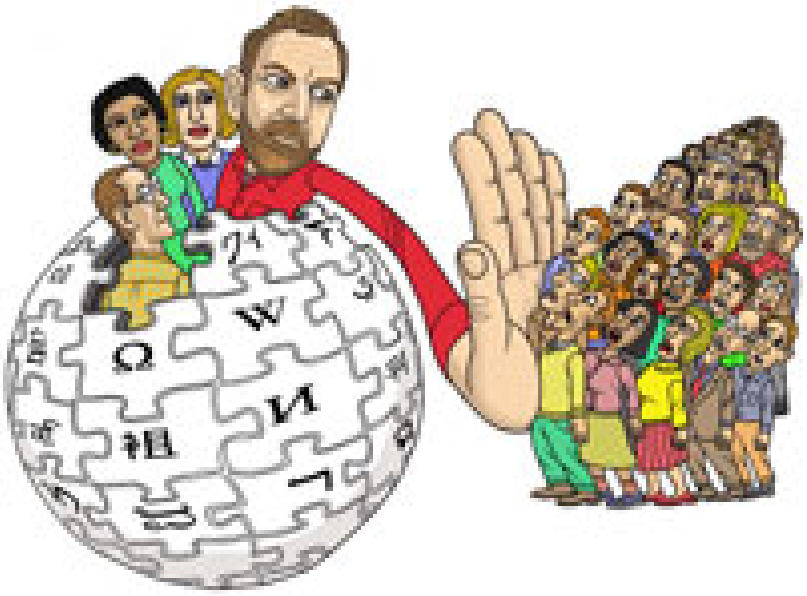
"Adobe's known for its designer tools, but they realize that development — for the browser, for the desktop, and for devices such as cellphones — is a huge growth market," said Steve Weiss, executive editor at O'Reilly Media, a technology publishing firm.

http://www.nytimes.com/2008/02/25/technology/25adobe.html?_r=1&th&emc=th&oref=slogin

The Wisdom of the Chaperones

Digg, Wikipedia, and the myth of Web 2.0 democracy.

By Chris Wilson
Posted Friday, Feb. 22, 2008, at 6:11 PM ET



It's getting harder to be a Wikipedia-hater. The user-generated and -edited online encyclopedia—which doesn't even require contributors to register—somehow holds its own against the *Encyclopedia Britannica* in accuracy, a *Nature* study concluded, and has many times more entries. But even though people are catching up to the idea that Wikipedia is a force for good, there are still huge misconceptions about what makes the encyclopedia tick. While Wikipedia does show the creative potential of online communities, it's a mistake to assume the site owes its success to the wisdom of the online crowd.

Social-media sites like Wikipedia and Digg are celebrated as shining examples of Web democracy, places built by millions of Web users who all act as writers, editors, and voters. In reality, a small number of people are running the show. According to researchers in Palo Alto, 1 percent of Wikipedia users are responsible for about half of the site's edits. The site also deploys bots—supervised by a special caste of devoted users—that help standardize format, prevent vandalism, and root out folks who flood the site with obscenities. This is not the wisdom of the crowd. This is the wisdom of the chaperones.

The same undemocratic underpinnings of Web 2.0 are on display at Digg.com. Digg is a social-bookmarking hub where people submit stories and rate others' submissions; the most popular links gravitate to the site's front page. The site's founders have never hidden that they use a "secret sauce"—a confidential algorithm that's tweaked regularly—to determine which submissions make it to the front page. Historically, this algorithm appears to have favored the site's most active participants. Last year, the top 100 Diggers submitted 44 percent of the site's top stories. In 2006, they were responsible for 56 percent.It's hard to avoid the conclusion that Digg—a site meant to "collectively determine the value of content"—is largely run by 100 people. The influence of these members was particularly apparent last month. After Digg tweaked its secret sauce, top contributors noticed a decline in influence—fewer of their submissions became top stories. The super Diggers published an open letter of grievances and threatened to boycott the site. The changes in the algorithm, the Digg execs said, were meant to bring a more diverse set of stories to the site, and they begged for patience from the top Digg contributors. (Thus far, a shaky truce has endured.) The takeaway: Digg's brass believe that the site, which purports to be the product of a broad-based community, will cease to run smoothly if a microscopic percentage of its user base stops participating.

At both Digg and Wikipedia, small groups of users have outsized authority. In the case of Wikipedia, this authority is both organic and institutionalized. A small segment of highly active users author the majority of the site's content; there are also elected site administrators who have the power to protect pages, block the IP addresses of problem users, and otherwise regulate Wikipedia's operations. At Digg, active users have more of a de facto authority over the site's goings-on (though there are persistent rumors that the site has "secret moderators" who delete content). But officially speaking, while the site's algorithm seems to favor devoted users, no individual Digger has the power to unilaterally delete a post. While both sites effectively function as oligarchies, they are still democratic in one important sense. Digg and Wikipedia's elite users aren't chosen by a corporate board of directors or by divine right. They're the people who participate the most. Despite the fairy tales about the participatory culture of Web 2.0, direct democracy isn't feasible at the scale on which these sites operate. Still, it's curious to note that these sites seem to have the hierarchical structure of the old-guard institutions they've sought to supplant.

This top-heavy structure of social-media sites isn't news to researchers and technophiles. Wikipedia co-founder Jimmy Wales has acknowledged that what he expected to be an "80-20" rule—a system where 20 percent of people control 80 percent of the resources—in fact understates the site's top-heaviness. Palo Alto Research Center's Ed Chi, the scientist who determined that 1 percent of Wikipedians author half of the content, told me he originally hypothesized that the site's most energetic editors were acting as custodians. Chi guessed that these users mostly cleaned up after the people who provided the bulk of the encyclopedia's facts. In reality, he found the opposite was true (PDF). People who've made more than 10,000 edits add nearly twice as many words to Wikipedia as they delete. By contrast, those who've made fewer than 100 edits are the only group that deletes more words than it adds. A small number of people are writing the articles, it seems, while less-frequent users are given the tasks of error correction and typo fixing.This isn't the kind of people-working-together image that Digg and Wikipedia promote. Of course, Wikipedia requires some level of administration—otherwise, the site would crash under the weight of additions and deletions to the George W. Bush page. But that doesn't explain the kind of territorialism—the authorial domination by 1 percent of contributors—on the site's pages. Is this a necessary artifact of operating an open-access site? Or is it possible to build a clearinghouse for high-quality, user-generated content without giving too much power to elite users and secret sauces? The moderation system at the tech blog Slashdot is perhaps the best example on the Web of a middle way. Slashdot, which draws on links submitted by readers, ordains active contributors with limited power to regulate comments and contributions from other users. Compared with Wikipedia, which requires supreme devotion from its smaller core of administrators, Slashdot makes it easy to become a moderator. Giving large numbers of people small chunks of responsibility has proven effective in eliminating trolls and flame wars in the comment section. Still, the authority any one moderator commands is small, and the site's official poobahs maintain control over which stories are featured at the top of the site. "These things are far from utopian," says founder Rob Malda, aka CmdrTaco. "Slashdot tends to have a lot of 'Microsoft does something bad' stories. If I let the community run the whole thing, we'd have a *lot* more. But I don't want Slashdot to be the 'Microsoft Sucks' page. It's just one of many subjects." Another compelling model comes from Helium.com, a Wikipedia-like repository of articles and editorials. Its founder, Silicon Valley veteran Mark Ranalli, compares his site to a capitalist version of Wikipedia. On Helium, contributors compete to have the top-ranked article on a given subject. As soon as you write an article, you're invited to pick your favorite of two articles on a similar subject. Requiring someone to write before he or she rates creates a more stable system: Rather than create a caste of creators and a caste of peons, Helium encourages everyone to do everything. Every model has its drawbacks. Unlike Wikipedia, Helium doesn't lend itself to comprehensive articles drawing on many sources. Nor is Slashdot free of moron commenters, though its quotient is significantly lower than on any unmoderated message board. It's refreshing, though, that these sites acknowledge that Web 2.0 isn't a fairy-tale democracy without letting themselves become dictatorships. Digg and Wikipedia would do well to stop pretending they're operated by the many and start thinking of ways to rein in the power of the few. ****** Got a better model for how to make democracy work on the Web? Let me know about it. (E-mail may be quoted by name unless the writer stipulates otherwise.)

*Chris Wilson is an editorial assistant at **Slate** in Washington, D.C.*

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Gone in an instant ...

This week Polaroid announced that it is to stop manufacturing its legendary film. Geoff Dyer celebrates the passing of a 60-year-old art form with this collection of photographs that were found discarded in bins, puddles and other unlikely places

Geoff Dyer
Thursday February 21, 2008

guardian.co.uk

These pictures were all found - on the street, in bins, or on trains - and submitted to the magazine Found that collects and publishes such things. There was a time - perhaps before the pictures themselves came into existence - when the people or scenes in them meant something to whoever took them. Then, possibly within moments of the image forming ("Hang on guys, that one didn't quite work, let's try another"), possibly years later, when some of the people had grown old or died, they became irrelevant. They were still memories, but no one knew whose - or why they were once thought important: memories without a rememberer. Homeless. Ghosts.

The locations of their rediscovery have been precisely catalogued. It is like a random archaeology of the not-too-distant past, the almost-present. Like pennies in a sofa, lost photos are always turning up - but, being Polaroids, these have an aura of their own because each picture is unique, a one-off. There was never a negative from which duplicate prints could be made.

This aura is especially strong just now, following the announcement that Polaroid is to stop making film. The medium itself is poised to become a thing of the past, a memory. Particular technologies do not just become associated with certain periods and places; they are an integral part of a particular period and how it is experienced. Once the Polaroid is no longer a recording option, these images are set to become pictures not just of the past but of, and from, another era. (One of the defining characteristics of the digital era is the way that the distinction between an original and its duplicate is meaningless.)

The Polaroid era lasted for approximately 60 years. The story has it that when Edwin Land, the then head of the Polaroid Corporation, was on vacation in New Mexico in 1944, his daughter wanted to know why

she had to wait to see the photographs he had just taken. Within an hour Land had sketched the means of

satisfying this filial whim and, by 1947, an instant sepia film and camera were on the market. Thereafter, his company became synonymous with this one aspect of its operations.

The peculiar colour saturation of the Polaroid appears as memory-drenched as Super-8 film but, in the case of the former, these memories are generated instantly . What could be simpler - or more wondrous? You see something you like the look of, press a button and, a few minutes later, a faithful record of that thing begins to take shape in your hands, before your eyes. And yet, as Walker Evans, the great American photographer most famous for documenting the Great Depression, discovered, it was possible to imbue this most anonymous of gadgets - "a toy", as he first thought of it - with the signature of a great artist. Strangely, the external world with its turquoise skies had never looked so solipsistic, as lucidly dreamlike as it did in the thousands of Polaroids made by Evans in 1974, the year before his death.

When looking at the places and people in these pictures - the jolly French version of the Last Supper, for example - a curious reversal occurs. They make us, as viewers, feel like ghosts. Each of them seems to be silently and visibly implying: look, this is what the world would have looked like even if you had never existed. They are there . We are the ones condemned never to enter the frame; the ones doing the haunting

http://arts.guardian.co.uk/art/photography/story/0,,2258736,00.html?gusrc=rss&feed=40

SPIEGEL INTERVIEW WITH NETSCAPE FOUNDER MARC ANDREESSEN

'The Internet Is Becoming the Main Medium'

Marc Andreessen, the 36-year-old co-founder of Netscape, discusses Microsoft's attack on Yahoo, the latest trends in the Web business and the search for the next big thing in a SPIEGEL interview.

SPIEGEL: Mr. Andreessen, does the idea of a huge Microsoft-Yahoo firm scare you?

Andreessen: No, not at all. If the merger happens, it will require two years of integration. In the end, it will be a combined company that will do some things good and other thinmgs badly. In the meantime, there is a tremendous amount of work to be done by other companies like us. And that means there will be lots of opportunities.

SPIEGEL: Do you think that would leave only two major players on the Internet -- Microsoft-Yahoo and Google -- who would dominate the industry?

Andreessen: It is totally impossible to predict the consequences of this merger, or to predict the position of the companies involved. And it is impossible to predict what start-ups will emerge during that time. And that is precisely what makes this industry so much fun.

SPIEGEL: What went wrong at Yahoo? Why did they keep losing market share to Google and thus allow themselves to become a takeover target?

Andreessen: One of the consequences of being a public company is that stuff like this happens. I started two companies and took them public, but my third, Ning, is not public. That's one of the nice things about my company, and I think Facebook is also enjoying this, is that nobody can attack you in that way. You also get to focus completely on what you are doing -- there are no earnings calls and no hostile takeovers. I enjoy not being a public company.

SPIEGEL: What trends have caused this sort of billion-dollar poker game in your industry?

Andreessen: First of all, the Internet is becoming real now in a way it has never been before. It's becoming the main medium in which consumers engage to get information and to communicate. You can

see this happening in advertising, you can see it happening in telecom, video with YouTube, with music, with newspapers and magazines. It is all shifting *en masse*, and all consumers are basically moving over to the Internet. We all talked about it in the 1990s, but it didn't happen then. Those were just experiments. But now it is really happening.

SPIEGEL: The amount of offline advertising is still much greater than the amount of online advertising.

Andreessen: You know that's going to migrate in the next five to 10 years. The big companies -- Google, Microsoft and Yahoo -- all have important roles to play in that transition. They are going to benefit a lot from it. But I also think there is a whole new generation of start-ups that are going to benefit from it.

SPIEGEL: But who is on to the next big thing? News Corp. bought MySpace, Google has invested in AOL, Microsoft purchased Facebook shares and is now fighting to acquire Yahoo. It looks like the pie will soon be cut up and distributed.

Andreesssen: No! If anything, I think this rate of change is accelerating. TV and the press have always functioned according to the same sets of rules and technical standards. But the Internet is based on software. And anybody can write a new piece of software on the Internet that years later a billion people are using. My theory is: Every year there is a new killer app. One year it's Ebay, the next year it's Craigslist, then it's Napster, then Paypal, YouTube, Facebook, MySpace and so on. I have invested in a whole series of start-ups that are all candidates to be one of these new big things -- take Digg, for example ...

SPIEGEL: ... an information portal in which editors are replaced by users who vote on articles, videos, podcasts and any other form of digital content to determine the placement of the news offerings on Digg's homepage.

Andreessen: Maybe in five years that will be the way we all are getting our news. It's certainly possible, but maybe not. This continuous mutation and evolution basically means: I don't think there is a stable state. I don't think there is a point in time where we will be able to say: Okay, Google does this, Microsoft does that. In the past, when we spoke of TV in the US, we always had CBS, NBC and ABC. And the press was comprised of the *New York Times*, *Washington Post* and *Los Angeles Times*. I think those days are over.

SPIEGEL: And users will be creating all that content by themselves, as professional entertainment and classical journalism lose their significance?

Andreessen: We have a saying -- that and $3 will get you a cup of coffee at Starbucks. Newspapers with declining circulations can complain all they want about their readers and even say they have no taste. But you will still go out of business over time. A newspaper is not a public trust -- it has a business model that either works or it doesn't.

SPIEGEL: Well, it's not quite that simple. In truth, all the major media brands are on the Web, and many have far more readers and far greater revenues than a site like digg.com.

Andreessen: Take the New York Times. They are slow and they are in denial. After 15 years of the Internet, their online division -- though it has been very aggressive and well run compared to its peers -- still represents only about 10 percent of the company's total revenue. And it's not enough. The core of the business is collapsing. What's going to happen is that print subscriptions will decline to a point where it's no longer economically feasible to keep the printing plants operating. They will be shut down. So will the distribution networks. When that happens, the only thing left will be revenues from the online divisions. That won't be enough to cover newsroom costs. There is no way that they have a transition strategy from point A to point B.

SPIEGEL: What would you do differently?

Andreessen: Well, if the newspaper companies all self-destruct because they have failed to come to grips with this transition, then that's their problem. The people who made horse carriages were not the ones who started car companies. But here's the point: There is an enormous market demand for information. It just has to be fulfilled in a way that fits with the technology of our times. It is also going to open up a lot of opportunities for a new generation of media companies, usually born on the Internet. Right now they are popping up all over the place -- like Talking Points Memo, a political blog from the left that is a bit of a throwback to pre-World War II journalism, when newspapers were expected to be partisan. None of them are huge, but that's how an industry gets created. We may be sitting here in 10 years and see major news organizations born out of experiements that are happening right now that have nothing to do with CNN.

SPIEGEL: Your youngest company, Ning, is a catchment basin for social networks. Users have created networks for fans of raw vegetables, baseball players or even Madonna fans. Aren't you a bit late to the starting gate?

Andreessen: MySpace and Facebook are doing great -- both are growing incredibly fast. But they are still largely walled garden concepts. We take the opposite position, which is to say: Get crazy, create whatever you want. There are tens of millions of people out there who are getting familiar with the concept of social networks. At some point they are going to want their own thing. And that's where we come in. Our site is just growing and compounding right now. For every person that joins a network, two more people will come in. A thousand users will become 3,000 users, 3,000 turns into 9,000 and so on. Our servers are just counting away tic, tic, tic.

SPIEGEL: Netscape's 1995 public offering was a smashing success. You were 24 at the time and earned millions of dollars. Ning is tiny by comparison. Why do you keep starting over from scratch?

Andreessen: I love Silicon Valley. I feel so lucky to be here. I grew up in the Midwest, where there are hardly any start-ups. This here is a magical place. Here a person with no business experience like me can create a new technology, start a company, watch it grow and become successful. It's just amazing.

SPIEGEL: Around two years ago, Web 2.0 became the new Internet catchphrase. In your opinion, what will Web 3.0 look like?

Andreessen: These are all empty expressions that attempt to group things. The Internet has always been, and always will be, a magic box. If somebody shows up and says he wants to start a Web 2.0 business, I say, "next, please!" Because he doesn't have a strong idea about what it is he is doing and he has no clear business model.

SPIEGEL: Around nine years ago, AOL paid billions of dollars for the Netscape browser that you developed. In early March, support for the browser will be permanently suspended. Are you disappointed?

Andreessen: It was really shut down in 1999! And from 1999 through 2008 it was a rolling catastrophe. It was part of the rolling catastrophe of AOL Time Warner.

SPIEGEL: The World Wide Web has existed for some 15 years now. Has any aspect of it become overwhelming?

Andreessen: Information. I certainly have too much information. It drives me bananas. that's why I have gone on an information diet.

Interview conducted by Frank Hornig.

http://www.spiegel.de/international/business/0,1518,druck-536087,00.html

Assessment Changes Everything

By Gerald Graff

When I served on college admissions committees in the 1990s, a phrase that kept coming up was "the best students," in comments like "We've got to get the best students" or "Rival College X down the road is beating us out for the best students." I came to think of the mentality behind these comments as the Best-Student Fetish, a symptom of the increasingly obsessive competition among colleges for the cream of the high school senior crop. The more I thought about the Best-Student Fetish, the more perverse its logic seemed: It is as if the ultimate dream of college admissions is to recruit a student body that is already so well educated that it hardly needs any instruction! Sitting in admissions committee meetings, it was all I could do not to ask, "Hey, why don't we recruit bad students and see if we can actually teach them something?"

The experience helped me realize that, despite our undoubtedly sincere efforts to make higher education democratic, the top colleges and universities and their wannabe imitators are still set up for the students who are already the best educated rather than for the struggling majority that needs us most. Perhaps we got so used to the split between intellectual haves and have-nots among undergraduates that we concluded that it's inevitable and there's nothing we can do about it. This would explain why, in the hundreds of faculty meetings I must have attended in my 40-plus years of teaching, I have never heard anyone ask how our department or college was doing at educating all its students.

That's why I've become a believer in the potential of learning outcomes assessment, which challenges the elitism of the Best-Student Fetish by asking us to articulate what we expect our students to learn — all of them, not just the high-achieving few — and then holds us accountable for helping them learn it. Whereas the Best-Student Fetish asks who the great students are before we see them, outcomes assessment changes the question to what students can do as a result of seeing us.

Furthermore, once we start asking whether our students are learning what we want them to learn, we realize pretty quickly that making this happen is necessarily a team effort, requiring us to think about our teaching not in isolation but in relation to that of our colleagues. The problem is not that we don't value good teaching, as our critics still often charge, but that we often share our culture's romanticized picture of teaching as a virtuoso performance by soloists, as seen in films like *Dead Poets Society, Dangerous Minds,* and *Freedom Writers.* According to this individualist conception of teaching — call it the Great-Teacher Fetish, the counterpart of the Best-Student Fetish — good education simply equals good teaching. This equation is pervasive in current discussions of school reform, where it is taken as a given that the main factor in improving schooling is recruiting more good teachers.

In fact, this way of thinking is a recipe for bad education. According to Richard F. Elmore's research on primary and secondary education, in failing schools the governing philosophy is often, Find the most talented teachers and liberate them "from the bonds of bureaucracy," which are often seen as infringements on academic freedom. (In the movies, the great teacher always works her classroom magic against the background of an inept, venal, or corrupt school bureaucracy.) Elmore reports that the pattern of teachers "working in isolated classrooms" is common in unsuccessful schools, where everything depends on the teachers' individual talents "with little guidance or support from the organizations that surround them." Conversely, as Elmore argues, successful schools tend to stress cooperation among teachers over individual teaching brilliance, though cooperation itself enhances individual teaching.

For all its obvious value, excellent teaching in itself doesn't guarantee good education. The courses taken in a semester by a high school or college student may all be wonderfully well taught by whatever criterion we want to use, but if the content of the courses is unrelated or contradictory, the educational effect can be incoherence and confusion. As students in today's intellectually diverse university go from course to course, they are inevitably exposed to starkly mixed messages. Though this exposure is often energizing for the high achievers who possess some already developed skill at synthesizing clashing ideas and turning them into coherent conversations, the struggling majority typically resort to giving successive instructors whatever they seem to want even if it is contradictory. Giving instructors what they want (assuming students can figure out what that is) replaces internalizing the norms of the intellectual community — that is, education.

The freedom that is granted us in higher education (at least at high-end and middle-rank institutions) to teach our courses as we please should have always carried an obligation to correlate and align our courses to prevent students from being bombarded with confusing disjunctions and mixed messages. Outcomes assessment holds us to that obligation by making us operate not as classroom divas and prima donnas but as team players who collaborate with our colleagues to produce a genuine program. We all use the P-word glibly, as in "our writing program" or "our literature program," but we have not earned the right to the word if it denotes only a collection of isolated courses, however individually excellent each may be.

By bringing us out from behind the walls of our classrooms, outcomes assessment deprivatizes teaching, making it not only less of a solo performance but more of a public activity. To be sure, with such increased public visibility may come greater vulnerability: Though it is students whose learning is evaluated in outcomes assessment, it is ultimately the faculty whose performance is put in the spotlight. If we have nothing to hide, however, then less secrecy and greater transparency in our classroom practices should work in our favor. At a time when attracting greater financial support for higher education increasingly depends on our ability to demonstrate the value of our work to wider publics, anything that makes teaching more visible and less of a black box figures to be in our interest. Giving teaching a more public face should help humanists doing cutting-edge work refute the widespread stereotype of them as tenured radicals who rule over their classes with iron fists. But it should also help humanists more generally to clarify to a wider public the critical reading and thinking competencies we stand for and to show that those competencies are indispensable enough to the workplace and democratic citizenship to merit greater investment.

But of course the critics of outcomes assessment are far less sanguine than I am in the face of the conservative politics they see driving it. In a talk delivered at our Modern Language Association "Outcomes Assessment" session, Michael Bennett, presenting what he called "the radical take on learning outcomes assessment," said this position "can be summarized in one word: resist!" Bennett argued that the push for outcomes assessment must be seen in the context of the increasing privatization of higher education, the co-optation of accreditation by the for-profit educational sector, and the attempt to force colleges to accept a version of the No Child Left Behind law in the schools. As Bennett put it:

"I see the focus on outcomes assessment as a dodge from the real problems with the American educational system: that it is embedded in an inequitable and violent socioeconomic system. The kind of policies that would truly help the students with whom I work are not more hearings, campus visits, and testing but adequate funding for secondary education; child care; a living wage; debt relief or, better yet, free universal postsecondary education; an adequately compensated academic workforce exercising free inquiry and building an educational community; and universal health care."

Bennett is certainly right that many of the problems of American education — including the so-called achievement gap between students from rich and poor backgrounds — are rooted in economic inequality and that more adequate funding and social services would do much to alleviate these problems. But to see outcomes assessment as merely a conservative dodge designed to distract everyone from structural inequality ignores the ways our own pedagogical and curricular practices contribute to the achievement gap. Though it calls itself "radical," this view is remarkably complacent in its suggestion that nothing in our house needs to change.

Though Bennett and other critics believe that assessment is an invention of recent conservatives that is being imposed on education from the outside, the truth is that assessment originated from within the educational community itself in the early 1990s, well before conservative efforts to co-opt it. I recall attending my first assessment conference in 1991 and noting the considerable buzz about assessment at meetings of organizations like the Association of American Colleges and Universities. The original motivations of assessment lie in legitimate progressive efforts to reform higher education from within, by judging colleges according to what their students learn rather than by their elite pedigrees.

But outcomes assessment can be used in undemocratic ways, and educators do need to take Bennett's concerns seriously. We should scrutinize the standards used in assessment, how these standards are determined and applied (and with what degree of input from faculties), and how assessment results are used. Rather than reject assessment and circle the wagons, however, we should actively involve ourselves in the process, not only to shape and direct it as much as possible but to avoid ceding it by

default to those who would misuse it. Had we been assessing outcomes all along in the normal course of our work, I doubt that the legislators and privatizers could have rushed in to fill the vacuum we created.

As David Bartholomae observes, "We make a huge mistake if we don't try to articulate more publicly what it is we value in intellectual work. We do this routinely for our students — so it should not be difficult to find the language we need to speak to parents and legislators." If we do not try to find that public language but argue instead that we are not accountable to those parents and legislators, we will only confirm what our cynical detractors say about us, that our real aim is to keep the secrets of our intellectual club to ourselves. By asking us to spell out those secrets and measuring our success in opening them to all, outcomes assessment helps make democratic education a reality.

Gerald Graff is professor of English at the University of Illinois at Chicago and president of the Modern Language Association. This essay is adapted from a paper he delivered in December at the MLA annual meeting, a version of which appears on the MLA's Web site and is reproduced here with the association's permission. Among Graff's books are *Professing Literature, Beyond the Culture Wars* and *Clueless in Academe: How School Obscures the Life of the Mind.*

The original story and user comments can be viewed online at http://insidehighered.com/views/2008/02/21/graff.

Book Lust

AP / Paul Sakuma

Every now and then, someone who is brilliant says something stupid — often the result of spending too much time riding a jet stream of high praise. Steve Jobs, the co-founder and chief executive of Apple Inc., did such a thing last month when he all but declared the death of reading.

Asked about Kindle, the electronic book reader from Amazon.com, Jobs was dismissive. "It doesn't matter how good or bad the product is," he told John Markoff of The Times, "the fact is that people don't read anymore. Forty percent of the people in the U.S. read one book or less last year."

This is nonsense on several levels. But before we get to reading, let's stipulate that Jobs is deserving of his 2007 ranking by Fortune Magazine as the most powerful person in business. Anyone who can cause revolutions in five industries, as Fortune noted, is a titan — capable of touching a billion lives.

His life story is inspiring. An adopted child, he drops out of Reed College in Portland, Ore., but remembers the calligraphy classes when he designs the typography for the Macintosh. Gets rich. Gets fired. Gets cancer. Survives all three. Takes acid, wanders around India, dates exotic older women. Marries. Has kids. Loves the Beatles, and cites their creative tension as a business model. Gives great commencement speech at Stanford, concluding: "Your time is limited, so don't waste it living someone else's life."

The Mac, Pixar, the iPhone, the iPod, iTunes. This stuff is cool. Lighter than air. iGetit. But it's just product, dude.

Reading is something else, an engagement of the imagination with life experience. It's fad-resistant, precisely because human beings are hard-wired for story, and intrinsically curious. Reading is not about product.

For most of my lifetime, I've heard that reading is dead. In that time, disco has died, drive-in movies have nearly died, and something called The Clapper has come and gone through bedrooms across the nation.

But reading? This year, about 400 million books will be sold in the United States. Overall, business is up 1 percent — not bad, in a rough economy, for a $15 billion industry still populated by people whose idea of how to sell books dates to Bartleby the Scrivener.

Next year, business may be down, and several publishers may merge, and certainly more of the poor, beloved independent bookstores will cling to life support. Steve Jobs will stroll into a room filled with breathless acolytes and pull a must-have trick from his bag. We'll oohh and ahhhh about it, then go back to lives where a good book still holds more power than anything with a screen. Power to transport the reader to another world. Power to get inside somebody's else mind, to live their story, to be moved.

Yes, the act of reading takes some effort, unlike the passive act of using the products Jobs has created, which involves little more than directing eyeballs to a flat patch or putting a plug into the ear. True, reading is down, somewhat, from 1992, especially reading of literature. So what? People are eating fewer vegetables than they used to – or should – but that doesn't mean carrots have no future.

When Jobs cited the 40-percent-who-don't-read figure, he was no doubt referring to a hand-wringing and possibly erroneous 2004 study by the National Endowment for the Arts. "This report documents a national crisis," the chairman, Dana Gioia, said at the time. Message from the cultural elite: read, you morons, and eat your spinach while you're at it!

Last year, a survey for the Associated Press found that a much smaller number — 27 percent — had not read a book lately, which means nearly three-in-four have read a book. Steve Jobs may be many things – maestro, visionary, demi-god – but he apparently isn't a careful reader of certain market reports.

The more compelling statistic was rarely mentioned in news accounts of the A.P. story: the survey found that another 27 percent of Americans had read 15 or more books a year. That report documents a national celebration.

Most companies would kill for a market like that – more than one-fourth of the world's biggest consumer market buying 15 or more of its items a year. And half the population bought nearly 6 books a year. If only Apple were so lucky. The latest Harry Potter book sold 9 million copies in its first 24 hours – in English. "The DaVinci Code," a story of ideas even with its wooden characters and absurd plotting, has sold more than 60 million copies.

By contrast, Apple reported selling a piddling 3.7 million of the much-hyped iPhones through 2007. Is the iPhone dead? Of course not. But what should be dead are foolish statements about how human nature itself has changed because of some new diversion for our thumbs.

Jobs was prompted by the excitement over Kindle, the $399 electronic book reader that shows signs of being a blockbuster for Amazon.com; demand is much higher than supply, according to the company.

Paper or plastic, it doesn't matter what form the book takes. What is timeless, Steve, is story, and that's why people will never stop reading. I loved Sara Rimer's piece in The Times about how immigrant children were taking to "The Great Gatsby," the perfect novel about the tragic side of the American Dream.

Our teenage son put his text-messaging aside when he discovered "Friday Night Lights," by H.G. Bissinger, and "Hate Mail from Cheerleaders," a collection of Rick Reilly's spot-on sports columns. Those were his gateway drugs. He's moved on to the Tobias Wolff memoir, "This Boy's Life," and "Seabiscuit," by Laura Hillenbrand. He even sets aside his iPod when he reads.

I look forward to a first-rate biography of Steve Jobs, an American original. His life – what a story! I'd read about it any day, in any form, long after the iStuff is forgotten.

http://egan.blogs.nytimes.com/2008/02/20/book-lust/index.html

Antarctic glaciers surge to ocean

By Martin Redfern
Rothera Research Station, Antarctica

UK scientists working in Antarctica have found some of the clearest evidence yet of instabilities in the ice of part of West Antarctica.

If the trend continues, they say, it could lead to a significant rise in global sea level.

The new evidence comes from a group of glaciers covering an area the size of Texas, in a remote and seldom visited part of West Antarctica.

The "rivers of ice" have surged sharply in speed towards the ocean.

David Vaughan, of the British Antarctic Survey, explained: "It has been called the weak underbelly of the West Antarctic Ice Sheet, and the reason for that is that this is the area where the bed beneath the ice sheet dips down steepest towards the interior.

"If there is a feedback mechanism to make the ice sheet unstable, it will be most unstable in this region."

There is good reason to be concerned.

Satellite measurements have shown that three huge glaciers here have been speeding up for more than a decade.

The biggest of the glaciers, the Pine Island Glacier, is causing the most concern.

Inhospitable conditions

Julian Scott has just returned from there. He told the BBC: "This is a very important glacier; it's putting more ice into the sea than any other glacier in Antarctica.

"It's a couple of kilometres thick, its 30km wide and it's moving at 3.5km per year, so it's putting a lot of ice into the ocean."

It is a very remote and inhospitable region. It was visited briefly in 1961 by American scientists but no one had returned until this season when Julian Scott and Rob Bingham and colleagues from the British Antarctic survey spent 97 days camping on the flat, white ice.

At times, the temperature got down to minus 30C and strong winds made work impossible.

At one point, the scientists were confined to their tent continuously for eight days.

"The wind really makes the way you feel incredibly colder, so just motivating yourself to go out in the wind is a really big deal," Rob Bingham told BBC News.

When the weather improved, the researchers spent most of their time driving skidoos across the flat, featureless ice.

"We drove skidoos over it for something like 2,500km each and we didn't see a single piece of topography."

Long drag

Rob Bingham was towing a radar on a 100m-long line and detecting reflections from within the ice using a receiver another 100m behind that.

The signals are revealing ancient flow lines in the ice. The hope is to reconstruct how it moved in the past.

Julian Scott was performing seismic studies, using pressurised hot water to drill holes 20m or so into the ice and place explosive charges in them. He used arrays of geophones strung out across the ice to detect reflections, looking, among other things, for signs of soft sediments beneath the ice that might be lubricating its flow.

He also placed recorders linked to the global positioning system (GPS) satellites on the ice to track the glacier's motion, recording its position every 10 seconds.

Throughout the 1990s, according to satellite measurements, the glacier was accelerating by around 1% a year. Julian Scott's sensational finding this season is that it now seems to have accelerated by 7% in a single season, sending more and more ice into the ocean.

"The measurements from last season seem to show an incredible acceleration, a rate of up to 7%. That is far greater than the accelerations they were getting excited about in the 1990s."

The reason does not seem to be warming in the surrounding air.

One possible culprit could be a deep ocean current that is channelled onto the continental shelf close to the mouth of the glacier. There is not much sea ice to protect it from the warm water, which seems to be undercutting the ice and lubricating its flow.

Ongoing monitoring

Julian Scott, however, thinks there may be other forces at work as well.

Much higher up the course of the glacier there is evidence of a volcano that erupted through the ice about 2,000 years ago and the whole region could be volcanically active, releasing geothermal heat to melt the base of the ice and help its slide towards the sea.

David Vaughan believes that the risk of a major collapse of this section of the West Antarctic ice sheet should be taken seriously.

"There has been the expectation that this could be a vulnerable area," he said.

"Now we have the data to show that this is the area that is changing. So the two things coinciding are actually quite worrying."

The big question now is whether what has been recorded is an exceptional surge or whether it heralds a major collapse of the ice. Julian Scott hopes to find out.

"It is extraordinary and we've left a GPS there over winter to see if it is going to continue this trend."

If the glacier does continue to surge and discharge most of it ice into the sea, say the researchers, the Pine Island Glacier alone could raise global sea level by 25cm.

That might take decades or a century, but neighbouring glaciers are accelerating too and if the entire region were to lose its ice, the sea would rise by 1.5m worldwide.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/7261171.stm

Published: 2008/02/24 00:24:09 GMT

Airline in first biofuel flight
The first flight by a commercial airline to be powered partly by biofuel has taken place.

A Virgin Atlantic jumbo jet has flown between London's Heathrow and Amsterdam using fuel derived from a mixture of Brazilian babassu nuts and coconuts.

Environmentalists have branded the flight a publicity stunt and claim biofuel cultivation is not sustainable.

Earlier this month, Airbus tested another alternative fuel - a synthetic mix of gas-to-liquid.

Virgin boss Sir Richard Branson said the flight marked a "vital breakthrough" for the entire airline industry.

"This pioneering flight will enable those of us who are serious about reducing our carbon emissions to go on developing the fuels of the future," he said.

But he said fully commercial biofuel flights were likely to use feedstocks such as algae rather than the mix used on the passenger-less flight.

Virgin's Boeing 747 had one of its four engines connected to an independent biofuel tank that it said could provide 20% of the engine's power.

> **Instead of looking for a magic green bullet, Virgin should focus on the real solution to this problem and call for a halt to relentless airport expansion**
> Dr Doug Parr, Greenpeace

The three other engines were capable of powering the plane on conventional fuel had there been a problem.

The company said the babassu tree, native to Brazil, and the coconuts did not compete with staple food sources and came from existing mature plantations.

Both products are commonly used in cosmetics and household paper products.

'Gimmick'

One problem with flying planes using biofuel is that it is more likely to freeze at high altitude.

The technology is still being developed by companies GE and Boeing, but Virgin believes airlines could routinely be flying on plant power within 10 years.

Kenneth Richter, of Friends of the Earth, said the flight was a "gimmick", distracting from real solutions to climate change.

"If you look at the latest scientific research it clearly shows biofuels do very little to reduce emissions," he said.

"At the same time we are very concerned about the impact of the large-scale increase in biofuel production on the environment and food prices worldwide.

"What we need to do is stop this mad expansion of aviation. At the moment it is the fastest growing source of greenhouse gases in the UK, and we need to stop subsidising the industry."

Greenpeace's chief scientist, Dr Doug Parr, labelled the flight a "high-altitude greenwash" and said less air travel was the only answer.

BIOFUELS
They are any fuels made from living things
Commonly means fuel made from crops including corn
Pioneers such as Henry Ford designed cars to run on biofuels

"Instead of looking for a magic green bullet, Virgin should focus on the real solution to this problem and call for a halt to relentless airport expansion."

Airbus ran its test using the world's largest passenger jet, the A380.

The three-hour flight from Filton near Bristol to Toulouse on 1 February was part of an ongoing research programme.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/uk_news/7261214.stm

Published: 2008/02/24 15:32:40 GMT

Japan blasts satellite into space
Japan's space agency has launched an experimental communications satellite designed to enable super high-speed data transmission in remote areas.

An H-2A rocket carrying the satellite Kizuna was launched from the southern island of Tanegashima, about 1,000km (620 miles) south of Tokyo.

A ship entering restricted waters near the launch site slightly delayed the lift-off.

The launch had been postponed by a week because of a mechanical fault.

The Japan Aerospace Exploration Agency (Jaxa) said the satellite had separated from the rocket and successfully entered its intended orbit, 283km from Earth.

The agency said that with Kizuna, it hoped to enable data transmission of up to 1.2 gigabits per second at a low cost across Japan and in 19 different locations in South-East Asia.

Kizuna is also known as the Wideband Inter-Networking Engineering Test and Demonstration Satellite, or Winds.

Hi-definition TV broadcast

Jaxa developed Kizuna with another government agency, the National Institute of Information and Communication Technology, and Mitsubishi Heavy Industries.

About 100 experiments will be conducted via the satellite, including a test broadcast of the next generation of high-definition television.

Jaxa spokeswoman Asaka Hagiwara said the total cost of the development, launch and operation of the satellite was estimated at 52bn yen (US$480m; £240m).

Saturday's launch is part of an ambitious space programme which sent Japan's first lunar probe into orbit around the moon last September.

Jaxa has said it wants to send astronauts to the moon by 2025, although Japan has not yet attempted manned space flight.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/asia-pacific/7260673.stm

Published: 2008/02/23 15:08:17 GMT

http://news.bbc.co.uk/2/hi/asia-pacific/7260673.stm

Heart-check beds to be developed
A bed packed with sensors could keep a close watch on the health of heart failure patients, it has been claimed.

It is hoped the system, alongside similar devices built into clothing, could help reduce the need for emergency hospital treatment.

The project will be funded by the EU, and led by electronics giant Philips.

The UK cardiologist helping to develop the devices said the key to dealing with long-term health problems was to help patients treat themselves.

> **The real challenge for this technology is not taking the measurements, but working out what to do with it, so that we are not constantly getting false alarms**
> Dr Nicholas Robinson
> TeleHealth Forum, Royal Society of Medicine

It is estimated there are around 63,500 new cases of heart failure each year in the UK which, if poorly controlled, can lead to a much shorter life expectancy.

Repeated hospitalisation also puts an expensive burden on the NHS, and one of the aims of the "MyHeart" initiative is to help spot problems several days before they become life-threatening.

The bed would include, not only an electronic weight scale and blood pressure monitor, but also sensors which measure heart rate, breathing rate and body movement while sleeping.

In addition, the patient could wear a vest with woven-in electrodes to provide a full electro-cardiogram reading.

All this information would be analysed on a PDA and the results sent via a telephone line or broadband connection to doctors.

The device, it is claimed, could even provide clues to interrupted sleep by measuring sleep phase patterns.

False alarms

Professor John Cleland, head of cardiology at the University of Hull, said: "The greatest challenge and opportunity for the management of long- term medical conditions is to help patients to help themselves.

"Investing directly in people who need help and not just in services that do things to or for them makes sense in terms of improved care, greater affordability and the effective deployment of scarce nursing and medical resources."

Dr Nick Robinson, a member of the Royal Society of Medicine's Telehealth forum, said that, while the technologies involved in gathering, storing and transmitting the information were becoming far more readily available, doctors might struggle to interpret the results.

He said: "We are used to making decisions based on taking a blood pressure reading on an occasional basis - and all the evidence we have for intervening is based on this.

"The real challenge for this technology is not taking the measurements, but working out what to do with it, so that we are not constantly getting false alarms."

It is not yet known which EU countries involved in the four-year project will be chosen to test the technology, or precisely when it will become available.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7259098.stm

Parents fail comprehension test

By Sean Coughlan
BBC News education reporter

If conspiracy theorists ever got into education, one of the first places that they might point their suspicious fingers is the tangled undergrowth of tests, qualifications and assessment.

They might well ask whether the whole baffling system had been created to be incomprehensible to parents.

Anyone with a child in the last year of primary school in a school in England will already be keenly aware of the Sats tests to be taken in May.

These tests (which as a minor digression are not really called Sats) were never exactly straightforward from a parent's perspective.

But at least we had grown used to catchy descriptions such as Key Stage 2 Level 4 as holding proof of our children's ability.

But this week even more fog was pumped into the subject with the debate over a new type of primary school test, a kind of son of Sats, known as the “single-level test”.

'Inappropriate entry'

The results of a pilot test involving 22,000 children were initially delayed, while officials examined the bewildering finding that younger children had got higher marks than older children.

Although "marks" is not the right word, because in these Alice in Wonderland-ish tests, pupils only take them when they are good enough to pass.

There is no mark, because no one who is deemed likely to fail takes them in the first place.

Rather like the arms industry not mentioning killing, these assessment systems avoid the idea of failure.

Pupils have not failed, they have suffered from an "inappropriate entry".

Confused? It's not just the single-level tests that are less than transparent.

This week, Barry Sheerman, chairman of the Commons children, schools and families select committee challenged the Schools Minister Jim Knight to find out how much parents really understood about how schools are assessed and rated.

In particular, he asked about the "contextual value added”", known as CVA, scores that are faithfully reproduced in the school league tables.

These are the scores that measure progress by putting the school's results in the context of the pupils and the areas that they serve.

Mr Sheerman suggested that there was no point being accountable if it was done in a way that was incomprehensible to most people.

But Mr Knight put him straight, saying: "I do not think that it is that difficult to understand that in CVA terms, 1,000 is the norm.

"If you are above 1,000, you are adding value better than the norm. If you are below 1,000, you are adding value lower than the norm. If that is all people understand, then it is pretty straightforward."

Right. That's that one sorted. What parent would not find that crystal clear?

Format war

In terms of unnecessary complications, the primary school tests are just the nursery slopes. Secondary and higher education qualifications enter into another realm of the incomprehensible.

The national qualifications framework has nine levels of difficulty. Download the list at level one and there are more than 1,200 different options, including various Key Skills, NVQs and BTEC courses.

Each of these abundant level one options are equivalent to GCSE grades D to G. Hold on, did not D to G use to be an… inappropriate entry?

There will be even more scope for confusion when Diplomas are added to the mix. Will A-levels versus Diplomas become education's first format war? And what about the children who end up with the Betamax version for the rest of their lives?

Qualifications and testing are an industry – and any business has its own jargon. But spare a thought for the pupils, schools and parents who have to make sense of it all.

If you want to comment on this story, please use the form below.

Add your comments on this story, using the form below.

Apparently this week's open evening is to set my daughters "targets for development" and discuss her "milestones and achievements outside of school". My daughter is...5! Now I'm glad the school takes an interest but I can't help feeling this is all out of proportion. I want her to be happy, and enjoying her classes, not worrying about whether she will pass this test or that milestone. Over scrutinised, over

examined and over the top. God help us when she gets a bit older, let's hope she doesn't get over stressed.
Chris, Otley, West Yorks

Many thanks for putting this in clear, simple language. Yes, this has all become an industry - a self-serving conspiracy foisted on us by the educational establishment and their oh-so-eager suppliers. It really is a disgrace. How on earth have the government and the civil service allowed this botch to come into being?
Gareth Robson, Beckenham

I have four children spread across primary and secondary schools. My eldest has just come home with his "report" . He is in Key Stage 3 and generally at level 4, projected to reach generally level 6, has a target of level 7. The national average of his age group will reach level 5 by end of year 9 (just before Key stage 4). I was initially shocked that he appeared to be failing on all subjects and it took many readings to decode what it meant (and I have a Masters Degree). He is simultaneously:
(1) Currently ahead of national average
(2) Forecast to fail his target
(3) Forecast to be at least one level above national average.
I would be delighted to provide a copy of this Noddy land report. And this is from a good normal regular state school!
Donald, Pickering, N Yorks

It really isn't very helpful for the media to keep on peddling the myth that only A*-C grades constitute a 'real' pass at GCSE. If we are, in fact, looking at CVA scores then, for a great number of students, a D, E, F or even G grade is a success.
Doug Belshaw, Doncaster

How glad I am I don't teach in England any more! More and more paper work, less and less contact with students, less and less scope for the individual teacher to tailor his/her classroom to the particular needs to the kids in it and to his/her special skills and interests. And all in the name of "accountability". Except that those to whom teachers are supposed to be accountable can't understand the avalanche of jargonese that descends upon them... I remember one teacher telling me of a father who came in to school with his son's multi-page report. "All I want to know," he said plaintively, "is whether to congratulate him or tell him off..."
Mike Tribe, Madrid, Spain

It's what used to be called 'snow'. An impenetrable blanket of jargon designed to discourage all criticism by rendering any enquirer comatose with boredom.
Gertrude, Lowestoft

Also spare a thought for the teachers who are also completely bewildered by the whole thing and are becoming increasingly fed-up by the endless changes which don't seem to be for the better.
R Brown, Derby

re. "the children who end up with the Betamax" version" - a young friend of mine took an animal care course alongside school based GCSEs in conjunction with a local college, having been told it was equivalent to another GCSE. It was only when signing on for sixth form that she learned it was equivalent to grade D-G only, so despite getting best possible grades in it this extra qualification effectively lowered her average GCSE points score to a level which barred her from returning to the sixth form as she had always intended. Assessors and teachers can have a second go next time and get it right. Most pupils only get one go and can end up disenchanted with the whole qualifications business.
Mary Keighley, Yorkshire

There is a strange sickness spread along the corridors of power and the marbled halls of the Department for Happy Children and Nice Schools that by changing qualifications you change the quality of education. As you point out this forgets that parents and employers take several years to adjust to changes while new courses take a minimum of 3 years to bed down and be made pupil friendly by teachers. I have introduced

six new qualifications over the last 15 years and every time we have managed to sort them out and make them interesting they are dumped and a new variation is introduced. Very frustrating for teachers, parents, pupils and employers. If only someone in the government machine would leave schools alone and stop the endless meddling which is destroying our system. The new diploma is a car crash waiting to happen with a byzantine structure of levels, modules, skills etc,. Nobody has explained how schools will move from their present state to cope with it without very large sums of money.
Max Phillips, Ipswich

The problem with contextual value added, is that a school that scores 1001 is hailed as a success, whereas a school that achieves 999 is deemed a failure. No two years' worth of students are the same, and the general attitude of students within a class can have a much bigger impact than anything the school actually does. Teachers could actually teach better in one year but because of student apathy the 'scores' could come out lower. Even one or two students (in a year group of 200) who, for whatever reasons (home life, depression, health), underachieve, can skew a school's rating significantly.
Angela M, Halifax, West Yorks

How can you possibly add negative value to something?! What rubbish, I fear for my daughter going into Year 1.
Alex Horspool, Haltwhistle, Northumberland

I desperately wanted to become a teacher but it's exactly this sort of politicised nonsense in education that put me off ('inappropriate entry'). As you say, jargon is a necessary evil in any sector but to an outsider the qualifications industry is now so labyrinthine it's in danger of disappearing up its own framework.
J Sharp, Newark, Notts

I thought some of these tests were designed to show how well the school was doing, not the pupils. Which ones are which I don't know - does anyone else?
Philippa Sutton, Newcastle upon Tyne

My daughter has managed to get right through primary school without me having any idea as to her level of ability. Her school reports are an outline of the National Curriculum with her name inserted into the appropriate "Slot". The Sats results are alsmost impossible to interpret and I'm a postgraduate so used to reading research!
Hazel, Newcastle

There is a basic flaw in a system that puts the same body (the Government) in the two positions of provider of a service and assessor of whether the service is satisfactory. It is only to be expected that the results from Government-designed tests will show that Government-provided education is performing well. That is just human nature. Anyone who really wanted to improve the service would allow a completely independent body to judge its results, or farm out the provision to someone else. The problem presumably is that there is too strong a political lobby against, for example, a system in which the testing was run by the Government but the service was provided by the private sector. However, given that putting those two roles in the same hands is so obviously bound to lead to a poorer result for the children in state education, aren't we forced to conclude that, if there is such a political lobby, it is actually aimed at preventing those children from succeeding?
Adrian Widdowson, Leeds

We home school - life is so much better for home schoolers - none of this nonsense to worry about, no bullying, no post code lottery for getting into schools, no school-run in the morning, holidays whenever you want - superb !
Juice, Edinburgh

Don't forget the equally confusing and entirely separate Scottish system - which has had at least as many revisions and changes recently as down south.
Daniel, Glasgow

When will the Government stop messing with quotas, assessment etc and just concentrate on teaching? Continued grade inflation has made it all pointless anyway. I'm currently recruiting and already bin any CV without straight As at A-Level or A2 (or whatever they are now) - what's the point in all these exams if you can't differentiate children?
Jonathan, London

I understand that new Diplomas in Hairdressing, which will not involve actual cutting of hair, would be "equivalent" to 2 A Levels. Meanwhile, British Airways cabin crew who undergo a period of six months training and experience will gain a NVQ - "equivalent" to 5 GCSEs. How can cabin crew training, which requires very practical skills (including real customer service and Aviation Medical activities involving defibrillation) be worth less than theoretical hairdressing? It's nonsense, isn't it?
Chris King, Fleet

I am working in a FE college and still find the qualifiction system confusing. In my opinion, the post 16 qualifications are more confusing then the primary and secondary school tests. Added to this the terms 'entry level, 'key skills', 'National Qualifications Framework' come into use. The external use of some of these levels is limited, because they used for progression by small steps at below GCSE A to C standard. The term "equivalence" is too broad as for example a Level 2 key skills in numeracy is less demanding than a GCSE in mathematics which is also rated at Level 2. A key skills Level 3 in numeracy is still less demanding than a mathematics GCSE A to C standard. My point is that key skills numeracy and GCSE mathematics are assessing different skills. Both have value but are not direct equilvalents. Confused?
Philip, Preston, Lancashire

D-G at GCSE, whatever people may think of the grade, is a pass, just not sufficient for a "good GCSE" (A-C). U is a fail, not a D. If these qualifications are equivalent to a poor GCSE pass, that's what they're equivalent to! People would be up in arms about grade deflation if they were worth any more than that.*
Jenna Power, Bath

It's no wonder so many people go to university these days, at least a degree means something!
Lindsey, Brighton

With so much hype and gobbledegook over current examinations - should we not be thinking of returning to the reliable (if old fashioned) 11 plus and GCEs? Whilst we are at it, make sure the grammar schools are brought back!
Hazzard, Bournemouth

Name
Your e-mail address
Town/city and country
Your comment
Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/uk_news/education/7253501.stm

Published: 2008/02/23 01:10:24 GMT

Ahhh, the Seductive Fragrance of Molecules Under Patent

By CHANDLER BURR

Its scent is reminiscent of a mixture of a just-picked apple and a rose in its prime. But to the Takasago International Corporation, which manufactures this synthetic material, it smells even sweeter.

Last year, that chemical, with the trade name Thesaron, became an essential ingredient in a new perfume, Silver Shadow Altitude, released by Davidoff, a brand owned by Coty. Playing a role in one of the most successful international fragrance trade names — Davidoff has had a scent on the top five perfume best-seller list for the last 20 years — means that molecule is highly profitable for Takasago.

Thesaron is a perfume industry version of pharmaceuticals like Lipitor, the commercial name of the active ingredient developed by Pfizer that lowers blood cholesterol. Drug companies have long made a lot of money by patenting new molecules.

Similarly, the scent makers — Symrise of Holzminden, Germany; Givaudan of Geneva; International Flavors and Fragrances of New York; and Takasago of Tokyo — spend billions on research to find new smell molecules, patent them and sell them. The innovative scents of these "captives," as the patented molecules are known, are crucial to enticing consumers to buy the 600 or so new perfumes introduced every year and appealing to buyers of other fragrant products like soaps and air fresheners.

Captives have other virtues as well. Jean Jacques, Takasago perfumer, put Thesaron in Altitude, for example, because it solved three problems: Thesaron has the fruity/rosy note of a very expensive class of molecules called rose ketones, but it costs far less and can be used in unlimited amounts (rose ketones are restricted because they set off allergic reactions at high doses).

Ned Polan, a vice president for fragrance ingredient research at I.F.F., pointed out another quality of captives: they allow perfumers to recreate smells found in nature and create new, wholly unknown ones.

"There are no new colors to see and very few new sounds, but we are actually creating new, unique smells no one has ever smelled before," Mr. Polan said. It is, quite literally, as if a paint company could make a new shade of blue.

Givaudan produces natural and synthetic perfumery raw materials and employs the perfumers who use these materials to make fragrances. In 2006 Givaudan's sales were 2.9 billion Swiss francs ($2.64 billion), and the double-digit sales growth of its fine-fragrances division — which that year made perfumes for Yves Saint Laurent, Burberry, Tom Ford and Hugo Boss — was powered by Givaudan's captives.

Givaudan began creating molecules in 1902. “Our new molecule platform drives our innovation and takes up a most significant part of our R&D budget,” said Kate Greene, vice president for marketing at Givaudan. “We have over 50 researchers dedicated to new captives.”

Like Pfizer, Abbott Laboratories or Novartis, Givaudan’s annual report prominently lists its new patents: “Three new molecules were introduced to the perfumers’ palette in the first half of 2007. Zinarine, natural green and tomato leaf notes with aspects of mint, fig, hyacinth; petitgrain Paradisamide, a long-lasting, fresh tropical fruit note with nuances of grapefruit, rhubarb and cassis; and Florymoss, a floral, green, mossy note which blends well with floral fruity and spicy accords.”

As with other scent makers, Givaudan does not break out the share of its research devoted to creating captives, but the company’s total research budget in 2007 was 371 million Swiss francs. According to Ms. Greene, Givaudan has become the leading producer of captives; its perfumers put the captive Amber Ketal in Aqua di Gio from Armani and Polo Blue from Ralph Lauren.

Each year, Givaudan’s scientists develop over 2,000 new molecules. After scent evaluation, synthesis studies and toxicity testing, “only three or four per year are selected for launch,” Ms. Greene said.

But they are crucial. Captives “provide newness to our perfumers’ palettes,” she said, “which in turn brings innovation to our clients’ brands.”

Takasago has just reorganized its two main chemical research centers in Japan and the United States. A scientist there, Ryoji Noyori, shared the Nobel Prize in chemistry in 2001 for his work in the synthesis of new captives.

Takasago’s captive Hindanol is in the scent it makes for Johnson & Johnson’s self-tanning product Holiday Skin. It smells of sandalwood, but it can do what no natural sandalwood can.

Where the natural is heavy and used as a perfume’s “base note” — smelled only after the lighter molecules have diffused — Hindanol is highly diffusive and thus can be used as a “top note,” allowing the user to smell sandalwood where she would not have before.

“Captives give us performance and functional attributes in different applications like soap or detergents where you might need specific attributes,” said Michael Popplewell, vice president for corporate research at I.F.F.

One example is a molecule that stays firmly on fabric, perfect for scenting laundry detergents. “That’s a specific attribute we like to see,” he said.

Captives also bolster ecological efforts. A captive synthetic jasmine can smell stronger than its natural counterpart, so perfumers can use fewer chemicals to get the same power, which reduces both the company’s costs and the amount of water needed to wash it away.

John C. Leffingwell, a scent industry analyst, notes: “Sandalwood is becoming outrageously expensive, around $1,700 per kilogram, and in short supply.” India’s sandalwood forests have been so decimated, further harvesting has been banned. Also, captives do not require costly and polluting fertilizers or cause farmers to deplete the soil.

The bulk of I.F.F.’s fundamental research spending goes to new molecules, and I.F.F. supports a large interdisciplinary scientific team.

“Your chemist generates a molecule,” Mr. Popplewell said. “Then you have to analyze what you’ve created — is it pure, how does it work? — then you have to create a synthesis, and then you have to figure out how to scale up to industrial production levels.”

Each molecule is assessed for potential commercial value — and each must pass toxicology tests. Those selected for the patent process are written up by I.F.F.'s patent lawyers and submitted to patent offices around the world. Responses arrive, Mr. Polan said, "generally in six months to several years."

In the United States, patents generally run 17 years, but after about 10 years, scent makers will start selling captives to their competitors, sacrificing exclusivity but generating another revenue stream.

Mr. Popplewell will not divulge how many researchers at I.F.F. work on new captives. "But we're increasing activities in open innovation," he said. "There's lots of smart people out there, so we're collaborating with neighboring disciplines, universities, consultants and outside institutes."

Scent makers do not reveal the cost for each molecule. "The cost depends on what the patent office makes us do, on the chemical, on the testing we have to do to get technical details right on yield, purity and reproducibility of the process synthesis chemistry, on whether we need new equipment and processes to make the molecule," Mr. Popplewell said. "Also the planned use or production volume: how much do we think we're going to use in perfumes."

He added: "It isn't cheap."

But in the end, it leads to I.F.F. captives like a proprietary musk I.F.F. uses in Sarah Jessica Parker's perfume Lovely.

Costs can limit the number of new molecules that the scent makers bring to market. "The biggest," said Jonathan Warr of Takasago's research department, is "safety testing, particularly now with more restrictions being imposed by clients. We're only interested in captives with global scope, materials that can be manufactured and marketed in China and Japan as well as Europe and North America."

One recent successful Takasago captive is l-muscone. A musk, l-muscone has been known for years, but no one could come up with a way to make it economically until Takasago did. It then patented not the molecule but the synthesis pathways to produce it.L-muscone is still expensive ("It's a luxury material," Mr. Warr said, "costing high four figures per pound"), and it has no trade name yet because Takasago does not sell it to anyone else. It's a "nature identical" — identical to the molecule found naturally in a gland in the musk deer — but Takasago produces only the synthetic version.

Andrea Lupo, a perfumer at Takasago, put l-muscone in the perfume Intimately Night for David and Victoria Beckham and Coty, their licensee.

"It helps create the scent's unique signature," she said. "The Coty people wanted a fragrance of edginess and masculinity. I wanted to give it a fresh, edgy top, and I used ginger and mandarin to blast that out, with a warm, sensual sandalwood, amber and coconut middle," including the noncaptive synthetic aldehyde C-18.

With conventional musks, Ms. Lupo said, the perfumer has to use a lot, but that then damps the other materials."The benefit of l-muscone is that you can get a musk effect using a small amount," she said. "So I was able to get a dark sexiness without repressing my sparkling top notes. It lets you use musk in a different way."

http://www.nytimes.com/2008/02/23/business/worldbusiness/23perfume.html?th&emc=th

Breast Feeding May Help Protect Babies Against Allergic Asthma

ScienceDaily (Feb. 25, 2008) — Breast feeding may help protect babies against allergic asthma. Airborne allergen is able to pass from mother to child through breast milk, which creates a tolerance to the allergen.

Allergic asthma affects 300 million people worldwide and is characterized by obstruction of the respiratory pathways in response to allergen exposure. Its prevalence has increased in recent decades, probably due to changes in environmental factors. Indeed, exposure to environmental antigens during infancy reduces the likelihood of developing asthma.

Valerie Julia and her colleagues investigated whether exposing lactating mice to an airborne allergen — ovalbumin — affected asthma development in the offspring. They found that ovalbumin was efficiently transferred from the mother to the neonate through the milk, leading to the development of immunological tolerance. Tolerance induction relied on the presence of transforming growth factor–beta and was mediated by regulatory CD4+ T lymphocytes, but did not require the transfer of immunoglobulins through the milk.

Breast milk–mediated transfer of an antigen to the neonate can result in oral tolerance induction, leading to antigen-specific protection from allergic asthma. These observations may pave the way for the design of new strategies to prevent the development of allergic diseases.

Journal reference: Valérie Verhasselt, Valérie Milcent, Julie Cazareth, Akira Kanda, Sébastien Fleury, David Dombrowicz, Nicolas Glaichenhaus & Valérie Julia. Breast milk–mediated transfer of an antigen induces tolerance and protection from allergic asthma pp 170 - 175. Published online Nature Medicine. 27 January 2008. doi 10.1038/nm1718

Adapted from materials provided by Nature Medicine.

http://www.sciencedaily.com:80/releases/2008/02/080224142005.htm

Very Large Array Retooling For 21st-century Science

VLA antennas getting modern electronics to meet new scientific challenges. (Credit: NRAO/AUI/NSF)

ScienceDaily (Feb. 25, 2008) — An international project to make the world's most productive ground-based telescope 10 times more capable has reached its halfway mark and is on schedule to provide astronomers with an extremely powerful new tool for exploring the Universe. The National Science Foundation's Very Large Array (VLA) radio telescope now has half of its giant, 230-ton dish antennas converted to use new, state-of-the-art digital electronics to replace analog equipment that has served since the facility's construction during the 1970s.

"We're taking a facility that has made landmark discoveries in astronomy for three decades and making it 10 times more powerful, at a cost that's a fraction of its total value, by replacing outdated technology with modern equipment," said Mark McKinnon, project manager for the Expanded VLA (EVLA). Rick Perley, EVLA project scientist, added: "When completed in 2012, the EVLA will be 10 times more sensitive, cover more frequencies, and provide far greater analysis capabilities than the current VLA. In addition, it will be much simpler to use, making its power available to a wider range of scientists."

The EVLA will give scientists new power and flexibility to meet the numerous challenges of 21st-Century astrophysics. The increased sensitivity will reveal the earliest epochs of galaxy formation, back to within a billion years of the Big Bang, or 93 percent of the look-back time to the beginning of the Universe. It will have the resolution to peer deep into the dustiest star-forming clouds, imaging protoplanetary disks around young stars on scales approaching that of the formation of terrestrial planets. The EVLA will provide unique capabilities to study magnetic fields in the Universe, to image regions near massive black holes, and to systematically track changes in transient objects such as supernovae and fast-moving jets from massive, compact objects such as neutron stars and black holes.

Authorized by Congress in 1972, the VLA was constructed during the 1970s and dedicated in 1980. Astronomers began using it for research even before its completion. To date, nearly 2,500 scientists from around the world have used the VLA for more than 13,000 observing projects. More than 200 Ph.D dissertations have been based on data obtained from VLA observations. The VLA's discoveries have ranged from finding water ice on Mercury, the closest planet to the Sun, to revealing details of the complex region surrounding the black hole at the core of our own Milky Way Galaxy, to providing surprising evidence that a distant galaxy had already formed and produced stars prolifically less than a billion years after the Big Bang.

Half, or fourteen, of the VLA's inventory of 28, 25-meter-diameter dish antennas now have been converted to the new, digital configuration. The antennas collect faint radio waves emitted by celestial objects. Data from all the antennas are brought to a central, special-purpose computing machine, called a correlator, to be combined into a form that allows scientists to produce detailed, high-quality images of the astronomical objects under investigation.

This entire system for collecting, transmitting and analyzing the cosmic radio signals is being replaced for the EVLA. New, more sensitive radio receivers will cover the entire frequency range of 1-50 GHz. A 1970s-era waveguide system gives way to a modern, fiber-optic system that dramatically increases the amount of data that can be delivered from the antenna to the correlator. Finally, a new, state-of-the-art correlator -- a special-purpose supercomputer -- is being built by Canadian scientists and engineers. This correlator will easily handle the increased data flow, offers much greater observing flexibility, and provides vastly expanded capabilities for analyzing the data to gain scientific insight about the astronomical objects.

"We're leapfrogging several generations of technological progress to make the EVLA a completely modern, 21st-Century scientific facility," said Fred K.Y. Lo, NRAO Director.

Construction work on the EVLA began in 2001. The project costs $93.75 million in U.S. dollars -- $58.7 million in new direct funding from the National Science Foundation, $1.75 million from Mexico, $17 million from Canada in the form of the new correlator, and $16.3 million in the form of labor from existing staff at the NRAO. The current value of the VLA infrastructure on which the EVLA is being built is estimated at $300 million.

"The EVLA project is giving us 10 times the VLA's capability at one-third the cost of the current facility," McKinnon pointed out.

To provide the improved scientific capabilities, the EVLA will boast some impressive technical feats. For example, the fiber-optic data transmission system will carry as much information instantaneously as the entire current U.S. internet. The EVLA receiving system will be so sensitive that it could detect the weak radio transmission from a cell phone at the distance of Jupiter -- half a billion miles away.

The National Radio Astronomy Observatory is a facility of the National Science Foundation, operated under cooperative agreement by Associated Universities, Inc.

Adapted from materials provided by National Radio Astronomy Observatory.

http://www.sciencedaily.com:80/releases/2008/02/080218142721.htm

Has An Ocean Circulation Collapse Been Triggered?

Geoscientists warn that there can be a considerable delay between the triggering of a collapse of the North Atlantic meridional overturning circulation and the actual collapse. (Credit: iStockphoto/Emmanuelle Combaud)

ScienceDaily (Feb. 25, 2008) — Predictions that the 21st century is safe from major circulation changes in the North Atlantic Ocean may not be as comforting as they seem, according to a Penn State researcher.

"The Intergovernmental Panel on Climate Change concluded that it is very unlikely that the North Atlantic meridional overturning circulation (MOC) will collapse in the 21st century. They predict a probability of less then 10 percent," says Klaus Keller, assistant professor of geosciences. "However, this should not be interpreted as an all clear signal. There can be a considerable delay between the triggering of an MOC collapse and the actual collapse. In a similar way, a person that has just jumped from a cliff may take comfort that pain in the next few seconds is very unlikely, but the outlook over the long term is less rosy."

Keller and his colleagues analyzed a possible threshold response for the MOC. A threshold response occurs when a system reacts in a highly nonlinear and potentially abrupt way. For example, a paddler can tip a canoe quite a bit without getting wet. However, pushing that canoe just a bit further can result in a wet paddler. The impacts of pushing the canoe to the side are negligible until the very last small push triggers the overturning of the canoe in a threshold response.

The MOC may also respond to human-made greenhouse gas emissions in a threshold response. The research projects sizeable impacts on patterns of surface air temperatures and precipitation, fisheries and terrestrial ecosystems if a slowdown or complete collapse of the MOC occurs.

"Currently, MOC projections are deeply uncertain. This uncertainty puts a large value on observation systems that could deliver an actionable early warning of an MOC collapse," Keller said February 17 at the annual meeting of the American Association for the Advancement of Science in Boston. "The problem is that information that arrives after the threshold response has been triggered is only of very

limited use. For example, warning a person in a canoe about an approaching waterfall can be useful before the waterfall, but is not really useful after the canoe went over the waterfall.

"The problem with the potential MOC collapse is that the signs of an approaching threshold response are very subtle to detect. The noise is large and picking out the signal from the noise is non trivial," he adds.

"There is tantalizing evidence for a recent MOC slow down. However, this is not an open-and-shut case," Keller continues.

The researchers analyzed how they could improve MOC observation systems to result in more skillful MOC projections. For example, optimizing the locations of the observation system can considerably improve the projections.

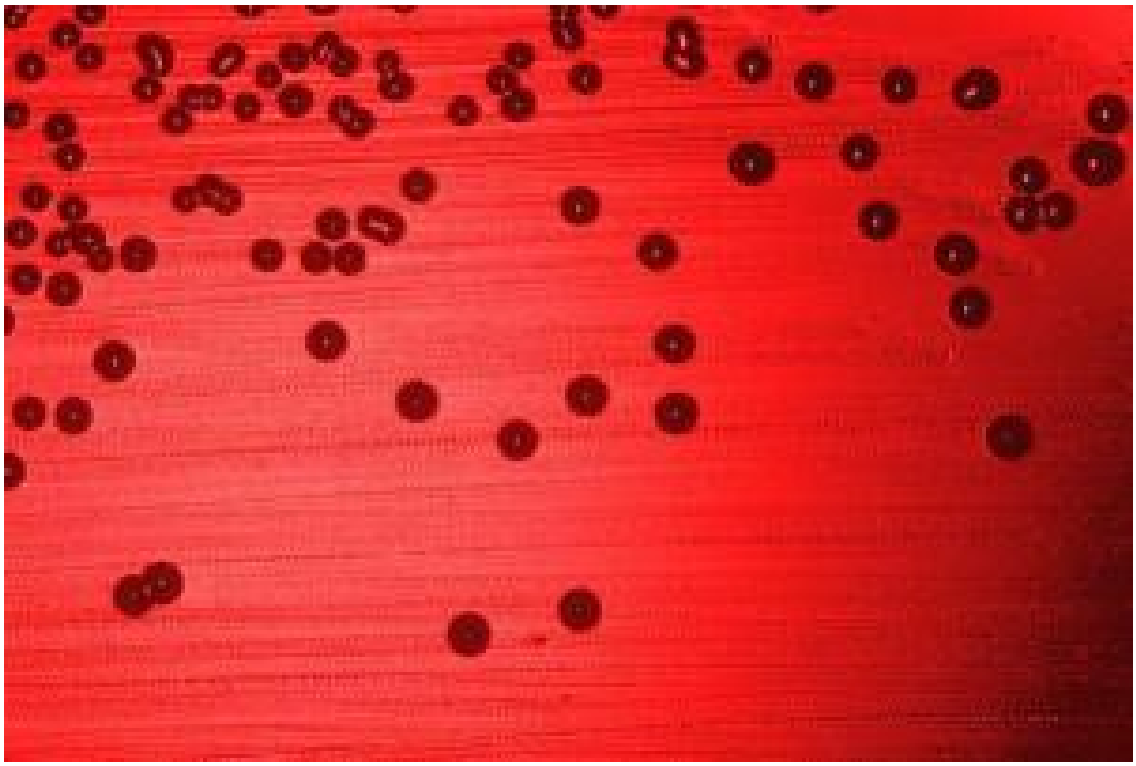
Improved MOC projections can enable improved climate policies and can have economic value. Keller and colleagues show that investments into an MOC observation system that would provide an early warning of an approaching MOC collapse would likely pass a cost benefit test.

The National Science Foundation and the U.S. EPA supported this work.

Adapted from materials provided by Penn State.

http://www.sciencedaily.com:80/releases/2008/02/080217102148.htm

Bacteria Use 'Invisibility Cloak' To Hide From Human Immune System



Blood agar plate culture of Haemophilus influenzae. (Credit: CDC)

ScienceDaily (Feb. 24, 2008) — Scientists at the University of York have characterised an important new step in the mechanism used by bacteria to evade our immune system. It is an 'invisibility cloak' which means that bacteria like Haemophilus influenzae, a common cause of ear infections in children, can move about the body without the risk of being attacked by the immune system. A multidisciplinary research team from the Departments of Biology and Chemistry at York have been studying how bacteria capture the molecule used to make the 'cloak', called sialic acid.

The researchers have now discovered an enzymatic activity that helps in the more efficient capture of sialic acids released from our cell surfaces. As well as using the sialic acid to make the 'invisibility cloak' other bacteria use similar methods to capture sialic acid as a simple food source, so are literally eating us from the inside! Dr Gavin Thomas, of the Department of Biology, who led the research said: "This novel enzyme, as well as other steps required for the formation of the 'invisibility cloak' that we have discovered in York, now offers the chance to develop novel antimicrobials against these bacteria."

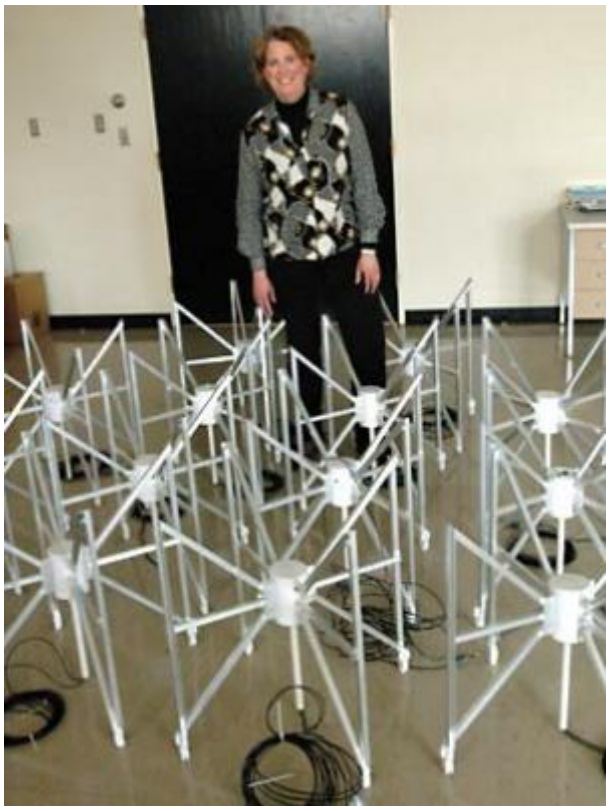
The work, which was funded by the Biotechnology and Biological Sciences Research Council (BBSRC), was undertaken by Dr. Emmanuele Severi (Biology - Thomas lab) in collaboration with Dr. Jennifer Potts (Biology and Chemistry), Dr. Andrew Leech (Biology) and Professor Keith Wilson and Dr. Axel Müller (Chemistry and York Structural Biology Laboratory).

The team used the Centre for Magnetic Resonance based in the Department of Chemistry, and the Technology Facility in the Department of Biology. The paper Sialic Acid Mutarotation Is Catalyzed by the Escherichia coli ß-Propeller Protein YjhTwas recently published in the Journal of Biological Chemistry.

Adapted from materials provided by University of York.

http://www.sciencedaily.com:80/releases/2008/02/080219102415.htm

New Telescopes Planned For Moon



Physics professor Jacqueline Hewitt, director of MIT's Kavli Institute for Astrophysics and Space Science, stands behind a prototype of a radio telescope array. A team she leads has been chosen by NASA to develop plans for such an array on the far side of the moon. (Credit: Donna Coveney)

ScienceDaily (Feb. 24, 2008) — NASA has selected a proposal by an MIT-led team to develop plans for an array of radio telescopes on the far side of the moon that would probe the earliest formation of the basic structures of the universe. The agency announced the selection and 18 others related to future observatories on Friday, Feb.15.

The new MIT telescopes would explore one of the greatest unknown realms of astronomy, the so-called "Dark Ages" near the beginning of the universe when stars, star clusters and galaxies first came into existence. This period of roughly a billion years, beginning shortly after the Big Bang, closely followed the time when cosmic background radiation, which has been mapped using satellites, filled all of space. Learning about this unobserved era is considered essential to filling in our understanding of how the earliest structures in the universe came into being.

The Lunar Array for Radio Cosmology (LARC) project is headed by Jacqueline Hewitt, a professor of physics and director of MIT's Kavli Institute for Astrophysics and Space Science. LARC includes nine other MIT scientists as well as several from other institutions. It is planned as a huge array of hundreds of telescope modules designed to pick up very-low-frequency radio emissions. The array will cover an area of up to two square kilometers; the modules would be moved into place on the lunar surface by automated vehicles.

Observations of the cosmic Dark Ages are impossible to make from Earth, Hewitt explains, because of two major sources of interference that obscure these faint low-frequency radio emissions. One is the Earth's ionosphere, a high-altitude layer of electrically charged gas. The other is all of Earth's radio and television transmissions, which produce background interference everywhere on the Earth's surface.

The only place that is totally shielded from both kinds of interference is the far side of the moon, which always faces away from the Earth and therefore is never exposed to terrestrial radio transmissions.

Besides being the top priority scientifically for a telescope on the moon, this low-frequency radio telescope array will also be one of the easiest to build, Hewitt says. That's because the long wavelengths of the radio waves it will detect don't require particularly accurate placement and alignment of the individual components. In addition, it doesn't matter if a few of the hundreds of antennas fail, and their performance would not be affected by the ever-present lunar dust.

The new lunar telescopes would add greatly to the capabilities of a low-frequency radio telescope array now under construction in Western Australia, one of the most radio-quiet areas on Earth. This array, which also involves MIT researchers, will be limited to the upper reaches of the low-frequency radio spectrum, and thus will only be able to penetrate into a portion of the cosmic Dark Ages.

According to prevailing theory, this unobserved span of time in the universe's infancy includes a period when dark matter--an unknown component of the universe that accounts for a majority of all matter--collapsed from a uniform soup of particles into clumps that formed the scaffolding for all the structures that emerged later, from stars and black holes to entire galaxies. All astronomical observations made so far only reveal the results of that whole formation process--except the cosmic background radiation, which only shows the raw material before the process began. The whole gestation and birth of all the kinds of objects seen in space today, which all took place in the Dark Ages, has so far been hidden from view.

The new observations could test current theories about how the universe formed and evolved into its present state, including the theory of cosmic inflation first proposed by MIT Professor Alan Guth.

In addition to their primary mission, the new telescopes would also be useful for studying huge eruptions from the sun, called coronal mass ejections, which can sometimes disrupt communications and electrical grids on Earth. They could also study space weather, the radio emissions from other planets and emissions from collisions between galaxies.

The present plan is for a one-year study to develop a detailed plan for the telescope array, whose construction would probably not begin until sometime after the year 2025, and is expected to cost more than $1 billion. The project to develop the plan is led by MIT's Hewitt, with a team that includes MIT professors Jeffrey Hoffman of the Department of Aeronautics and Astronautics and Maria Zuber, chair of the Department of Earth, Atmospheric and Planetary Sciences, as well as others from MIT and scientists from Harvard, the National Radio Astronomy Observatory, the University of California at Berkeley, University of Washington and NASA's Jet Propulsion Laboratory.

To develop this detailed plan, NASA is awarding a grant of $500,000, to be divided between the MIT-led team and a second team that is independently developing a similar proposal, headed by scientists at the Naval Research Laboratory.

Adapted from materials provided by Massachusetts Institute of Technology.

http://www.sciencedaily.com:80/releases/2008/02/080219132146.htm

Empty Nest Syndrome May Not Be Bad After All, Study Finds

ScienceDaily (Feb. 24, 2008) — One day they are crawling, the next day they are driving and then suddenly they aren't kids anymore. As children reach adulthood, the parent-child relationship changes as parents learn to adapt to newly independent children. A new study by a University of Missouri professor explored the differences in how mothers and fathers interacted with their young adult children. She found there were few differences in the way mothers and fathers felt and that many of the changes were positive, despite the perception that mothers in particular fall apart and experience the so-called empty nest syndrome.

"As children age, direct caretaking and influence diminish, and children are often seen by their parents as peers with whom they are have continuing relationships," said Christine Proulx, assistant professor of human development and family studies in the College of Human Environmental Sciences."Although our between-families results suggest these patterns of change and continuity differ by parent and child gender, our within-family analyses suggest important similarities among mothers and fathers within the same family."

Of most concern to the parents in the study were firstborns' independence, time spent together and role patterns. The study found that generally fathers and mothers reported similar changes in the parent-child relationship during their child's movements into young adulthood. Both fathers and mothers reported differences in independence/maturity of the child, closeness/openness in the relationship, contact/time spent together and changes in role pattern.

Another change reported by parents was relating more like peers and having more adult-like interactions with their young adult child than in prior years. Other parents reported acting more like a mentor and giving advice to their children rather than demands.

Some of the things that remained the same in the parent-child relationship were providing financial assistance and continuing to be a mentor to their young adult child. Few parents in the study reported changes in emotional support to the children.

"The within-family analysis suggests that mothers and fathers in the same families in our study rarely reported divergent experiences with their young adult sons and daughters," Proulx said. "Overwhelmingly, the examination of mothers' and fathers' responses revealed similarities in mothers' and fathers' experiences as parents to their young adult child."

The study interviewed 142 sets of parents with firstborn young adult sons and daughters and was published in the Journal of Family Issues.

Adapted from materials provided by University of Missouri-Columbia.

http://www.sciencedaily.com:80/releases/2008/02/080221133313.htm

Inside The Head Of An Ape

Do apes have imagination? (Credit: iStockphoto/Eric Isselée)

ScienceDaily (Feb. 24, 2008) — Do apes have imagination? How do they understand pictures? A years-long study of apes performed by cognitive scientist Tomas Persson shows, among other things, that it doesn't take a human brain to understand pictures as being a representation. Persson's dissertation, which is now being submitted at Lund University, is the first one in Sweden to focus entirely on the thinking of apes.

When humans compare a picture with reality, it's often necessary to fill in information that is missing in the picture. For instance, how do we know that a person in a picture is running, as opposed to being frozen in a position?

How do we know that that bright orange thing on Donald Duck is a beak? How do we recognize the motif of pictures we have never seen before? The answer is: we interpret.

Many animals have no trouble recognizing the content of realistic pictures, such as photographs, but can they relate a picture to reality in such a way that they can recognize a drawing? The answer is yes, with reservation.

This is shown by Tomas Persson in his dissertation Pictorial Primates - A Search for Iconic Abilities in Great Apes, which will be publicly defended on February 22.

A review of previous research shows that there are many ways for animals to understand the relation between a picture and reality, but it is only the special case when they understand that the picture

represents reality that the picture is being interpreted by being placed it in its proper context and having the missing information filled in.

The conclusion from Tomas Persson's many years of studying gorillas at Givskud Zoo in Denmark is that it is not easy to teach an ape to relate a picture to reality.

"However, it is unclear whether this is a matter of the training method or the capacity of the apes," says Tomas Persson.

This is because he also found that language-trained bonobos at Great Ape Trust of Iowa in the U.S. can readily name simple non-realistic images that they have never seen before.

"This is the most promising evidence yet that you don't have to have a human brain to understand pictures as representations. But many studies remain to be done before we will know the extent of this ability in apes. A further question for the future is whether the language training the bonobos have had is the direct reason behind their ability to understand images," says Tomas Persson.

Research on the thinking of apes, which is an expanding field internationally, will be placed on a new footing in Sweden as well, with the research station that cognitive scientists from Lund University are helping establish at Furuvik Zoo in Gävle, Sweden. Since humans share ancestors with today's great apes, this research is important not only for our understanding of cognition as a general biological phenomenon but also for our understanding of the evolution of human thinking. Tomas Persson's dissertation is hopefully only the first in a long series on this theme in Swedish research.

Adapted from materials provided by Lund University, via AlphaGalileo.

http://www.sciencedaily.com:80/releases/2008/02/080221120201.htm

Herpes Virus Link To Preterm Birth And High Blood Pressure During Pregnancy

Viral nucleic acid was discovered in heel-prick blood samples taken from more than 1300 newborn babies over a 10-year period. (Credit: Photo by David Ellis)

ScienceDaily (Feb. 24, 2008) — Researchers at Adelaide's Women's & Children's Hospital and the University of Adelaide, Australia, have made a world-first discovery that links viral infection with high blood pressure during pregnancy and pre-term birth.

The research findings are a major step forward in unravelling the mystery of the cause of high blood pressure in pregnancy.

The research has been conducted by the South Australian Cerebral Palsy Research Group, based in the University of Adelaide's School of Paediatrics & Reproductive Health and the Women's and Children's Hospital Microbiology & Infectious Diseases Department.

Their work demonstrates, for the first time, that exposure to viral infection -- especially viruses of the herpes group -- may be associated with pregnancy-induced hypertensive disease (pre-eclampsia) and also with pre-term birth.

The research discovered the presence of viral nucleic acid in heel-prick blood samples from 1326 newborn babies, taken over a 10-year period. More than 400 of these babies were diagnosed with cerebral palsy.

"This is an exciting finding and further studies are now required to look at the link between viral exposure in pregnancy and genetic susceptibility to adverse pregnancy outcomes, such as high blood pressure, premature delivery and cerebral palsy," says Professor Alastair MacLennan, leader of the research group.

Pregnancy hypertension (high blood pressure) occurs in up to 10% of first pregnancies throughout the developed world, such as in the UK, the United States and Australia. When untreated, it can lead to uncontrolled epileptic fits of eclampsia with loss of baby and mother. It is a common cause of maternal death in Third World countries.

The cause of high blood pressure in pregnancy has been an enigma for decades and a holy grail for many researchers.

The Adelaide research group has already demonstrated a link between viral infection in pregnancy, genetic mutations in genes controlling inflammatory and blood clotting processes, and the development of cerebral palsy.

The group has also found an association between several hereditary gene mutations with changes in inflammatory proteins that may cause dysfunction and constriction of the blood vessels of the placenta and brain, thus causing the rise in blood pressure in pregnancy. If not controlled, this can be lethal.

"We are just beginning to understand the interaction and importance of exposure to viruses and genetic susceptibility to infection both in pregnancy and the newborn," says Associate Professor Paul Goldwater, the virologist of the team.

This research was published in the British Journal of Obstetrics & Gynaecology.

Adapted from materials provided by University of Adelaide.

http://www.sciencedaily.com:80/releases/2008/02/080218134633.htm

Two Oxygenation Events In Ancient Oceans Sparked Spread Of Complex Life

The photo (field of view about 0.15 millimeter in width) is of an exceptionally preserved eukaryotic fossil from the Doushantuo Formation (635--551 million years old) in South China. High-resolution geochemical data from the Doushantuo Formation indicate that the early diversification of eukaryotes may have coupled with episodic oxygenation of Ediacaran oceans. (Credit: Photograph by Shuhai Xiao)

ScienceDaily (Feb. 26, 2008) — The rise of oxygen and the oxidation of deep oceans between 635 and 551 million years ago may have had an impact on the increase and spread of the earliest complex life, including animals, according to a new study.

Today, we take oxygen for granted. But the atmosphere had almost no oxygen until 2.5 billion years ago, and it was not until about 600 million years ago when the atmospheric oxygen level rose to a fraction of modern levels. For a long time, geologists and evolutionary biologists have speculated that the rise of the breathing gas and subsequent oxygenation of the deep oceans are intimately tied to the evolution of modern biological systems.

To test the interaction between biological evolution and environmental change, an international team of scientists from Virginia Tech, the University of Maryland, University of Nevada at Las Vegas, and Chinese Academy of Sciences, examined changes in the geochemistry and fossil distribution of 635- to 551-million-year old sediments preserved in the Doushantuo Formation in the Yangtze Gorges area of South China.

Millions of years ago, the Yangtze Gorges area was an ancient sea, said Kathleen A. McFadden, a Ph.D. candidate in geobiology at Virginia Tech and the lead author of the PNAS article.

To determine when there was enough oxygen to support animal life in the ocean, the researchers asked, "What kind of geochemical evidence would there be in the rock record?" said Shuhai Xiao, associate professor of geosciences at Virginia Tech.

Scientists hypothesized that there was a lot of dissolved organic carbon in the ocean when oxygen levels were low. If oxygen levels rose, some of this organic carbon would be oxidized into inorganic forms, some of which can be preserved as calcium carbonate in the rock record. "We measured the carbon isotope signatures of organic and inorganic carbon in the ancient rocks to infer oxidation events," said co-author Ganqing Jiang, assistant professor of geology at the University of Nevada at Las Vegas.

The layers of sediment exposed by the Three Gorges Dam represent millions of years of deposits. "We went through road cuts, bed by bed, measuring and describing the exposed rock, then took small rock samples every few feet or so,," said McFadden. She collected about 200 samples; hundreds of samples were taken to three labs.

The researchers cleaned and crushed the small samples to powder, which they reacted with acid to release carbon dioxide from carbonate minerals, and then burned the residue to get carbon dioxide from organic matter. "The CO2 that is released was measured with mass spectrometers to gives us the isotopic signature of the carbonate and organic carbon that was present in the rock," said McFadden.

"The relative abundances of the carbon-12 and carbon-13 isotopes, which are stable and do not decay with time, provide a snapshot of the environmental processes taking place in the ocean at the different times recorded in the layers of rock," McFadden said.

The stratigraphic pattern of carbon isotope abundances suggested to these researchers that the ocean, which largely lacked oxygen before animals arrived on the scene, was aerated by two discrete pulses of oxygen.

"The first pulse apparently had little impact on a large organic carbon reservoir in the deep ocean, but did spark changes in microscopic life forms," McFadden said. "The second event, which occurred around 550 million years ago, however, resulted in the reduction of the organic carbon reservoir, indicating that the ocean became fully oxidizing just before the evolution and diversification of many of Earth's earliest animals," she said.

"The Doushantuo Formation has a wonderful fossil record," McFadden said. "It allows us to look at major fossil groups, when they appear and when they disappear, and to see a relationship between oxidation events and biological groups."

"This study supports the growing view that life and environment co-evolved through this tumultuous period of Earth history," said geochemist Alan J. Kaufman, a co-author of the study from the University of Maryland.

The researchers analyzed the fossils in the Doushantuo Formation, from microscopic life forms of 635 million years ago to large algae around 551 million years ago. Looking at data from four locations with very similar isotopic records, they report that the first oxygen spike resulted in a rise in microscopic organisms, some of which are thought to be the earliest animal embryos. The second spike in oxygen coincides with a dramatic increase in species of large complex algae.

"Both oxidation events appear to coincide with increased diversity of fossils assemblages in the Doushantuo basin, with the number of species nearly doubling," McFadden said.

Following this second oxidation event, between 550 and 542 million years ago, there was a worldwide increase of Ediacara organisms, complex macroscopic life forms, an event recently dubbed as the Avalon Explosion. "This was when we see the first burrowing animals and biomineralizing animals in the fossil record," McFadden said. Biomineralizing animals are the first animals to form external skeletons, or shells.

The triggers for the oxidation events remain elusive, however. "These events recorded in the ocean were probably related to oxygen in the atmosphere reacting with sediments on land," McFadden said. "Weathering of rocks and soils on the continents would result in the release of certain dissolved ions, such as sulfate, into rivers. These would then be transported to the sea where they might be used by bacteria to oxidize the organic carbon pool in the deep oceans," she said..

The article, "Pulsed oxidation and biological evolution in the Ediacaran Doushantuo Formation," was written by Kathleen A. McFadden; Jing Huang and Xuelei Chu of the Institute of Geology and Geophysics, Chinese Academy of Sciences; Ganqing Jiang; Alan J. Kaufman; Chuanming Zhou and Xunlai Yuan of the Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences; and Shuhai Xiao. The URL for the paper is http://www.pnas.org/cgi/content/abstract/0708336105v1. The paper will publish in the print issue of March 4 (Issue 9, Volume 105, pp. 3197-3202).

The joint research was supported by NSF Sedimentary Geology and Paleobiology Program, NASA Exobiology Program, National Natural Science Foundation of China, Virginia Tech Institute of Critical Technology and Applied Sciences, Evolving Earth Foundation, and several other funding agencies.

Adapted from materials provided by Virginia Tech, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com:80/releases/2008/02/080225213645.htm

Cheap, Clean Drinking Water Purified Through Nanotechnology

ScienceDaily (Feb. 26, 2008) — Tiny particles of pure silica coated with an active material could be used to remove toxic chemicals, bacteria, viruses, and other hazardous materials from water much more effectively and at lower cost than conventional water purification methods, according to researchers writing in the current issue of the International Journal of Nanotechnology.Peter Majewski and Chiu Ping Chan of the Ian Wark Research Institute, at the University of South Australia, explain that the availability of drinking quality water is fast becoming a major socio-economic issue across the globe, especially in the developing world. However, water purification technology is often complicated, requires sophisticated equipment and is expensive to run and maintain. Moreover, it usually requires a final costly disinfection stage. The Australian team suggests that nanotechnology could provide a simple answer to the problem.The researchers have investigated how silica particles can be coated easily with a nanometer-thin layer of active material based on a hydrocarbon with a silicon-containing anchor. The coating is formed through a chemical self-assembly process so involves nothing more than stirring the ingredients to make the active particles.These active particles, so called Surface Engineered Silica (SES), were then tested to demonstrate that they could remove biological molecules, pathogens such as viruses like the Polio virus, bacteria like Escherichia coli, and Cryptosporidium parvum, which is a waterborne parasite."The results clearly show that organic species can efficiently be removed at pH ranges of drinking water by stirring the coated particles in the contaminated water for up to one hour and filtering the powder," the researchers say. They point out that the filtration process occurs through an electrostatic attraction between the pathogens and the surface engineered particles.

The recent report entitled 'Water for People - Water for Life' of the World Water Assessment Program of the UNESCO says that more than 6000 people die every day due to water-related diseases, including diarrhea, worm infections, and infectious diseases. In addition, organic pollutants from industrial waste water from pulp and paper mills, textiles and leather factories, steel foundries, and petrochemicals refineries, are a major cause of illness in parts of the world where regulations do not necessarily protect people from such industrial outflows.The team's nanotech approach to water purification could help prevent disease and poisoning for potentially millions of people.

Adapted from materials provided by Inderscience Publishers, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com:80/releases/2008/02/080220094656.htm

Past Greenhouse Warming Provides Clues To What The Future May Hold

James Zachos (foreground) inspects a sediment core drilled from the ocean floor. (Credit: Courtesy J. Zachos)

ScienceDaily (Feb. 26, 2008) — If carbon dioxide emissions from the burning of fossil fuels continue on a "business-as-usual" trajectory, humans will have added about 5 trillion metric tons of carbon to the atmosphere by the year 2400. A similarly massive release of carbon accompanied an extreme period of global warming 55 million years ago known as the Paleocene-Eocene Thermal Maximum (PETM). Scientists studying the PETM are piecing together an increasingly detailed picture of its causes and consequences. Their findings describe what may be the best analog in the geologic record for the global changes likely to result from continued carbon dioxide emissions from human activities, according to James Zachos, professor of Earth and planetary sciences at the University of California, Santa Cruz.

"All the evidence points to a massive release of carbon at the PETM, and if you compare it with the projections for anthropogenic carbon emissions, it's roughly the same amount of carbon," Zachos said. "The difference is the rate at which it was released--we're on track to do in a few hundred years what may have taken a few thousand years back then."

Zachos and his collaborators have been studying marine sediments deposited on the deep ocean floor during the PETM and recovered in sediment cores by the International Ocean Drilling Program. He will discuss their findings, which reveal drastic changes in ocean chemistry during the PETM, in a presentation at the annual meeting of the Association for the Advancement of Sciencein Boston on February 15. His talk is part of a symposium entitled "Ocean Acidification and Carbon-Climate Connections: Lessons from the Geologic Past."

The ocean has the capacity to absorb huge amounts of carbon dioxide from the atmosphere. But as carbon dioxide dissolves in the ocean, it makes the water more acidic. That, in turn, could make life more difficult for corals and other marine organisms that build shells and skeletons out of calcium carbonate.

Technically, the "acidification" is a lowering of the pH of ocean water, moving it closer to the acidic range of the pH scale, although it remains slightly alkaline. Lowering the pH affects the chemical equilibrium of the ocean with respect to calcium carbonate, reducing the concentration of carbonate ions and making it harder for organisms to build and maintain structures of calcium carbonate. Corals and some other marine organisms use a form of calcium carbonate called aragonite, which dissolves first, while many others build shells of a more resistant form called calcite.

"As the carbonate concentration starts to decrease, it becomes harder for some organisms to build their shells. They have to use more energy, and eventually it's impossible--in laboratory experiments, they precipitate some shell during the day, and overnight it dissolves," Zachos said. "If you lower the carbonate concentration enough, corals and eventually even calcite shells start to dissolve."

The effect of ocean acidification on the chemistry of calcium carbonate is reflected in the sediment cores from the PETM. Marine sediments are typically rich in calcium carbonate from the shells of marine organisms that sink to the seafloor after they die. Sediments deposited at the start of the PETM, however, show an abrupt transition from carbonate-rich ooze to a dark-red clay layer in which the carbonate shells are completely gone.

Ocean acidification starts at the surface, where carbon dioxide is absorbed from the atmosphere, and spreads to the deep sea as surface waters mix with deeper layers. The calcium carbonate in marine sediments on the seafloor provides a buffer, neutralizing the increased acidity as the shells dissolve and enabling the ocean to absorb more carbon dioxide. But the mixing time required to bring acidified surface waters into the deep sea is long--500 to 1,000 years, according to Zachos. "We are adding all this carbon dioxide in less than one mixing cycle. That's important for how the ocean buffers itself, and it means the carbonate concentration in surface waters will get low enough to affect corals and other organisms, assuming emissions continue on the current trajectory," he said.

In a recent article in Nature (January 17, 2008), Zachos and coauthors Gerald Dickens of Rice University and Richard Zeebe of the University of Hawaii provided an overview of the PETM and other episodes of greenhouse warming in the past 65 million years. These "natural experiments" can help scientists understand the complex interactions that link the carbon cycle and the climate. Christina Ravelo, a professor of ocean sciences at UCSC and coorganizer of the symposium at which Zachos will speak, said climate records preserved in seafloor sediments provide a valuable test for the climate models scientists use to predict the future consequences of greenhouse gas emissions.

"There are no exact analogs in the past for what is happening now, but we can use past climates to test the models and improve them," Ravelo said. "The ocean drilling program is the only way to get really good records of these past warm periods." Current climate models tend to have difficulty replicating the features of warm periods in the past, such as the PETM, she said. "Even though the models do a great job of simulating the climate over the past 150 years, the future probably holds many climatic surprises. As you run the models farther into the future, the uncertainties become greater."

A particular concern over the long run is the potential for positive feedback that could amplify the initial warming caused by carbon dioxide emissions. For example, one possible cause of the PETM is the decomposition of methane deposits on the seafloor, which could have been triggered by an initial warming. Methane hydrates are frozen deposits found in the deep ocean near continental margins. Methane released from the deposits would react with oxygen to form carbon dioxide. Both compounds are potent greenhouse gases. "We have some new evidence that there was a lag between the initial warming and the main carbon excursion of the PETM," said Zachos, who is a coauthor of a paper describing these findings in the December 20/27, 2007, issue of Nature. "It's consistent with the notion of a positive feedback, with an initial warming causing the hydrates to decompose," he said.

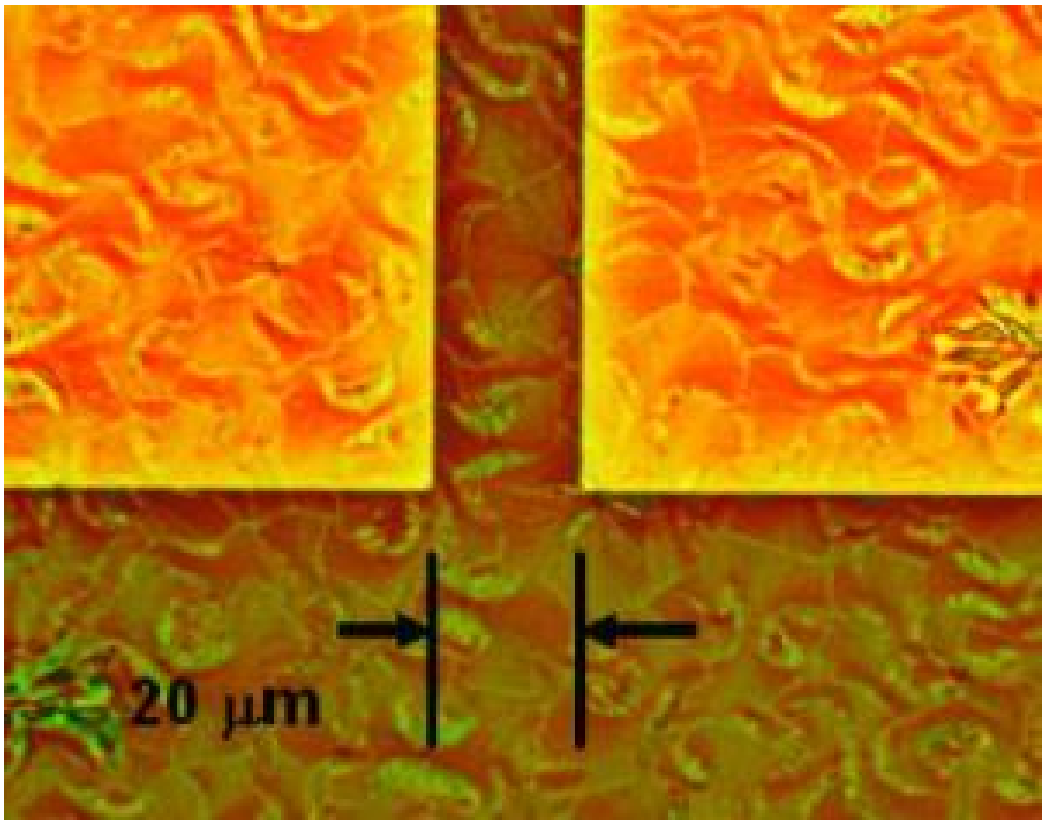
Although this raises the possibility that the current global warming trend might trigger a similar release of methane from the ocean floor, that would not happen any time soon. It would take several centuries for the warming to reach the deeper parts of the ocean where the methane hydrate deposits are, Zachos said.

"By slowing the rate of carbon emissions and warming, we may be able to avoid triggering a strong, uncontrolled positive feedback," he said.

Adapted from materials provided by University of California - Santa Cruz.

http://www.sciencedaily.com:80/releases/2008/02/080215151221.htm

Directed Self-ordering Of Organic Molecules For Electronic Devices



Optical micrographs of typical FET structures in the NIST/Penn State/UK experiments show the effect of pretreating contacts to promote organic crystal formation. Treated structure shows crystal structure extending from the rectangular contacts and merging in the channel. (Credit: NIST)

ScienceDaily (Feb. 26, 2008) — A simple surface treatment technique demonstrated by a collaboration between researchers at the National Institute of Standards and Technology, Penn State and the University of Kentucky potentially offers a low-cost way to mass produce large arrays of organic electronic transistors on polymer sheets for a wide range of applications including flexible displays, "intelligent paper" and flexible sheets of biosensor arrays for field diagnostics.

In a paper posted recently,* the team describes how a chemical pretreatment of electrical contacts can induce self-assembly of molecular crystals to both improve the performance of organic semiconductor devices and provide electrical isolation between devices.

Organic electronic devices are inching towards the market. Compounds with tongue-twisting names like "5,11-bis(triethylsilylethynyl) anthradithiophene" can be designed with many of the electrical properties of more conventional semiconductors. But unlike traditional semiconductors that require high-temperature processing steps, organic semiconductor devices can be manufactured at room temperature. They could be built on flexible polymers instead of rigid silicon wafers. Magazine-size displays that could be rolled up or folded to pocket size and plastic sheets that incorporate large arrays of detectors for medical monitoring or diagnostics in the field are just a couple of the tantalizing possibilities.

One unsolved problem is how to manufacture them efficiently and at low cost. Large areas can be coated rapidly with a thin film of the organic compound in solution, which dries to a semiconductor layer. But for big arrays like displays, that layer must be patterned into electrically isolated devices. Doing that requires one or more additional steps that are costly, time-consuming and/or difficult to do accurately.

The NIST team and their partners studied the organic version of a workhorse device--the field effect transistor (FET)--that commonly is used as a switch to, for example, turn pixels on and off in computer displays. The essential structure consists of two electrical contacts with a channel of semiconductor between them. The researchers found that by applying a specially tailored pretreatment compound to the contacts before applying the organic semiconductor solution, they could induce the molecules in solution to self-assemble into well-ordered crystals at the contact sites.

These structures grow outwards to join across the FET channel in a way that provides good electrical properties at the FET site, but further away from the treated contacts the molecules dry in a more random, helter-skelter arrangement that has dramatically poorer properties--effectively providing the needed electrical isolation for each device without any additional processing steps. The work is an example of the merging of device structure and function that may enable low cost manufacturing, and an area where organic materials have important advantages.

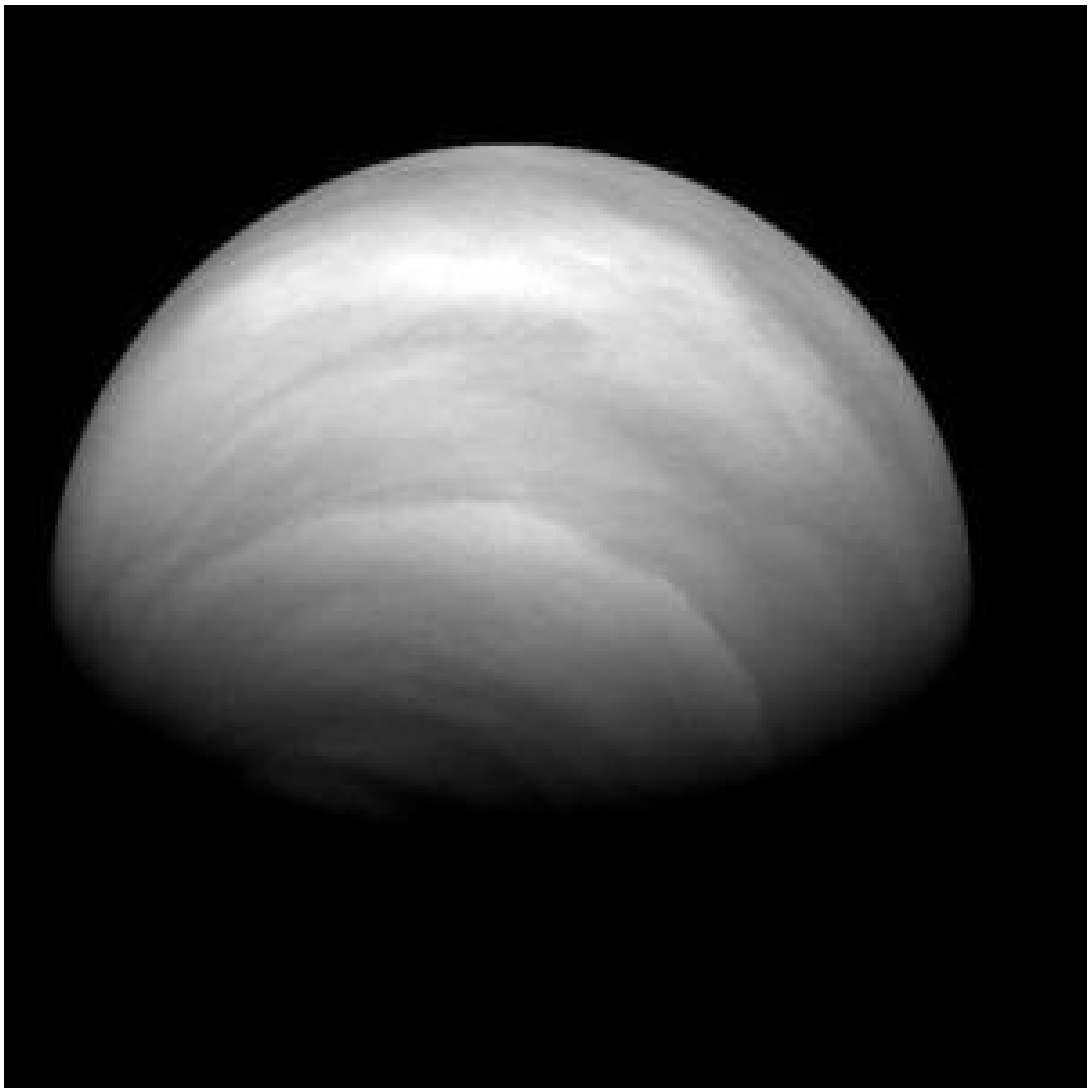
In addition to its potential as a commercially important manufacturing process, the authors note, this chemically engineered self-ordering of organic semiconductor molecules can be used to create test structures for fundamental studies of charge transport and other important properties of a range of organic electronic systems.

* Journal reference: D.J. Gundlach, J.E. Royer, S.K. Park, S. Subramanian, O.D. Jurchescu, B.H. Hamadani, A.J. Moad, R.J. Kline, L.C. Teague, O. Kirillov, C.A. Richter, J.G. Kushmerick, L.J. Richter, S.R. Parkin, T.N. Jackson and J.E. Anthony. Contact-induced crystallinity for high-performance soluble acene-based transistors and circuits. Nature Materials Advanced Online Publication, 17 February 2008.

Adapted from materials provided by National Institute of Standards and Technology.

http://www.sciencedaily.com:80/releases/2008/02/080219203513.htm

Venus Has Extraordinarily Changeable And Extremely Large-scale Weather



This is a picture of Venus's atmosphere, taken by the Venus Monitoring Camera (VMC) during Venus Express orbit number 443 on 8 July 2007. The view shows the southern hemisphere of the planet. (Credit: ESA/ MPS/DLR/IDA)

ScienceDaily (Feb. 26, 2008) — Venus Express has revealed a planet of extraordinarily changeable and extremely large-scale weather. Bright hazes appear in a matter of days, reaching from the south pole to the low southern latitudes and disappearing just as quickly. Such 'global weather', unlike anything on Earth, has given scientists a new mystery to solve.

The cloud-covered world of Venus is all but a featureless, unchangeable globe at visible wavelengths of light. Switch to the ultraviolet and it reveals a truly dynamic nature. Transient dark and bright markings stripe the planet, indicating regions where solar ultraviolet radiation is absorbed or reflected, respectively.

Venus Express watches the behaviour of the planet's atmosphere with its Venus Monitoring Camera (VMC). It has seen some amazing things. In July 2007, VMC captured a series of images showing the development of the bright southern haze. Within days, the high-altitude veil continually brightened and dimmed, moving towards equatorial latitudes and back towards the pole again.

Such global weather suggests that fast dynamical, chemical and microphysical processes are at work on the planet. During these episodes, the brightness of the southern polar latitudes increased by about a third and faded just as quickly, as sulphuric acid particles coagulate.

"This bright haze layer is made of sulphuric acid," says Dmitri Titov, VMC Co-Investigator and Venus Express Science Coordinator, Max Planck Institute for Solar System Research, Germany. That composition suggests the existence of a formation process to the VMC team.

At an altitude of about 70 km and below, Venus's carbon dioxide-rich atmosphere contains small amounts of water vapour and gaseous sulphur dioxide. These are usually buried in the cloud layer that blocks our view of the surface at visible wavelengths.

However, if some atmospheric process lifts these molecules high up above the cloud tops, they are exposed to solar ultraviolet radiation. This breaks the molecules, making them highly reactive. The fragments find each other and combine quickly to form sulphuric acid particles, creating the haze.

"The process is a bit similar to what happens with urban smog over cities," says Titov. With over 600 orbits completed, the VMC team now plan to look for repeating patterns of behaviour in the build-up and decrease of the haze layer.

What causes the water vapour and sulphur dioxide to well up in the first place? The team does not know yet. Titov says that it is probably an internal dynamical process in the planet's atmosphere. Also, the influence of solar activity on haze formation has not been completely ruled out.

When the team have worked out what causes the hazes and their vigorous dynamics, there is still another problem waiting to be solved. The dark markings on these images are one of the biggest remaining mysteries of Venus's atmosphere. They are caused by some chemical species, absorbing solar ultraviolet radiation. However, as yet, planetary scientists do not know the identity of the chemical. Now that they can spot these dark patches quickly with VMC, the team hopes to use another Venus Express instrument, VIRTIS, to pinpoint the exact chemical composition of these regions.

Adapted from materials provided by European Space Agency.

http://www.sciencedaily.com:80/releases/2008/02/080221084148.htm

How Bacteria Gain Resistance To Multiple Types Of Antibiotics: Mechanism Discovered

ScienceDaily (Feb. 26, 2008) — A team of scientists from the University Paris Descartes has solved the structure of two proteins that allow bacteria to gain resistance to multiple types of antibiotics, according to a report in EMBO reports this month.

This work provides new clues as to how bacteria adapt to resist antibiotics and how to design new drugs that counteract this defense mechanism.

Frédéric Dardel and colleagues crystallized both the narrow and broad-spectrum resistance forms of the antibiotic-modifying acetyltransferase enzyme.

Their report reveals that the enzyme has a flexible active site that can evolve to accommodate new antibiotics, allowing the bacteria to break them down and render them useless.

This explains why this type of enzyme is now carried by many bacteria struggling for survival in the antibiotic age.

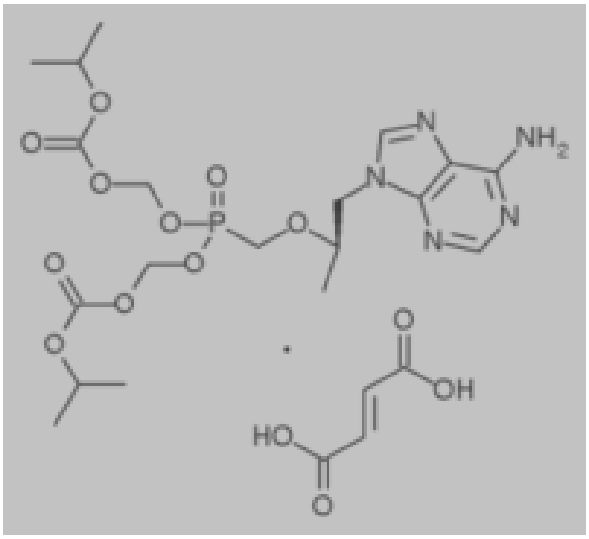
More importantly, the research provides new insight for the design of new antibiotics that could evade this form of resistance, and new inhibitors that would extend the effectiveness of current antibiotics, both of which could help in the fight against the deadly infections becoming more frequent in hospitals.

Journal reference: Frédérique Maurice, Isabelle Broutin, Isabelle Podglajen, Philippe Benas, Ekkehard Collatz & Frédéric Dardel. Enzyme structural plasticity and the emergence of broad-spectrum antibiotic resistance. http://www.nature.com/embor/journal/vaop/ncurrent/abs/embor20089.html

Adapted from materials provided by European Molecular Biology Organization, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com:80/releases/2008/02/080222101547.htm

HIV Prevention: Tenofovir Gel Safe For Daily Use By Women, New Study Suggests



ScienceDaily (Feb. 26, 2008) — A vaginal microbicide that incorporates an antiretroviral (ARV) drug normally used to treat people with HIV is safe for sexually active HIV-negative women to use every day over an extended period, suggest results of a clinical trial of tenofovir topical gel. Moreover, most of the women who participated in the study conducted in India and the United States adhered to a regimen involving either daily or sex-dependent use of the gel, report researchers from the U.S. National Institutes of Health-funded Microbicide Trials Network (MTN) at Microbicides 2008, an international meeting taking place Feb. 24-26 at the Hotel Ashok in New Delhi.

The findings are a significant boost to HIV prevention efforts focused on the potential of "next-generation" microbicides to curb infection rates in women. Globally, nearly half of those living with HIV/AIDS are women, and between 70 and 90 percent of all HIV infections in women are due to heterosexual intercourse. In India and many other parts of the world, even married women and women with steady partners are at risk.

In this Phase II study, called HPTN 059, researchers wanted to understand if tenofovir was safe to use every day for six months compared to its use prior to each act of sex, and if women were able to adhere, or follow, each regimen. Researchers found both approaches equally safe and women's adherence to product use similar. Interestingly, most participants also said they would be willing to apply gel, including daily, if one were found effective to prevent against getting HIV from their sexual partners.

Microbicides are products designed to prevent the sexual transmission of HIV when applied topically on the inside of the vagina or rectum. Tenofovir gel is among a newer class of candidate microbicides that differ from early types because they have specific action against HIV. In addition, because tenofovir gel and similar products are longer acting, their use may not be required before each act of sex, which is not always practical or desirable for some women.

"Finding that daily use is both safe and feasible is important because we believe a daily approach may provide more sustainable protection against the virus in women who can't always predict when they will have sex. Based on what we have learned we can proceed with greater confidence on a path that will answer whether tenofovir gel and other gels with HIV-specific compounds will be able to prevent sexual transmission of HIV in women when other approaches have failed to do so. It is a critical time for all of us engaged in HIV prevention, and I truly believe we are turning a corner," said Sharon L. Hillier, Ph.D., professor and vice chair for faculty affairs, and director of reproductive infectious disease research in the department of obstetrics, gynecology and reproductive sciences at the University of Pittsburgh School of Medicine, who is MTN principal investigator and led the study.

According to UNAIDS, women represent nearly half, or 46 percent, of the 33.2 million people living with HIV/AIDS worldwide, and they are more than twice as likely as men to acquire HIV through sexual intercourse, due to both biological and cultural factors. Although correct and consistent use of male condoms has been shown to prevent HIV infection, women often cannot successfully negotiate condom use with their male partners.

HPTN 059 involved 200 sexually active HIV-negative women: 52 were enrolled at the University of Alabama at Birmingham (UAB) in Birmingham, Alabama; 48 at Bronx-Lebanon Hospital Center, Bronx, New York; and 100 women entered the study at the National AIDS Research Institute in Pune, India. The mean age was 32 and 64 percent of the women were married. All but one of the women at the Indian site were married compared to 28 percent of the women at the two U.S. sites.

Once enrolled, women were randomly assigned to one of four groups: tenofovir gel applied daily; tenofovir gel applied up to two hours before sex; placebo gel (without an active drug) used every day; or placebo gel applied prior to sex. Because the tenofovir and placebo gels look the same, neither researchers nor participants knew who had been assigned to use which gel during the six-month study period. Women were assessed at one month, three months and six months. Throughout the study, participants received free condoms and HIV risk-reduction counseling as well as routine testing and treatment for sexually transmitted infections.

The study found no differences in liver, blood and kidney function between the groups of women using either regimen of tenofovir gel and the groups assigned to use placebo, nor were there differences in these safety measures between groups using daily gel and groups using gel with sex. Likewise, researchers report no statistical differences in the development of genital symptoms such as itching and burning, which are considered minor. One woman became pregnant and stopped gel use. No participants acquired HIV during the study.

Adherence to treatment was also similar. According to structured interviews, 80 percent of the women instructed to use gel within two hours of having sex said they complied with the regimen. Of the women in the daily-use groups, an average of 83 percent reported study gel use in the past week. The two most cited reasons women gave for not using gel was menstruation (41 percent) and forgetting (23 percent).

Overall, 41 percent of the women indicated there was nothing they disliked about using the gel and 39 percent said it was easy to use. Other attributes of the gel women identified included its potential for protecting against HIV (19 percent), its smell and appearance (14 percent) and that it made sex more pleasurable (12 percent). Thirty-two percent didn't like that the gel was messy, but none of the women said sex was made less pleasurable because of the gel.

Importantly, when asked if they would use the gel if it were found to help prevent people from getting HIV, 90 percent of the women who had been assigned to use the gel at the time of sex and 96 percent of the women who had been asked to use gel daily said yes.

"Women are definitely willing to use a gel to protect against sexual transmission of HIV. That's very encouraging," Dr. Hillier commented.

HPTN 059 also evaluated how the active ingredient in the gel was absorbed from the vagina into the blood and vaginal tissue; and looked at the effects of prolonged use on vaginal flora, the vagina's naturally protective population of microorganisms; and whether the activity of certain immune system molecules called cytokines could serve as a useful measure, or marker, for assessing the safety of microbicides. Results of these evaluations are not yet available.

HPTN 059 was conducted by the Microbicide Trials Network (MTN), a clinical trials network established in 2006 by the National Institute of Allergy and Infectious Diseases (NIAID) with co-funding from the National Institute of Child Health and Human Development and the National Institute of Mental Health, all components of the U.S. National Institutes of Health (NIH). Prior to the establishment of the MTN,

HPTN 059 study was led by the NIAID-funded HIV Prevention Trials Network (HPTN), from which the study gets its name.

At the site level, HPTN 059 was led by Smita Joshi, MBBS, in Pune, India; Jessica Justman, M.D., at Bronx-Lebanon Hospital; and Craig Hoesley, M.D., UAB.

In its pill form, tenofovir is a mainstay of one of the most widely used regimens for treating HIV. The active ingredient in tenofovir gel belongs to a class of anti-retroviral drugs called nucleotide reverse transcriptase inhibitors, which act against HIV by targeting a key enzyme the virus needs to copy itself before taking over a host cell. The topical gel form of tenofovir was not developed as treatment for HIV but as an approach to prevent the sexual transmission of HIV. Both oral and topical formulations were developed by Gilead Sciences, Inc., of Foster City, California, which assigned a royalty-free license for the topical gel to the International Partnership for Microbicides of Silver Spring, Maryland, and CONRAD, of Arlington, Virginia, in December 2006.

MTN will launch a series of other trials that will further evaluate the safety and adherence of tenofovir gel as well as look at its effectiveness for preventing HIV. Researchers will soon begin enrolling participants into MTN-002, the first trial of a candidate microbicide in pregnant women that seeks to understand the extent of drug absorption during pregnancy and the degree to which the active ingredient in tenofovir gel can be transferred to the fetus. Another trial, MTN-001, will be the first direct comparison of oral and vaginal gel preparations of tenofovir -- looking at differences in drug absorption (systemically and locally) and adherence and acceptability of each approach separately and in combination.

Finally, the VOICE Study (Vaginal and Oral Interventions to Control the Epidemic) will be the first effectiveness trial of a microbicide that women use every day instead of at the time of sexual intercourse. Moreover, VOICE will be the only trial evaluating two promising HIV prevention approaches in the same study: tenofovir gel and pre-exposure prophylaxis, or PrEP, an HIV prevention approach that involves daily use of oral anti-retrovirals.

Currently, tenofovir gel is being evaluated in a Phase IIb study being conducted at the Centre for the AIDS Programme of Research in South Africa (CAPRISA) in Durban. The study, known as CAPRISA 004, will enroll 980 women. Unlike VOICE, researchers are evaluating a dosing strategy timed around sexual intercourse.

Other microbicide products have been or are currently being tested in clinical trials, although none is yet approved or available for use by women.

In addition to Drs. Hillier, Justman, Joshi and Hoelsley, other authors of the HPTN 059 study presented at Microbicides 2008 are Elena Cyrus-Cameron, M.P.H., Family Health International, Research Triangle Park, North Carolina; Benoît Mâsse, Ph.D., Statistical Center for HIV/AIDS Research & Prevention at the Fred Hutchinson Cancer Research Center, University of Washington, Seattle; and Craig Hendrix, M.D., Johns Hopkins University, Baltimore, Maryland.

Adapted from materials provided by Microbicide Trials Network.

http://www.sciencedaily.com:80/releases/2008/02/080225090821.htm

Energy Strategy To Combat Climate Change Proposed

ScienceDaily (Feb. 26, 2008) — To even begin to combat climate change effectively, CO_2 emissions have to fall sharply: to 1 ton per capita per year. According to researchers from ETH Zurich the way to reach this goal in this century is through an energy strategy based on the three Es: increased efficiency, renewable energy and electrification.

In the past year, various reports from the United Nations' Intergovernmental Panel on Climate Change (IPCC) have warned the world in no uncertain terms that in order to achieve a stable climate on our planet by the end of this century, any increase in CO_2 emissions in the coming decades must be curbed before the emissions can be appreciably reduced. According to the IPCC, the maximum amount of CO_2 emissions that can be tolerated globally by the end of the 21st century amounts to roughly 2000 gigatons. This will mean a considerable reduction in the emission of CO_2 per capita.

The per capita emission of carbon dioxide in Switzerland is currently 9 tons per year, approximately twice the global average. "Our objective for the climate and energy policy for the century has to be to induce each member of the human race to produce not more than 1 ton of carbon dioxide per year", Professor Ralph Eichler, President ETH Zurich, explained.

Systematic implementation of 3E strategy

This proposed emission target for carbon dioxide may seem ambitious by today's standards, but it can be achieved by the end of the century both in Switzerland and throughout the world. This is reflected in the calculations made by ETH Zurich's own Energy Science Center (ESC). In order to reach the target, an energy strategy will have to be consistently implemented. As stated by Professor Konstantinos Boulouchos, the proposed strategy is based on three pillars:

1. the exhaustion of efficiency potential,
2. the extended use of renewable energy sources and
3. the increased share of electricity in the energy mix.

Exhausting the efficiency potential will mean increasing efficiency in every link of the energy conversion chain, from extraction at the energy source, through storage and distribution up to energy usage. This

alone would harbour great savings potential, especially when combined with market-based instruments to influence the demand side.

The second E of the strategy focuses on the use of renewable energy sources, such as photovoltaics, water, and wind. Important to note is that economic as well as ecological aspects must be taken into consideration when using renewable energy sources.

Electricity as the backbone of the energy system

The newcomer to the 3-E strategy constitutes the third E: electrification. According to ETH Zurich researchers, in future $C0_2$-poor electricity will establish itself as the backbone of a sustainable energy system. It is increasingly being used in heating and cooling buildings (with heat pumps, for example), and is expected to extend to individual mobility (moving, in the long run, from hybrid vehicles to fully electric cars).

A reorientation of the energy system, however, will not happen overnight. It is likely to take several decades. All the more reason that it is crucial that steps be taken today: infrastructure in industrialized countries (transmission network, power plants) needs to be renewed and in threshold countries, erected.

Innovative research

ETH Zurich conducts intensive research with a mind to finding new solutions and methods to face the CO_2 problem. Professor Marco Mazzotti from the Institute for Process Engineering is researching the possibilities of eliminating CO_2 in fossil-fueled power stations and combining it with stable and solid substances. This so-called mineralization thus facilitates the permanent and secure storage of greenhouse gases.

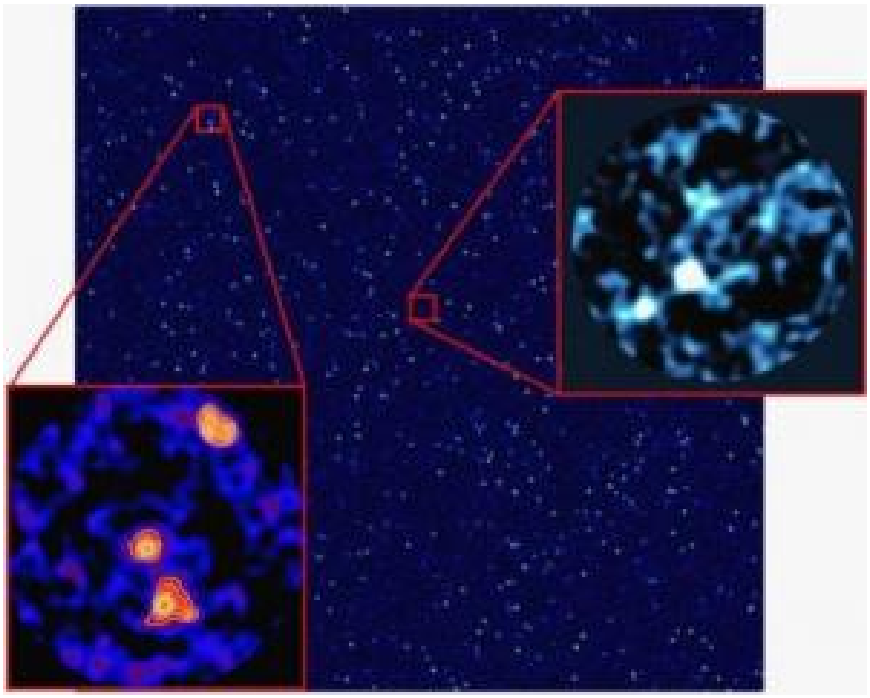
Power electronics are becoming increasingly smaller and more efficient: the research group headed by Professor Johann Kolar from the Power Electronic Systems Laboratory is devoted to developing such components that are deployed, for example, in hybrid vehicles. Efficient control of the drive system of such cars makes a significant contribution towards environmentally-friendly private transport.

Promising ETH Zurich research is also being carried out in the field of building systems engineering. The technology at our fingertips today would already enable us to replace CO_2-emitting heating and boiler systems with a combination of innovative wall insulation and heat pumps - with free renewable energy from the ground. This ingenious concept is also just the ticket for existing buildings. "We just need to get cracking", explains Professor HansJürg Leibundgut from the Institute for Building Systems. Within five to six years it should be possible to produce the necessary components on an industrial level so that for the price of a mid-range car, a four-room apartment can be refurbished, with the effect that practically all of the CO_2 previously generated by heating and warm water can be prevented.

Adapted from materials provided by ETH Zurich/Swiss Federal Institute of Technology.

http://www.sciencedaily.com:80/releases/2008/02/080225101126.htm

SCUBA-2 Camera Will Explore Earliest Phases Of Galaxy Formation



The large square is a simulation of a patch of sky covering an area of about 4 full Moons - the kind of area that SCUBA-2 will explore with ease. The insets show the tiny areas that have been studied so far in the submillimetre, revealing super-luminous primeval galaxies, hidden from optical telescopes. SCUBA-2 will be able to map the sky 1000 times faster than any other instrument and find thousands of these galaxies and explore their properties in great detail. (Credit: Image courtesy of Science and Technology Facilities Council) ScienceDaily (Feb. 25, 2008) — The Science and Technology Facility Council's UK Astronomy Technology Centre (UK ATC) at the Royal Observatory Edinburgh shipped its biggest and most complex ever instrument on February 21. The giant camera known as SCUBA-2 will be transported to the James Clerk Maxwell Telescope (JCMT) on top of a 14,000 foot mountain in Hawaii where it is expected to make major discoveries related to the origins of galaxies, stars and planets.

Rather than detecting visible light, SCUBA-2 will detect submillimetre radiation, which is sensitive to the heat emitted by extremely cold dust in the Universe. This material is associated with the mysterious earliest phases of the formation of galaxies, stars and planets, hitherto largely undetectable. Typically the dust is at temperatures of about -200 Celsius and so detecting its extremely weak emissions presents a huge technological challenge. Dr Wayne Holland, the project leader at the UK ATC said "Submillimetre astronomy is a relatively new science and one where the UK has led the world over the past two decades. Our latest camera is the most powerful yet: SCUBA-2 on the JCMT should detect the equivalent of the heat from a candle on the surface of the Moon."

New technologies

In order to detect such low levels of heat, the detectors inside the camera must be as sensitive as possible. To achieve this they must be cooled to within a tenth of a degree above absolute zero (or about -273 Celsius). This is a huge technical challenge and to prevent the detectors being swamped by heat from the camera itself, the internal optics of the camera must also be cooled. As a result, the complete camera is the size of a family car and weighs about 4 tons.

The superconducting detectors are the most sensitive thermal detectors ever built. Their design and construction was the result of a highly successful collaboration with the National Institute of Standards and Technology in Boulder, Colorado, and the Scottish Microelectronics Centre of the University of Edinburgh.

Professor Ian Robson, Director of the UK ATC, said "SCUBA-2 is an incredible achievement; it is almost certainly one of the most complex projects that UK astronomers have ever attempted but it is also a project that is expected to produce amazing results. After seven years of construction in Edinburgh, the world's most powerful submillimetre camera by a huge margin is poised to open up a new frontier in astronomical research."

The cold Universe

One of the most exciting discoveries in astronomy over the past decade was made by SCUBA, the predecessor to SCUBA-2. Astronomers were surprised to detect a population of distant galaxies completely enshrouded in dust that had never been seen before. These galaxies are usually invisible to telescopes that detect visible light and can only be seen using submillimetre telescopes. They are known as primeval galaxies because they represent some of the earliest structures observable in the universe. Over it's 8-year lifetime SCUBA was able to produce images of only a hundred or so of these galaxies with each one taking several nights of valuable telescope time. In contrast SCUBA-2 is expected to be able to pinpoint and image many hundreds of these in a single night. Professor John Peacock, head of the Institute for Astronomy at the University of Edinburgh, is excited about the prospect of using the new camera, "Earlier submillimetre cameras such as SCUBA have taught us that galaxies like the Milky May formed most of their stars in an early dust-rich episode that we can't study with visible light. SCUBA-2 will let us find thousands of galaxies in the earliest act of assembly, and study them in detail. It will be like moving from black-and-white film to 10-megapixel digital cameras. Astronomers can't wait for this wonderful machine to start producing results." Professor Gary Davis, Director of the JCMT, said "We at the telescope are anxiously awaiting the arrival of this new camera. I expect it to revolutionise submillimetre astronomy, just as its predecessor SCUBA did. The JCMT's user community in the UK, Canada and the Netherlands has designed a joint, comprehensive Legacy Survey based on the enormous promise of this instrument, and we can't wait to get started."

Signposts to planetary systems

Closer to home SCUBA-2 will survey giant molecular clouds, where stars are currently being born and, intriguingly, it will search for the imprints of planetary systems on the cold dusty debris found around many nearby stars. This will entail observing around 500 stars and searching for the tell-tale signs that that planetary systems exist. "One of the most exciting things SCUBA-2 will do is to probe regions similar in size to our own Solar System around nearby stars", Dr Holland says. "This will tell us if there are other such systems out there and whether our Solar System is unique".

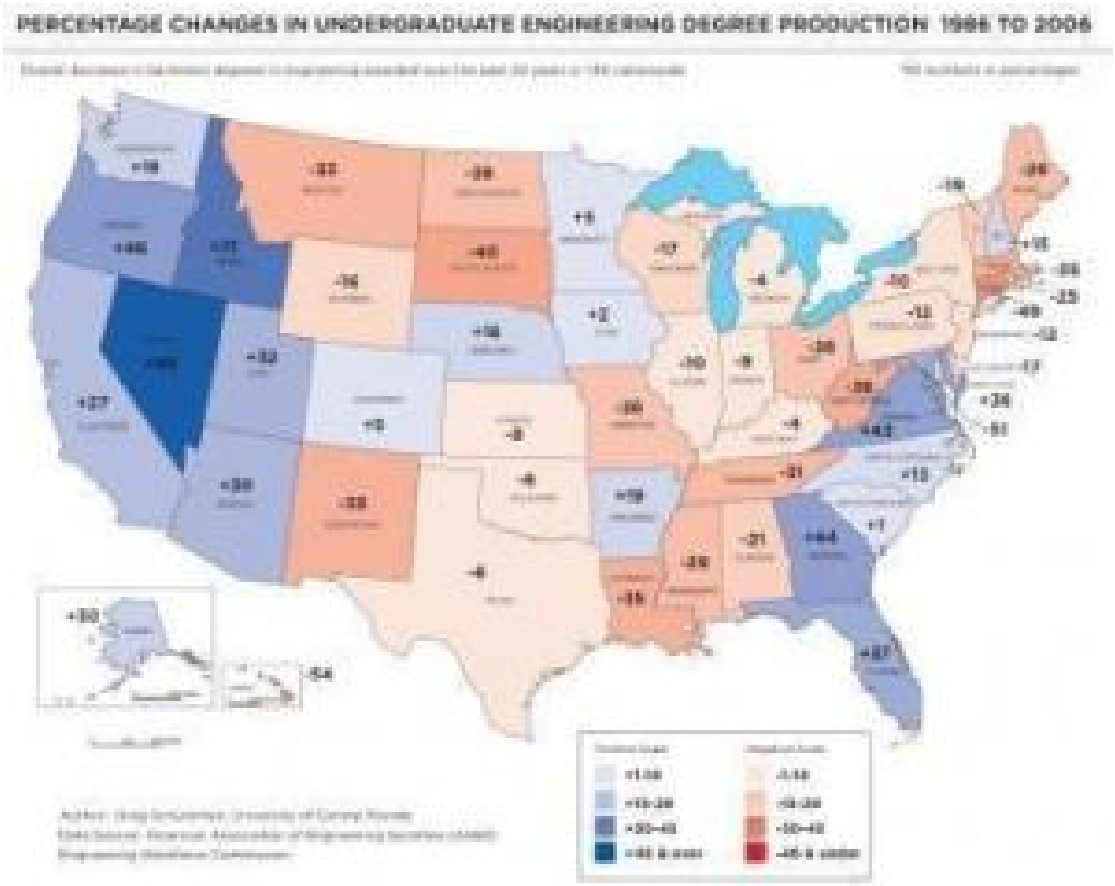
Atlas of the sky

For astronomical instruments pixel count is all important, particularly if you want to survey large areas of sky. Containing over 10,000 pixels SCUBA-2 will push back the boundaries of technology much further than has ever been done before. Professor Robson says "The closest rival camera has only a few hundred pixels. SCUBA-2 will survey the sky 1000 times faster than any other instrument out there, with the exciting prospect of producing the first detailed map of the sky - a true atlas of the cold universe". SCUBA-2 is a multi-million pound instrument. It has taken seven years to build and has been the result of a hugely successful collaboration between the UK ATC, the National Institute of Standards and Technology (Boulder, US), the University of Edinburgh, Cardiff University, the Joint Astronomy Centre, Hawaii, and a consortium of Canadian universities, including the Universities of Waterloo and British Columbia. SCUBA-2 will arrive in Hawaii in mid-March and will begin initial science operations in the summer.

Adapted from materials provided by Science and Technology Facilities Council.

http://www.sciencedaily.com:80/releases/2008/02/080221095420.htm

Where Will We Find The Next Generation Of Engineers?



A state-by-state ranking of engineering graduates shows an unmet need. (Credit: University of Central Florida)

ScienceDaily (Feb. 25, 2008) — A new study that examines the number of engineering graduates coming out of our nation's engineering schools reveals a mixed picture of how prepared each state is for meeting the need for high-tech workers in the coming years.

Greg Schuckman, Assistant Vice President of University Relations and Director of Federal Relations and Research Advancement at the University of Central Florida, authored the study after revisiting data that he had analyzed in 1998 while working for the American Association of Engineering Societies (AAES) in Washington, DC.

"Over the past 20 years, the number of students earning bachelors degrees in engineering has declined by almost 3 percent nationally," says Schuckman. "While that statistic may not seem significant by itself, the decline comes at a time when the number of students receiving bachelors degrees overall in the United States has increased by more than 50 percent."

John Brooks Slaughter, Ph.D., P.E., President and CEO of the National Action Council for Minorities in Engineering, Inc. (NACME) noted last year that, "Huge changes have occurred in our economy largely as a result of globalization and technological innovation. Manufacturing has declined while the information age requires more professional and high-tech skills from employees. It is estimated that more than a half million engineers will be needed over the next decade to replace those who retire and that at least that many new engineers will be needed to fill the demand that will exist at the end of that period. We find ourselves importing talent and exporting jobs, not just because it is less expensive to have the work performed by lower-wage skilled workers in developing countries but also because we do not produce enough native-born, well-qualified scientists and engineers in our nation's colleges and universities."

Overall, twenty states increased their production of engineering graduates while 30 states and the District of Columbia decreased between 1986 and 2006.

"The space race was won in no small part through the engineering prowess of young students who were emboldened by the launch of Sputnik." says Schuckman. "While there is no definitive 'Sputnik moment' today, the competitiveness challenge that nations such as China, India, and others pose to the U.S. is as real a threat to our way of life today as Sputnik was 50 years ago."

Sam Palmisano, President and CEO of the IBM Corporation and Honorary Co-Chair of the 2008 National Engineers Week, summed up the challenge: "We need to recruit engineers from a broad cross-section of society, and this means reaching out to populations that are underrepresented in the engineering professions. Only 11 percent in the United States today are women, 3 percent Blacks and 4 percent Hispanics. These statistics reveal a large reservoir of potential engineers that is not being fully tapped. I encourage you to use the E-Week 2008 campaign to inspire the next generation of engineers, reaching out to a diverse cross section of youngsters, independent of gender, ethnicity, or physical disability. And finally, let's engage the general public to see, touch and embrace engineering, the source of so much of the prosperity, growth and hope that are reaching more and more people around the globe."

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

http://www.sciencedaily.com:80/releases/2008/02/080218161733.htm

New Way To Store Information Via DNA Discovered

Researchers at UC Riverside have discovered a system to encode digital information within DNA. This method relies on the length of the fragments obtained by the partial restriction digest rather than the actual content of the nucleotide sequence. (Credit: iStockphoto)

ScienceDaily (Feb. 25, 2008) — Researchers at UC Riverside have found a way to get into your body and your bloodstream. No, they're not spiritual gurus or B-movie mad scientists. Nathaniel G. Portney, Yonghui Wu, Stefano Lonardi, and Mihri Ozkan from UCR's departments of Bioengineering, Computer Science and Engineering, Biochemistry, and Electrical Engineering, and the Center for Nanoscale Science and Engineering, are just talented when it comes to manipulating DNA.

The researchers discovered a system to encode digital information within DNA. This method relies on the length of the fragments obtained by the partial restriction digest rather than the actual content of the nucleotide sequence. As a result, the technology eliminates the need to use expensive sequencing machinery.

Why is this discovery important? The human genome consists of the equivalent of approximately 750 megabytes of data – a significant amount of storage space. However, only about three percent of DNA goes into composing the more than 22,000 genes that make us what we are. The remaining 97 percent

leaves plenty of room to encode information in a genome, allowing the information to be preserved and replicated in perpetuity.

Given the size of the DNA fragments (one base pair of DNA is 0.33 nanometers), one could store a large amount of information in a very small space. By storing messages within DNA, organizations can "tag" objects to verify authenticity, as well as to inconspicuously send data to a specific destination. "Already there are several companies using DNA to tag objects that they certify to be original and which then can be very difficult to counterfeit," says Stefano Lonardi, Associate Professor of Computer Science & Engineering at UCR's Bourns College of Engineering.

For example, the British company, Redweb Security, has developed something called i-powder that tags DNA and another company called PSA DNA Authentication services tags sports memorabilia.

"What we developed at UCR is a method to encode a message in DNA in a way that does not require an expensive sequencing machine," notes Lonardi. "The decoding still requires a wet lab procedure, but the experimental procedure is significantly easier."

The article, entitled "Length-based Encoding of Binary Data in DNA," was published by the American Chemical Society in Langmuir December 18, 2007.

Adapted from materials provided by University of California, Riverside.

http://www.sciencedaily.com:80/releases/2008/02/080224150305.htm

Fresh Look Inside Mount St. Helens

The most recent eruption of Mount St Helens began in October 2004 and is still going on. (Credit: Image courtesy of Michigan Technological University)

ScienceDaily (Feb. 25, 2008) — Volcanoes are notoriously hard to study. All the action takes place deep inside, at enormous temperatures. So geophysicists make models, using what they know to develop theories about what they don't know.

Research led by Gregory P. Waite, an assistant professor of geophysics at Michigan Technological University, has produced a new seismic model for figuring out what's going on inside Mount St. Helens, North America's most active volcano. Waite hopes his research into the causes of the earthquakes that accompany the eruption of a volcano will help scientists better assess the hazard of a violent explosion at Mount St. Helens and similar volcanoes.

Waite and co-authors Bernard A. Chouet and Phillip B. Dawson published their findings on February 19, 2008, in the Journal of Geophysical Research.

Volcanoes don't always erupt suddenly and violently. The most recent eruption of Mount St Helens, for example, began in October 2004 and is still going on. It's what Waite and other volcanologists call a passive eruption, with thick and sticky lava squeezing slowly out of the ground like toothpaste from a tube.

When a volcano such as Mount St Helens erupts, it can cause a series of shallow, repetitive earthquakes at intervals so regular that they've been called "drumbeat earthquakes." Until now, scientists generally believed that these earthquakes were caused by the jerky movements of a solid plug of molten rock traveling up from the volcano's core, a process known as the stick-slip model.

Modeling of seismic data collected by Waite and colleagues dispute that explanation. "The regularity and similarity of the shallow earthquakes seem consistent with a stick-slip model," said Waite. Broadband measurements indicated that the energy is concentrated in a short bandwidth—between .5 and 2 Hz—and

the earthquakes have nearly identical wave forms. Interestingly, the first motions observed at all of the seismic stations were the same.

“But this is not typical of a stick-slip event,” Waite said. “Rather, it suggests a source with a net volume change, such as a resonating fluid-filled crack.”

The fluid in the crack most likely is steam, derived from the magma and combined with water vaporized by the heat of the molten rock. A continuous supply of heat and fluid keeps the crack pressurized and the “drumbeats” beating, Waite explained.

“The pressurized crack in our model is filled with steam that could conceivably drive a small explosive eruption if the pattern (of earthquakes) we observe is disturbed,” he noted. Mount St. Helens erupted violently in 1980, losing nearly 1,000 feet of its cone-shaped top.

“The cause of Mount St. Helens earthquakes during the 2004-2008 eruption has been a matter of great debate,” said Seth Moran, the principal USGS seismologist monitoring the current eruption. “Greg collected a fantastic dataset with temporary seismometers and used highly sophisticated modeling techniques to produce a robust and intriguing model for the process responsible for those earthquakes. His model is somewhat different from the hypothesis that many other Mount St. Helens researchers have been using,” the seismologist went on to say, “and we are adjusting our understanding of the mechanics underlying the current eruption to incorporate his results.”

Waite’s research was conducted during a Mendenhall Postdoctoral Fellowship with the U.S. Geological Survey (USGS). Waite’s co-author, Chouet, who also works for the USGS, proposed a similar seismological model for volcanoes in Hawaii, where the lava is much more fluid and flows more easily. This is the first time the model has been applied to volcanoes like Mount St. Helens, with slow-flowing, sticky lava.

Adapted from materials provided by Michigan Technological University.

http://www.sciencedaily.com:80/releases/2008/02/080219203516.htm

Radiation From Mobile Phones Changes Protein Expression In Living People, Study Suggests

A new study on effects of mobile phone radiation on human skin strengthens the results of the human cell line analyses: living tissue responds to mobile phone radiation. (Credit: iStockphoto/Luis Pedrosa)

ScienceDaily (Feb. 25, 2008) — A new study completed by the Finnish Radiation and Nuclear Safety Authority (STUK) on effects of mobile phone radiation on human skin strengthens the results of the human cell line analyses: living tissue responds to mobile phone radiation.

Earlier studies have shown that mobile phone radiation (radiofrequency modulated electromagnetic fields; RF-EMF) alters protein expression and activity in human endothelial cell line. STUK's new study is globally unique, because for the first time it has examined whether a local exposure of human skin to RF-EMF will cause changes in protein expression in living people. In the study, a small area of forearm's skin in 10 volunteers was exposed to GSM signal for one hour. After that skin biopsies were collected from exposed and non-exposed areas of skin and all extractable proteins were examined. The analysis of 580 proteins identified 8 proteins that were statistically significantly affected.

"Mobile phone radiation has some biological effect. Even if the changes are small, they still exist", says Dariusz Leszczynski, Research Professor at STUK. According to Leszczynski it is much too early to say will these changes induced by the mobile phone radiation have any effect on health. "The aim of this project was not detecting any possible health effects, but to find out whether living human skin responds to mobile phone radiation and whether proteomics approach is useful in sorting out this issue", he states.

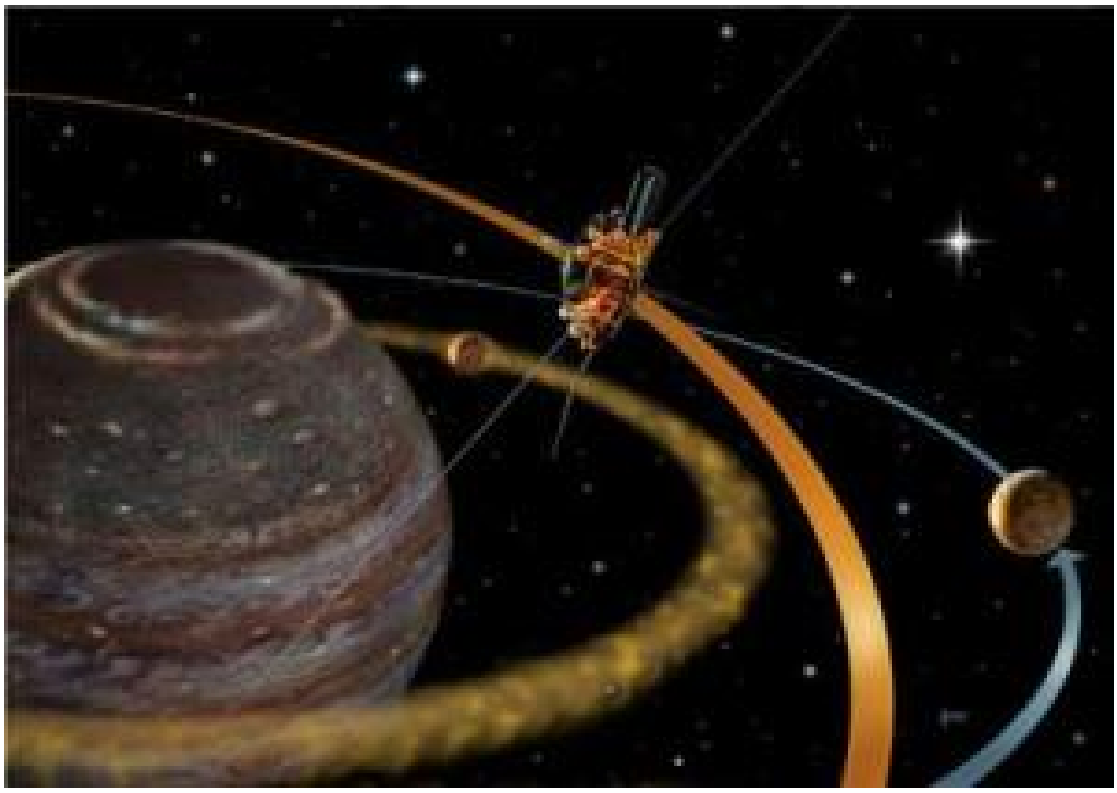
A more extensive study with 50-100 volunteers is now planned at STUK. The new study is expected to begin in 2009. Funding for the present study was provided by Tekes - Finnish Funding Agency for Technology and Innovation and STUK, and it was a part of national HERMO project (Health Risk Assessment of Mobile Communications) finished in September 2007.

The entire article "Mobile phone radiation might alter protein expression in human skin" is available in the BMC Genomics web journal: http://www.biomedcentral.com/1471-2164/9/77/abstract

Adapted from materials provided by Radiation and Nuclear Safety Authority, Finland.

http://www.sciencedaily.com:80/releases/2008/02/080224100008.htm

Ulysses Mission On Sun And Stars Coming To A Cold Quiet End



A joint ESA and NASA mission, Ulysses (named after the hero of Greek legend) is charting the unknown reaches of space above and below the poles of the sun. (Credit: ESA)

ScienceDaily (Feb. 25, 2008) — Ulysses, the mission to study the Sun's poles and the influence of our star on surrounding space is coming to an end. After more than 17 years in space – almost four times its expected lifetime – the mission is finally succumbing to its harsh environment and is likely to finish sometime in the next month or two.

Ulysses is a joint mission between ESA and NASA. It was launched in 1990 from a space shuttle and was the first mission to study the environment of space above and below the poles of the Sun. The reams of data Ulysses has returned have forever changed the way scientists view the Sun and its effect on the space surrounding it.

Ulysses is in a six-year orbit around the Sun. Its long path through space carries it out to Jupiter's orbit and back again. The further it ventures from the Sun, the colder the spacecraft becomes. If it drops to 2ºC, the spacecraft's hydrazine fuel will freeze.

This has not been a problem in the past because Ulysses carries heaters to maintain a workable on-board temperature. The spacecraft is powered by the decay of a radioactive isotope and over the 17-plus years, the power it has been supplying has been steadily dropping. Now, the spacecraft no longer has enough power to run all of its communications, heating and scientific equipment simultaneously.

'We expect certain parts of the spacecraft to reach 2ºC pretty soon," says Richard Marsden, ESA's Ulysses Project Scientist and Mission Manager. This will block the fuel pipes, making the spacecraft impossible to manoeuvre.

In an attempt to solve this problem, the ESA-NASA project team approved a plan to temporarily shut off the main spacecraft transmitter. This would release 60 watts of power that could be channelled to the science instruments and the heater. When data was to be transmitted back to Earth, the team planned to

turn the transmitter back on. Unfortunately, during the first test of this method in January, the power supply to the radio transmitter failed to turn back on.

"The decision to switch the transmitter off was not taken lightly. It was the only way to continue the science mission," says Marsden, who is a 30-year veteran of the project, having worked on it for 12 years before the spacecraft was launched.

After many attempts, the Ulysses project team now consider it highly unlikely that the X-band transmitter will be recovered. They believe the fault can be traced to the power supply, meaning that the extra energy they hoped to gain cannot be routed to the heater and science instruments after all.

So, the spacecraft has lost its ability to send large quantities of scientific data back to Earth and is facing the gradual freezing of its fuel lines. This spells the end of this highly successful mission. "Ulysses is a terrific old workhorse. It has produced great science and lasted much longer than we ever thought it would," says Marsden. "This was going to happen in the next year or two, it has just taken place a little sooner than we hoped."

The team plan to continue operating the spacecraft in its reduced capacity for as long as they can over the next few weeks. "We will squeeze the very last drops of science out of it," says Marsden.

Adapted from materials provided by European Space Agency.

http://www.sciencedaily.com:80/releases/2008/02/080222101542.htm

America's 50 Best Hospitals 2008, As Rated By HealthGrades

ScienceDaily (Feb. 25, 2008) — HealthGrades, an independent healthcare ratings organization in the US, has identified America's 50 Best Hospitals, an elite class of top-performing facilities. The HealthGrades America's 50 Best Hospital designation represents the healthcare industry's only quality ranking based solely on objective clinical outcomes among U.S. hospitals.

To identify the 2008 designees, HealthGrades researchers analyzed approximately 100 million hospitalization records from nearly 5,000 hospitals, from the years 1999 to 2006. To be listed among America's 50 Best Hospitals, facilities must have demonstrated clinical outcomes among the top five percent in the nation, not just in one medical specialty, but aggregated across 27 different procedures and diagnoses, and must have maintained this superior level of care during all years studied. These hospitals were found to have an average 27 percent lower mortality rate, on average, than all other U.S. hospitals.

"HealthGrades America's 50 Best Hospitals demonstrate survival rates that are among the highest in the nation, and complication rates that are among the lowest in the nation, and they do it year after year," said Dr. Samantha Collier, HealthGrades' chief medical officer and lead study author. "These hospitals are proof that top-notch medical care is something that can be achieved with dedication and commitment to quality. As our nation increasingly focuses on disparities in healthcare cost and quality, it is these elite, world-class facilities that will lead the way."

For the second consecutive year, the HealthGrades America's 50 Best Hospitals list contains nationally known facilities, such as Cedars Sinai in Los Angeles, Mayo Clinic in Minnesota and the Cleveland Clinic in Cleveland. But the list also identifies many hospitals that do not have national brand names, but that continue to demonstrate patient outcomes that are superior to their peers across the country.

As with all HealthGrades awards, the HealthGrades America's 50 Best Hospital designation is based exclusively on clinical outcomes -- risk-adjusted mortality and complication rates for patients at nearly every hospital in the nation. Hospitals cannot apply for this independent analysis, and they cannot opt-in or out of being rated.

"Think about it," said Collier. "Only one percent of the nation's hospitals achieve this level of clinical excellence. These hospitals are doing something very, very special that begins with the leadership and is infused throughout the hospital and its staff."

HealthGrades' annual assessment of mortality and complication rates in American hospitals analyzes the following procedures and diagnoses and then risk-adjusts the data to account for differences in patient populations among hospitals:

- Atrial Fibrillation
- Back and Neck Surgery (Spinal Fusion)
- Back and Neck Surgery (except Spinal Fusion)
- Bowel Obstruction
- Carotid Surgery
- Cholecystectomy
- Chronic Obstructive Pulmonary Disease (COPD)
- Coronary Bypass Surgery
- Coronary Interventional Procedures (Angioplasty and Stents)
- Diabetic Acidosis and Coma
- Gastrointestinal Bleed
- Gastrointestinal Surgeries and Procedures
- Heart Attack
- Heart Failure
- Hip Fracture Repair
- Pancreatitis

- Peripheral Vascular Bypass
- Pneumonia
- Prostatectomy
- Pulmonary Embolism
- Resection/Replacement of Abdominal Aorta
- Respiratory Failure
- Sepsis
- Stroke
- Total Hip Replacement
- Total Knee Replacement
- Valve Replacement Surgery

Methodology

In this analysis, HealthGrades independently and objectively analyzed approximately 100 million Medicare patient records from fiscal years 1999 through 2006 for 27 medical procedures and diagnoses. To qualify for the list, hospitals were required to meet minimum thresholds in terms of patient volumes, quality ratings, and the range of services provided. Prior to comparing the inhospital mortality and complication rates of the nation's hospitals, HealthGrades risk-adjusted the data to compare on equal footing hospitals that treated sicker patients. Hospitals with risk-adjusted mortality and complication rates that scored in the top five percent or better nationally -- which demonstrates superior overall clinical performance -- were then recognized as Distinguished Hospitals for Clinical Excellence.

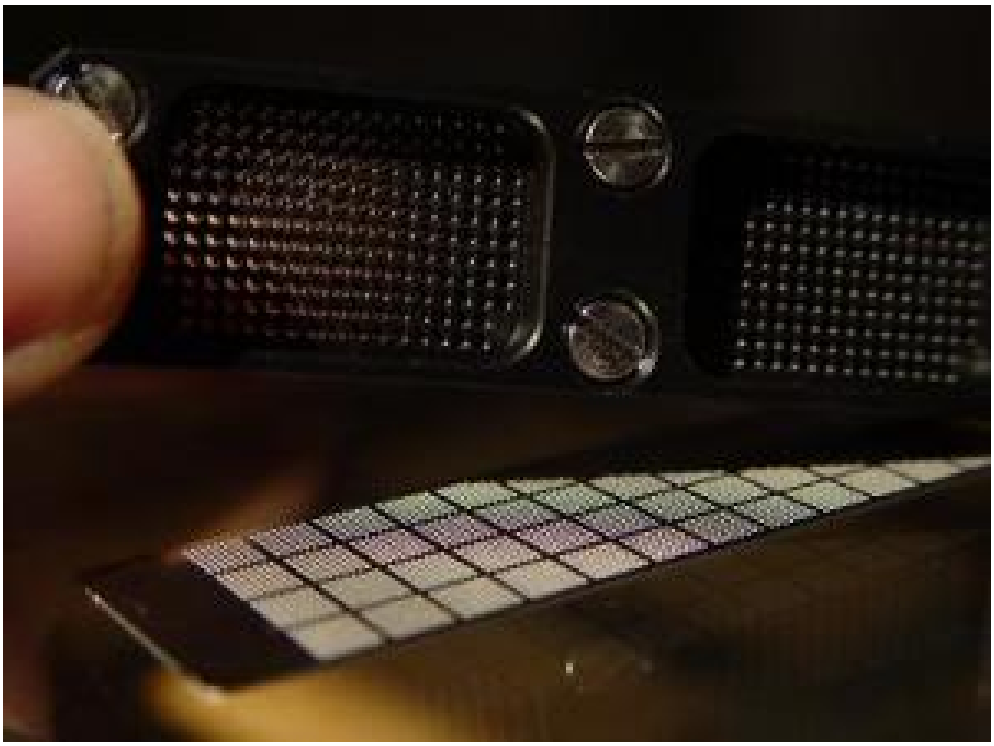
Hospitals that received that designation the most consecutive times over the last six years were named HealthGrades America's 50 Best Hospitals. HealthGrades' methodology can be found in the study and on the company's Web site. (Each of the six designations was based on three years of Medicare data, so eight years of data were studied.)

See page 7-8 of report for list of top rated hospitals:
http://www.healthgrades.com/media/dms/pdf/Americas50BestHospitals2008Report.pdf

Adapted from materials provided by HealthGrades.

http://www.sciencedaily.com:80/releases/2008/02/080225072634.htm

'Stubborn' Microbes Propagated WIth New Incubation Method



Diffusion chamber "chip" created by Northeastern University professors Slava Epstein and Kim Lewis. (Credit: Image courtesy of Northeastern University)

ScienceDaily (Feb. 25, 2008) — Two Northeastern University researchers have discovered a way to domesticate "stubborn" microbial species. The revolutionary method capitalizes on their earlier technology to grow microorganisms in diffusion chambers incubated in natural environment.

Now Professors Slava Epstein and Kim Lewis, Director of Northeastern's Antimicrobial Discovery Center, have shown that a series of such incubations lead to the appearance of variants capable of growth on standard media. Additionally, they designed a "chip" allowing massively parallel growth and isolation of pure microbial cultures.

"This new process will allow Northeastern researchers to grow microorganisms without having to painstakingly separate the strains as previous techniques required," said Epstein, Associate Professor of Microbiology at Northeastern University.

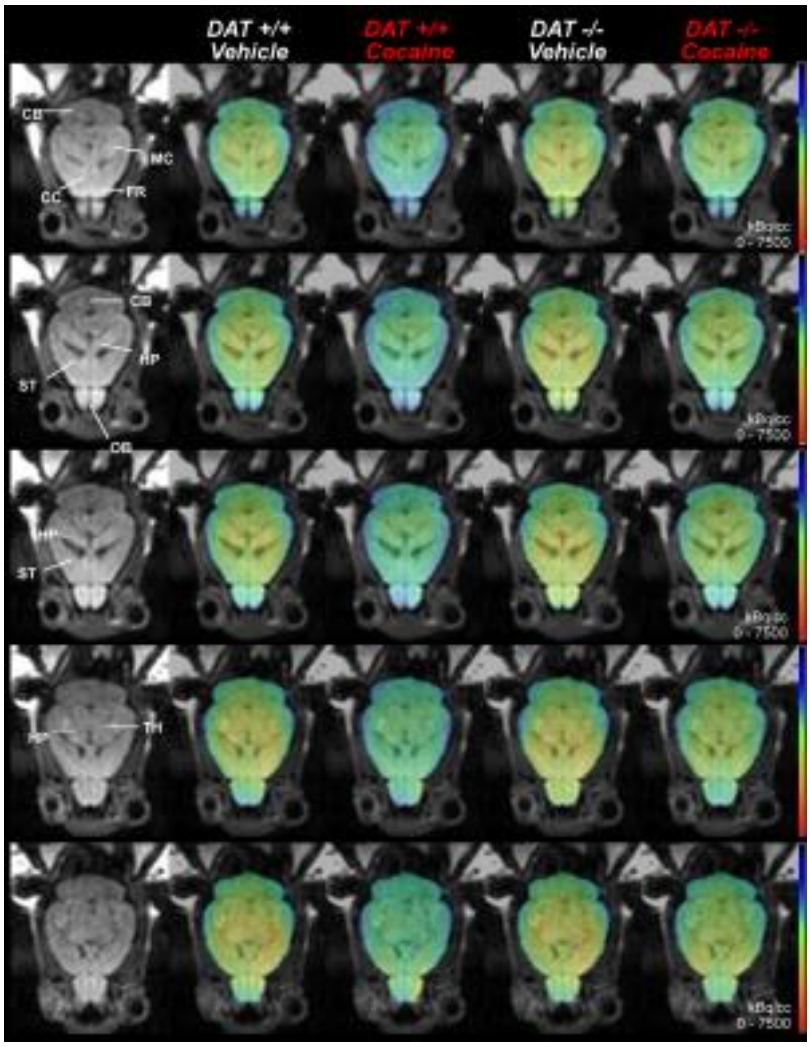
The net effect of the new developments is a simple, high throughput technology to access a novel source of biological diversity: previously uncultivated microbial species. Microbial cultivation is a fundamental tool in both basic and applied microbiology, and invaluable in obtaining sufficient microbial biomass to harvest useful molecules it produces.

The new technology will enable growing and utilizing novel species important for application in bioremediation, alternative fuel research, and drug discovery.

Adapted from materials provided by Northeastern University.

http://www.sciencedaily.com:80/releases/2008/02/080223121818.htm

Cocaine's Effects On Brain Metabolism May Contribute To Abuse



Magnetic resonance imaging (MRI) and positron emission tomography (PET) scans showing the effect of cocaine on brain metabolism in mice with normal levels of dopamine transporter proteins (DAT +/+) and mice lacking dopamine transporters (DAT -/-). Cocaine was compared with saline treatment (vehicle). Cocaine use blunted whole brain metabolism in both groups of mice (indicated by a reduced amount of yellow visible on the cocaine images), and had a particularly significant effect on the thalamus (TH) in DAT -/- mice. These results indicate that cocaine affects the brain in ways not modulated by its blockade of dopamine transporter proteins. (Credit: Image courtesy of DOE/Brookhaven National Laboratory)

ScienceDaily (Feb. 25, 2008) — Many studies on cocaine addiction - and attempts to block its addictiveness - have focused on dopamine transporters, proteins that reabsorb the brain's "reward" chemical once its signal is sent. Since cocaine blocks dopamine transporters from doing their recycling job, it leaves the feel-good chemical around to keep sending the pleasure signal. Now a new study conducted at the U.S. Department of Energy's Brookhaven National Laboratory suggests that cocaine's effects go beyond the dopamine system. In the study, cocaine had significant effects on brain metabolism, even in mice that lack the gene for dopamine transporters.

"In dopamine-transporter-deficient mice, these effects on metabolism are clearly independent of cocaine's effects on dopamine," said Brookhaven neuroscientist Panayotis (Peter) Thanos, who led the research. "These metabolic factors may be a strong regulator of cocaine use and abuse, and may also suggest new avenues for addiction treatments."

The scientists used positron emission tomography, or PET scanning, to measure brain metabolism in dopamine-transporter deficient mice (known as DAT knockouts) and in littermates that had normal dopamine transporter levels. In this technique, the scientists administer a radioactively labeled form of sugar (glucose) - the brain's main "fuel" - and use the PET scanner to track its site-specific concentrations in various brain regions. They tested the mice before and after cocaine administration, and compared the results to mice treated with saline instead of the drug.

Before any treatment, mice lacking dopamine transporters had significantly higher metabolism in the thalamus and cerebellum compared with normal mice. This elevated metabolism may be linked to chronically high levels of dopamine in the DAT knockout mice. It also suggests that dopamine levels may play an important role in modulating glucose levels in these brain areas, which play important roles integrating sensory information, learning, and motor function.

Interestingly, DAT knockout mice have been suggested as an animal model for attention-deficit hyperactivity disorder (ADHD). Elevated metabolism due to persistent elevated dopamine levels may be a factor contributing to the symptoms of ADHD, Thanos said.

After the scientists administered cocaine, whole brain metabolism decreased in both groups of mice, but more significantly in normal mice than in DAT knockouts. The scientists were able to detect this reduction in metabolism in a wide range of brain regions in the normal mice, suggesting that these decreases in metabolism are somehow associated with the blockade of dopamine transporters by cocaine.

The scientists also observed a reduction in metabolism in the thalamus region in the DAT knockout mice. This effect may likely be due to the effect of cocaine on other neurotransmitter systems, for example, norepinepherine or serotonin.

In summary, cocaine exposure has an effect on regional brain activity, which is mostly driven by dopamine action and to a secondary degree norepinephrine or serotonin. These results also support the idea that the thalamus and the cerebellum play key roles in cocaine's mechanism of effect on sensory input, learning, and motor function. This is particularly of interest in better understanding the mechanism of cocaine addiction as well as the neurobiology of ADHD.

The study will appear in the May 2008 issue of the journal Synapse, and will be available online on Monday, February 18, 2008. The research was funded by The National Institute on Alcohol Abuse and Alcoholism Intramural Research Program at the National Institutes of Health and by the Office of Biological and Environmental Research within the U.S. Department of Energy's (DOE) Office of Science.

Adapted from materials provided by DOE/Brookhaven National Laboratory.

http://www.sciencedaily.com:80/releases/2008/02/080218134721.htm

When Puppet and Puppeteer Switch Places

By ROSLYN SULCAS

It's not often that a piece makes you sit up straighter, wondering what it is exactly you are seeing, but these are the moments that lovers of the arts live for. And it happened on Thursday night at Dance New Amsterdam, which presented the first program of "Gene Pool," a selection of offerings from 10 choreographers who all teach there.

In Faye Driscoll's "837 Venice Boulevard" two dancers (Michael Helland and Celia Rowlson-Hall) lurch onto the stage, laughing manically and holding each other up. For several minutes they stagger around the stage, her arm around his neck, as he manipulates her limbs like a violent puppet master. Then they switch roles, and she pumps his arms, pulls his leg into a brutal stretch, and shakes his head side to side and up and down. ("No no no, yes yes yes," she says.)

All the while they laugh, and although the audience did too, Ms. Driscoll's rigorous exploration of this physical — and, it seems, mental — manipulation feels startlingly original in its peculiar configuration of slapstick and darkness. Less powerful is a second section in which the dancers do a deadpan routine to electronic pop (by Jacno) that mixes aerobics with clunky jazz dance moves, performed in the manner of earnest beginners. But Mr. Helland and Ms. Rowlson-Hall are no less brilliant here as seething frustration seeps through their banal movements.

Also impressive was Teri and Oliver Steele's "Bicipital Groove or Echo My Instincts," a piece for 13 dancers dressed in a fabulous mix of black and white. The women look like male fantasies, dressed in feather-trimmed baby-doll dresses and deconstructed parlor-maid gear. And the men also look like male fantasies, in black pants like pirates', cropped T-shirts and neckbands.

The opening section is wonderful: alternate lines of dancers surge in unison with high, sweeping legs and curving arms, and the Steeles are adept at creating seamless, ever-changing configurations of dancers. Peering around the pillars that line the sides of the stage as the soundtrack (mixed by DJ Heinz) offers laughter and bolts of thunder over the music, the dancers seem to be at the strangest of parties, a hallucinatory ball.

Less successful were Laurie De Vito's "Embrace Her," an all-female quintet to Arvo Pärt's "Fratres," and Katiti King's "Water for My Journey," a heavily solemn solo (it's a bad sign when the dancer begins by lighting a candle) performed with conviction by Teresa Perez to songs by Leela James and Sinead O'Connor.

Both suffered from an excess of concept and an inchoate structure that eventually blurred the movement — attractively calligraphic in Ms. de Vito's case — into an uninteresting expression of undifferentiated angst.

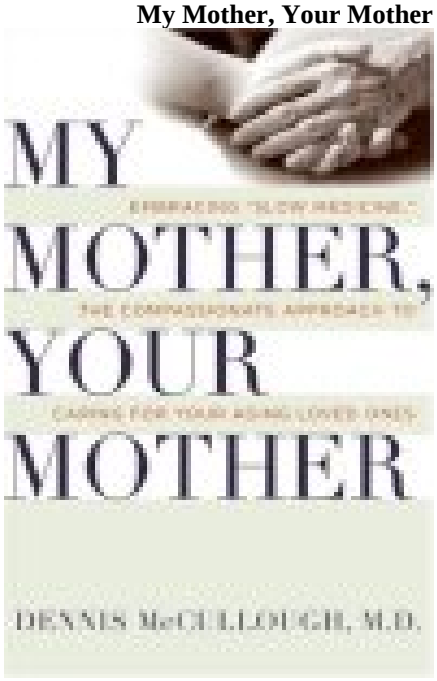
http://www.nytimes.com/2008/02/25/arts/dance/25pool.html?ref=dance

BOOKS

For the Very Old, a Dose of 'Slow Medicine'

By ABIGAIL ZUGER, M.D.

My Mother, Your Mother



Embracing "Slow Medicine," the Compassionate Approach to Caring for Your Aging Loved Ones. By Dennis McCullough, M.D. HarperCollins. 263 pages. $25.95

It was two decades ago that a group of culinary mavericks took a giant step backward down the evolutionary trail with the "slow food" movement. Instead of fast food produced by the assembly lines of giant consortiums, they championed products of small-scale agriculture — time-consuming to prepare, beautiful to behold, very good for you.

Now (and, some might add, at last) doctors are following suit, rejecting the assembly line of modern medical care for older, gentler options. The substituted menu is not for all patients — at least not yet. For the very elderly, however, most agree the usual tough love of modern medicine in all its hospital-based, medication-obsessed, high-tech impersonality may hurt more than it helps.

In its place, doctors like Dennis McCullough, a family physician and geriatrician at Dartmouth Medical School, suggest "slow medicine" — as he puts it, "a family-centered, less expensive way."

This medicine is specifically not intended to save lives or to restore youthful vigor, but to ease the inevitable irreversible decline of the very old.

Dr. McCullough directs his book to the children of elderly parents, and he pegs it to the story of his mother. She evolved from a vital, healthy 85-year-old retiree to a feeble 92-year-old dying in hospice care, not from any particular disease so much as the aggressive frailty common among the oldest of old people.

His bottom line is this: It is up to friends and relatives to rescue the elderly from standard medical care. And slow medicine, like slow food, involves a lot of hard work. Readers who sign on will acquire a

staggering list of tasks to perform, some of which may be just as tiring and tear-producing as chopping onions.

First, while the aging parent is still vital and lively, children must not fool themselves that this happy situation will last forever. This is the time, Dr. McCullough suggests, to reinsert themselves back into the parent's life, to show up at doctor visits and to raise unpleasant topics like advance directives and health proxies.

After few more years, it is time to address the "Should you still drive?" and "Can you still manage at home?" issues, and to help create routines that compensate for a slipping memory and slightly wobbly balance.

Medical crises will inevitably arise; the child must be vigilant for a hospital's bad habits when caring for elderly patients. An "advocacy team" of friends and relatives should be mustered to help protect the hospitalized parent; a wider "circle of concern" should be tapped for moral support.

Still down the road is the complex world of rehabilitation, either home-based or institutional, and the even more complex spectrum of available nursing options for the slightly impaired, the seriously impaired and those near death.

All the while, medical care for the parent should favor the tried and true over the high tech. For instance, Dr. McCullough points out that instead of a yearly mammogram, a manual breast exam may suffice for the very old, and home tests for blood in the stool may replace the draining routine of a colonoscopy.

The parent's doctors should be nudged to justify flashy but exhausting diagnostic tests, and to constantly re-evaluate medication regimens. The high-blood-pressure pills that are life-saving at 75 may cause problems at 95, and paid companionship or a roster of visitors may prove to be antidepressants at least as effective as any drug.

The pace of care should be slowed to a crawl. For doctors, that means starting medications at low doses and increasing them gradually. For children, that means learning not to panic and yell for an ambulance on every bad day. And for a good overall picture of a parent's condition, a child is well advised to ignore the usual medical and nursing jargon and to focus instead on the sound of the parent's own voice. "No one," Dr. McCullough says, "can be a bigger expert on a parent's voice than a former teenager trained in the same household."

Some standard self-help muzziness creeps around the edges of this book, with reflections on the value of scrapbooks to preserve family memories and admonitions that "it is always the right time to say 'thank you' and 'I love you.' " Dr. McCullough's decision to call each stage of old age a "station" (as in "The Station of Crisis," "The Station of Decline" and "The Station of Prelude to Dying") may be a little too religious for some and far too reminiscent for others of the food stations at large catered events.

Instead, he might have steeled the book's spine with a few hard-headed tips for those who would valiantly try to slow the twin Mack trucks of the modern doctor and the modern hospital. How should relatives go about applying the brakes to their fast doctors without alienating them or earning for themselves the label of troublemaker? Dr. McCullough, by his own report, works in something of a paradise when it comes to geriatric care, but in many medical venues the phrase "slow down" is an obscenity.

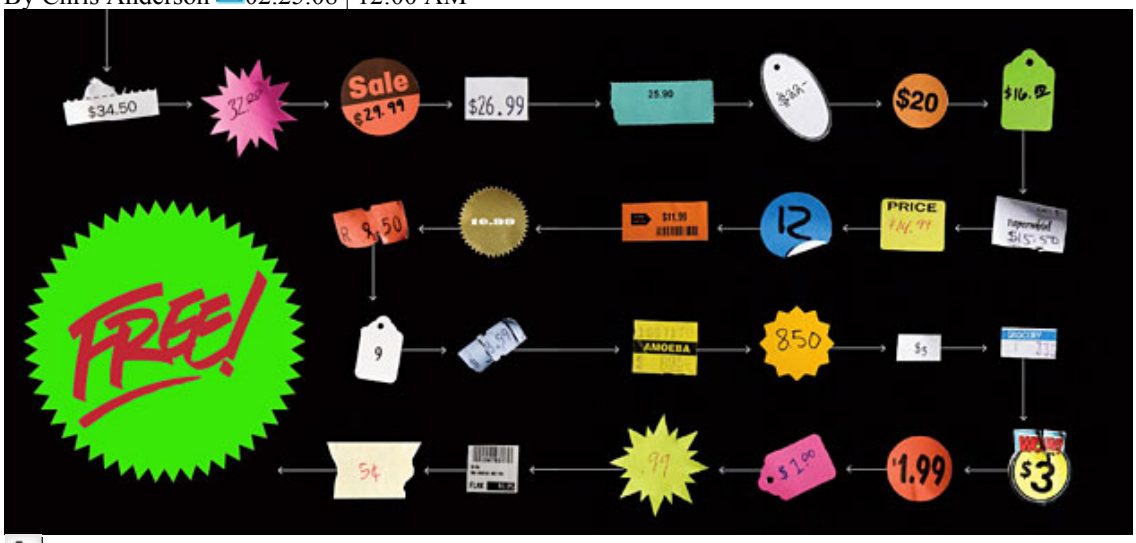
Still, he has written a valuable book, chilling and comforting in equal measure. A similar book directed at fast doctors, fast hospital administrators and fast insurers might be the next welcome stride backward down the path.

http://www.nytimes.com/2008/02/26/health/views/26books.html?th&emc=th

WIRED MAGAZINE: 16.03

Free! Why $0.00 Is the Future of Business

By Chris Anderson ✉02.25.08 | 12:00 AM



HOW-TO WIKI

How To Make Money Around Free Content

At the age of 40, King Gillette was a frustrated inventor, a bitter anticapitalist, and a salesman of cork-lined bottle caps. It was 1895, and despite ideas, energy, and wealthy parents, he had little to show for his work. He blamed the evils of market competition. Indeed, the previous year he had published a book, *The Human Drift*, which argued that all industry should be taken over by a single corporation owned by the public and that millions of Americans should live in a giant city called Metropolis powered by Niagara Falls. His boss at the bottle cap company, meanwhile, had just one piece of advice: Invent something people use and throw away.

One day, while he was shaving with a straight razor that was so worn it could no longer be sharpened, the idea came to him. What if the blade could be made of a thin metal strip? Rather than spending time maintaining the blades, men could simply discard them when they became dull. A few years of metallurgy experimentation later, the disposable-blade safety razor was born. But it didn't take off immediately. In its first year, 1903, Gillette sold a total of 51 razors and 168 blades. Over the next two decades, he tried every marketing gimmick he could think of. He put his own face on the package, making him both legendary and, some people believed, fictional. He sold millions of razors to the Army at a steep discount, hoping the habits soldiers developed at war would carry over to peacetime. He sold razors in bulk to banks so they could give them away with new deposits ("shave and save" campaigns). Razors were bundled with everything from Wrigley's gum to packets of coffee, tea, spices, and marshmallows. The freebies helped to sell those products, but the tactic helped Gillette even more. By giving away the razors, which were useless by themselves, he was creating demand for disposable blades. A few billion blades later, this business model is now the foundation of entire industries: Give away the cell phone, sell the monthly plan; make the videogame console cheap and sell expensive games; install fancy coffeemakers in offices at no charge so you can sell managers expensive coffee sachets.

Thanks to Gillette, the idea that you can make money by giving something away is no longer radical. But until recently, practically everything "free" was really just the result of what economists would call a cross-subsidy: You'd get one thing free if you bought another, or you'd get a product free only if you paid for a service.

Over the past decade, however, a different sort of free has emerged. The new model is based not on cross-subsidies — the shifting of costs from one product to another — but on the fact that the cost of products *themselves* is falling fast. It's as if the price of steel had dropped so close to zero that King Gillette could give away both razor and blade, and make his money on something else entirely. (Shaving cream?)

You know this freaky land of free as the Web. A decade and a half into the great online experiment, the last debates over free versus pay online are ending. In 2007 *The New York Times* went free; this year, so will much of *The Wall Street Journal*. (The remaining fee-based parts, new owner Rupert Murdoch announced, will be "really special ... and, sorry to tell you, probably more expensive." This calls to mind one version of Stewart Brand's original aphorism from 1984: "Information wants to be free. Information also wants to be expensive ... That tension will not go away.")

Scenario 1: Low-cost digital distribution will make the summer blockbuster free. Theaters will make their money from concessions — and by selling the premium moviegoing experience at a high price.

Once a marketing gimmick, free has emerged as a full-fledged economy. Offering free music proved successful for Radiohead, Trent Reznor of Nine Inch Nails, and a swarm of other bands on MySpace that grasped the audience-building merits of zero. The fastest-growing parts of the gaming industry are ad-supported casual games online and free-to-try massively multiplayer online games. Virtually everything Google does is free to consumers, from Gmail to Picasa to GOOG-411.

The rise of "freeconomics" is being driven by the underlying technologies that power the Web. Just as Moore's law dictates that a unit of processing power halves in price every 18 months, the price of bandwidth and storage is dropping even faster. Which is to say, the trend lines that determine the cost of doing business online all point the same way: to zero.

But tell that to the poor CIO who just shelled out six figures to buy another rack of servers. Technology sure doesn't feel free when you're buying it by the gross. Yet if you look at it from the other side of the fat pipe, the economics change. That expensive bank of hard drives (fixed costs) can serve tens of thousands of users (marginal costs). The Web is all about scale, finding ways to attract the most users for centralized resources, spreading those costs over larger and larger audiences as the technology gets more and more capable. It's not about the cost of the equipment in the racks at the data center; it's about what that equipment can do. And every year, like some sort of magic clockwork, it does more and more for less and less, bringing the marginal costs of technology in the units that we individuals consume closer to zero.

As much as we complain about how expensive things are getting, we're surrounded by forces that are making them cheaper. Forty years ago, the principal nutritional problem in America was hunger; now it's obesity, for which we have the Green Revolution to thank. Forty years ago, charity was dominated by clothing drives for the poor. Now you can get a T-shirt for less than the price of a cup of coffee, thanks to China and global sourcing. So too for toys, gadgets, and commodities of every sort. Even cocaine has pretty much never been cheaper (globalization works in mysterious ways).

Digital technology benefits from these dynamics and from something else even more powerful: the 20th-century shift from Newtonian to quantum machines. We're still just beginning to exploit atomic-scale effects in revolutionary new materials — semiconductors (processing power), ferromagnetic compounds (storage), and fiber optics (bandwidth). In the arc of history, all three substances are still new, and we have a lot to learn about them. We are just a few decades into the discovery of a new world.

What does this mean for the notion of free? Well, just take one example. Last year, Yahoo announced that Yahoo Mail, its free webmail service, would provide unlimited storage. Just in case that wasn't totally clear, that's "unlimited" as in "infinite." So the market price of online storage, at least for email, has now fallen to zero (see "Webmail Windfall"). And the stunning thing is that nobody was surprised; many had assumed infinite free storage was already the case.

For good reason: It's now clear that practically everything Web technology touches starts down the path to gratis, at least as far as we consumers are concerned. Storage now joins bandwidth (YouTube: free) and processing power (Google: free) in the race to the bottom. Basic economics tells us that in a competitive market, price falls to the marginal cost. There's never been a more competitive market than the Internet, and every day the marginal cost of digital information comes closer to nothing.

One of the old jokes from the late-'90s bubble was that there are only two numbers on the Internet: infinity and zero. The first, at least as it applied to stock market valuations, proved false. But the second is alive and well. The Web has become the land of the free.

The result is that we now have not one but two trends driving the spread of free business models across the economy. The first is the extension of King Gillette's cross-subsidy to more and more industries. Technology is giving companies greater flexibility in how broadly they can define their markets, allowing them more freedom to give away products or services to one set of customers while selling to another set. Ryanair, for instance, has disrupted its industry by defining itself more as a full-service travel agency than a seller of airline seats (see "How Can Air Travel Be Free?").

The second trend is simply that anything that touches digital networks quickly feels the effect of falling costs. There's nothing new about technology's deflationary force, but what is new is the speed at which industries of all sorts are becoming digital businesses and thus able to exploit those economics. When Google turned advertising into a software application, a classic services business formerly based on human economics (things get more expensive each year) switched to software economics (things get cheaper). So, too, for everything from banking to gambling. The moment a company's primary expenses become things based in silicon, free becomes not just an option but the inevitable destination.

WASTE AND WASTE AGAIN

Forty years ago, Caltech professor Carver Mead identified the corollary to Moore's law of ever-increasing computing power. Every 18 months, Mead observed, the price of a transistor would halve. And so it did, going from tens of dollars in the 1960s to approximately 0.000001 cent today for each of the transistors in Intel's latest quad-core. This, Mead realized, meant that we should start to "waste" transistors.

Scenario 2: Ads on the subway? That's so 20th century. By sponsoring the whole line and making trips free, the local merchants association brings grateful commuters to neighborhood shops.

Waste is a dirty word, and that was especially true in the IT world of the 1970s. An entire generation of computer professionals had been taught that their job was to dole out expensive computer resources sparingly. In the glass-walled facilities of the mainframe era, these systems operators exercised their power by choosing whose programs should be allowed to run on the costly computing machines. Their role was to conserve transistors, and they not only decided what was worthy but also encouraged programmers to make the most economical use of their computer time. As a result, early developers devoted as much code as possible to running their core algorithms efficiently and gave little thought to user interface. This was the era of the command line, and the only conceivable reason someone might have wanted to use a computer at home was to organize recipe files. In fact, the world's first personal computer, a stylish kitchen appliance offered by Honeywell in 1969, came with integrated counter space.

And here was Mead, telling programmers to embrace waste. They scratched their heads — how do you waste computer power? It took Alan Kay, an engineer working at Xerox's Palo Alto Research Center, to show them. Rather than conserve transistors for core processing functions, he developed a computer concept — the Dynabook — that would frivolously deploy silicon to do silly things: draw icons, windows, pointers, and even animations on the screen. The purpose of this profligate eye candy? Ease of use for regular folks, including children. Kay's work on the graphical user interface became the inspiration for the Xerox Alto, and then the Apple Macintosh, which changed the world by opening computing to the rest of us. (We, in turn, found no shortage of things to do with it; tellingly, organizing recipes was not high on the list.)

Of course, computers were not free then, and they are not free today. But what Mead and Kay understood was that the transistors in them — the atomic units of computation — would become so numerous that on an individual basis, they'd be close enough to costless that they might as well be free. That meant software writers, liberated from worrying about scarce computational resources like memory and CPU cycles, could become more and more ambitious, focusing on higher-order functions such as user interfaces and new markets such as entertainment. And that meant software of broader appeal, which brought in more users, who in turn found even more uses for computers. Thanks to that wasteful throwing of transistors against the wall, the world was changed.

What's interesting is that transistors (or storage, or bandwidth) don't have to be completely free to invoke this effect. At a certain point, they're cheap enough to be safely disregarded. The Greek philosopher Zeno wrestled with this concept in a slightly different context. In Zeno's dichotomy paradox, you run toward a wall. As you run, you halve the distance to the wall, then halve it again, and so on. But if you continue to subdivide space forever, how can you ever actually reach the wall? (The answer is that you can't: Once you're within a few nanometers, atomic repulsion forces become too strong for you to get any closer.)

In economics, the parallel is this: If the unitary cost of technology ("per megabyte" or "per megabit per second" or "per thousand floating-point operations per second") is halving every 18 months, when does it come close enough to zero to say that you've arrived and can safely round down to nothing? The answer: almost always sooner than you think.

What Mead understood is that a psychological switch should flip as things head toward zero. Even though they may never become entirely free, as the price drops there is great advantage to be had in treating them as if they *were* free. Not too cheap to *meter*, as Atomic Energy Commission chief Lewis Strauss said in a

different context, but too cheap to *matter*. Indeed, the history of technological innovation has been marked by people spotting such price and performance trends and getting ahead of them.

From the consumer's perspective, though, there is a huge difference between cheap and free. Give a product away and it can go viral. Charge a single cent for it and you're in an entirely different business, one of clawing and scratching for every customer. The psychology of "free" is powerful indeed, as any marketer will tell you.

This difference between cheap and free is what venture capitalist Josh Kopelman calls the "penny gap." People think demand is elastic and that volume falls in a straight line as price rises, but the truth is that zero is one market and any other price is another. In many cases, that's the difference between a great market and none at all.

The huge psychological gap between "almost zero" and "zero" is why micropayments failed. It's why Google doesn't show up on your credit card. It's why modern Web companies don't charge their users anything. And it's why Yahoo gives away disk drive space. The question of infinite storage was not *if* but *when*. The winners made their stuff free first.

Traditionalists wring their hands about the "vaporization of value" and "demonetization" of entire industries. The success of craigslist's free listings, for instance, has hurt the newspaper classified ad business. But that lost newspaper revenue is certainly not ending up in the craigslist coffers. In 2006, the site earned an estimated $40 million from the few things it charges for. That's about 12 percent of the $326 million by which classified ad revenue declined that year.

But free is not quite as simple — or as stupid — as it sounds. Just because products are free doesn't mean that someone, somewhere, isn't making huge gobs of money. Google is the prime example of this. The monetary benefits of craigslist are enormous as well, but they're distributed among its tens of thousands of users rather than funneled straight to Craig Newmark Inc. To follow the money, you have to shift from a basic view of a market as a matching of two parties — buyers and sellers — to a broader sense of an ecosystem with many parties, only some of which exchange cash.

The most common of the economies built around free is the three-party system. Here a third party pays to participate in a market created by a free exchange between the first two parties. Sound complicated? You're probably experiencing it right now. It's the basis of virtually all media.

In the traditional media model, a publisher provides a product free (or nearly free) to consumers, and advertisers pay to ride along. Radio is "free to air," and so is much of television. Likewise, newspaper and magazine publishers don't charge readers anything close to the actual cost of creating, printing, and distributing their products. They're not selling papers and magazines to readers, they're selling readers to advertisers. It's a three-way market.

In a sense, what the Web represents is the extension of the media business model to industries of all sorts. This is not simply the notion that advertising will pay for everything. There are dozens of ways that media companies make money around free content, from selling information about consumers to brand licensing, "value-added" subscriptions, and direct ecommerce (see wired.com/extras for a complete list). Now an entire ecosystem of Web companies is growing up around the same set of models.

A TAXONOMY OF FREE
Between new ways companies have found to subsidize products and the falling cost of doing business in a digital age, the opportunities to adopt a free business model of some sort have never been greater. But which one? And how many are there? Probably hundreds, but the priceless economy can be broken down into six broad categories:

· "Freemium"
What's free: Web software and services, some content. Free to whom: users of the basic version.

This term, coined by venture capitalist Fred Wilson, is the basis of the subscription model of media and is one of the most common Web business models. It can take a range of forms: varying tiers of content, from free to expensive, or a premium "pro" version of some site or software with more features than the free version (think Flickr and the $25-a-year Flickr Pro).

Again, this sounds familiar. Isn't it just the free sample model found everywhere from perfume counters to street corners? Yes, but with a pretty significant twist. The traditional free sample is the promotional candy bar handout or the diapers mailed to a new mother. Since these samples have real costs, the manufacturer gives away only a tiny quantity — hoping to hook consumers and stimulate demand for many more.

Photo Illustration: Jeff Mermelstein

But for digital products, this ratio of free to paid is reversed. A typical online site follows the 1 Percent Rule — 1 percent of users support all the rest. In the freemium model, that means for every user who pays for the premium version of the site, 99 others get the basic free version. The reason this works is that the cost of serving the 99 percent is close enough to zero to call it nothing.

· Advertising
What's free: content, services, software, and more. Free to whom: everyone.

Broadcast commercials and print display ads have given way to a blizzard of new Web-based ad formats: Yahoo's pay-per-pageview banners, Google's pay-per-click text ads, Amazon's pay-per-transaction "affiliate ads," and site sponsorships were just the start. Then came the next wave: paid inclusion in search results, paid listing in information services, and lead generation, where a third party pays for the names of people interested in a certain subject. Now companies are trying everything from product placement (PayPerPost) to pay-per-connection on social networks like Facebook. All of these approaches are based on the principle that free offerings build audiences with distinct interests and expressed needs that advertisers will pay to reach.

· Cross-subsidies
What's free: any product that entices you to pay for something else. Free to whom: everyone willing to pay eventually, one way or another.

Scenario 3: It's a free second-gen Wiii! But only if you buy the deluxe version of Rock Band.

When Wal-Mart charges $15 for a new hit DVD, it's a loss leader. The company is offering the DVD below cost to lure you into the store, where it hopes to sell you a washing machine at a profit. Expensive wine subsidizes food in a restaurant, and the original "free lunch" was a gratis meal for anyone who ordered at least one beer in San Francisco saloons in the late 1800s. In any package of products and services, from banking to mobile calling plans, the price of each individual component is often determined by psychology, not cost. Your cell phone company may not make money on your monthly minutes — it keeps that fee low because it knows that's the first thing you look at when picking a carrier — but your monthly voicemail fee is pure profit.

On a busy corner in São Paulo, Brazil, street vendors pitch the latest "tecnobrega" CDs, including one by a hot band called Banda Calypso. Like CDs from most street vendors, these did not come from a record label. But neither are they illicit. They came directly from the band. Calypso distributes masters of its CDs and CD liner art to street vendor networks in towns it plans to tour, with full agreement that the vendors will copy the CDs, sell them, and keep all the money. That's OK, because selling discs isn't Calypso's main source of income. The band is really in the performance business — and business is good. Traveling from town to town this way, preceded by a wave of supercheap CDs, Calypso has filled its shows and paid for a private jet.

The vendors generate literal street cred in each town Calypso visits, and its omnipresence in the urban soundscape means that it gets huge crowds to its rave/dj/concert events. Free music is just publicity for a far more lucrative tour business. Nobody thinks of this as piracy.

· Zero marginal cost
What's free: things that can be distributed without an appreciable cost to anyone. Free to whom: everyone.

This describes nothing so well as online music. Between digital reproduction and peer-to-peer distribution, the real cost of distributing music has truly hit bottom. This is a case where the product has become free because of sheer economic gravity, with or without a business model. That force is so powerful that laws, guilt trips, DRM, and every other barrier to piracy the labels can think of have failed. Some artists give away their music online as a way of marketing concerts, merchandise, licensing, and other paid fare. But others have simply accepted that, for them, music is not a moneymaking business. It's something they do for other reasons, from fun to creative expression. Which, of course, has always been true for most musicians anyway.

· Labor exchange
What's free: Web sites and services. Free to whom: all users, since the act of using these sites and services actually creates something of value.

You can get free porn if you solve a few captchas, those scrambled text boxes used to block bots. What you're actually doing is giving answers to a bot used by spammers to gain access to other sites — which is worth more to them than the bandwidth you'll consume browsing images. Likewise for rating stories on Digg, voting on Yahoo Answers, or using Google's 411 service (see "How Can Directory Assistance Be Free?"). In each case, the act of using the service creates something of value, either improving the service itself or creating information that can be useful somewhere else.

· Gift economy
What's free: the whole enchilada, be it open source software or user-generated content. Free to whom: everyone.

From Freecycle (free secondhand goods for anyone who will take them away) to Wikipedia, we are discovering that money isn't the only motivator. Altruism has always existed, but the Web gives it a platform where the actions of individuals can have global impact. In a sense, zero-cost distribution has turned sharing into an industry. In the monetary economy it all looks free — indeed, in the monetary economy it looks like unfair competition — but that says more about our shortsighted ways of measuring value than it does about the worth of what's created.

THE ECONOMICS OF ABUNDANCE
Enabled by the miracle of abundance, digital economics has turned traditional economics upside down. Read your college textbook and it's likely to define economics as "the social science of choice under scarcity." The entire field is built on studying trade-offs and how they're made. Milton Friedman himself reminded us time and time again that "there's no such thing as a free lunch.

"But Friedman was wrong in two ways. First, a free lunch doesn't necessarily mean the food is being given away or that you'll pay for it later — it could just mean someone else is picking up the tab. Second, in the digital realm, as we've seen, the main feedstocks of the information economy — storage, processing power, and bandwidth — are getting cheaper by the day. Two of the main scarcity functions of traditional economics — the marginal costs of manufacturing and distribution — are rushing headlong to zip. It's as if the restaurant suddenly didn't have to pay any food or labor costs for that lunch.

Surely economics has something to say about that?

It does. The word is *externalities*, a concept that holds that money is not the only scarcity in the world. Chief among the others are your time and respect, two factors that we've always known about but have only recently been able to measure properly. The "attention economy" and "reputation economy" are too fuzzy to merit an academic department, but there's something real at the heart of both. Thanks to Google, we now have a handy way to convert from reputation (PageRank) to attention (traffic) to money (ads). Anything you can consistently convert to cash is a form of currency itself, and Google plays the role of central banker for these new economies.

There is, presumably, a limited supply of reputation and attention in the world at any point in time. These are the new scarcities — and the world of free exists mostly to acquire these valuable assets for the sake

of a business model to be identified later. Free shifts the economy from a focus on only that which can be quantified in dollars and cents to a more realistic accounting of *all* the things we truly value today.

FREE CHANGES EVERYTHING

Between digital economics and the wholesale embrace of King's Gillette's experiment in price shifting, we are entering an era when free will be seen as the norm, not an anomaly. How big a deal is that? Well, consider this analogy: In 1954, at the dawn of nuclear power, Lewis Strauss, head of the Atomic Energy Commission, promised that we were entering an age when electricity would be "too cheap to meter." Needless to say, that didn't happen, mostly because the risks of nuclear energy hugely increased its costs. But what if he'd been right? What if electricity had in fact become virtually free?The answer is that everything electricity touched — which is to say just about everything — would have been transformed. Rather than balance electricity against other energy sources, we'd use electricity for as many things as we could — we'd waste it, in fact, because it would be too cheap to worry about.

All buildings would be electrically heated, never mind the thermal conversion rate. We'd all be driving electric cars (free electricity would be incentive enough to develop the efficient battery technology to store it). Massive desalination plants would turn seawater into all the freshwater anyone could want, irrigating vast inland swaths and turning deserts into fertile acres, many of them making biofuels as a cheaper store of energy than batteries. Relative to free electrons, fossil fuels would be seen as ludicrously expensive and dirty, and so carbon emissions would plummet. The phrase "global warming" would have never entered the language.

Today it's digital technologies, not electricity, that have become too cheap to meter. It took decades to shake off the assumption that computing was supposed to be rationed for the few, and we're only now starting to liberate bandwidth and storage from the same poverty of imagination. But a generation raised on the free Web is coming of age, and they will find entirely new ways to embrace waste, transforming the world in the process. Because free is what you want — and free, increasingly, is what you're going to get.

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http://www.wired.com/print/techbiz/it/magazine/16-03/ff_free

Laughing with pessimists

By Tobias Grey
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When it comes to staging her plays, Yasmina Reza, one of the world's most successful playwrights, leaves nothing to chance. She vets the actors, dissects the directors and prods the producers. It's a way of working that she first devised more than 20 years ago when she wrote her first play, *Conversations After a Burial*, and continues with her latest, *God of Carnage* .

"I was an actress, you see, I knew bad actors would have spoiled what I'd written," says Reza, a delicate-boned 48-year-old, with large expressive brown eyes. "I write for virtuosos, otherwise what's the point?"

In Paris, Reza has directed *God of Carnage* herself. "I'm astonished that I never had the guts to do it before," she says, sipping a cup of herbal tea. "I'd already worked with a lot of directors who let me talk to the actors, sort of hand out advice. Quite a lot of them suggested I should take it up myself."

The hotel tea-room where we meet begins to fill up with the sound of chatter and spoon-stirring; Reza looks around anxiously. "It's very fragile my writing, fragile in a good way," she continues, stressing each word. "Like something that's been finely chiselled. With *great actors* it can work, with lesser ones it can't. So I knew it was better to wait for the right actors, the right production and a talented director."

For the Paris premiere of *God of Carnage*, a four-hander about a married couple who invite another couple round to their house for a chat after their sons have had a violent altercation, it is a wait that has brought her Isabelle Huppert, who plays Véronique, a neurotic do-gooder . The play was partly inspired by a conversation Reza had with her teenage son. "One of his friends had had his tooth broken by another boy," she says, "The mother of my son's friend complained that the boy's parents hadn't even rung up to apologise. I don't know why but something just clicked."

The play has its West End debut next month at the Gielgud Theatre in a production that also has a starry cast: Ralph Fiennes, Janet McTeer, Tamsin Greig and Ken Stott. Like four of Reza's previous plays – including her international breakthrough hit *Art* (1994), it will be directed by Matthew Warchus .

"What appeals to me about Yasmina's plays is that she picks a tiny subject or situation, and from it reveals universal truths," says Warchus. "She somehow manages to write epic drama from a miniature position ... The kind of drama she's interested in is a world in which somebody vomits, or somebody draws a skier on a white painting, or enters a room and overhears something that they shouldn't have. In a way her plays remind me of Chekhov's."

Like Chekhov, Reza does not seek moral finality in her plays: every character gets a fair shake, however seemingly reprehensible. It is, undoubtedly, one of the reasons actors are so keen to be in her plays. "I could never [judge my characters]," she says. "Perhaps it's my weakness: I love them all. I say weakness because I'm not sure it's a strength for a writer."

Warchus is convinced that Reza's characters represent different facets of her own personality. "She's very honest about her personality," says Warchus. "She says in her plays: I can be good, I can be bad, I can be compassionate, I can be really horrible. It's so honest, her work, that I find it healing in a way, even though it has none of those pretensions."

Reza is quick to dismiss any notion that she's an intellectual. "I'm not entirely sure if it's typical of French artists or not, this fervent desire to be intellectual," she says. "But for me as a writer what I do is anti-intellectual. That is, I see the world and talk about it with a maximum of subjectivity, with all the strong contradictions, even bad faith, that involves."

Reza believes her refusal to adopt intellectual positions has alienated her from many French critics, who have never praised her in quite the same way as their American, British and German counterparts.

"My relationship with the French critics is complicated," she says. "Being successful doesn't win you many friends over here. When you have a popular success, there's automatically the suspicion that because what you've done is commercial it's not very good. Another thing the French didn't like very much was that as soon as I could, I took my plays around the world. They thought that it was me being disdainful of France, which is untrue. Though, it is true I was always more interested in what was going on in New York or London than in Paris."

The incredible success of *Art*, a play ostensibly about three male friends arguing the merits of an all-white painting, was the crucial turning point in Reza's career. Indeed, since its first staging in Paris in 1994, *Art*, which has been translated into 35 languages, has taken more than $300m on its travels, the magazine Business Week once calculated.

It was Sean Connery's French wife Micheline who first raised the possibility of bringing *Art* to an audience outside France. She had seen the play in Paris and thought there might be a film role in it for her husband. Sean Connery offered to buy the movie rights from Reza, who turned him down. He then asked her what she wanted to do with the play.

"I said to myself that if it got turned into a film, then it would be dead as a play," remembers Reza. "When Sean asked me what I dreamed of doing with it, I said I wanted it to go on the London stage. That's how he ended up producing it."

Art ushered in some fruitful partnerships for Reza. Not only with Warchus, who was only 30 years old at the time, but also with the English playwright Christopher Hampton, who has translated five of Reza's plays from French into English.

"I think she absolutely has a voice and has carved out a particular area which is recognisably her own," says Hampton. "Her first play, *Conversations After a Burial*, I think, is consciously Chekhovian, but since then she's developed into something more particular. She's what you might call a lepidopterist of the middle class."

Art's extraordinary international success has made Reza the first French playwright since Jean Anouilh to seduce Anglophone audiences. The play won a Tony award in the US, a Laurence Olivier award in Britain and four Molières in France. Since then she has found little trouble mounting subsequent plays overseas. But, paradoxically, *Art* gave Reza an enormous creative headache.

She worried that she would never be able to move out from under its shadow. "There's something very sad about reaching your horizons," says Warchus. "It makes you feel tired, empty, lonely, alienated even. That happened to Yasmina quite early on in her work as a writer. There's this pressure of 'how do you ever write something that will ever be that successful again?' Everything you write, whether it's better or worse, will be measured against that first success."

Reza has, however, kept on writing, and not just plays but novels, memoirs and, most recently, a book about Nicolas Sarkozy's presidential campaign . "I write when life is not enough," she told one interviewer, and it is true that her writing, though darkly comic, is imbued with a rare melancholy .

Reza has developed what she describes as "a certain vision of the world" by embracing her Jewish origins: "In my first novel, *Desolation*, I wrote a phrase I think says a lot about me and my writing and my relationship with my friends. It went: 'You can only laugh with the great pessimists.' When I ask a friend, 'How are you doing?' and they reply, 'I'm feeling terrible,' that opens a door to laughter, and we laugh. How Jewish is that!"

The elder of three sisters, one of whom died in infancy, Reza was born in Paris in May 1959. Her mother is still alive – very much the Jewish matriarch, says Reza – having fled with her family to Paris after the Communists came to power in her native Hungary. Reza's father, a Jew with Iranian and Spanish ancestry born in Moscow in the middle of the Russian Revolution, died a few years ago. He, too, had fled with his parents to Paris, where he had met and married Reza's mother.

In her slim memoir *Nulle Part* (2005). Reza, who has two teenage children by her former partner, the film director Didier Martiny, says she has always felt like an outsider. "I don't know the languages of my father, my mother, my ancestors, I recognise neither land nor tree; there is no soil that I can call my own or say this is where I come from…"

However, while it is not unknown for artists to embellish their early years with tales of penury and personal suffering, Reza, as confident, contrary and paradoxical in her dealings with the press as any of her characters, did precisely the opposite by choosing to describe her upbringing in the most idyllic terms. And in France a reputation as a writer born with a silver spoon in her mouth stuck fast, much to her chagrin.

Three years ago, in an interview with the French literary magazine Lire, she attempted to set the record straight and admitted to having lied. "I reinvented my life ... I hated the intrusion into my life and the questions about my privacy, my parents, the place where I was born, or where I grew up."

Today, Reza still dislikes the prying nature of interviews. “If I was living in an ideal world, there wouldn’t be any need for them,” she says. “I write books, I write plays, that should be enough. Why did I tell Lire I lied? Because I’d made up this glossy story about my life which was blown out proportion by journalists, and I found myself saddled with this story... I felt I needed to say, ‘No, everything wasn’t that easy,’ but it hasn’t really changed anything.”

Does she still feel a similar urge to lie? “No, but I don’t need to tell everything about myself either,” she replies, as confident and contrary an interviewee as ever.

‘Le Dieu du Carnage’ is showing until March 29 at the Théâtre Antoine, 75010 Paris. ‘God of Carnage’ opens on March 8 at the Gielgud Theatre, London W1. www.godofcarnage.com

http://www.ft.com:80/cms/s/0/99b58684-e0d7-11dc-b0d7-0000779fd2ac.html

Why Do We Love Babies? Parental Instinct Region Found In The Brain

Why do we almost instinctively treat babies as special, protecting them and enabling them to survive? (Credit: iStockphoto/Aldo Murillo)

ScienceDaily (Feb. 27, 2008) — Why do we almost instinctively treat babies as special, protecting them and enabling them to survive? Darwin originally pointed out that there is something about infants which prompts adults to respond to and care for them which allows our species to survive. Nobel-Prize-winning zoologist Konrad Lorenz proposed that it is the specific structure of the infant face, including a relatively large head and forehead, large and low lying eyes and bulging cheek region, that serves to elicit these parental responses. But the biological basis for this has remained elusive.

Now, a possible brain basis for this parental instinct has been reported. This research was led by Morten Kringelbach and Alan Stein from the University of Oxford and was funded by the Wellcome Trust and TrygFonden Charitable Foundation. The authors showed that a region of the human brain called the medial orbitofrontal cortex is highly specifically active within a seventh of a second in response to (unfamiliar) infant faces but not to adult faces.

This finding has potentially important clinical application in relation to postnatal depression, which is common, occurring in approximately 13% of mothers after birth and often within six weeks. The present findings could eventually provide opportunities for early identification of families at risk.

The research team used a neuroimaging method called magnetoencephalography (MEG) at Aston University, UK. This is an advanced neuroscientific tool which offers both excellent temporal (in milliseconds) and spatial (in millimetres) resolution of whole brain activity. Because the researchers were primarily interested in the highly automatized processing of faces, they used an implicit task that required participants to monitor the colour of a small red cross and to press a button as soon as the colour changed. This was interspersed by adult and infant faces that were shown for 300 ms, but which were not important to solve the task.

The authors found a key difference in the early brain activity of normal adults when they viewed infant faces compared to adult faces. In addition to the well documented brain activity in the visual areas of the

brain in response to faces, early activity was found in the medial orbitofrontal cortex to infant faces but not adult faces. This wave of activity starts around a seventh of a second after presentation of an infant face. These responses are almost certainly too fast to be consciously controlled and are therefore perhaps instinctive.

The medial orbitofrontal cortex is located in the front of the brain, just over the eyeballs. It is a key region of the emotional brain and appears to be related to the ongoing monitoring of salient reward-related stimuli in the environment. In the context of the experiment, the medial orbitofrontal cortex may provide the necessary emotional tagging of infant faces that predisposes us to treat infant faces as special and plays a key role in establishing a parental bond.

Also, there is now evidence from deep brain stimulation linking depression to the nearby subgenual cingulate cortex which is strongly connected with the medial orbitofrontal cortex. This lends support to the possibility that changes to activity in the medial orbitofrontal cortex secondary to depression may adversely affect parental responsivity.

Postnatal depression is common and there are some experimental evidence suggesting that mothers with postnatal depression have difficulties in responding to infant cues. Further research could identify whether the present finding of early and specific medial orbitofrontal responses to infant faces (own and others) are affected and even suppressed by depression, thereby helping to explain this lack of maternal responsiveness. The present paradigm could eventually provide opportunities for early identification of families at risk.

Journal reference: Kringelbach ML, Lehtonen A, Squire S, Harvey AG, Craske MG, et al (2008) A Specific and Rapid Neural Signature for Parental Instinct. PLoS ONE 3(2): e1664.doi:10.1371/journal.pone.0001664http://www.plosone.org/doi/pone.0001664

Adapted from materials provided by Public Library of Science, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/02/080226213448.htm

Nano Scaffold Developed To Rebuild Nerve Damage

ScienceDaily (Feb. 27, 2008) — A Monash University PhD student has developed a new technique that could revolutionise stem cell treatment for Parkinson's disease and spinal cord injury.

David Nisbet from Monash University's Department of Materials Engineering has used existing polymer-based biodegradable fibres, 100 times smaller than a human hair, and re-engineered them to create a unique 3-D scaffold that could potentially allow stem cells to repair damaged nerves in the human body more quickly and effectively.

Mr Nisbet said a combined process of electrospinning and chemical treatment was used to customise the fibre structure, which can then be located within the body.

"The scaffold is injected into the body at the site requiring nerve regeneration. We can embed the stem cells into the scaffold outside the body or once the scaffold is implanted. The nerve cells adhere to the scaffold in the same way ivy grips and weaves through a trellis, forming a bridge in the brain or spinal cord. Over time, the scaffold breaks down and is naturally passed from the body, leaving the newly regenerated nerves intact," Mr Nisbet said.

Mr Nisbet said the existing processes released stem cells into the nervous system where they 'floated' around.

"Our studies show that stem cells anchored to a scaffold not only attach more easily, but rapidly adapt to their environment and regenerate effectively. We are very excited about the therapeutic outcomes that could be obtained from our research," Mr Nisbet said.

"We are at the interface of two once separate disciplines -- nanotechnology and stem cell research -- combining into a new exciting era of discovery which could be the first step towards a cure for conditions such as Parkinson's disease and spinal cord injury.

"Repairing damaged neural pathways is the holy grail of many researchers. It is a very long road to success, which will require small steps from many people, but it's wonderful to know we're making such a significant contribution here at Monash University," Mr Nisbet said.

The potential of Nisbet's scaffold design has captured the interest of colleagues. The University of Toronto in Canada and the Melbourne-based Howard Florey Institute are conducting further tests, with preliminary results showing strong potential.

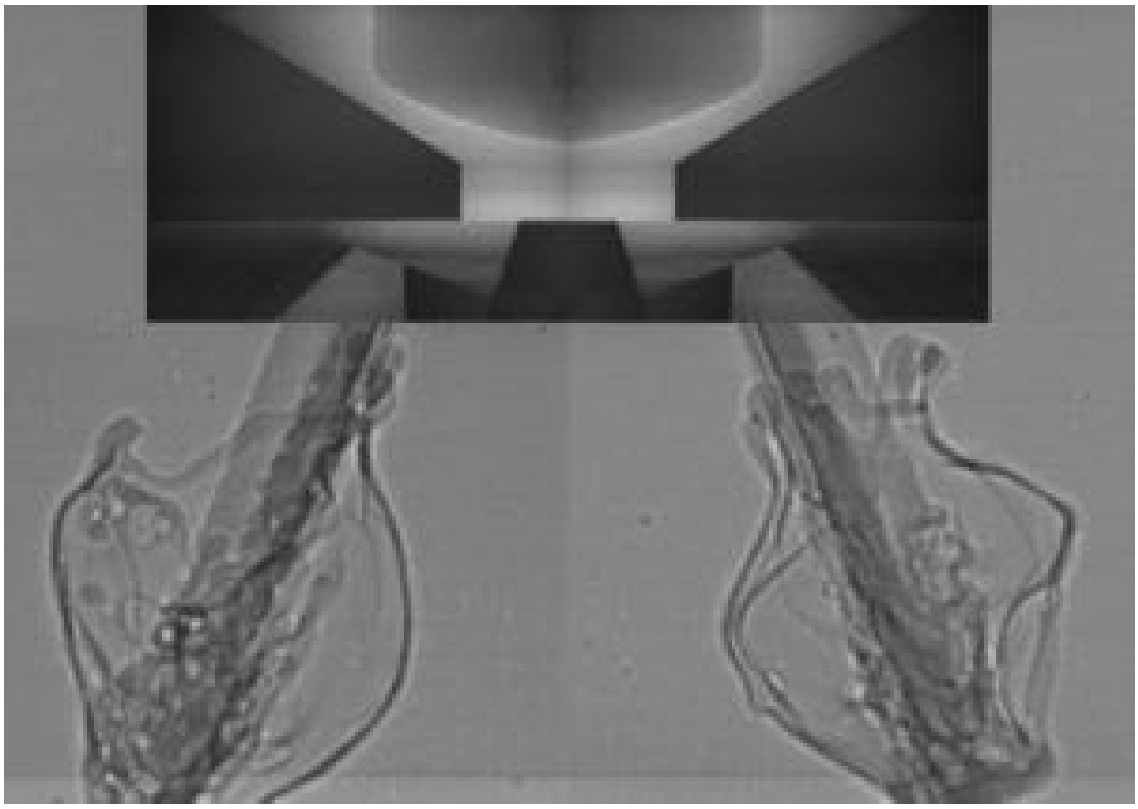
Another collaboration, with the Mental Health Research Institute of Victoria, is investigating the use of scaffolds in the potential treatment of damaged brain nerve cells.

Mr Nisbet said biodegradable fibres were commonly used in biomedical sciences and regenerative technologies, but his technique of re-engineering them into a 3-D structure is a world first.

Adapted from materials provided by Monash University.

http://www.sciencedaily.com:80/releases/2008/02/080225085147.htm

Peeling Away Layers Of Dense Liquid Flow Dynamics



The liquid breakup of a high-density stream from a fuel injector can easily be seen using an X-ray technique developed at Argonne National Laboratory. The technique could lead to better and cleaner fuel injectors. (Credit: Image courtesy of DOE/Argonne National Laboratory)

ScienceDaily (Feb. 27, 2008) — Standard microscopy and visible light imaging techniques cannot peer into the dark and murky centers of dense-liquid jets, which has hindered scientists in their quest for a full understanding of liquid breakup in devices such as automobile fuel injectors.

Scientists at the U.S. Department of Energy's (DOE) Argonne National Laboratory have developed a technique to peer through high-speed dense liquids using high-energy X-rays from Argonne's Advanced Photon Source (APS).

“The imaging contrast is crisp and we can do it orders of magnitude faster than ever before,” Argonne X-ray Science Division physicist Kamel Fezzaa said.

Fuel injector efficiency and clean combustion is dependent on the best mixture of the fuel and air. To improve injector design, it is critical to understand how fuel is atomized as it is injected. However, standard laser characterization techniques have been unsuccessful due to the high density of the fuel jet near the injector opening. Scientists have been forced to study the fuel far away from the nozzle and extrapolate its dispersal pattern. The resulting models of breakup are highly speculative, oversimplified and often not validated by experiments.

“Research in this area has been a predicament for some time, and there has been a great need for accurate experimental measurement,” Fezzaa said. “Now we can capture the internal structure of the jet and map its velocity with clarity and confidence, which wasn't possible before.”

Fezzaa and his colleagues, along with collaborators from Visteon Corp. developed a new ultrafast synchrotron X-ray full-field phase contrast imaging technique and used it to reveal instantaneous velocity

and internal structure of these optically dense sprays. This work is highlighted in the Advance Online Publication of the journal Nature Physics.

A key to the experiment was taking advantage of the special properties of the X-ray beam generated at the APS. Unlike hospital x-rays, the synchrotron x-rays are a trillion times brighter and come in very short pulses with durations as little as 0.1 nanoseconds.

"The main challenge that our team had to overcome was to be able to isolate single x-ray pulses and use them to do experiments, and at the same time protect the experimental setup from being destroyed by the overwhelming power of the full x-ray beam," Fezzaa said.

Their new technique has the ability to examine the internal structure of materials at high speed, and is sensitive to boundaries. Multiphase flows, such as high-speed jets or bubbles in a stream of water, are ideal systems to study with this technique. Other applications include the dynamics of material failure under explosive or ballistic impact, which is of major importance to transportation safety and national security, and material diffusion under intense heat.

Adapted from materials provided by DOE/Argonne National Laboratory.

http://www.sciencedaily.com:80/releases/2008/02/080222101535.htm

Galaxy Ablaze With Starbirth Imaged With NASA's Swift Satellite

Imagine looking at a tree through eyeglasses that only allow red light to pass through. The tree is going to look a lot different than how it would look without the glasses. The same goes for a galaxy when astronomers look at it through different types of telescopes. (Credit: NASA/Swift Science Team/Stefan Immler) ScienceDaily (Feb. 27, 2008) — Imagine looking at a tree through eyeglasses that only allow red light to pass through. The tree is going to look a lot different than how it would look without the glasses. The same goes for a galaxy when astronomers look at it through different types of telescopes.

This new image from NASA's Swift satellite demonstrates what happens when astronomers look at a galaxy in ultraviolet light rather than the visible light that we see with our eyes. Swift took the image through a series of filters that only let in ultraviolet light. We cannot see ultraviolet light with our eyes, but we can feel its effects: it gives us sunburn if we stay out in the Sun too long on a bright, sunny day.

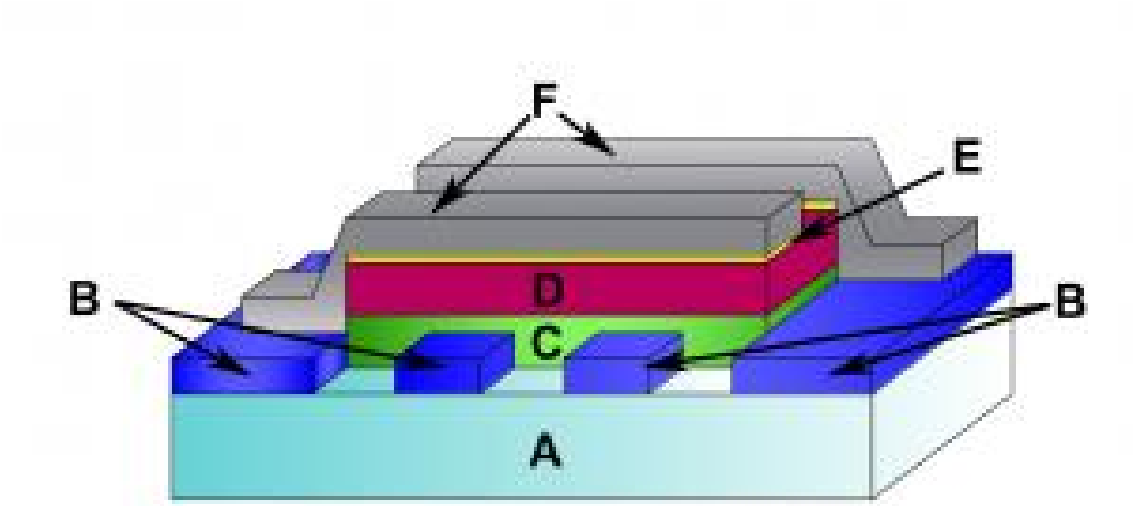
The Swift ultraviolet image shows the Triangulum Galaxy, so named because it resides in the northern constellation Triangulum. The galaxy is also known as M33, because it's the 33rd object in a catalog of sky objects that was assembled by French astronomer Charles Messier in the 1700s. The galaxy itself is about half the size of our Milky Way Galaxy, and is located about 2.9 million light-years from Earth. This means that it takes the light from M33 2.9 million years to reach Earth. The image itself is actually a mosaic of 13 individual pictures that were taken between December 23, 2007 and January 4, 2008. Astronomer Stefan Immler of NASA's Goddard Space Flight Center used a computer to stitch the individual pictures into a seamless image. "This is the most detailed ultraviolet image of an entire galaxy ever taken," says Immler.

The image clearly shows the spiral structure of M33. New stars are forming inside the spiral arms. These stars are very hot, and give off a lot of ultraviolet light. This light hits nearby clouds of gas, heating them up and causing them to also shine in ultraviolet light. "The ultraviolet colors of star clusters tell us their ages and compositions," says Swift team member Stephen Holland of NASA Goddard. "With Swift's high spatial resolution, we can zero in on the clusters themselves and separate out nearby stars and gas clouds. This will enable us to trace the star-forming history of the entire galaxy."

"The entire galaxy is ablaze with starbirth," adds Immler. "Despite M33's small size, it has a much higher star-formation rate than our Milky Way Galaxy. All of this starbirth lights up the galaxy in the ultraviolet." *Adapted from materials provided by NASA/Goddard Space Flight Center, via EurekAlert!, a service of AAAS.*

http://www.sciencedaily.com:80/releases/2008/02/080226092800.htm

Special Coating Greatly Improves Solar Cell Performance



Solar cell schematic showing a glass substrate (A) coated with the transparent conducting anodes (B), followed by the nickel oxide electron-blocking/hole transport layer (C), which in turn is then coated with the polymer-fullerene light absorbing/charge transporting layer (D), then an additional interfacial layer of LiF (E) and, finally, the device is completed by vapor deposition of the aluminum cathodes (F). (Credit: Michael Irwin, Northwestern University)

ScienceDaily (Feb. 26, 2008) — The energy from sunlight falling on only 9 percent of California's Mojave Desert could power all of the United States' electricity needs if the energy could be efficiently harvested, according to some estimates. Unfortunately, current-generation solar cell technologies are too expensive and inefficient for wide-scale commercial applications.

A team of Northwestern University researchers has developed a new anode coating strategy that significantly enhances the efficiency of solar energy power conversion. A paper about the work, which focuses on "engineering" organic material-electrode interfaces in bulk-heterojunction organic solar cells, is published online in the Proceedings of the National Academy of Sciences.

This breakthrough in solar energy conversion promises to bring researchers and developers worldwide closer to the goal of producing cheaper, more manufacturable and more easily implemented solar cells. Such technology would greatly reduce our dependence on burning fossil fuels for electricity production as well as reduce the combustion product: carbon dioxide, a global warming greenhouse gas.

Tobin J. Marks, the Vladimir N. Ipatieff Research Professor in Chemistry in the Weinberg College of Arts and Sciences and professor of materials science and engineering, and Robert Chang, professor of materials science and engineering in the McCormick School of Engineering and Applied Science, led the research team. Other Northwestern team members were researcher Bruce Buchholz and graduate students Michael D. Irwin and Alexander W. Hains.

Of the new solar energy conversion technologies on the horizon, solar cells fabricated from plastic-like organic materials are attractive because they could be printed cheaply and quickly by a process similar to printing a newspaper (roll-to-roll processing).

To date, the most successful type of plastic photovoltaic cell is called a "bulk-heterojunction cell." This cell utilizes a layer consisting of a mixture of a semiconducting polymer (an electron donor) and a fullerene (an electron acceptor) sandwiched between two electrodes -- one a transparent electrically

conducting electrode (the anode, which is usually a tin-doped indium oxide) and a metal (the cathode), such as aluminum.

When light enters through the transparent conducting electrode and strikes the light-absorbing polymer layer, electricity flows due to formation of pairs of electrons and holes that separate and move to the cathode and anode, respectively. These moving charges are the electrical current (photocurrent) generated by the cell and are collected by the two electrodes, assuming that each type of charge can readily traverse the interface between the polymer-fullerene active layer and the correct electrode to carry away the charge -- a significant challenge.

The Northwestern researchers employed a laser deposition technique that coats the anode with a very thin (5 to 10 nanometers thick) and smooth layer of nickel oxide. This material is an excellent conductor for extracting holes from the irradiated cell but, equally important, is an efficient "blocker" which prevents misdirected electrons from straying to the "wrong" electrode (the anode), which would compromise the cell energy conversion efficiency.

In contrast to earlier approaches for anode coating, the Northwestern nickel oxide coating is cheap, electrically homogeneous and non-corrosive. In the case of model bulk-heterojunction cells, the Northwestern team has increased the cell voltage by approximately 40 percent and the power conversion efficiency from approximately 3 to 4 percent to 5.2 to 5.6 percent.

The researchers currently are working on further tuning the anode coating technique for increased hole extraction and electron blocking efficiency and moving to production-scaling experiments on flexible substrates.

The PNAS paper is titled "p-Type Semiconducting Nickel Oxide as an Efficiency-enhancing Anode Interfacial Layer in Polymer Bulk-heterojunction Solar Cells."

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

http://www.sciencedaily.com:80/releases/2008/02/080222125628.htm

Heart Attack Rates Fall Following National Smoking Bans

ScienceDaily (Feb. 26, 2008) — French researchers announced a striking 15% decrease in admissions of patients with myocardial infarction to emergency wards since the public ban on smoking came into effect in restaurants, hotels and casinos in France last January. The announcement was made on 23 February by the National Sanitary Institute. Similar results were published in Italy on 12 February by the Environmental Health Authority: researchers in Rome found an 11.2 percent reduction of acute coronary events since the January 2005 smoking ban took effect in Italy.

The European Society of Cardiology (ESC) wishes to stress the positive impact of smoking bans in all European countries that have adopted laws banning tobacco use in public places. "There is a wealth of data linking smoking and cardiovascular disease (CVD)," stated Prof David Thomas, of the European Society of Cardiology and a Senior Cardiologist in the Centre Hospitalier Pitié- Salpêtrière in Paris. "Although further studies are needed all over France to confirm the strong decrease in smoking related deaths over time, these statistics show the same tendency professionals have already observed in Italy, Ireland and Scotland when these countries introduced their own bans on tobacco. To me, the most striking aspect in this study is the reduction of pollution inside cafés and restaurants by over 35%. Passive smoking has been shown to increase the risk of coronary heart disease and the recent smoking ban is obviously having a beneficial effect on both smokers and non-smokers."

The European Society of Cardiology together with other health institutions has continuously informed the public of the overwhelming evidence of the adverse effect of smoking on cardiovascular health. The European Guidelines on CVD prevention warn that smoking is responsible for 50% of all avoidable deaths and that smoking causes heart attacks at any age. Data produced by Prof Pekka Jousilahti from Finland at the ESC's EuroPrevent Congress in 2006 showed that smoking releases over 4000 chemicals into the body affecting every organ. "The swift reduction of heart attacks and strokes in France is very good news indeed!"states Prof Jean Pierre Bassand, Past President of the ESC and Head of the Cardiology Department at the University Hospital of Besançon . "Cardiologists do not need to be convinced that smoking and passive smoking have an important impact on the rate of heart attacks; they are also convinced that giving up cigarettes and eliminating passive smoking has a very favourable effect on the rate of heart attacks. Unfortunately the ban on smoking in public places has not led to a reduction in the number of smokers in France, confirming data observed elsewhere."

Prof Daniel Thomas agrees: "Governments must learn from these findings and not give in to pressure from the tobacco lobby. In France people are actually still buying tobacco but just the fact that working and living environments are free from smoke pollution has made an enormous difference to public health, not only regarding cardiovascular disease, but also respiratory disease and other complaints such as headaches, as the INVS findings show. It is very important to stress the immediate results observed on cardiovascular disease when people live in smoke free environments." "Although cardiovascular diseases are very complex in nature and due to many causes, smoking bans most certainly have caused a reduction in coronary events. This is consistent with the pollution reduction observed in indoor public places" explains Roberto Ferrari, President Elect of the ESC.

The European Society of Cardiology would like to encourage smoke cessation across the continent through smoking bans and taxes on cigarettes. There is a consensus on the benefits of smoking cessation which are usually almost immediate and contribute to diminish the burden of cardiovascular disease.

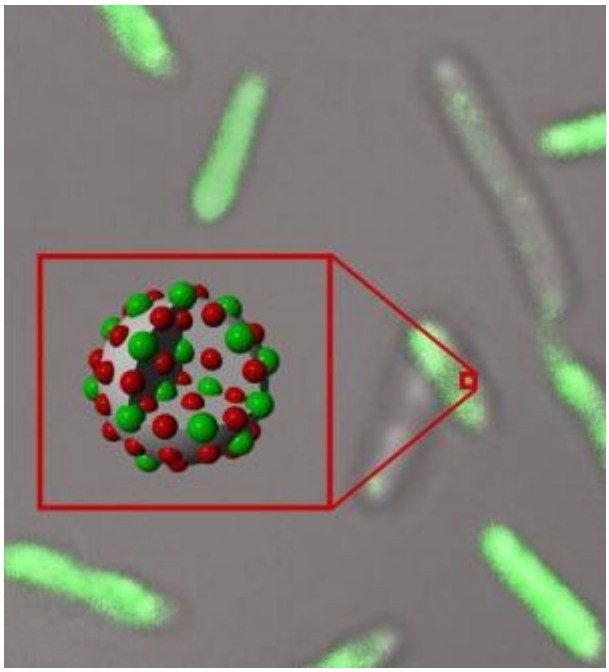
The positive figures communicated last week in Italy and France should encourage other European countries to enforce similar measures to protect their citizens.

Smoking bans can save lives.

Adapted from materials provided by European Society of Cardiology, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com:80/releases/2008/02/080226102607.htm

Silica Smart Bombs Deliver Knock-out To Bacteria



Mark Schoenfisch and his lab of analytical chemists at UNC have created nano-scale scaffolds made of silica and loaded with nitric oxide (NO) -- an important molecule in mammals that plays a role in regulating blood pressure, neurotransmission and fighting bacterial infections, among other vital functions. (Credit: Image courtesy of University of North Carolina at Chapel Hill)

ScienceDaily (Feb. 26, 2008) — Bacteria mutate for a living, evading antibiotic drugs while killing tens of thousands of people in the United States each year. But as concern about drug-resistant bacteria grows, one novel approach under way at the University of North Carolina at Chapel Hill seeks to thwart the bug without a drug by taking a cue from nature.

Mark Schoenfisch and his lab of analytical chemists at UNC have created nano-scale scaffolds made of silica and loaded with nitric oxide (NO) -- an important molecule in mammals that plays a role in regulating blood pressure, neurotransmission and fighting bacterial infections, among other vital functions.

"There was evidence that nitric oxide kills bacteria, but the difficult part involved storing it in a manner such that it could be delivered to bacterial cells," said Evan Hetrick, a doctoral student in Schoenfisch's lab and lead author on a paper in the February issue of the American Chemical Society's journal ACS Nano.

While the body constantly produces NO, and can ramp up its production to fight infection, sometimes it can't produce enough to mount a sufficient defense. Previous research using small molecules to deliver NO hit roadblocks -- controlling the release of the compound was difficult and the molecules were potentially toxic to healthy cells in the body.

"With silica scaffolds, nitric oxide stores easily and we could very carefully control the release," said Schoenfisch, an associate professor of chemistry in UNC's College of Arts and Sciences.

Schoenfisch, Hetrick and their colleagues tested their silica scaffolds head-to-head with small molecules against the bacteria Pseudomonas aeruginosa, which is commonly found in burn and other wound infections.

NO delivered by both methods completely killed the bacteria. But the silica nanoparticles delivered the NO right to the bacteria's doorstep. In contrast, the small molecules released NO indiscriminately, and the concentration of NO is lost as it makes its way toward bacterial cells.

"With the silica particles, more NO actually reached the inside of the cells, enhancing the efficacy of the nanoparticles compared to the small molecule. So, the overall amount of NO needed to kill bacteria is much less with silica nanoparticles," Schoenfisch said. "And, with small molecules, you're left with potentially toxic byproducts," Schoenfisch said. Using mouse cells, they proved that the silica nanoparticles weren't toxic to healthy cells, but the small molecules were.

Schoenfisch has a history of success with NO-releasing materials. His lab has successfully created a variety of coatings for different biomedical applications. Such materials hold promise as anti-infective coatings and as methods to improve the body's integration of biological implants -- such as hip or knee joints -- and implanted sensors that relay various biological measures, such as blood glucose or oxygen concentrations.

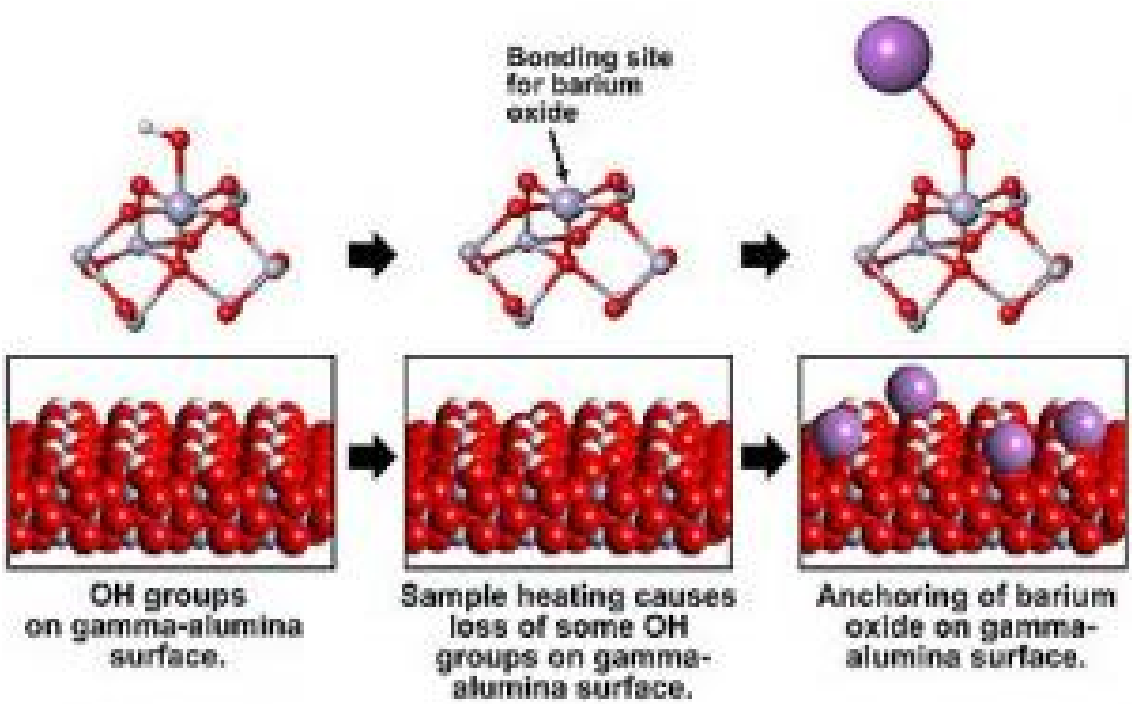
The amount and rate of NO release are easily modified and controlled by using these different silica nanoparticles. "Release rates are a function of the precursors used to make the nanoparticles," Schoenfisch said. "It depends entirely on how we build the silica structures."

Future research will include studying additional bacterial strains, active targeting, preferential uptake and biodistribution studies.

Adapted from materials provided by University of North Carolina at Chapel Hill, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com:80/releases/2008/02/080225213452.htm

Catalysis Discovery Takes Aim At NOx Emissions



Scientists looking for better vehicle emission treatments have discovered how potential catalyst materials are constructed. Researchers found that, in the presence of water, aluminum ions (gray) on the surface of alumina bond to six oxygen ions (red). Heating removes the water and leaves some aluminum ions with only five oxygen ions. This creates a bonding site for the NOx-removing catalyst barium oxide. (Credit: Image courtesy of DOE/Pacific Northwest National Laboratory)

ScienceDaily (Feb. 26, 2008) — A discovery in molecular chemistry may help remove a barrier to widespread use of diesel and other fuel-efficient "lean burn" vehicle engines. Researchers at the Department of Energy's Pacific Northwest National Laboratory have recorded the first observations of how certain catalyst materials used in emission control devices are constructed.

The PNNL team observed how barium oxide attaches itself to the surface of gamma-alumina. Barium oxide is a compound that absorbs toxic nitrogen oxide, commonly referred to as NO_x, from tail-pipe emissions. Gamma alumina is a form of aluminum oxide that is used as a support for catalyst materials, such as barium oxide, that are the active ingredients in exhaust systems.

"The discovery is encouraging because understanding catalysts in molecular and atomic detail can directly identify new ways to improve them," said PNNL researcher Janos Szanyi. The manner in which barium oxide anchors onto alumina suggests the exact site where catalytic materials begin to form - and where they can be available to absorb NO_x emissions.

Lean burn engines deliver up to 35 percent better fuel economy because they mix more air with gasoline than standard internal combustion engines. But the more efficient engines can't meet strict emissions standards because current after-treatment devices don't effectively reduce NO_x emissions. New catalysts are essential before the economic and environmental benefits of lean burn engines can be realized.

Alumina is a common and relatively inexpensive catalyst support material. Its surface structure, formation and thermal stability have been the subjects of much research, but the alumina particles are too small and poorly crystalline for traditional surface analysis. Researchers used the world's first 900-MHz nuclear magnetic resonance spectrometer to reveal the anchoring behavior. The instrument is located at the William R. Wiley Environmental Molecular Sciences Laboratory, a DOE national scientific user facility at PNNL.

Scientists know that the aluminum ions in alumina coordinate, or bond, to either four or six oxygen ions. When water is present, 10 to 15 percent of the aluminum ions on the surface bond to six oxygen ions: one underneath to the bulk of the alumina, four in a square on the surface and one on top to an oxygen ion in the water molecule.

Removing the water by heating leaves the aluminum ion with only five oxygen bonds. In this "penta-coordinated" state, the aluminum is open for bonding to the barium oxide. Results from the NMR spectrometer showed that the catalyst filled every available penta-coordinated site, atom-for-atom.

The team is now examining the interaction of gamma-alumina with other metal and metal oxide particles to determine if penta-coordinated aluminum ions are suitable bonding locations for other catalytic materials.

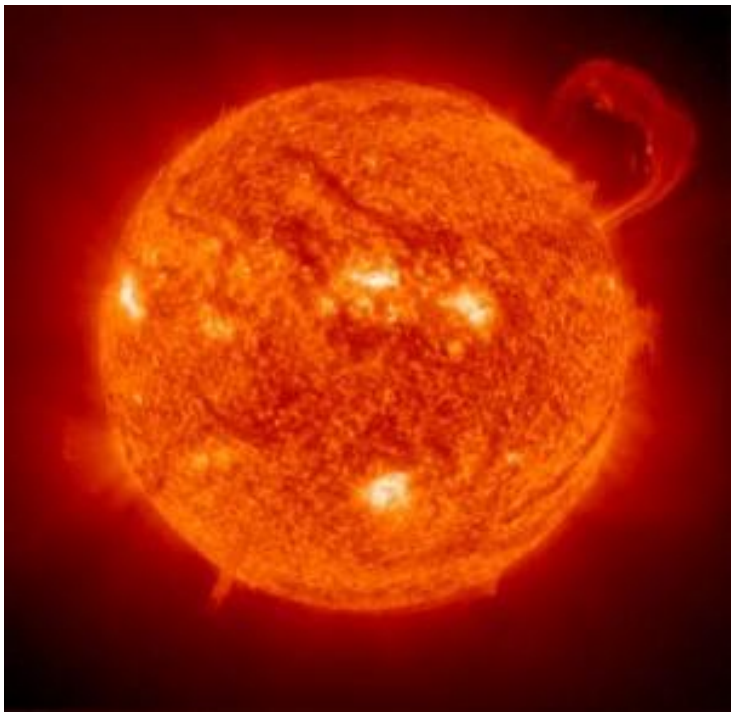
Journal reference: Ja Hun Kwak, Jain Zhi Hu, Do Heui Kim, Janos Szanyi and Charles Peden. "Penta-coordinated Al3+ Ions as Preferential Nucleation Sites for BaO on γ-Al2O3." Journal of Catalysis 251(1):189-194. July 2007.

DOE's Office of Basic Energy Sciences, Division of Chemical Sciences funded the research, which was facilitated by the laboratory's Institute for Interfacial Catalysis.

Adapted from materials provided by DOE/Pacific Northwest National Laboratory.

http://www.sciencedaily.com:80/releases/2008/02/080222095427.htm

Easing Concerns About Pollution From Manufacture Of Solar Cells



Manufacturing solar cells, which harness the energy of the sun, produces far few pollutants than conventional fossil fuel technologies, scientists say. (Credit: Courtesy of NASA)

ScienceDaily (Feb. 26, 2008) — In a finding that could help ease concerns about the potential environmental impact of manufacturing solar cells, scientists report that the manufacture of solar cells produces far fewer air pollutants than conventional fossil fuel technologies. Their report is the first comprehensive study on the pollutants produced during the manufacture of solar cells.

Solar energy has been touted for years as a safer, cleaner alternative to burning fossil fuels to meet rising energy demands. However, environmentalists and others are increasingly concerned about the potential negative impact of solar cell (photovoltaic) technology.

Manufacture of photovoltaic cells requires potentially toxic metals such as lead, mercury and cadmium and produces carbon dioxide, which contributes to global warming.

In the new study, Vasilis M. Fthenakis and colleagues gathered air pollution emissions data from 13 solar cell manufacturers in Europe and the United States from 2004-2006. The solar cells include four major commercial types: multicrystalline silicon, monocrystalline silicon, ribbon silicon, and thin-film cadmium telluride.

The researchers found that producing electricity from solar cells reduces air pollutants by about 90 percent in comparison to using conventional fossil fuel technologies.

The study "Emissions from Photovoltaic Life Cycles" is scheduled for the March 15 issue of the ACS' Environmental Science & Technology. doi./10.1021/es071763q

Adapted from materials provided by American Chemical Society, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com:80/releases/2008/02/080225090826.htm

Obesity And Carbs Linked To Esophageal Cancer, Study Suggests

ScienceDaily (Feb. 26, 2008) — Cases of esophageal cancer (adenocarcinoma) in the U.S. have risen in recent decades from 300,000 cases in 1973 to 2.1 million in 2001 at age-adjusted rates. A new study shows that these rates in the U.S. closely mirrored trends of increased carbohydrate intake and obesity from 1973-2001.

A new study illustrates what may be a public heath concern as the composition of U.S. diets changes and total carbohydrate and refined carbohydrate intakes increase. Obesity is a risk factor for many types of cancer, and a diet that includes a high percentage of calories from refined carbohydrates is a common contributor to obesity. Carbohydrates were also unique in that no other studied nutrients were found to correlate with esophageal cancer rates.

The causes of esophageal cancer remain largely unknown. Despite recent advances in treatment, esophageal cancer has a poor prognosis. The five-year rate of survival for esophageal cancer remains below 20 percent and is the eighth-leading cause of cancer related death in American men.

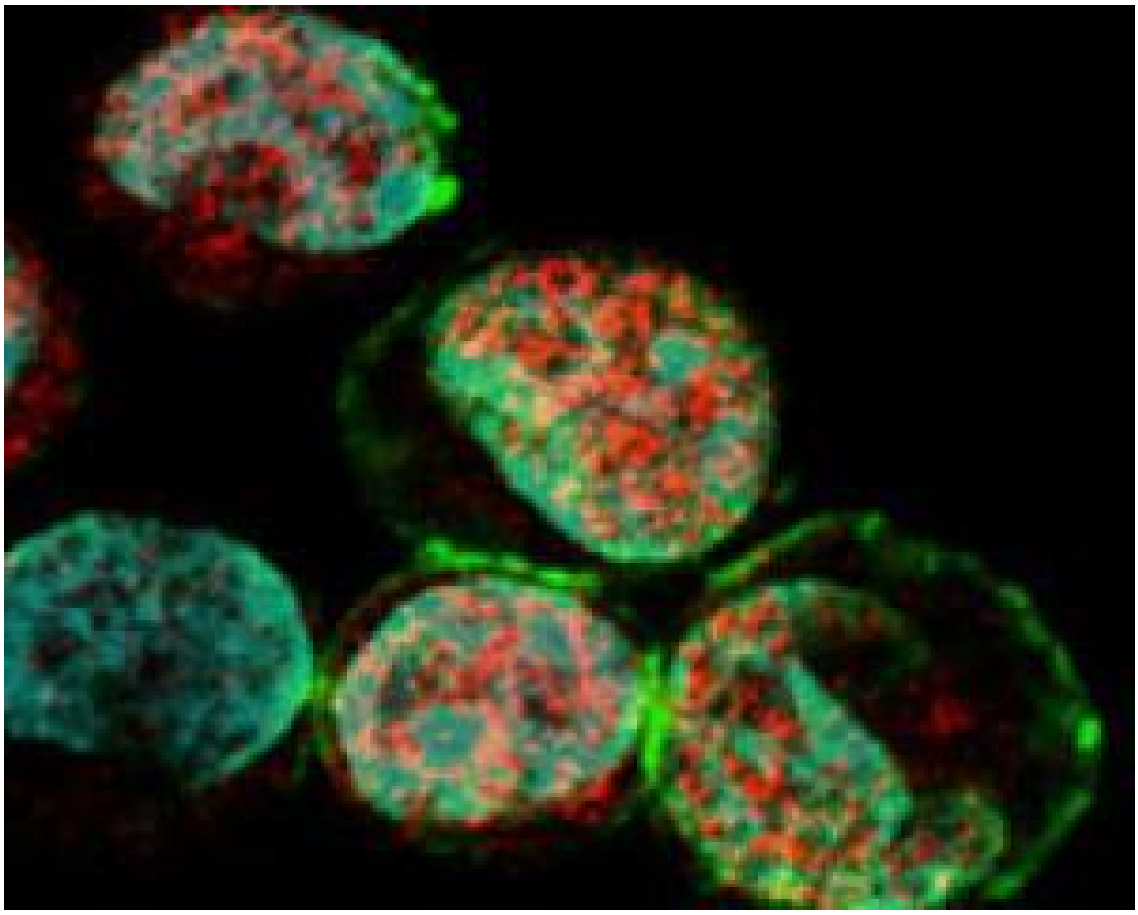
"If we can reverse the trends in refined carbohydrate intake and obesity in the U.S., we may be able to reduce the incidence of esophageal cancer," says Dr. Li Li, senior author of the study.

This study is published in The American Journal of Gastroenterology.

Adapted from materials provided by Blackwell Publishing Ltd..

http://www.sciencedaily.com:80/releases/2008/02/080225112604.htm

New Switch Of The Immune Response Discovered



PI3-kinase, a protein essential to the activation of the innate response immune in this image, immune cells responding to attack: IRF-7 (red) is in the nucleus and so can trigger the innate immune response. (Credit: Copyright Cristiana Guiducci/Institut Curie)

ScienceDaily (Feb. 26, 2008) — At the Institut Curie, Inserm researchers, in collaboration with collegues from Dynavax(1), have discovered a new mechanism controlling the choice in humans between two lines of defence in the event of attack. In the presence of viruses or bacteria, the immune system can trigger a response that is rapid but devoid of memory – innate immunity – or a response that takes longer to put in place but is more specifically targeted – adaptive immunity.

The essential prerequisite to the proper functioning of innate immunity is the "turning on" of the protein PI3-kinase. Once PI3-kinase is activated, the immune response is triggered, leading to the production of type I interferons, the spearhead of innate immunity, which destroy the body's invaders. This discovery opens up new therapeutic prospects since it may suggest ways of restoring the function of innate immunity, which is overactivated in autoimmune diseases and inhibited in certain cancers.

The body is often faced with attacks from outside (viral or bacterial infection) and sometimes from inside, because of the dysfunction of its own cells (cancer), and defends itself by activating its immune system. There are two types of defence. The first is innate immunity: this has no memory, and is permanently on guard to detect and destroy abnormal cells, tumor cells, or virus-infected cells. The second, which takes longer to initiate, is adaptive immunity, which specifically targets an invader. This response requires a education phase during which the cells of the immune system learn to recognize their enemy.

Dendritic cells, the body's "sentinels", are the first line of defence against invading pathogens: they recognize viruses and bacteria and then trigger an immune response, which, depending on the case, may

be innate or adaptive. In response to an intruder, the so-called plasmacytoid dendritic cells can either produce large amounts of interferons, molecules that trigger a rapid response against viral infections, or "specialize" and become cells able to teach the immune system to recognize the pathogens.

At the Institut Curie, Vassili Soumelis(2) and his team ("Immunity and Cancer", Inserm/Institut Curie Unit 653) have discovered how the dendritic cells choose between the two types of immune response. First, whatever the response, the presence of an intruder stimulates the TLR receptor inside the dendritic cells. Only then is the choice made between the two types of response. The PI3-kinase signaling pathway is activated, and the innate response is triggered. Kinase PI3 is the switch that turns on a whole cascade of proteins inside the cell. Information on the presence of an intruder in the body is thus transmitted to its final destination, in the cell's nucleus, where the protein IRF-7 (transcription factor) modifies the expression of specific genes and so alters the cell's behavior. In this specific case, IRF-7 induces the production of type 1 interferons (interferon-alpha, for example), which will bring about the destruction of the viruses and strongly activate various cells of the immune system.

Vassili Soumelis MD, PhD at the Institut Curie explains: "Activation of the protein PI3-kinase is one of the very first steps needed for the production of large quantities of type 1 interferons, leading to the triggering or strengthening of the innate immune response."

In certain autoimmune diseases, like systemic lupus erythematosus(3) or Sjögren's syndrome, this innate response overstimulated, leading to an abnormal defense reaction of the immune system, which attacks its own cells, tissues, or organs. In some cancers, on the other hand, the innate response is virtually absent. It may be that the cancer cells are able to block the PI3-kinase signaling pathway. Through this discovery, Vassili Soumelis and his collaborators hope, in time, to develop new treatments for use in autoimmune diseases and oncology. By acting on PI3-kinase, it may be possible to adapt the innate response, so as to inhibit it in the treatment of autoimmune diseases and boost it in cancer treatment.

This work is published in the 18 February 2008 issue of the Journal of Experimental Medicine.

Notes

1. Dynavax Technologies, Berkeley, California, United States.
2. Vassili Soumelis is an attending physician and Inserm immunology researcher at the Institut Curie.
3. Systemic lupus erythematosus is an inflammatory disease characterized by involvement of the joints and muscles, skin, kidneys, and blood, inflammation of the lungs or heart, neurological or psychiatric manifestations, fever.

Adapted from materials provided by Curie Institute, via AlphaGalileo.

http://www.sciencedaily.com:80/releases/2008/02/080221101319.htm

Krill Discovered Living In The Antarctic Abyss

Female Antarctic krill. Krill have been found living and feeding down to depths of 3,000 meters. (Credit: Image courtesy of British Antarctic Survey)

ScienceDaily (Feb. 26, 2008) — Scientists have discovered Antarctic krill (Euphausia superba) living and feeding down to depths of 3000 metres in the waters around the Antarctic Peninsula. Until now this shrimp-like crustacean was thought to live only in the upper ocean. The discovery completely changes scientists' understanding of the major food source for fish, squid, penguins, seals and whales.

Reporting recently in Current Biology, scientists from British Antarctic Survey (BAS) and the National Oceanography Centre, Southampton* (NOCS) describe how they used a deep-diving, remotely operated vehicle (RoV) known as the Isis to film previously unknown behaviour of krill.

Professor Andrew Clarke of the British Antarctic Survey said, "While most krill make their living in the ocean's surface waters, the new findings revise significantly our understanding of the depth distribution and ecology of Antarctic krill. It was a surprise to observe actively-feeding adult krill, including females that were apparently ready to spawn, close to the seabed in deep water."

Scientists have been studying krill since the 'Discovery' expeditions of the early 20th century. Oceanographic expeditions, using a combination of echo-sound techniques and collection samples in nets, indicated that the bulk of the population of adult krill is typically confined to the top 150 metres of the water column.

The grant to purchase the Isis RoV was led by Professor Paul A Tyler of NOCS. He says,"Having the ability to use a deep-water ROV in Antarctica gave us a unique opportunity to observe the krill and also to observe the diversity of animals living at the deep-sea floor from depths of 500m down to 3500m. The importance of such observations is that, not only do we have the ability to identify species, but we can see the relations among individual species and their relationship to the ambient environment."

The discovery holds some important lessons, Clarke continued. "The behaviour of marine organisms - even quite 'primitive' ones - can be complex and more varied than we usually assume. There is still a great

deal to learn about the deep sea and an important role for exploration in our attempts to understand the world we live in."

About Antarctic krill

Antarctic krill (Euphausia superba), feed on phytoplankton and are in turn eaten by a wide range of animals including fish, penguins, seals and whales. Phytoplankon are the starting point for the marine food chain and use photosynthesis to extract carbon from carbon dioxide.

Krill live in the open ocean, mainly in large swarms and reach particularly high numbers in Antarctica. Antarctic krill can grow up to a length of 6cm and can live for 5-6 years. They are one of the largest protein resources on Earth and can be fished easily with large nets for human consumption. The total weight of Antarctic krill is calculated between 50-150 million tonnes.

Numbers of Antarctic krill appear to have dropped by about 80% since the 1970s. The most likely explanation is a dramatic decline in winter sea-ice. Krill feed on the algae found under the surface of the sea-ice, which acts as a kind of 'nursery'. The Antarctic Peninsula, a key breeding ground for the krill, has warmed by 2.5°C in the last 50 years, with a striking decrease in sea-ice. It is not fully understood how the loss of sea-ice there is connected to the warming, but could be behind the decline in krill.

The article, "Antarctic krill feeding at abyssal depths" by Andrew Clarke and Paul Tyler is published in Current Biology the week of February 25, 2008.

Adapted from materials provided by British Antarctic Survey.

http://www.sciencedaily.com:80/releases/2008/02/080225122334.htm

In The Race To The Top, Zigzagging Is More Efficient Than A Straight Line

Trails used by humans exhibit zigzags, or switchbacks, when they traverse steep hillsides, such as this on in Mallorca, Spain. (Credit: Martin Llobera)

ScienceDaily (Feb. 26, 2008) — A straight line may be the shortest distance between two points, but it isn't necessarily the fastest or easiest path to follow. That's particularly true when terrain is not level, and now American and British researchers have developed a mathematical model showing that a zigzag course provides the most efficient way for humans to go up or down steep slopes.

"I think zigzagging is something people do intuitively," said Marcos Llobera, a University of Washington assistant professor of anthropology who is a landscape archaeologist. "People recognize that zigzagging, or switchbacks, help but they don't realize why they came about."

Llobera, who is interested in reconstructing patterns of movement within past landscapes, said the model and a study that describes it stem from earlier research that looked at the emergence of trail systems. That research focused on flat terrain.

"You would expect a similar process on any landscape, but when you have changes in elevation it makes things more complicated," he said. "There is a point, or critical slope, where it becomes metabolically too costly to go straight ahead, so people move at an angle, cutting into the slope. Eventually they need to go back toward the direction they were originally headed and this creates zigzags. The steeper the slope, the more important it is that you tackle it at the right angle."

Trails evolve, among other reasons, because of physical differences in people and the differences in the biomechanics and energy cost of ascending and descending a slope.

"You get a different pattern if people are going up or down and this may lead to the emergence of shortcuts. Walking downhill generally takes less energy except for braking. We would expect to see

different paths going up and down, but what we end up with is a compromise and shortcuts aren't as apparent."

Llobera said many other physical factors can influence the creation and development of a trail or path, and that the new model is a simplified one and a place to start. Eventually he hopes to build a simulation engine that would allow archaeologists to plug in a terrain and explore different patterns of movement through it. He is particularly interested in using it with landscapes that have resulted from the accumulations of various societies and cultures.

The study appears the Journal of Theoretical Biology and was funded by a Leverhulme Trust Early Career Fellowship awarded to Llobera. Co-author of the paper is T.J. Sluckin, a mathematician at the University of Southampton in the United Kingdom.

Adapted from materials provided by University of Washington.

http://www.sciencedaily.com:80/releases/2008/02/080220130507.htm

Doggie Robot Eases Loneliness In Nursing Home Residents As Well As Real Dog, Study Finds

Robotic dogs worked just as well as real dogs in easing loneliness and fostering attachments in a nursing home setting. (Credit: Image courtesy of Saint Louis University)

ScienceDaily (Feb. 26, 2008) — A sophisticated robotic dog could be a good companion for your dog-loving grandmother who can't care for a living pet, a new Saint Louis University study suggests.

The researchers compared how residents of three nursing homes interacted with Sparky, a living, medium-sized gentle mutt, and Aibo, a doggie robot once manufactured by Sony that looks like a three-dimensional cartoon.

"The most surprising thing is they worked almost equally well in terms of alleviating loneliness and causing residents to form attachments," says William A. Banks, M.D., professor of geriatric medicine at Saint Louis University.

"For those people who can't have a living pet but who would like to have a pet, robotics could address the issue of companionship," Banks says.

To test whether residents connected better with Sparky or Aibo, researchers divided a total of 38 nursing home residents into three groups. All were asked questions to assess their level of loneliness. One group saw Sparky once a week for 30 minutes, another group had similar visits with Aibo, and a control group saw neither furry nor mechanical critter.

During visits, Marian Banks, Banks' wife and co-researcher, brought Sparky or Aibo into a resident's room and placed the pet companion near the resident. Both pets interacted with residents -- wagging their tails and responding to the people they visited.

After seven weeks, all residents were asked questions about how lonely they felt and how attached they were to Sparky or Aibo.

The residents who received visits from real and artificial pooches felt less lonely and more attached to their canine attention-givers than those who got visits from neither.

There was no statistical difference between whether the real or robotic dog did a better job easing loneliness and fostering attachments.

Whether powered by a beating heart or by a rechargeable battery, dogs can be powerful weapons in helping pet-loving nursing home residents feel less lonely and more connected to another being, Banks says.

"There is a lot of loneliness in nursing homes and animal-assisted therapy -- whether from a dog or a robot -- is one answer for addressing that," he says.

Robots with personality also could help care for older adults who live alone and need a little monitoring, Banks adds. Think R2D2.

"This health companion could follow a person in his home, giving reminders on when to take medication or sending out an alert when a person has suddenly gone from a vertical position to a horizontal one," Banks says.

"A person could get tired of a robot following him around. But if you could change that inanimate voyeur to a personal part of his life and a companion, that could be entirely different."

The research was published in the March issue of the Journal of the American Medical Directors Association.

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

http://www.sciencedaily.com:80/releases/2008/02/080225213636.htm

The Advantages of Closing a Few Doors

By JOHN TIERNEY

The next time you're juggling options — which friend to see, which house to buy, which career to pursue — try asking yourself this question: What would Xiang Yu do?

Xiang Yu was a Chinese general in the third century B.C. who took his troops across the Yangtze River into enemy territory and performed an experiment in decision making. He crushed his troops' cooking pots and burned their ships.

He explained this was to focus them on moving forward — a motivational speech that was not appreciated by many of the soldiers watching their retreat option go up in flames. But General Xiang Yu would be vindicated, both on the battlefield and in the annals of social science research.

He is one of the role models in Dan Ariely's new book, "Predictably Irrational," an entertaining look at human foibles like the penchant for keeping too many options open. General Xiang Yu was a rare exception to the norm, a warrior who conquered by being unpredictably rational.

Most people can't make such a painful choice, not even the students at a bastion of rationality like the Massachusetts Institute of Technology, where Dr. Ariely is a professor of behavioral economics. In a series of experiments, hundreds of students could not bear to let their options vanish, even though it was obviously a dumb strategy (and they weren't even asked to burn anything).

The experiments involved a game that eliminated the excuses we usually have for refusing to let go. In the real world, we can always tell ourselves that it's good to keep options open.

You don't even know how a camera's burst-mode flash works, but you persuade yourself to pay for the extra feature just in case. You no longer have anything in common with someone who keeps calling you, but you hate to just zap the relationship.

Your child is exhausted from after-school soccer, ballet and Chinese lessons, but you won't let her drop the piano lessons. They could come in handy! And who knows? Maybe they will.

In the M.I.T. experiments, the students should have known better. They played a computer game that paid real cash to look for money behind three doors on the screen. (You can play it yourself, without pay, at tierneylab.blogs.nytimes.com.) After they opened a door by clicking on it, each subsequent click earned a little money, with the sum varying each time.

As each player went through the 100 allotted clicks, he could switch rooms to search for higher payoffs, but each switch used up a click to open the new door. The best strategy was to quickly check out the three rooms and settle in the one with the highest rewards.

Even after students got the hang of the game by practicing it, they were flummoxed when a new visual feature was introduced. If they stayed out of any room, its door would start shrinking and eventually disappear.

They should have ignored those disappearing doors, but the students couldn't. They wasted so many clicks rushing back to reopen doors that their earnings dropped 15 percent. Even when the penalties for switching grew stiffer — besides losing a click, the players had to pay a cash fee — the students kept losing money by frantically keeping all their doors open.

Why were they so attached to those doors? The players, like the parents of that overscheduled piano student, would probably say they were just trying to keep future options open. But that's not the real reason, according to Dr. Ariely and his collaborator in the experiments, Jiwoong Shin, an economist who is now at Yale.

They plumbed the players' motivations by introducing yet another twist. This time, even if a door vanished from the screen, players could make it reappear whenever they wanted. But even when they knew it would not cost anything to make the door reappear, they still kept frantically trying to prevent doors from vanishing.

Apparently they did not care so much about maintaining flexibility in the future. What really motivated them was the desire to avoid the immediate pain of watching a door close.

"Closing a door on an option is experienced as a loss, and people are willing to pay a price to avoid the emotion of loss," Dr. Ariely says. In the experiment, the price was easy to measure in lost cash. In life, the costs are less obvious — wasted time, missed opportunities. If you are afraid to drop any project at the office, you pay for it at home.

"We may work more hours at our jobs," Dr. Ariely writes in his book, "without realizing that the childhood of our sons and daughters is slipping away. Sometimes these doors close too slowly for us to see them vanishing."

Dr. Ariely, one of the most prolific authors in his field, does not pretend that he is above this problem himself. When he was trying to decide between job offers from M.I.T. and Stanford, he recalls, within a week or two it was clear that he and his family would be more or less equally happy in either place. But he dragged out the process for months because he became so obsessed with weighing the options.

"I'm just as workaholic and prone to errors as anyone else," he says.. "I have way too many projects, and it would probably be better for me and the academic community if I focused my efforts. But every time I have an idea or someone offers me a chance to collaborate, I hate to give it up."

So what can be done? One answer, Dr. Ariely said, is to develop more social checks on overbooking. He points to marriage as an example: "In marriage, we create a situation where we promise ourselves not to keep options open. We close doors and announce to others we've closed doors."

Or we can just try to do it on our own. Since conducting the door experiments, Dr. Ariely says, he has made a conscious effort to cancel projects and give away his ideas to colleagues. He urges the rest of us to resign from committees, prune holiday card lists, rethink hobbies and remember the lessons of door closers like Xiang Yu.

If the general's tactics seem too crude, Dr. Ariely recommends another role model, Rhett Butler, for his supreme moment of unpredictable rationality at the end of his marriage. Scarlett, like the rest of us, can't bear the pain of giving up an option, but Rhett recognizes the marriage's futility and closes the door with astonishing elan. Frankly, he doesn't give a damn.

http://www.nytimes.com/2008/02/26/science/26tier.html?_r=2&ref=science&oref=slogin&oref=slogin

Fulfilling the Promise of Open Content

By Lisa Petrides

The concept of aggregating, sharing, and collaboratively enriching free educational materials over the Internet has been emerging over the past several years. The movement has been led by faculty members and content specialists who believe that making lesson plans, training modules and full courses freely available can help improve teaching and make educational resources more dynamic through a cross-pollination of ideas and expertise. The Hewlett Foundation-funded OpenCourseWare initiative and the Institute for the Study of Knowledge Management in Education's OER Commons offer a glimpse of the potential for open content in higher education.

Unfortunately, the movement to use open educational resources in higher education hasn't yet realized the full impact that its founders anticipated. Open content is still in its infancy and faces some technical and cultural challenges that affect its widespread adoption.

Interoperability — the ability of multiple initiatives on different technology platforms to seamlessly share metadata and resources–is at the root of the technical challenge for open education resources. Like many initiatives in education, there is a tangled web of entry. People in higher education are accessing OER using numerous technologies, software applications, and Web sites. Content can be found in dozens and dozens of different formats. Meanwhile, some content is behind firewalls, while other content simply requires the user to create a free account, and some is truly open – like Wikipedia.

While the present lack of interoperability is a challenge, it is also the nature of innovation. For example, there used to be dozens of search engines, each of which produced varying results with different methods. Now there are a few major ones that produce similar results. We can expect that several major open content initiatives will survive on the basis of merit and that this diversity will strengthen the movement as a whole.

An even greater challenge may be the cultural resistance to open educational resources, including the closed-door, "this is mine" mentality and pride of ownership over content that pervades college teaching. Many college faculty members hold on tightly to their syllabi, readings, and lecture notes because this material closely follows a book or article idea that they are in the midst of writing. Or they fear that their ideas will be appropriated by others. Or there may be promotion review on the horizon, and this original

scholarship might be their ticket to success. Or they may simply be reluctant to allow people they don't know and to whom they haven't given explicit permission to use and share the content of their course materials.

Issues of ownership and intellectual property rights are a related cultural – and legal – challenge. For example, it is unclear in many institutions who really owns faculty-produced content in the first place. Do faculty have the right to give away something that a university has already bought and paid for as part of their salary? Or does intellectual freedom and expression entitle faculty to freely own and license their ideas to others?

Ironically, a countervailing trend – toward openness and collaboration – also inhabits higher education, where the spirit of open educational resources has been prevalent for centuries. An individual instructor might create a syllabus and lecture notes that are then passed along to a group of instructors for a class that is then taught by 10 different people over five years. These economies of scale emerge to increase efficiency, which allows more time for research and professional service. Professors also may gravitate to syllabi and reading lists that elicit the best results from their specific students. In other cases, new faculty will take an old syllabus for a specific course and reshape it to match their own interests, research, or philosophies.Recently, experts in education, open content– along with alternative-copyright advocates and Internet innovators – gathered in Cape Town to explore how to spark a global revolution in teaching and learning in which educators and students could be much more actively engaged as creators, users, and adapters of content. In their Cape Town declaration, they argued that this transformation can only occur if educators, authors, publishers, and higher education institutions make more materials available and accessible for public use. To speed acceptance of open content, the declaration calls on administrators to incorporate open education into policy decisions, making sharing of educational resources a new prioriity. The document emphasizes that open education is fundamentally about strengthening all scholarship and teaching through collaboration—and developing the technologies to make that happen. Open education should be a "win" for all faculty members and constitutes "a wise investment in teaching and learning for the 21st century."

Points of debate at the Cape Town meeting focused on the value of licenses that allow for commercial or non-commercial use of content, and on the importance of enabling the modification and adaptation of the content. Other questions arose regarding the messages we were sending: Is the open education movement about practitioners or policies? How "disruptive" should the call to action be? Is this document for teachers and faculty or for others? The Declaration was not designed to articulate consensus. Rather, it communicates a common core of commitments that form the starting point for the worldwide OER movement.The Cape Town meeting identified OER as a linchpin to a basic right. Just like food, shelter, and clean drinking water, everybody deserves access to education and knowledge.

While many may agree with this sentiment today, for the OER movement to have greater impact on higher education, colleges and universities need to create incentives to reward faculty for sharing their content. This might include developing new types of sabbaticals focused on creating the first generation of open educational resources. Foundations could even fund "remixing communities" focused on expanding and refining open educational resources.In addition to faculty, whose scholarship can advance immeasurably faster with broad adoption of OER, students stand to benefit enormously. Open education holds the promise of opening the door of higher education to millions. For example, open content can reduce the need to purchase expensive textbooks, which can constitute up to three-fourths of community-college students' spending. But even these benefits are not the final yield of the OER movement, which holds the promise of nothing less than finally ensuring that access to the highest-quality education is a right of all people, everywhere.

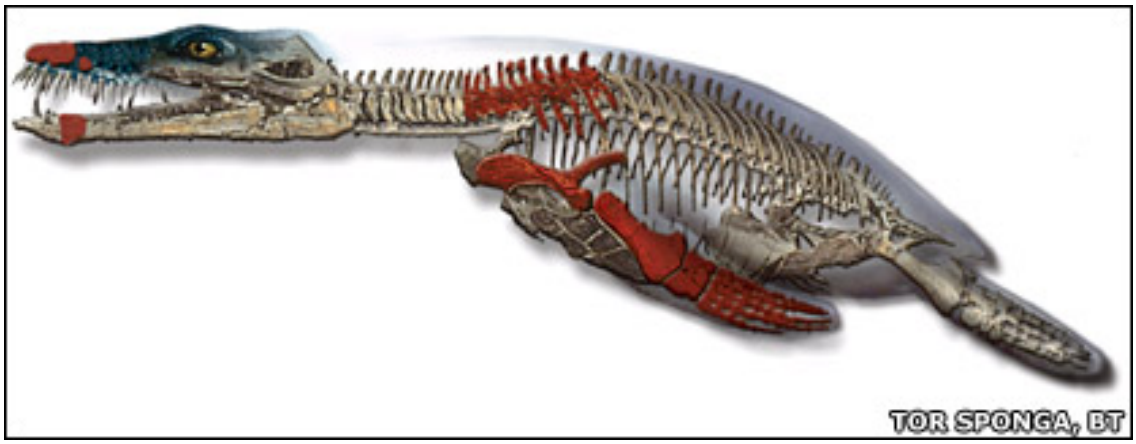
Lisa Petrides is president of the Institute for Knowledge Management in Education, a research institute in Half Moon Bay, Calif., that has developed OER Commons, which was funded by the Hewlett Foundation. Petrides, one of 27 participants at the Cape Town meeting of proponents of open content, is a former professor at Columbia University Teachers College.

The original story and user comments can be viewed online at http://insidehighered.com/views/2008/02/26/petrides.

Sea reptile is biggest on record

By Paul Rincon
Science reporter, BBC News

A fossilised "sea monster" unearthed on an Arctic island is the largest marine reptile known to science, Norwegian scientists have announced.



The 150 million-year-old specimen was found on Spitspergen, in the Arctic island chain of Svalbard, in 2006.

The Jurassic-era leviathan is one of 40 sea reptiles from a fossil "treasure trove" uncovered on the island.

Nicknamed "The Monster", the immense creature would have measured 15m (50ft) from nose to tail.

> **A large pliosaur was big enough to pick up a small car in its jaws and bite it in half**
> Richard Forrest, plesiosaur palaeontologist

And during the last field expedition, scientists discovered the remains of another so-called pliosaur which is thought to belong to the same species as The Monster - and may have been just as colossal.

The expedition's director Dr Jorn Hurum, from the University of Oslo Natural History Museum, said the Svalbard specimen is 20% larger than the previous biggest marine reptile - another massive pliosaur from Australia called *Kronosaurus* .

"We have carried out a search of the literature, so we now know that we have the biggest [pliosaur]. It's not just arm-waving anymore," Dr Hurum told the BBC News website.

"The flipper is 3m long with very few parts missing. On Monday, we assembled all the bones in our basement and we amazed ourselves - we had never seen it together before."

Pliosaurs were a short-necked form of plesiosaur, a group of extinct reptiles that lived in the world's oceans during the age of the dinosaurs.

A pliosaur's body was tear drop-shaped with two sets of powerful flippers which it used to propel itself through the water.

"These animals were awesomely powerful predators," said plesiosaur palaeontologist Richard Forrest.

"If you compare the skull of a large pliosaur to a crocodile, it is very clear it is much better built for biting... by comparison with a crocodile, you have something like three or four times the cross-sectional space for muscles. So you have much bigger, more powerful muscles and huge, robust jaws.

"A large pliosaur was big enough to pick up a small car in its jaws and bite it in half."

"There are a few isolated bones of huge pliosaurs already known but this is the first find of a significant portion of a whole skeleton of such a giant," said Angela Milner, associate keeper of palaeontology at London's Natural History Museum

"It will undoubtedly add much to our knowledge of these top marine predators. Pliosaurs were reptiles and they were almost certainly not warm-blooded so this discovery is also a good demonstration of plate tectonics and ancient climates.

"One hundred and fifty million years ago, Svalbard was not so near the North Pole, there was no ice cap and the climate was much warmer than it is today."

The Monster was excavated in August 2007 and taken to the Natural History Museum in Oslo. Team members had to remove hundreds of tonnes of rock by hand in high winds, fog, rain, freezing temperatures and with the constant threat of attack by polar bears.

They recovered the animal's snout, some teeth, much of the neck and back, the shoulder girdle and a nearly complete flipper.

Unfortunately, there was a small river running through where the head lay, so much of the skull had been washed away.

A preliminary analysis of the bones suggests this beast belongs to a previously unknown species.

Unprecedented haul

The researchers plan to return to Svalbard later this year to excavate the new pliosaur.

A few skull pieces, broken teeth and vertebrae from this second large specimen are already exposed and plenty more may be waiting to be excavated.

"It's a large one, and has the same bone structure as the previous one we found," said Espen Knutsen, from Oslo's Natural History Museum, who is studying the fossils.

Dr Hurum and his colleagues have now identified a total of 40 marine reptiles from Svalbard. The haul includes many long-necked plesiosaurs and ichthyosaurs in addition to the two pliosaurs.

Long-necked plesiosaurs are said to fit descriptions of Scotland's mythical Loch Ness monster. Ichthyosaurs bore a passing resemblance to modern dolphins, but they used an upright tail fin to propel themselves through the water.

Richard Forrest commented: "Here in Svalbard you have 40 specimens just lying around, which is like nothing we know.

"Even in classic fossil exposures such as you have in Dorset [in England], there are cliffs eroding over many years and every so often something pops up. But we haven't had 40 plesiosaurs from Dorset in 200 years."

The fossils were found in a fine-grained sedimentary rock called black shale. When the animals died, they sank to the bottom of a cold, shallow Jurassic sea and were covered over by mud. The oxygen-free, alkaline chemistry of the mud may explain the fossils' remarkable preservation, said Dr Hurum.

The discovery of another large pliosaur was announced in 2002. Known as the "Monster of Aramberri" after the site in north-eastern Mexico where it was dug up, the creature could be just as big as the Svalbard specimen, according to the team that found it.

But palaeontologists told the BBC a much more detailed analysis of these fossils was required before a true picture of its size could be obtained.

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Truancy rate 'highest since 1997'
Truancy rates in England's schools are at their highest since 1997, the latest figures show.

An estimated 63,000 pupils truanted every day, equating to 1% of all school sessions missed without a valid reason.

This is also a rise of a quarter, or 0.21 of a percentage point, on comparable figures from last year which were 0.79%.

The government has written to local authorities urging them to keep up the pressure on persistent absenteeism.

Working with schools and local authorities we need to do much more
Kevin Brennan
Children's minister

Between 2004 and 2007 over 30,000 penalty notices were issued to parents because of their child's high level of unauthorised absence.

And more than 19,000 parenting contracts were agreed to improve attendance, ministers said.

Children's minister Kevin Brennan said the rise in truancy rates could be partly down to the efforts being made to tackle it.

As head teachers "get tougher" on truants, more instances of absenteeism are categorised as unauthorised rather than authorised as fewer excuses are accepted, he argued.

"Dubious absences are now being rigorously queried rather than overlooked as they may have been a decade ago," he added.

He also argued that unauthorised absence did not equate to truancy as it included includes lateness, term-time holidays and flimsy excuses.

Holidays

Overall absence, including children off sick with permission, has fallen. It fell overall from 6.68% to 6.49% between 2006 and 2007.

"We're on course to meet our 2008 target of reducing absence by 8% compared to 2002/3 figures," said Mr Brennan.

"But working with schools and local authorities we need to do much more.

"While we have cut the amount of persistent absence - from 7.1% to 6.7 % - in the last year it is still the major challenge we must tackle.

"About 7% of pupils account for a third of all absence in secondary schools but the evidence shows that targeting is working, with 436 schools with the biggest share of persistent absence having reduced it by almost 20 per cent in a year," he added.

'More excuses'

For the first time this year, more details of why pupils are absent are contained in the figures.

Although head teachers are not required to give a reason, the Department for Children, Families and Schools said nine out of 10 did.

Within the overall absence rate of 6.49%, just under half - 3.47% - of days were due to illness.

The second most commonly reported reason was family holidays - which includes those agreed and not agreed.

Absence for family holidays accounted for 0.7% of the days and equates to 6.8 million school days.

However, about 90% of these were authorised by the school in question.

'Deprivation'

Shadow Children's Secretary Michael Gove said truancy was at record levels and increasing every year.

"There are now twice as many school days missed as the government promised 10 years ago.

"Ministers have completely failed to get a grip of the problem. Yet again the latest figures have prompted more excuses and complacency."

Liberal Democrat education spokesman David Laws said it was totally unacceptable that one in 10 15-year-olds were persistent absentees, seriously damaging their education in this crucial year.

"This undermines any success the government is claiming on overall absence.

"It's clear that the top-down approach pursued by ministers has failed and what is needed is a more effective local approach involving parents, schools and the police."

General secretary of the NASUWT teaching union Chris Keates said: "Despite reports, it is clear from the figures that a great deal of progress has been made in tackling persistent truancy.

"Schools are to be congratulated for the significant improvements in attendance figures. Clearly, however, a core of persistent truants remain."

National Union of Teachers general secretary Steve Sinnott said: "Overcoming truancy is a difficult and demanding task requiring teachers and parents to work together.

"But there are factors, such as multiple deprivation, which influence truanting and must be tackled."

In 2005 the government spending watchdog pointed out that truancy rates had not been dented despite the millions of pounds spend on the issue.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/uk_news/education/7264365.stm

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INVESTING IN THE WORLD'S POOR

Taking Microfinance to the Next Level

By Jennifer L. Schenker

The aim of outfits like BlueOrchard to serve those below the poverty line is both a philanthropic and profitable endeavor.

Thanks in part to the Nobel Peace Prize awarded in 2006 to Mohammad Yunus, the Bangladeshi founder of Grameen Bank, there has been a surge of interest in recent years in microfinance, a tool Yunus helped pioneer. Made especially to poor people in emerging economies, these small business loans, averaging about $345 (€229), play a vital role in lifting millions of people out of poverty.

Yunus was far from the only devotee of microfinance, though. In 2001 a pair of Europeans, Jean-Philippe de Schrevel and Cédric Lombard, discovered they shared a mutual conviction that the best way to cure poverty is through the capital markets. So they began lending money to microfinance institutions through a Geneva vehicle called BlueOrchard. Belgian de Schrevel, a former McKinsey & Co. consultant, got his MBA at Wharton, while Lombard hails from one of the families behind Lombard Odier Darier Hentsch, among Switzerland's oldest private banks. (Lombard is no longer involved with BlueOrchard, but has founded a Geneva company called Symbiotics that provides consulting and services to the microfinance industry.)

Seven years later, BlueOrchard Finance manages a loan portfolio of more than $710 million through different funds launched in partnership with major international banks such as Dexia, Rothschild, BBVA and Morgan Stanley. Along the way it has forged relationships with more than 107 microfinance institutions in 36 countries.

Now, BlueOrchard wants to do for microfinance institutions what local lenders do for loan recipients: help them expand their businesses. It is launching a Luxembourg-based private equity fund it hopes to grow to $100 million by the end of 2008. The fund is aimed at buying into microfinance institutions around the world and helping them launch new services for people without access to banks, including savings accounts, mortgages, and insurance. One advantage of taking equity positions is that BlueOrchard will gain some influence over the strategic direction of its investment targets.

The BlueOrchard Private Equity Fund, which has already raised $35 million from private, institutional, and individual investors, also plans to help microfinance institutions in far-flung corners of the globe expand across borders and become regional players.

Return on Investment

In recent years investors' appetite for microfinance has exploded. A wide variety of players, including hedge funds and venture capitalists, have begun competing to lend money to the institutions that provide such loans. Among them are Omidyar Network, established by Pierre Omidyar, the founder of eBay, and his wife Pamela, as well as Sequoia Capital, the Silicon Valley-based venture firm that backed Google and YouTube.

One reason for the interest in microfinance is that, as it turns out, institutions serving especially poor customers are more profitable than those serving better-off clients, partly because of the high interest paid on microloans and partly because there tend to be fewer defaults.

Altogether there are now an estimated 85 investment vehicles lending money to microfinance institutions, according to the Consultative Group to Assist the Poor, a microfinance industry association housed at the World Bank in Washington. But most are debt vehicles, and if microcredit institutions are taking on debt in foreign currency and lending in local currency they are vulnerable to currency movements. It is only now that equity investments are being added to the mix, a welcome development because there is only so much hard currency microfinance institutions can absorb, says Elizabeth Littlefield, CGAP's chief executive.

BlueOrchard is among only a handful of new equity funds aimed specifically at microfinance. And it's not stopping there. The company will continue its debt financing program in parallel, and de Schrevel is also launching a $20 million Geneva-based investment fund, called Bamboo Finance Oasis Fund, that aims to boost young companies working on ideas that could help bring clean water, energy, education, health, housing, and insurance to people living below poverty level.

The notion is to forge a link with microcredit institutions whenever possible, leveraging their access to customers as a means of distributing new products tailored for the poorest of the poor. Indeed, says de Schrevel, one of the greatest values of microfinance outfits lies in their networks. "They have the capacity to reach out to millions of people who have never been touched by any distribution channels," he says. "In the beginning it was about lending and then collecting savings. In the future, it could be debit cards, credit cards, microinsurance. A whole range of financial products needs to be defined."

At the same time, de Schrevel believes it may be possible to combine financial services with products geared toward the poorest of the poor. One company Oasis may invest in has developed a $20 lantern powered by miniature solar panels that would last 25 years or more with no maintenance. Such a product might be distributed for sale through microfinance institutions that cater mostly to people without electricity, he says.

No Longer a "Mono Product"

Clearly, today's service offerings are just the beginning. CGAP estimates some 3 billion people of working age lack access to basic financial services. Some of the gap is closed by state-owned agricultural, development, and postal banks; member-owned collectives; savings banks; and low-capital local banks, which serve hundreds of millions of people ignored by commercial banks and other financiers.

These so-called alternative financial institutions, or AFIs, offer services -- from savings to remittances to insurance -- that are generally outside the purview of traditional microlending institutions. That AFI savings accounts outnumber loans by four to one affirms the growing need for such services, argues CGAP. It estimates that some two-thirds of small loans and microloans come from AFIs.

Yet, CGAP estimates that even with as many as 750 million accounts on their books, these institutions, combined with smaller, nongovernmental microfinance institutions, serve only one-sixth of the potential microfinance market. All the more reason to help microfinance institutions "move from a mono product to progressively offering a spread of banking services," says Martin Velasco, a well-known European business angel and a member of BlueOrchard Private Equity Fund's executive board.

Up to the Challenge

Littlefield cautions that private equity funds targeting microfinance lenders will face a number of challenges. For one thing, the legal structure of many such institutions prevents outside equity investments. What's more, it's tricky to establish fair valuations and exiting from the investments can be difficult.

De Schrevel is unfazed. When making loans from its debt vehicle, BlueOrchard isn't able to exert any influence over strategies of the microfinance institutions it lends to. But with its new private equity arm, which will acquire minority stakes of 15 percent to 30 percent, BlueOrchard can play a more active governance role, sharing its international experience, information, networks, and knowledge.

Already, the new equity fund is helping three separate South American microfinance institutions set up cross-border operations, de Schrevel says. "As an equity investor we will become shareholders, and our influence will become much stronger." And though the fund is structured as a traditional private equity vehicle, the investment horizon will be much longer, he says.

"We are at the beginning of a huge wave," de Schrevel says. "Market development at the bottom of the pyramid is very sustainable and will have dramatic social impact."

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URL: http://www.spiegel.de/international/business/0,1518,538088,00.html

Juilliard and Met Meld Opera Training

By ALLAN KOZINN

The Metropolitan Opera and the Juilliard School have agreed to pool their resources in a program for young opera singers, as well as pianists who hope to work as vocal accompanists or opera conductors, the two institutions announced Wednesday.

The program is to begin in the 2010-11 season and will be called the Metropolitan Opera Lindemann Young Artist Development Program in Partnership with the Juilliard School. James Levine, the music director at the Met, will be its artistic director and will conduct the participants and the Juilliard Orchestra in an annual opera performance — either a fully staged or concert version — at the school's 900-seat Peter Jay Sharp Theater. Brian Zeger, a prominent accompanist and the artistic director of the Juilliard School's vocal arts department, will be the executive director of the new program.

Peter Gelb, the Met's general manager, said: "One of my jobs at the Met is to integrate all the different aspects of the company, and our young artist program has been less fully integrated than I'd like it to be. We have global talent scouts looking for artists who should be on our stage, and I think they should be looking for young singers who should be in this program as well. We want to attract talents from around the world."

The idea of joining forces was first raised toward the end of last year, when Mr. Gelb met with Joseph W. Polisi, president of the Juilliard School, and Ara Guzelimian, the school's recently installed dean, to discuss potential collaborations. Mr. Levine and Mr. Zeger later took part in the discussions, and, as Mr. Gelb put it, "They spent a lot of time together discussing philosophy, and they were on the same page."

The program is essentially an expansion of the Met's young artist program, which Mr. Levine founded in 1980. It was renamed the Lindemann Young Artist Development Program in 1998, when George

Lindemann, a telecommunications entrepreneur, and his wife, Frayda, made a $10 million gift to the Met's endowment campaign, earmarked for the training program. The Lindemann program — for 13 singers and 3 pianists — provides a stipend (currently $30,000 to $40,000 annually), as well as coaching from the Met's artistic staff and performance opportunities, usually in smaller stage roles but also in recitals. Singers who have participated include Stephanie Blythe, Dawn Upshaw, Anthony Dean Griffey, Paul Groves, Nathan Gunn, Aprile Millo and Heidi Grant Murphy.

The new Met-Juilliard program will continue to provide the stipend and coaching. The term of the program also remains three years. The Juilliard School is contributing vocal master classes, as well as acting and movement and access to academic courses in, for example, music theory. Though the program's participants will not be enrolled in a Juilliard degree program (they will be considered fellows or young artists rather than students), they will be able to use the school's library and practice rooms. But the main draw is expected to be the annual production and the opportunity it affords singers to perform at Lincoln Center, if not at the Met itself.

"One of the shortcomings of our young artist program in the past has been that when our young singers do get onstage, it's typically in a smaller role," Mr. Gelb said. "Getting a major role is rare. This will help give them that experience."

The partnership will also mean a reconfiguration of Juilliard's vocal program. Currently about 70 students are working toward undergraduate or graduate degrees at the school. Under the new arrangement, the number of artist diploma candidates, who participate in the school's most advanced program, the Juilliard Opera Center, will be reduced to 8 from 14. The Juilliard Opera Center will be folded into the Juilliard Opera, a more general program open to all of the school's singers. The Juilliard Opera will present two productions a year.

"There will no longer be a wall between one degree program and another," Mr. Polisi said, "so that all our students have an opportunity be cast in our own two productions and possibly have secondary roles in the Met-Juilliard productions."

He added that the partnership presented an opportunity for the school and the Met to get to know each other better. "And it's a chance to carefully educate and train the next generation of opera singers and respond to their needs in everything from ear training and score reading to repertory choices," he said. "We're also hoping that as time goes on, our graduate students and undergrads will have greater access to the Met's resources — rehearsals for example — that they don't have now."

http://www.nytimes.com/2008/02/28/arts/music/28oper.html?_r=1&th&emc=th&oref=slogin

A Serious Building, Tailor Made for Fun

By ROBIN POGREBIN

The butter-hued building with porthole windows rises from the weathered brownstones of Crown Heights like a yellow submarine surfacing from a slate-gray sea. The Brooklyn Children's Museum, after a six-year, $46 million expansion complicated by financial challenges, is readying itself to open in May.

On a recent afternoon Rafael Viñoly, the project's architect, roamed the building site at the corner of St. Marks and Brooklyn Avenues as construction workers hammered away at the staircase that climbs from the ground-floor lobby to the second-floor exhibition area. Others were scrubbing some of the 8.1 million ceramic tiles that clad the museum's facade.

With his design, Mr. Viñoly said, he set out to combine a sense of fun with the seriousness of childhood curiosity. "I was constantly struggling with the question of transforming it into a toy and it not being a toy," he said.

The hulking, wavy museum certainly stands out, with its bulging sides and brazen color. Mr. Viñoly said he hoped the building will be a beacon in a neighborhood that could use a bright spot. "It's a sort of gesture of boldness that I think the place needs," he said.

The museum — founded in 1899 and reputed to be the oldest children's museum in the country — has long been a nexus of activity in the neighborhood, with local youngsters working there as volunteers and 250,000 people visiting a year. But it has lacked a strong physical presence, in part because most of its space has been underground since a 1977 design by Hardy Holzman Pfeiffer Associates created two lower levels. The new renovation adds light while doubling the museum's size to 102,000 square feet, and by 2010 the institution hopes the number of annual visitors will rise to 400,000.

"The new design faces outward," said Carol Enseki, the museum's president. "It's not a bunker behind fences. The original building turned its back on the neighborhood. Our programs don't do that, so it reflects the philosophy of the museum."

The shape of the new building "reflects what happens inside," Mr. Viñoly said.

What will happen inside will be new science and cultural exhibitions and a headquarters for an education and leadership program for local residents ages 7 to 18. The galleries will include interactive multimedia stations, a new family computer area and a room for birthday parties.

Mr. Viñoly has taken the museum above ground, with curtain wall glass at street level and at the building's second-floor terrace, which has bleachers for outdoor activities and is meant to be a new gathering space that connects the building to the surrounding park.

"It's like an oasis when the trees are in bloom," Ms. Enseki said of the terrace. "It was totally underutilized."

The architect essentially wrapped the old building with a new L-shaped structure whose upper floor is cantilevered above the ground level and features portholes facing the street that are positioned at different child-friendly levels. The subterranean portion has been reconfigured to give more room to administrative operations and to a new gallery and study area that will display some of the museum's 27,000 artifacts, including masks, animal specimens, textiles and pottery. The addition includes an expanded lobby and a larger home for the museum's early-learning toddler program, with child-powered vehicles and water activities.

The project's hurdles were significant, particularly the challenge of raising money after the World Trade Center attacks. The museum "adapted to those pressures in a way that I think is admirable," said Kate D. Levin, the Cultural Affairs commissioner of New York, who commended it for expanding its board and keeping its doors open during construction until last fall.

The city, which owns the building, contributed $45 million, and the museum raised the rest from private and public sources. It also raised an additional $20 million for exhibitions and programs. Two elements remain unfinished pending financing: a 250-seat theater and a parking lot.

Building the undulating wall and finding the right weather-proof tile were formidable technical challenges. "We built a large mock-up at a test lab in Pennsylvania and had it tested for wind, water and thermal stress," said David J. Burney, the city's commissioner of the Department of Design and Construction. "It has had about the same rigorous test schedule as the space shuttle."

Enlisting Mr. Viñoly raised the project's profile. He was on one of the final teams in the design competition for a master plan for ground zero in 2002. His buildings include the Kimmel Center in Philadelphia (2001), the Boston Convention and Exhibition Center (2004) and Jazz at Lincoln Center in the Time Warner building (2004).

The museum hopes to be the first "green" children's museum in the nation, certified by the Green Building Council's Leadership in Energy and Environmental Design program. A geothermal system of heat pumps and six 300-foot-deep wells will heat and cool the building. Photovoltaic roof panels will generate about 2.5 percent of its electricity. These features are expected to save the city about $103,000 annually on energy costs and will play a part in new environmental programs and exhibitions.

The new museum — with its unorthodox silhouette and unconventional color — evokes some kind of exotic creature or physical experiment. That's just what Mr. Viñoly wanted, he said: for the deep portholes to be "a mysterious thing that connects the space with the neighborhood" and for the structure itself to defy easy description and prompt further investigation.

"It's a thing that's impossible to define," he said. "Because it really doesn't look like a building."

http://www.nytimes.com/2008/02/28/arts/design/28vino.html?ref=design

A Watercolorist Who Turned His Hand to Oils of Heroic Vision

By KEN JOHNSON

Search the history of American art, and you will discover few watercolors more beautiful than those of Charles Demuth. Combining exacting botanical observation and loosely Cubist abstraction, his watercolors of flowers, fruit and vegetables have a magical liveliness and an almost shocking sensuousness.

Watercolors were easy for Demuth, (1883-1935), and it didn't hurt that collectors readily snapped them up. But in his era watercolors were considered a minor art form; if he were to make his mark as a Modern artist, he believed, he must do something more difficult — something bigger, bolder and in oil paint.

So in the 1920s Demuth began painting oils, and in 1927, when he was in his 40s, he embarked on what turned out to be his final campaign: a series of seven panel paintings depicting factory buildings in his hometown, Lancaster, Pa..

Six of those paintings are highlighted in "Chimneys and Towers: Charles Demuth's Late Paintings of Lancaster," a gorgeous, tightly focused exhibition at the Whitney Museum of American Art. They are not as wonderful as his floral watercolors — a few of these are also in the show — but the oils have a gripping radiance.

The exhibition was organized by the art historian Betsy Fahlman for the Amon Carter Museum in Fort Worth, where it was on view last summer.

Though the Lancaster paintings are not big by today's standards — the largest measures 2 ½ feet by 3 feet — they project a monumental scale and a heroic vision. In each the view is upward. Hulking 19th-century brick buildings, soaring cylindrical smokestacks, rocketlike water towers and a giant concrete grain silo loom against blue or gray skies.

Working in a style that came to be called Precisionism, Demuth painted within pencil lines that he had incised into fiberboard panels. In addition to defining objects in a composition, the lines cut diagonally through the pictures like light rays, creating faceted crystalline patterns enhanced by shifts in color and shading. Tension between architectural solidity and Cubist fracturing in these works creates a futuristic dynamism, while close examination reveals their sumptuous, satiny surfaces.

Other than the occasional passage of yellow, the main colors used are red, white and blue. Considering that one painting is called "And the Home of the Brave" and that another takes its title, "After All," from a poem by Walt Whitman, the series can be seen as a kind of hymn to the United States. It was a time when American Modernists were embracing native themes and celebrating American achievements in industry and engineering.

Today Demuth's industrial romance seems more quaint than inspirational. But other, less overt emotions add to the aura of the series.

Throughout the years Demuth worked on the Lancaster paintings, he suffered from diabetes — so severely that for extended periods he was unable to paint. Insulin began to be used in 1922 as a remedy for this disease, and Demuth was among the first wave of patients to be treated with the new medicine. (In her essay in the show's catalog, Ms. Fahlman reveals that Dr. Albert C. Barnes, the art collector who created the Barnes Foundation outside Philadelphia, was instrumental in helping Demuth get the best medical care.)

But insulin was not enough to save Demuth. He completed "After All," the last painting in the series, in 1933, and he died two years later at 51. Knowing the circumstances under which the Lancaster paintings were made gives their heroic imagery a sharply personal character.

There is also the back story of Demuth's life as a gay man in bohemian New York, where he spent much time without ever permanently leaving the childhood home in Lancaster that he shared with his mother.

Among Demuth's most delightful works are supple, cartoonish watercolors that depict men together in sexually charged situations. Two comparatively demure examples are included in the Whitney show, hung in a separate room along with some flower watercolors, a watercolor of circus trapeze artists in action and a heartbreaking photographic portrait of an emaciated Demuth by his New York dealer, Alfred Stieglitz. As configured by the Whitney curatorial assistant Sasha Nicholas, that small room reveals a tender, personal side of Demuth that remains hidden among the comparatively impersonal factoryscapes in the front room.

In her essay Ms. Fahlman speculates that despite the more liberal sexual attitudes that prevailed among American avant-garde artists, Demuth might have felt marginalized by the mainly heterosexual art world. If true, that interpretation casts the Lancaster paintings in another intriguing light.

You could read the series as Demuth's attempt to shuck off any stigma of effeminacy that might have accompanied his career as a watercolorist and flower specialist. Certainly the Lancaster paintings represent an ambition that his critics at the time would have favorably regarded as more virile.

Having entertained that notion, you reconsider those unmistakably phallic water towers and smokestacks. What was Demuth thinking? Marcel Duchamp was his good friend; Freud's ideas about the possible meanings of inanimate objects were in the air. Could Demuth have been unaware of the thrusting urgency in his pictures?

I like to think he was having a bit of fun with the expectations of his day, that he said to himself: "They want manly paintings. I'll give them manly paintings!" What he couldn't help doing was to make them beautiful.

"Chimneys and Towers: Charles Demuth's Late Paintings of Lancaster" is on view through April 27 at the Whitney Museum of American Art, 945 Madison Avenue, at 75th Street; (800) 944-8639 or whitney.org.

http://www.nytimes.com/2008/02/27/arts/design/27demu.html?ref=design

A Kingdom in the Mountains Shares Its Secrets

By SUSAN EMERLING

WHEN American curators arrived one spring morning at Norbugang Yu Lhakang, a Buddhist temple in a remote village in western Bhutan, they found a group of monks sitting on the floor in bright robes, chanting. They had been there since 6 a.m., intent on creating the right ambience for a divination ceremony.

The question before them was whether a small 18th-century gilt bronze sculpture — a female personification of supreme Buddhist wisdom — could make its way to the United States for a traveling exhibition of Bhutanese art.

It fell to the sculpture's owner, a Bhutanese businessman whose family had had the piece for generations, to roll the divination dice. Tremulously, he rolled a two, a six and a nine.

A furious dialogue ensued in Dzongkha, the Bhutanese language, among the priests, the owner, the government official overseeing the country's cultural properties and the curators' Bhutanese driver over how to interpret this ambiguous sign. (Even numbers are bad, ascending numbers are good, and nine is great, the most auspicious number of all.)

The priests, eager to see their temple receive some international exposure, kept on chiming in to say "Give it a chance," recalled Stephen Little, director of the Honolulu Academy of Arts, describing the scene in an interview. But it wasn't their decision. It was up to the owner, who seemed to have a presentiment that if he allowed the object to depart, his father would die.

A member of the curatorial team who is also a physician pointedly told the owner that there was a 50-50 chance that his father would die anyway. (The father was 90.) But Mr. Little, observing the owner's clouded face, called an end to the discussion. Having vowed early on never to press against resistance to lending an object, the team from the Honolulu Academy had to accept the outcome and walk away.

Yet that was one of the rare reversals for Western scholars on a two-year trek of discovery to remote temples and monasteries in Bhutan. They succeeded in borrowing some 110 objects and recording 330 films of ritual dances never before seen in the West — all of which will go on view Tuesday in "The Dragon's Gift: The Sacred Arts of Bhutan" at the Honolulu Academy of Arts.

The curatorial odyssey got started in the fall of 1997, when Ephraim Jose, a conservator of Asian and Himalayan art from San Francisco, faced a 24-hour layover in Paro, Bhutan, on his way home from a vacation. With little else to occupy Mr. Jose, his guide arranged for a tour of the National Museum, which was normally closed that day. When the museum's director learned that Mr. Jose was a master conservator, he asked him to restore some thangkas — traditional painted or embroidered scroll paintings — in the collection. Mr. Jose promised he would do so someday.

Returning to San Francisco, he approached Terese Tse Bartholomew, curator of Himalayan art at the Asian Art Museum in San Francisco, about organizing an exhibition of Bhutanese art. She tried for several years but had no luck securing assent from the Bhutanese government. Finally, in 2003, she took the idea to Mr. Little, who was the curator of Asian art at the Art Institute of Chicago and was about to decamp to a new post as director of the Honolulu Academy of Arts. Mr. Little was intrigued. There had never been a comprehensive art-historical exhibition of Bhutanese art, and there was so little published on the subject that it was hard to imagine what such a show would look like.

One reason lay in the history of Bhutan, which is the least accessible and least known of the Himalayan countries. Unlike Nepal and Tibet, Bhutan forbids trekkers in its sacred mountains, which range as high as 23,000 feet. The country is also unique among its neighbors in that it has never having been colonized, conquered or invaded, so its treasures have never been looted. Because its art remains largely sacred, restricted to veneration within monasteries, it has remained almost unknown both in and outside Bhutan.

Mr. Little rewrote the exhibition proposal and sent it to Bhutan's government, suggesting that it include not just works of art but also documentation of the ritual dance called cham. Original fieldwork would be performed by art curators and filmmakers and financed through grants to the Honolulu Academy. He received approval from the government in 2004. It was clear from the start that the project required someone unusual on the ground in Bhutan, a land with an obscure language, limited roads, almost no hotels and monasteries at remote altitudes.

Around that time Mr. Little received a phone call from John Johnston, a former art intern he had worked with who now had a master's degree in art history and specialized in Chinese Buddhist art. He had also worked as a Chinese art specialist at Sotheby's in New York before dropping out of the art world. Better yet, Mr. Johnston was temporarily out of a job.

Mr. Little realized he had an ideal candidate. "John was Mr. Calm," he said, and "I knew he had an ability to quickly assess works of art from working at Sotheby's." What is more, Mr. Johnston was a practicing Buddhist and was willing to move to Bhutan for a couple of years and learn Dzongkha. He was also comfortable hiking in the mountains for days at a time and sleeping on the floor of a monastery.

From March 2005 to March 2007, Mr. Johnston lived in Bhutan virtually full time, taking the first several months to learn how to handle sacred images and develop a strategy for "how to conduct ourselves," he said. He worked with Ms. Bartholomew, Mr. Little and an expert in Buddhist iconography, Reda Sobky, in the capital city of Thimphu reviewing snapshots of thousands of artworks at the government's

Department of Culture before heading out into the field to locate them. He was also hoping to find thangkas and sculptures that had not been documented. Over the next year he visited 200 temples and monasteries — about 10 percent of the sacred sites in Bhutan — accompanied by a high-ranking monk and a representative of the royal government. Some of these temples were easily located off main roads, but others were more remote, requiring seven to eight hours of hiking.

When Mr. Johnston and his guides arrived at a temple or monastery, they would normally be welcomed with tea; if they were lucky, they would meet with the head lama or abbot before asking to view their works of art. Soon monks were sending him to places he had never heard of to see undocumented artworks. “We found the best works of art through word of mouth,” he recalled. “A monk would say, ‘Have you been there?’ They’d give us clues and we’d follow them.” One major find was Seula Gonpa, a monastery in Punakha in western Bhutan, which is now a school for young monks and seven hours by foot from the nearest road. There Mr. Johnston was shown 75 to 100 thangkas, each more beautiful than the last. Yet many of the works were in terrible condition after years of being rolled, handled, venerated in front of butter lamps emitting thick acrid smoke and stacked in bins infested with animals.

“There was so much neglect, bad handling, bad storage,” said Mr. Jose, the conservator. “There is the Buddhist teaching of impermanence in Bhutan — they thought with art, too, nothing lasts forever.”Mr. Johnston returned to Thimphu with photographs of his discoveries. Before making selections for the show, curators assembled a group of Bhutanese monks, lamas and scholars to discuss the paintings’ iconography. “Books could not help us because nobody had written about Bhutanese iconography,” Mr. Johnston said.

While Mr. Johnston was doing his fieldwork, Mr. Little enlisted Joseph Houseal, a choreographer and dance preservationist, to do for the sacred dances what the others were doing for the visual arts. Mr. Houseal and Gerard Houghton, a cameraman, made two early trips to Bhutan to witness the cham dances without shooting any film. Then they developed some noninvasive production techniques that would allow them “to make a clear historical record of the structure of the dance and the shape of the choreography,” Mr. Houseal said.

"We never pushed it — people came to trust us, and they let us see secret things," he said. "We revived four dances and saved one from extinction that was only known to one person in his 80s." Over two years, traveling with their gear on horses, mules and yaks, they recorded 330 folk and sacred dances performed at festivals. Typically Mr. Houghton filmed from above the brightly dressed dancers to catch the patterns of movement. On occasion he mounted a lipstick camera inside a performer's mask to capture the swirling motion from the dancer's perspective. "Dance is critically important to their conception of the universe," Mr. Houghton said. "A mandala is a dance — gods dance, they don't walk around. It is a dramatic representation of what is going on in heaven." This understanding also informed the art-historical interpretation of the dancing figures in the thangkas and sculptures. After teaching the locals to use cameras, the team would leave behind its gear at the end of each visit, then acquire new equipment for the next round of filming.

Conservation in both dance and the visual arts will be one of the lasting legacies of the exhibition. Mr. Jose and Mark Fenn, a sculpture conservator, have conducted several workshops in Bhutan, and Mr. Jose has brought monks to Honolulu for training. He also intends to return to Bhutan on vacation over the next few years to train nine monks who will spend the rest of their lives preserving thangkas and instilling a conservation tradition. At the Honolulu Academy show, visitors will have the rare chance to see Bhutanese sacred dances performed in a public secular context by five monks who will stay with the objects throughout their travels. More than 100 newly restored objects dating from the seventh to 20th centuries will be on public view for the first time, including a rare set of 19th-century Arhat paintings of the Buddha and his 16 disciples and an exquisite 18th-century jewel-encrusted appliqué thangka of the Buddhist master Jamgon Ngawang Gyaltsen.

Dance films will be screened on video monitors, and veneration rituals will be offered by a rotating team of three monks. (The show is expected to travel to five other museums over the next two years, including the Rubin Museum of Art in New York, where it opens this September.)Shawn Eichman, the Honolulu Academy's curator of Asian art, said that experts on Buddhist art from around the globe had signaled that they planned to attend the exhibition. "This is a once-in-a-lifetime chance to see these things," he said.

http://www.nytimes.com/2008/02/24/arts/design/24emer.html?ref=design

When music is misery

You know the feeling - the shiver that shoots across your skin when you hear that song. But why do some of us feel the tingle of Barber's strings, while others are tickled by Bjork's epic voice? And why do a small proportion of us feel no shivers at all?

The glory of the iPod is lost on those who suffer from a rare condition known as amusia - a complete inability to comprehend or take pleasure from music. Where once these people would have been dismissed as "tone deaf", there is a growing recognition that amusia is a neurological condition, inherited through families.

Professor Tim Griffiths listens to the experiences of amusic patients every month in his auditory clinic in Newcastle. "Some are just indifferent to music, but for others it really sounds quite unpleasant and abrasive," he says.

Griffiths is the UK's leading expert on amusia. He was quick to recognise that those who "just don't get it" hold the key. By peering into their minds, we can begin to answer deeper mysteries - why do humans enjoy music, and what use is it to us?

Griffiths is exploring the relationships between musical processing and our mechanisms of speech, reading and learning. "It's not just about musical disorders: there are links with dyslexia, dementia and autism," he says. "These patients may give us the tools to understand the brain."

Studies have shown that the brain has distinct systems for processing pitch, melody and rhythm. A further brain region creates the emotional effect of music, and this is the area in which Griffiths is most interested. "A patient of mine was very fond of Rachmaninov, until he suffered brain damage. He could still recognise the music, but no longer felt so emotional. This suggests our brain has a separate system producing these emotions."

Interestingly, he found, the centre that produces the "shiver" also mediates our responses to cocaine and orgasms. The headiest combination is literally sex, drugs and rock'n'roll.

If all this makes you worry that you might be more than just a bad singer, there's a quick way to find out - take the online test developed by Professor Isabelle Peretz, of Montreal University, a world expert on amusia.It was Peretz who, in 2002, published the first scientific portrait of an amusia sufferer - Monica, a Canadian in her 40s who had lived her whole life without even the most basic sense of melody and tune.

Take Peretz's musical "spot the difference" test and you are likely to find you can distinguish the small variations in pitch, no matter how awful you are at karaoke. But for Monica and others like her, even leaps of an octave - for example the first two notes of Somewhere Over the Rainbow - are barely noticeable.

Peretz is trying to understand how music might be therapeutic - as an alternative to drug treatments for depression, for example. "It's not a case of reprogramming the brain - music can't do that," she explains. "It's more about changing the balance in there."

By JAMES MORGAN reporter

http://www.theherald.co.uk/features/features/display.var.2078541.0.when_music_is_misery.php

NUMBERS GUY

Are our brains wired for math?

by Jim Holt March 3, 2008

According to Stanislas Dehaene, humans have an inbuilt "number sense" capable of some basic calculations and estimates. The problems start when we learn mathematics and have to perform procedures that are anything but instinctive.

One morning in September, 1989, a former sales representative in his mid-forties entered an examination room with Stanislas Dehaene, a young neuroscientist based in Paris. Three years earlier, the man, whom researchers came to refer to as Mr. N, had sustained a brain hemorrhage that left him with an enormous lesion in the rear half of his left hemisphere. He suffered from severe handicaps: his right arm was in a sling; he couldn't read; and his speech was painfully slow. He had once been married, with two daughters, but was now incapable of leading an independent life and lived with his elderly parents. Dehaene had been invited to see him because his impairments included severe acalculia, a general term for any one of several deficits in number processing. When asked to add 2 and 2, he answered "three." He could still count and recite a sequence like 2, 4, 6, 8, but he was incapable of counting downward from 9, differentiating odd and even numbers, or recognizing the numeral 5 when it was flashed in front of him.

To Dehaene, these impairments were less interesting than the fragmentary capabilities Mr. N had managed to retain. When he was shown the numeral 5 for a few seconds, he knew it was a numeral rather than a letter and, by counting up from 1 until he got to the right integer, he eventually identified it as a 5. He did the same thing when asked the age of his seven-year-old daughter. In the 1997 book "The Number Sense," Dehaene wrote, "He appears to know right from the start what quantities he wishes to express, but reciting the number series seems to be his only means of retrieving the corresponding word."

Dehaene also noticed that although Mr. N could no longer read, he sometimes had an approximate sense of words that were flashed in front of him; when he was shown the word "ham," he said, "It's some kind of meat." Dehaene decided to see if Mr. N still had a similar sense of number. He showed him the numerals 7 and 8. Mr. N was able to answer quickly that 8 was the larger number—far more quickly than if he had had to identify them by counting up to the right quantities. He could also judge whether various numbers were bigger or smaller than 55, slipping up only when they were very close to 55. Dehaene dubbed Mr. N "the Approximate Man." The Approximate Man lived in a world where a year comprised "about 350 days" and an hour "about fifty minutes," where there were five seasons, and where a dozen eggs amounted to "six or ten." Dehaene asked him to add 2 and 2 several times and received answers ranging from three to five. But, he noted, "he never offers a result as absurd as 9."

In cognitive science, incidents of brain damage are nature's experiments. If a lesion knocks out one ability but leaves another intact, it is evidence that they are wired into different neural circuits. In this instance, Dehaene theorized that our ability to learn sophisticated mathematical procedures resided in an entirely different part of the brain from a rougher quantitative sense. Over the decades, evidence concerning cognitive deficits in brain-damaged patients has accumulated, and researchers have concluded that we have a sense of number that is independent of language, memory, and reasoning in general. Within neuroscience, numerical cognition has emerged as a vibrant field, and Dehaene, now in his early forties, has become one of its foremost researchers. His work is "completely pioneering," Susan Carey, a psychology professor at Harvard who has studied numerical cognition, told me. "If you want to make sure the math that children are learning is meaningful, you have to know something about how the brain represents number at the kind of level that Stan is trying to understand."

Dehaene has spent most of his career plotting the contours of our number sense and puzzling over which aspects of our mathematical ability are innate and which are learned, and how the two systems overlap and affect each other. He has approached the problem from every imaginable angle. Working with colleagues both in France and in the United States, he has carried out experiments that probe the way numbers are coded in our minds. He has studied the numerical abilities of animals, of Amazon tribespeople, of top French mathematics students. He has used brain-scanning technology to investigate

precisely where in the folds and crevices of the cerebral cortex our numerical faculties are nestled. And he has weighed the extent to which some languages make numbers more difficult than others. His work raises crucial issues about the way mathematics is taught. In Dehaene's view, we are all born with an evolutionarily ancient mathematical instinct. To become numerate, children must capitalize on this instinct, but they must also unlearn certain tendencies that were helpful to our primate ancestors but that clash with skills needed today. And some societies are evidently better than others at getting kids to do this. In both France and the United States, mathematics education is often felt to be in a state of crisis. The math skills of American children fare poorly in comparison with those of their peers in countries like Singapore, South Korea, and Japan. Fixing this state of affairs means grappling with the question that has taken up much of Dehaene's career: What is it about the brain that makes numbers sometimes so easy and sometimes so hard?

Dehaene's own gifts as a mathematician are considerable. Born in 1965, he grew up in Roubaix, a medium-sized industrial city near France's border with Belgium. (His surname is Flemish.) His father, a pediatrician, was among the first to study fetal alcohol syndrome. As a teen-ager, Dehaene developed what he calls a "passion" for mathematics, and he attended the École Normale Supérieure in Paris, the training ground for France's scholarly élite. Dehaene's own interests tended toward computer modelling and artificial intelligence. He was drawn to brain science after reading, at the age of eighteen, the 1983 book "Neuronal Man," by Jean-Pierre Changeux, France's most distinguished neurobiologist. Changeux's approach to the brain held out the tantalizing possibility of reconciling psychology with neuroscience. Dehaene met Changeux and began to work with him on abstract models of thinking and memory. He also linked up with the cognitive scientist Jacques Mehler. It was in Mehler's lab that he met his future wife, Ghislaine Lambertz, a researcher in infant cognitive psychology.

By "pure luck," Dehaene recalls, Mehler happened to be doing research on how numbers are understood. This led to Dehaene's first encounter with what he came to characterize as "the number sense." Dehaene's work centered on an apparently simple question: How do we know whether numbers are bigger or smaller than one another? If you are asked to choose which of a pair of Arabic numerals—4 and 7, say—stands for the bigger number, you respond "seven" in a split second, and one might think that any two digits could be compared in the same very brief period of time. Yet in Dehaene's experiments, while subjects answered quickly and accurately when the digits were far apart, like 2 and 9, they slowed down when the digits were closer together, like 5 and 6. Performance also got worse as the digits grew larger: 2 and 3 were much easier to compare than 7 and 8. When Dehaene tested some of the best mathematics students at the École Normale, the students were amazed to find themselves slowing down and making errors when asked whether 8 or 9 was the larger number.

Dehaene conjectured that, when we see numerals or hear number words, our brains automatically map them onto a number line that grows increasingly fuzzy above 3 or 4. He found that no amount of training can change this. "It is a basic structural property of how our brains represent number, not just a lack of facility," he told me.

In 1987, while Dehaene was still a student in Paris, the American cognitive psychologist Michael Posner and colleagues at Washington University in St. Louis published a pioneering paper in the journal *Nature*. Using a scanning technique that can track the flow of blood in the brain, Posner's team had detailed how different areas became active in language processing. Their research was a revelation for Dehaene. "I remember very well sitting and reading this paper, and then debating it with Jacques Mehler, my Ph.D. adviser," he told me. Mehler, whose focus was on determining the abstract organization of cognitive functions, didn't see the point of trying to locate precisely where in the brain things happened, but Dehaene wanted to "bridge the gap," as he put it, between psychology and neurobiology, to find out exactly how the functions of the mind—thought, perception, feeling, will—are realized in the gelatinous three-pound lump of matter in our skulls. Now, thanks to new technologies, it was finally possible to create pictures, however crude, of the brain in the act of thinking. So, after receiving his doctorate, he spent two years studying brain scanning with Posner, who was by then at the University of Oregon, in Eugene. "It was very strange to find that some of the most exciting results of the budding cognitive-neuroscience field were coming out of this small place—the only place where I ever saw sixty-year-old hippies sitting around in tie-dyed shirts!" he said.

Dehaene is a compact, attractive, and genial man; he dresses casually, wears fashionable glasses, and has a glabrous dome of a head, which he protects from the elements with a *chapeau de cowboy*. When I visited him recently, he had just moved into a new laboratory, known as NeuroSpin, on the campus of a national center for nuclear-energy research, a dozen or so miles southwest of Paris. The building, which was completed a year ago, is a modernist composition in glass and metal filled with the ambient hums and whirs and whooshes of brain-scanning equipment, much of which was still being assembled. A series of

arches ran along one wall in the form of a giant sine wave; behind each was a concrete vault built to house a liquid-helium-cooled superconducting electromagnet. (In brain imaging, the more powerful the magnetic field, the sharper the picture.) The new brain scanners are expected to show the human cerebral anatomy at a level of detail never before seen, and may reveal subtle anomalies in the brains of people with dyslexia and with dyscalculia, a crippling deficiency in dealing with numbers which, researchers suspect, may be as widespread as dyslexia. One of the scanners was already up and running. "You don't wear a pacemaker or anything, do you?" Dehaene asked me as we entered a room where two researchers were fiddling with controls. Although the scanner was built to accommodate humans, inside, I could see from the monitor, was a brown rat. Researchers were looking at how its brain reacted to various odors, which were puffed in every so often. Then Dehaene led me upstairs to a spacious gallery where the brain scientists working at NeuroSpin are expected to congregate and share ideas. At the moment, it was empty. "We're hoping for a coffee machine," he said.

Dehaene has become a scanning virtuoso. On returning to France after his time with Posner, he pressed on with the use of imaging technologies to study how the mind processes numbers. The existence of an evolved number ability had long been hypothesized, based on research with animals and infants, and evidence from brain-damaged patients gave clues to where in the brain it might be found. Dehaene set about localizing this facility more precisely and describing its architecture. "In one experiment I particularly liked," he recalled, "we tried to map the whole parietal lobe in a half hour, by having the subject perform functions like moving the eyes and hands, pointing with fingers, grasping an object, engaging in various language tasks, and, of course, making small calculations, like thirteen minus four. We found there was a beautiful geometrical organization to the areas that were activated. The eye movements were at the back, the hand movements were in the middle, grasping was in the front, and so on. And right in the middle, we were able to confirm, was an area that cared about number."

The number area lies deep within a fold in the parietal lobe called the intraparietal sulcus (just behind the crown of the head). But it isn't easy to tell what the neurons there are actually doing. Brain imaging, for all the sophistication of its technology, yields a fairly crude picture of what's going on inside the skull, and the same spot in the brain might light up for two tasks even though different neurons are involved. "Some people believe that psychology is just being replaced by brain imaging, but I don't think that's the case at all," Dehaene said. "We need psychology to refine our idea of what the imagery is going to show us. That's why we do behavioral experiments, see patients. It's the confrontation of all these different methods that creates knowledge."

Dehaene has been able to bring together the experimental and the theoretical sides of his quest, and, on at least one occasion, he has even theorized the existence of a neurological feature whose presence was later confirmed by other researchers. In the early nineteen-nineties, working with Jean-Pierre Changeux, he set out to create a computer model to simulate the way humans and some animals estimate at a glance the number of objects in their environment. In the case of very small numbers, this estimate can be made with almost perfect accuracy, an ability known as "subitizing" (from the Latin word *subitus*, meaning "sudden"). Some psychologists think that subitizing is merely rapid, unconscious counting, but others, Dehaene included, believe that our minds perceive up to three or four objects all at once, without having to mentally "spotlight" them one by one. Getting the computer model to subitize the way humans and animals did was possible, he found, only if he built in "number neurons" tuned to fire with maximum intensity in response to a specific number of objects. His model had, for example, a special four neuron that got particularly excited when the computer was presented with four objects. The model's number neurons were pure theory, but almost a decade later two teams of researchers discovered what seemed to be the real item, in the brains of macaque monkeys that had been trained to do number tasks. The number neurons fired precisely the way Dehaene's model predicted—a vindication of theoretical psychology. "Basically, we can derive the behavioral properties of these neurons from first principles," he told me. "Psychology has become a little more like physics."

But the brain is the product of evolution—a messy, random process—and though the number sense may be lodged in a particular bit of the cerebral cortex, its circuitry seems to be intermingled with the wiring for other mental functions. A few years ago, while analyzing an experiment on number comparisons, Dehaene noticed that subjects performed better with large numbers if they held the response key in their right hand but did better with small numbers if they held the response key in their left hand. Strangely, if the subjects were made to cross their hands, the effect was reversed. The actual hand used to make the response was, it seemed, irrelevant; it was space itself that the subjects unconsciously associated with larger or smaller numbers. Dehaene hypothesizes that the neural circuitry for number and the circuitry for location overlap. He even suspects that this may be why travellers get disoriented entering Terminal 2 of Paris's Charles de Gaulle Airport, where small-numbered gates are on the right and large-

numbered gates are on the left. “It’s become a whole industry now to see how we associate number to space and space to number,” Dehaene said. “And we’re finding the association goes very, very deep in the brain.”

Last winter, I saw Dehaene in the ornate setting of the Institut de France, across the Seine from the Louvre. There he accepted a prize of a quarter of a million euros from Liliane Bettencourt, whose father created the cosmetics group L’Oréal. In a salon hung with tapestries, Dehaene described his research to a small audience that included a former Prime Minister of France. New techniques of neuroimaging, he explained, promise to reveal how a thought process like calculation unfolds in the brain. This isn’t just a matter of pure knowledge, he added. Since the brain’s architecture determines the sort of abilities that come naturally to us, a detailed understanding of that architecture should lead to better ways of teaching children mathematics and may help close the educational gap that separates children in the West from those in several Asian countries. The fundamental problem with learning mathematics is that while the number sense may be genetic, exact calculation requires cultural tools—symbols and algorithms—that have been around for only a few thousand years and must therefore be absorbed by areas of the brain that evolved for other purposes. The process is made easier when what we are learning harmonizes with built-in circuitry. If we can’t change the architecture of our brains, we can at least adapt our teaching methods to the constraints it imposes.

For nearly two decades, American educators have pushed “reform math,” in which children are encouraged to explore their own ways of solving problems. Before reform math, there was the “new math,” now widely thought to have been an educational disaster. (In France, it was called *les maths modernes*, and is similarly despised.) The new math was grounded in the theories of the influential Swiss psychologist Jean Piaget, who believed that children are born without any sense of number and only gradually build up the concept in a series of developmental stages. Piaget thought that children, until the age of four or five, cannot grasp the simple principle that moving objects around does not affect how many of them there are, and that there was therefore no point in trying to teach them arithmetic before the age of six or seven.

Piaget’s view had become standard by the nineteen-fifties, but psychologists have since come to believe that he underrated the arithmetic competence of small children. Six-month-old babies, exposed simultaneously to images of common objects and sequences of drumbeats, consistently gaze longer at the collection of objects that matches the number of drumbeats. By now, it is generally agreed that infants come equipped with a rudimentary ability to perceive and represent number. (The same appears to be true for many kinds of animals, including salamanders, pigeons, raccoons, dolphins, parrots, and monkeys.) And if evolution has equipped us with one way of representing number, embodied in the primitive number sense, culture furnishes two more: numerals and number words. These three modes of thinking about number, Dehaene believes, correspond to distinct areas of the brain. The number sense is lodged in the parietal lobe, the part of the brain that relates to space and location; numerals are dealt with by the visual areas; and number words are processed by the language areas.

Nowhere in all this elaborate brain circuitry, alas, is there the equivalent of the chip found in a five-dollar calculator. This deficiency can make learning that terrible quartet—“Ambition, Distraction, Uglification, and Derision,” as Lewis Carroll burlesqued them—a chore. It’s not so bad at first. Our number sense endows us with a crude feel for addition, so that, even before schooling, children can find simple recipes for adding numbers. If asked to compute 2 + 4, for example, a child might start with the first number and then count upward by the second number: “two, three is one, four is two, five is three, six is four, *six*.” But multiplication is another matter. It is an “unnatural practice,” Dehaene is fond of saying, and the reason is that our brains are wired the wrong way. Neither intuition nor counting is of much use, and multiplication facts must be stored in the brain verbally, as strings of words. The list of arithmetical facts to be memorized may be short, but it is fiendishly tricky: the same numbers occur over and over, in different orders, with partial overlaps and irrelevant rhymes. (Bilinguals, it has been found, revert to the language they used in school when doing multiplication.) The human memory, unlike that of a computer, has evolved to be associative, which makes it ill-suited to arithmetic, where bits of knowledge must be kept from interfering with one another: if you’re trying to retrieve the result of multiplying 7 X 6, the reflex activation of 7 + 6 and 7 X 5 can be disastrous. So multiplication is a double terror: not only is it remote from our intuitive sense of number; it has to be internalized in a form that clashes with the evolved organization of our memory. The result is that when adults multiply single-digit numbers they make mistakes ten to fifteen per cent of the time. For the hardest problems, like 7 X 8, the error rate can exceed twenty-five per cent.

Our inbuilt ineptness when it comes to more complex mathematical processes has led Dehaene to question why we insist on drilling procedures like long division into our children at all. There is, after all,

an alternative: the electronic calculator. “Give a calculator to a five-year-old, and you will teach him how to make friends with numbers instead of despising them,” he has written. By removing the need to spend hundreds of hours memorizing boring procedures, he says, calculators can free children to concentrate on the meaning of these procedures, which is neglected under the educational status quo. This attitude might make Dehaene sound like a natural ally of educators who advocate reform math, and a natural foe of parents who want their children’s math teachers to go “back to basics.” But when I asked him about reform math he wasn’t especially sympathetic. “The idea that all children are different, and that they need to discover things their own way—I don’t buy it at all,” he said. “I believe there is one brain organization. We see it in babies, we see it in adults. Basically, with a few variations, we’re all travelling on the same road.” He admires the mathematics curricula of Asian countries like China and Japan, which provide children with a highly structured experience, anticipating the kind of responses they make at each stage and presenting them with challenges designed to minimize the number of errors. “That’s what we’re trying to get back to in France,” he said. Working with his colleague Anna Wilson, Dehaene has developed a computer game called “The Number Race” to help dyscalculic children. The software is adaptive, detecting the number tasks where the child is shaky and adjusting the level of difficulty to maintain an encouraging success rate of seventy-five per cent.

Despite our shared brain organization, cultural differences in how we handle numbers persist, and they are not confined to the classroom. Evolution may have endowed us with an approximate number line, but it takes a system of symbols to make numbers precise—to “crystallize” them, in Dehaene’s metaphor. The Mundurukú, an Amazon tribe that Dehaene and colleagues, notably the linguist Pierre Pica, have studied recently, have words for numbers only up to five. (Their word for five literally means “one hand.”) Even these words seem to be merely approximate labels for them: a Mundurukú who is shown three objects will sometimes say there are three, sometimes four. Nevertheless, the Mundurukú have a good numerical intuition. “They know, for example, that fifty plus thirty is going to be larger than sixty,” Dehaene said. “Of course, they do not know this verbally and have no way of talking about it. But when we showed them the relevant sets and transformations they immediately got it.”

The Mundurukú, it seems, have developed few cultural tools to augment the inborn number sense. Interestingly, the very symbols with which we write down the counting numbers bear the trace of a similar stage. The first three Roman numerals, I, II, and III, were formed by using the symbol for one as many times as necessary; the symbol for four, IV, is not so transparent. The same principle applies to Chinese numerals: the first three consist of one, two, and three horizontal bars, but the fourth takes a different form. Even Arabic numerals follow this logic: 1 is a single vertical bar; 2 and 3 began as two and three horizontal bars tied together for ease of writing. (“That’s a beautiful little fact, but I don’t think it’s coded in our brains any longer,” Dehaene observed.)

Today, Arabic numerals are in use pretty much around the world, while the words with which we name numbers naturally differ from language to language. And, as Dehaene and others have noted, these differences are far from trivial. English is cumbersome. There are special words for the numbers from 11 to 19, and for the decades from 20 to 90. This makes counting a challenge for English-speaking children, who are prone to such errors as “twenty-eight, twenty-nine, twenty-ten, twenty-eleven.” French is just as bad, with vestigial base-twenty monstrosities, like *quatre-vingt-dix-neuf* (“four twenty ten nine”) for 99. Chinese, by contrast, is simplicity itself; its number syntax perfectly mirrors the base-ten form of Arabic numerals, with a minimum of terms. Consequently, the average Chinese four-year-old can count up to forty, whereas American children of the same age struggle to get to fifteen. And the advantages extend to adults. Because Chinese number words are so brief—they take less than a quarter of a second to say, on average, compared with a third of a second for English—the average Chinese speaker has a memory span of nine digits, versus seven digits for English speakers. (Speakers of the marvellously efficient Cantonese dialect, common in Hong Kong, can juggle ten digits in active memory.)

In 2005, Dehaene was elected to the chair in experimental cognitive psychology at the Collège de France, a highly prestigious institution founded by Francis I in 1530. The faculty consists of just fifty-two scholars, and Dehaene is the youngest member. In his inaugural lecture, Dehaene marvelled at the fact that mathematics is simultaneously a product of the human mind and a powerful instrument for discovering the laws by which the human mind operates. He spoke of the confrontation between new technologies like brain imaging and ancient philosophical questions concerning number, space, and time. And he pronounced himself lucky to be living in an era when advances in psychology and neuroimaging are combining to “render visible” the hitherto invisible realm of thought.

For Dehaene, numerical thought is only the beginning of this quest. Recently, he has been pondering how the philosophical problem of consciousness might be approached by the methods of empirical science. Experiments involving subliminal “number priming” show that much of what our mind does

with numbers is unconscious, a finding that has led Dehaene to wonder why some mental activity crosses the threshold of awareness and some doesn't. Collaborating with a couple of colleagues, Dehaene has explored the neural basis of what is known as the "global workspace" theory of consciousness, which has elicited keen interest among philosophers. In his version of the theory, information becomes conscious when certain "workspace" neurons broadcast it to many areas of the brain at once, making it simultaneously available for, say, language, memory, perceptual categorization, action-planning, and so on. In other words, consciousness is "cerebral celebrity," as the philosopher Daniel Dennett has described it, or "fame in the brain."

In his office at NeuroSpin, Dehaene described to me how certain extremely long workspace neurons might link far-flung areas of the human brain together into a single pulsating circuit of consciousness. To show me where these areas were, he reached into a closet and pulled out an irregularly shaped baby-blue plaster object, about the size of a softball. "This is my brain!" he announced with evident pleasure. The model that he was holding had been fabricated, he explained, by a rapid-prototyping machine (a sort of three-dimensional printer) from computer data obtained from one of the many MRI scans that he has undergone. He pointed to the little furrow where the number sense was supposed to be situated, and observed that his had a somewhat uncommon shape. Curiously, the computer software had identified Dehaene's brain as an "outlier," so dissimilar are its activation patterns from the human norm. Cradling the pastel-colored lump in his hands, a model of his mind devised by his own mental efforts, Dehaene paused for a moment. Then he smiled and said, "So, I kind of like my brain." ♦

http://www.newyorker.com/reporting/2008/03/03/080303fa_fact_holt?currentPage=all

Scientists advance 'drought crop'
By Matt McGrath
BBC News science reporter

Scientists say they have made a key breakthrough in understanding the genes of plants that could lead to crops that can survive in a drought.

Researchers in Finland and the United States say they have discovered a gene that controls the amount of carbon dioxide a plant absorbs.

It also controls the amount of water vapour it releases into the atmosphere.

This information could be important for food production and in regulating climate change.

Water control

Plants play a crucial role in the regulation of the atmosphere by absorbing carbon dioxide from the air. They absorb the gas through tiny pores on their leaves called stomata and these pores also release water vapour as the plant grows.

In extremely dry weather, a plant can lose 95% of its water in this way.

It opens the avenue, it is still several years away
Professor Jakko Kangasjarvi

Scientists have been trying to find the gene that controls the response of the stomata for decades.

Now teams in Finland and California are reporting in the journal Nature that they have found a crucial genetic pathway that controls the opening and closing of these pores.

The researchers say that this understanding could allow them to modify plants so that they continue to absorb carbon dioxide but reduce the amount of water released into the atmosphere, enabling them to thrive in very dry conditions.

On the way

Professor Jakko Kangasjarvi from the University of Helsinki says this work is the first step on that road

"It opens the avenue, it is still several years away but before this publication, there was no single component which would have so many different effects... there was no target to modify, now we know the target," he said.

While the experiments have been done in a variety of cress, the scientists say that the underlying genetic mechanisms are the same in many food plants, including rice.

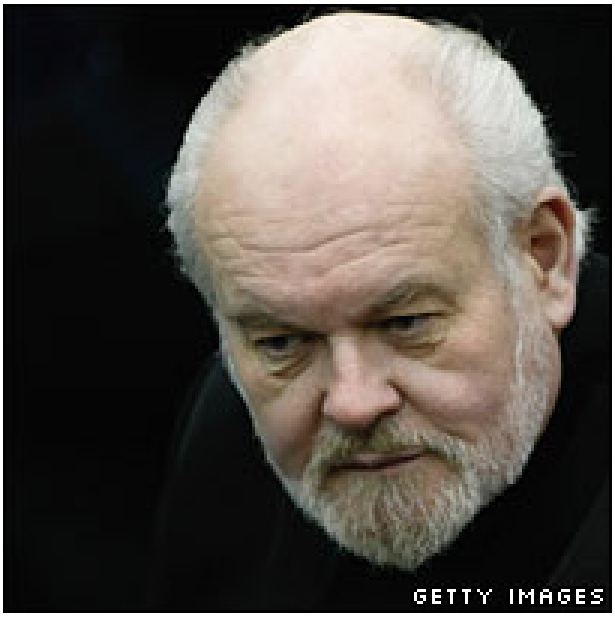
It is believed that this new genetic understanding of how to control the amount of water that plants use could be commercialised within the next 20 years.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/americas/7268079.stm

Published: 2008/02/28 00:41:35 GMT

Moral appeal for UK energy saving

By Richard Black
Environment correspondent, BBC News website



The battle against climate change has been described by a church leader as a "moral issue", at the launch of a strategy to reduce UK electricity use.

The Bishop of London said parts of the world are already affected by change.

Energy Saving Day, which is backed by environmental and religious groups and major energy companies, asks people to turn off electrical devices not in use.

Over 24 hours from 1800 GMT Wednesday, the National Grid will monitor what effect this has on UK consumption.

The BBC News website will be displaying results in close to real time.

Organisations from all sectors of society have been prepared to see what they can do to help tackle climate change
Matt Prescott

Major energy companies including EDF, E.On and National Power are offering customers simplified access to home insulation.

At a launch event featuring a bicycle-powered cinema showing specially-commissioned short films on climate, bishop Dr Richard Chartres made the moral case for taking part.

"Let us remember people in the Ganges delta who are already feeling the effects of sea level rise and climate change," he said.

"The science changes year by year - though rarely in the right direction - but the moral imperative remains the same."

Responsible reward

E-Day was conceived and developed by Matt Prescott, a scientist and long-time campaigner for low-energy lightbulbs.

"I'm delighted by the way in which so many organisations from all sectors of society have been prepared to see what they can do to help tackle climate change," he told BBC News.

"They have offered to set aside their day-to-day differences in order to highlight that they accept the available science, agree that saving energy is a good idea, and want to simplify and widen access to some of the other potential solutions to climate change."

Those organisations include some of the UK's principal energy retailers, and the environmental groups that sometimes lambast them for their greenhouse gas emissions.

HAVE YOUR SAY Great idea! Pity I only found out about it nearly 15 hours into the day itself. Perhaps more energy needed to be spent on publicity Veronica, London

"We do call on companies to take more action," said Ashok Sinha, director of Stop Climate Chaos, an umbrella campaigning group on climate change.

"But we think it's welcome that they're encouraging their customers to save energy - that's responsible behaviour for an energy company."

The government obliges energy providers to offer energy saving measures to their customers.

People can use the E-Day website to register their interest in receiving help from these companies with loft and wall insulation.

Grid lines

E-Day started life as a Planet Relief, which was to have been an awareness-raising BBC TV programme with a large element of comedy.

But in September the BBC decided to pull the project, saying viewers preferred factual or documentary programmes about climate change.

The decision came after poor audiences for Live Earth, and public debate over whether it was the corporation's role to "save the planet".

Dr Prescott then decided to see whether he could mount E-Day as an independent operation, and secured the backing of important partners such as the energy companies and the National Grid.

Its role is crucial, acting as an independent and credible monitor of how much difference E-Day makes to the UK's electricity consumption.

Part of the Grid's job is to forecast demand for electricity. It says its forecasts are usually accurate to within 1% - so comparing demand across the 24 hours of E-Day with its predictions should provide an accurate measure of whether the initiative has made much difference.

Dr Prescott believes savings are likely to be small, up to 3%.

But even this could be the equivalent of taking a coal-fired power station off line for the day.

And he hopes the event will help confirm the idea that personal action can make a noticeable impact on energy use and greenhouse gas emissions.

Richard.Black-INTERNET@bbc.co.uk

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/7267915.stm

Published: 2008/02/27 21:09:46 GMT

Heart risk link to eye condition
Age-related macular degeneration, a common cause of blindness, has been linked to an increased risk of heart attack and stroke.

Researchers found the risk of dying from the cardiovascular conditions was at least doubled in people with AMD.

The study raises the possibility - disputed by UK experts - that drugs for the condition may be to blame.

The University of Sydney research appears in the British Journal of Ophthalmology.

AGE-RELATED MACULAR DEGENERATION
There are two forms - wet and dry - with the dry form being far more common
The wet type is the most aggressive and accounts for around 90% of blindness caused by the condition
More than 20,000 people in the UK are newly-diagnosed with wet AMD each year

AMD affects the centre of the retina (macula) at the back of the eye, which is used for fine central vision tasks, such as reading and driving.

It is most common in the elderly, among whom it is a major cause of untreatable blindness in developed countries. It is estimated to affect 500,000 people in the UK alone.

The Sydney team assessed the general and eye health of over 3,600 people, all aged at least 49 years at the start of the study.

Of these 2,335 people were re-examined five years later, and 1,952 were examined again 10 years later.

Among people under the age of 75 at the start of the study, early AMD was associated with a doubling in the risks of dying from a heart attack or stroke within the next decade.

Those with late stage disease at the start of the study had five times the risk of dying from a heart attack, and 10 times the risk of dying from a stroke.

Possible reasons

The researchers admitted that more work was needed to confirm their work, as the numbers in their study were relatively small.

They said the reason for a link between AMD and cardiovascular disease was unclear.

The likely reason for the link is vascular degeneration
Mr Winfried Amoaku
Royal College of Ophthalmologists

It could simply be that AMD is a sign that the body is ageing, and vulnerable to all sorts of disease.

Alternatively, it may be that AMD and cardiovascular disease are caused by the same problems, such as inflammation, thickening of the arteries or general tissue damage caused by unstable particles called free radicals.

Another possibility is that anti-VEGF drug treatments for AMD may raise the risk of heart attack and stroke.

Anti-VEGF drugs work by inhibiting the growth of new blood vessels.

This is an effective strategy for AMD because the condition is caused by unstable new blood vessels in the eye, which leak fluid and blood under the retina and cause scarring, which in turn leads to irreversible sight loss.

However, there is concern that inhibiting blood vessel growth may have a wider impact on the cardiovascular system.

Monitoring

The researchers said: "Our results suggest that individuals with a high cardiovascular risk profile may potentially need to be monitored closely if receiving anti-VEGF therapy."

The National Institute for Health and Clinical Excellence (NICE) eased restrictions on NHS use of one of the anti-VEGF drugs, Lucentis last year, following a campaign to make it more widely available to AMD patients.

Mr Winfried Amoaku, of the Royal College of Ophthalmologists, said other research had also suggested a link between AMD and cardiovascular disease.

But he said anti-VEGF drugs approved for UK use had been shown to be safe.

He said: "The likely reason for the link is vascular degeneration. This is a systemic failure that can affect several parts of the body in relatively quick succession."

The RNIB said the study had not established that the drugs raised the risk of cardiovascular disease, and urged patients not to be put off seeking treatment.

Novartis, the makers of Lucentis, said the drug was very effective, and had proved safe in major clinical trials.

Inflammation genes

A second study in the same journal highlights variations in genes that control the production of chemicals involved in inflammation as a possible key to AMD.

A team from the University of Southampton examined variations in genes controlling production and suppression of cytokines - powerful chemicals involved in inflammatory processes in the body.

They compared DNA samples from people with AMD to those who showed no signs of the disease.

One particular gene variant was significantly more common in the people with AMD.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7266362.stm

Published: 2008/02/28 02:25:45 GMT

This Is Your Brain On Jazz: Researchers Use MRI To Study Spontaneity, Creativity

Because fMRI uses powerful magnets, the researchers designed an unconventional keyboard with no iron-containing metal parts that the magnets could attract. (Credit: iStockphoto/Eva Serrabassa)

ScienceDaily (Feb. 28, 2008) — A pair of Johns Hopkins and government scientists have discovered that when jazz musicians improvise, their brains turn off areas linked to self-censoring and inhibition, and turn on those that let self-expression flow.

The joint research, using functional magnetic resonance imaging, or fMRI, and musician volunteers from the Johns Hopkins University's Peabody Institute, sheds light on the creative improvisation that artists and non-artists use in everyday life, the investigators say.

It appears, they conclude, that jazz musicians create their unique improvised riffs by turning off inhibition and turning up creativity.

The scientists from the University's School of Medicine and the National Institute on Deafness and Other Communications Disorders describe their curiosity about the possible neurological underpinnings of the almost trance-like state jazz artists enter during spontaneous improvisation.

"When jazz musicians improvise, they often play with eyes closed in a distinctive, personal style that transcends traditional rules of melody and rhythm," says Charles J. Limb, M.D., assistant professor in the Department of Otolaryngology-Head and Neck Surgery at the Johns Hopkins School of Medicine and a trained jazz saxophonist himself. "It's a remarkable frame of mind," he adds, "during which, all of a sudden, the musician is generating music that has never been heard, thought, practiced or played before. What comes out is completely spontaneous."

Though many recent studies have focused on understanding what parts of a person's brain are active when listening to music, Limb says few have delved into brain activity while music is being spontaneously composed.

Curious about his own "brain on jazz," he and a colleague, Allen R. Braun, M.D., of NIDCD, devised a plan to view in real time the brain functions of musicians improvising.

For the study, they recruited six trained jazz pianists, three from the Peabody Institute, a music conservatory where Limb holds a joint faculty appointment. Other volunteers learned about the study by word of mouth through the local jazz community.

The researchers designed a special keyboard to allow the pianists to play inside a functional magnetic resonance imaging (fMRI) machine, a brain-scanner that illuminates areas of the brain responding to various stimuli, identifying which areas are active while a person is involved in some mental task, for example.

Because fMRI uses powerful magnets, the researchers designed the unconventional keyboard with no iron-containing metal parts that the magnet could attract. They also used fMRI-compatible headphones that would allow musicians to hear the music they generate while they're playing it.

Each musician first took part in four different exercises designed to separate out the brain activity involved in playing simple memorized piano pieces and activity while improvising their music. While lying in the fMRI machine with the special keyboard propped on their laps, the pianists all began by playing the C-major scale, a well-memorized order of notes that every beginner learns. With the sound of a metronome playing over the headphones, the musicians were instructed to play the scale, making sure that each volunteer played the same notes with the same timing.

In the second exercise, the pianists were asked to improvise in time with the metronome. They were asked to use quarter notes on the C-major scale, but could play any of these notes that they wanted.

Next, the musicians were asked to play an original blues melody that they all memorized in advance, while a recorded jazz quartet that complemented the tune played in the background. In the last exercise, the musicians were told to improvise their own tunes with the same recorded jazz quartet.

Limb and Braun then analyzed the brain scans. Since the brain areas activated during memorized playing are parts that tend to be active during any kind of piano playing, the researchers subtracted those images from ones taken during improvisation. Left only with brain activity unique to improvisation, the scientists saw strikingly similar patterns, regardless of whether the musicians were doing simple improvisation on the C-major scale or playing more complex tunes with the jazz quartet.

The scientists found that a region of the brain known as the dorsolateral prefrontal cortex, a broad portion of the front of the brain that extends to the sides, showed a slowdown in activity during improvisation. This area has been linked to planned actions and self-censoring, such as carefully deciding what words you might say at a job interview. Shutting down this area could lead to lowered inhibitions, Limb suggests.

The researchers also saw increased activity in the medial prefrontal cortex, which sits in the center of the brain's frontal lobe. This area has been linked with self-expression and activities that convey individuality, such as telling a story about yourself.

"Jazz is often described as being an extremely individualistic art form. You can figure out which jazz musician is playing because one person's improvisation sounds only like him or her," says Limb. "What we think is happening is when you're telling your own musical story, you're shutting down impulses that might impede the flow of novel ideas."

Limb notes that this type of brain activity may also be present during other types of improvisational behavior that are integral parts of life for artists and non-artists alike. For example, he notes, people are continually improvising words in conversations and improvising solutions to problems on the spot. "Without this type of creativity, humans wouldn't have advanced as a species. It's an integral part of who we are," Limb says.

He and Braun plan to use similar techniques to see whether the improvisational brain activity they identified matches that in other types of artists, such as poets or visual artists, as well as non-artists asked to improvise.

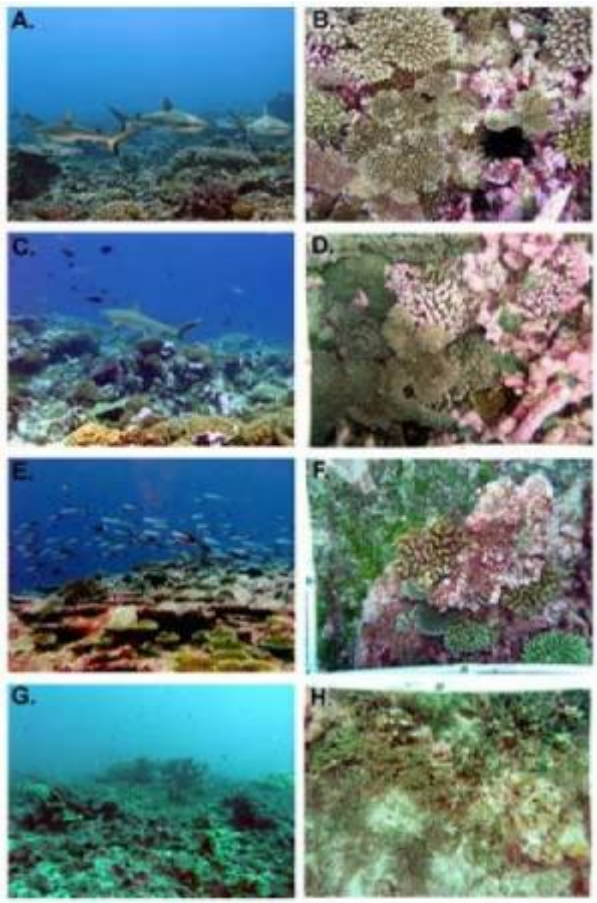
The study is published in the Feb. 27 issue of the journal Public Library of Science (PLoS) One. http://www.plosone.org/article/fetchArticle.action?articleURI=info:doi/10.1371/journal.pone.0001679

This research was funded by the Division of Intramural Research, National Institute on Deafness and Other Communication Disorders, National Institutes of Health.

Adapted from materials provided by Johns Hopkins Medical Institutions.

http://www.sciencedaily.com:80/releases/2008/02/080226213431.htm

From Sharks To Microbes, Key Data At Central Pacific's Line Islands Archipelago Captured



Line Islands coral reef habitats (left column) and bottoms (right column) are depicted across four atolls exhibiting declining states of health, from a reef dominated by top predators and coral to one of mostly small fishes and algae: Kingman (A, B), Palmyra (C,D), Tabuaeran (E, F) and Kiritimati (G,H). (Credit: A by Zafer Kizilkaya, B-H by Jennifer Smith)

ScienceDaily (Feb. 28, 2008) — An ambitious expedition led by scientists at Scripps Institution of Oceanography at UC San Diego to a chain of little-known islands in the central Pacific Ocean has yielded an unprecedented wealth of information about coral reefs and threats from human activities.

The exploration of four atolls in the Line Islands, part of a chain approximately a thousand miles south of Hawaii, has produced the first study of coral reefs comprehensively spanning organisms from microbes to sharks. This in-depth description was replicated across a gradient of human impacts, from uninhabited Kingman Reef to Kiritimati, also called Christmas Island, with a population of 5,000 people.

The results are published in two papers in the Public Library of Science.

At Kingman, the researchers described one of the planet's most pristine coral reefs, a resource they say provides a much-needed baseline for the conservation of coral reefs. In one paper, the scientists describe Kingman's atypical food web, where predators such as sharks accounted for 85 percent of the total fish biomass (the weight of all fish together). This inverted pyramid, they say, runs contrary to the bottom-heavy pyramids seen in other parts of the world where top predators have been fished out. Kingman also exhibited healthy coral populations and was nearly absent of seaweed and had low microbe concentrations, unlike evidence found elsewhere on disturbed reefs.

A comparison of Kingman with other reefs in the Line Islands revealed increasing levels of human impacts, including declining coral health, fewer and smaller fish and an increase in microbes.

The Kingman baseline, the researchers say, will be essential for comparisons against degraded reefs elsewhere and for evaluating the efficacy of current conservation actions. They say the data will stimulate new ideas for conserving reefs against threats such as pollution, global warming and overfishing.

"This is the first study in which an entire coral reef community, from the smallest to the largest organisms, is described across a gradient of human habitation," said Enric Sala, who led the 2005 expedition and is a coauthor of the PLoS One papers. Sala, an adjunct professor at Scripps and a National Geographic emerging explorer and fellow, is based at the National Council of Scientific Research of Spain. "We use Kingman as a window into the past, a time machine that allows us to understand what we have lost and how we lost it."

"One of the major surprising findings from this study, with direct conservation relevance, is that the healthier reefs showed the capacity to recover from climate change events," said Scripps Oceanography scientist Stuart Sandin, lead author of the PLoS paper covering large organisms and coordinator of the Line Islands Expedition. "When the ecosystem structure is intact, the corals appear to bounce back better from previous warm water events that have killed coral."

The second PLoS One paper describes the ecology of microbes across the four atolls. The researchers, led by Elizabeth Dinsdale and Forest Rohwer of San Diego State University, found 10 times more microbial cells and virus-like particles in the Kiritimati water column compared with Kingman. The microbes around Kiritimati's reefs, which had the highest percentage of coral disease and smallest coverage of corals, contained a large percentage of potential pathogens.

"Obtaining this microbial data set is particularly important given the association of microbes in the ongoing degradation of coral reef ecosystems worldwide," the authors noted.

A PLoS Biology essay authored by Nancy Knowlton, adjunct professor at Scripps Oceanography and currently with the Smithsonian Institution, and Jeremy Jackson, professor, Center for Marine Biodiversity and Conservation, Scripps Oceanography, analyzes the importance of establishing baselines for understanding reef ecology in the face of global threats.

They argue that so-called "shifting baselines," when ecosystems degrade and baselines are downgraded from one generation to the next, is at the root of understanding the factors driving coral reef decline and what, if anything, can be done to stop it.

In the essay, titled "Shifting Baselines, Local Impacts and Global Change on Coral Reefs," they write: "How to manage coral reefs locally in a globally changing world so that they retain or regain the critical ecosystem attributes of uninhabited reefs and still meet human needs is the central challenge facing reef conservation today."

"In a world of doom and gloom, it is important to know that reefs with exuberant coral growth and abundant fish populations still exist," said Knowlton. "These remote healthy reefs clearly show that local protection can make reefs resilient to the impacts of global change. The challenge is to translate the lessons of these reefs to management, so that reefs near people can also thrive."

• "Baselines and Degradation of Coral Reefs in the Northern Line Islands" is authored by: Sandin, Jennifer Smith, Edward DeMartini, Dinsdale, Simon Donner, Alan Friedlander, Talina Konotchick, Machel Malay, James Maragos, David Obura, Olga Pantos, Gustav Paulay, Morgan Richie, Rohwer, Robert Schroeder, Sheila Walsh, Jackson, Knowlton and Sala. (available at: http://www.plosone.org/doi/pone.0001548.)

• "Microbial Ecology of Four Coral Atolls in the Northern Line Islands" is authored by: Dinsdale, Olga Pantos, Steven Smriga, Robert Edwards, Florent Angly, Linda Wegley, Mark Hatay, Dana Hall, Elysa

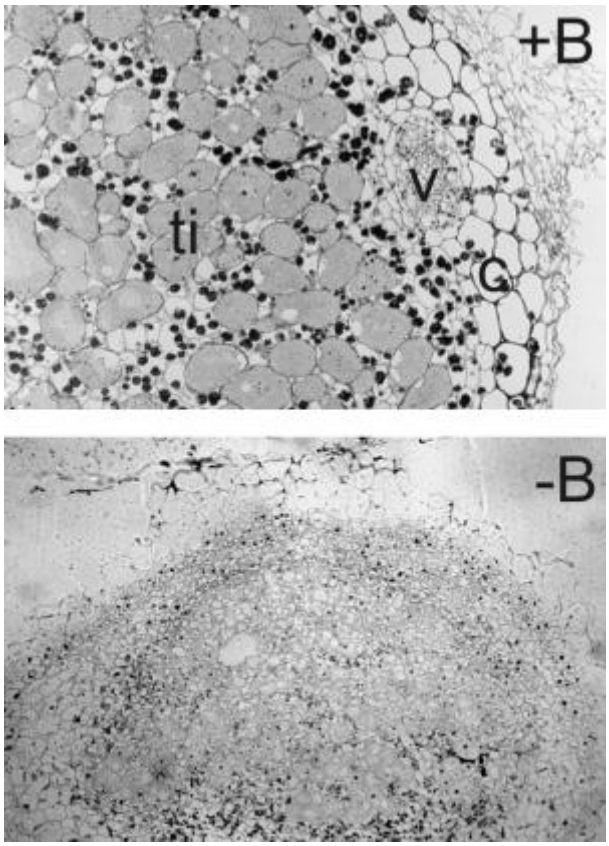
Brown, Matthew Haynes, Lutz Krause, Sala, Sandin, Rebecca Vega Thurber, Bette Willis, Farooq Azam, Knowlton and Rohwer. (available at: http://www.plosone.org/doi/pone.0001584.)

The Line Islands research was supported by: the National Geographic Society; Moore Family Foundation; Gordon and Betty Moore Foundation; Fairweather Foundation; Marine Managed Areas Program - Conservation International; and several private donors. Logistical support was provided by: the US Fish and Wildlife Service (on the Kingman and Palmyra National Wildlife Refuges), the Kiribati Ministry of the Environment (on Christmas and Fanning), the Palmyra Atoll Research Consortium and the Nature Conservancy.

Adapted from materials provided by University of California - San Diego, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com:80/releases/2008/02/080225213657.htm

Boron Is Essential For The Growth Of Plants And Animals



Effect of boron deficiency on the development of nodules in legume plants. The image shows the structure of the nodules of a common bean (Phaseolus vulgaris) induced by the nitrogen fixating bacteria Rhizobium etli. In cultures with sufficient boron (+B), the nodules present a central nucleus (ti), with cells (interior died) where the bacteria are fixating nitrogen and others with starch granules inside used for the transport of nutrients between the plant and the bacteria forming a vascular network (v). The entire nodule is surrounded by a cortex (c), composed by layers of more compacted cells. In a boron deficient culture (-B), non functional nodules develop, with a tumour structure. An extensive cellular proliferation is exhibited, but those cells do not grow and differentiate correctly to form different tissues. (Credit: Image courtesy of Universidad Autónoma de Madrid)

ScienceDaily (Feb. 28, 2008) — A research group from the biology department of the Universidad Autónoma de Madrid has shwon that boron, although only required in tiny doses, is essential for organogenesis in plants.

Research on the biological role of boron (B), a chemical element described almost a century ago as required in small quantities to maintain just the structure of plants, has given more relevance to its importance as an essential element for embryonic development and organogenesis in plants and animals.

Only a few of Earth's naturally occurring chemical elements make up living matter. Just six of them - carbon, hydrogen, nitrogen, oxygen, phosphorous and sulphur - make up for 99% of all living tissues. Nevertheless, other dietary minerals or trace elements are still crucial for all vital functions even if this may be in extremely low dosages. Some of these, such as iron, copper, cobalt, zinc or manganese, are required by all living forms and others are only associated with some groups, mainly because research has not been extended to include a wider range of living organisms.

Such is the case with boron (B), proven essential for the structure of plants in 1923 (Warington. Annals of Botany, Vol. 37: 629–672; 1923). Its activity depends on its presence as borate ion H4BO4- with the capacity to form bonds with molecules such as polysaccharides, glycoproteins or glycolipids. In this way,

borate acts as a molecular staple that gives stability and functionality to biomolecules like pectins that make up the cellular wall of most higher terrestrial plants, or glycolipids of the bacterial cell wall (Bolaños et al. Plant, Physiology and Biochemistry, Vol. 42: 907–912; 2004).

It has not been considered essential in animals, but nonetheless the disadvantages of a boron deficient diet, such as its negative effects on bone calcification, have already been studied. More recently, additional consequences on embryo development in fish and amphibians have been described where cellular proliferation lacks the differentiation required for the formation of tissues and organs, thereby demonstrating a failure in cellular signalling. Achieving a boron deficiency for experimentation in animals is very complicated, which makes the investigation more difficult.

Working with root nodules of legumes, which were the result of a complex and well controlled development procedure produced by the symbiotic interaction between nitrogen fixing bacteria (Rhizobium) and the plant, the research team managed by profesors Ildefonso Bonilla and Luis Bolaños (Biology Dep, UAM) have confirmed the necessity of borate for the stability of glycoproteins in the cellular membrane Plant, Cell & Environment, Vol. 30:1436–1443; 2007).

Boron deficiency causes a lack of glycoproteins in these very membranes, leading to the same development alteration as in the case of amphibians and fish - an extensive cellular proliferation but no subsequent differentiation of tissue which manifests as small tumour structures in the legumes roots. Coinciding with these investigations, it has been described that the use of boric acid H3BO3 inhibits the cellular proliferation of some prostate and breast cancers (Meacham et al., en: Advances in Plant and Animal Boron Nutrition, Pp: 299-306; Springer 2007).

With this in mind, Doctors Bonilla and Bolaños have proposed a model describing the need for proper boron nutrition in animals too. (Plant, Signaling & Behavior, Vol. 3; 2008), This model is based on the role of the dietary element as an stabilising factor for membrane glycoproteins involved in the communication between cells and necessary for the regulation of development procedures and whose lack causes an abnormal cellular proliferation processes.

Journal reference: Plant, Cell & Environment, Vol. 30:1436–1443; 2007

Adapted from materials provided by Universidad Autónoma de Madrid, via AlphaGalileo.

http://www.sciencedaily.com:80/releases/2008/02/080226164521.htm

Centuries-old Maya Blue Mystery Finally Solved

The altar on the Temple of the Warriors at Chichén Itzá upon which human sacrifices were made. The altar was painted blue. After human victims were stripped, painted blue, and thrust back down on the altar, their beating hearts were removed. (Credit: Photo by Dean E. Arnold, Courtesy of Dean E. Arnold)

ScienceDaily (Feb. 28, 2008) — Anthropologists from Wheaton College (Illinois) and The Field Museum have discovered how the ancient Maya produced an unusual and widely studied blue pigment that was used in offerings, pottery, murals and other contexts across Mesoamerica from about A.D. 300 to 1500.

First identified in 1931, this blue pigment (known as Maya Blue) has puzzled archaeologists, chemists and material scientists for years because of its unusual chemical stability, composition and persistent color in one of the world's harshest climates.

The anthropologists solved another old mystery, namely the presence of a 14-foot layer of blue precipitate found at the bottom of the Sacred Cenote (a natural well) at Chichén Itzá. This remarkably thick blue layer was discovered at the beginning of the 20th century when the well was dredged.

Chichén Itzá, one of the Seven Wonders of the Ancient World, is an important pre-Columbian archeological site built by the Maya who lived on what is now the Yucatán Peninsula of Mexico.

The findings from this research will be published online Feb. 26, 2008, by the prestigious British journal Antiquity and will appear in the print version of the quarterly journal to be released in early March.

According to 16th Century textual accounts, blue was the color of sacrifice for the ancient Maya. They painted human beings blue before thrusting them backwards on an altar (see below for image) and cutting their beating heart from their bodies. Human sacrifices were also painted blue before they were thrown

into the Sacred Cenote at Chichén Itzá. In addition, blue was used on murals, pottery, copal incense, rubber, wood and other items thrown into the well.

The new research concludes that the sacrificial blue paint found at this site was not just any pigment. Instead, it was the renowned Maya Blue -- an important, vivid, virtually indestructible pigment.

Maya Blue is resistant to age, acid, weathering, biodegradation and even modern chemical solvents. It has been called "one of the great technological and artistic achievements of Mesoamerica."

Scientists have long known that the remarkably stable Maya Blue results from a unique chemical bond between indigo and palygorskite, an unusual clay mineral that, unlike most clay minerals, has long interior channels. Several studies have found that Maya Blue can be created by heating a mixture of palygorskite with a small amount of indigo, but they have not been able to discover how the ancient Maya themselves actually produced the pigment.

The new research shows that at Chichén Itzá the creation of Maya Blue was actually a part of the performance of rituals that took place alongside the Sacred Cenote. Specifically, the indigo and palygorskite were fused together with heat by burning a mixture of copal incense, palygorskite and probably the leaves of the indigo plant. Then the sacrifices were painted blue and thrown into the Sacred Cenote.

"These sacrifices were aimed at placating the rain god Chaak," said Dean E. Arnold, Professor of Anthropology at Wheaton College, Research Associate at The Field Museum and lead author of the study. "The ritual combination of these three materials, each of which was used for healing, had great symbolic value and ritualistic significance.

"The Maya used indigo, copal incense and palygorskite for medicinal purposes," Arnold continued. "So, what we have here are three healing elements that were combined with fire during the ritual at the edge of the Sacred Cenote. The result created Maya Blue, symbolic of the healing power of water in an agricultural community."

Rain was critical to the ancient Maya of northern Yucatan. From January through mid-May there is little rain -- so little that the dry season could be described as a seasonal drought. "The offering of three healing elements thus fed Chaak and symbolically brought him into the ritual in the form a bright blue color that hopefully would bring rainfall and allow the corn to grow again," Arnold said.

Museum collections play key role

One of the keys to solving the mystery of Maya Blue production was a three-footed pottery bowl (Field Museum catalog number 1969.189262; see below for reference to image) containing rarely preserved copal dredged from the Sacred Cenote at Chichén Itzá in 1904 and traded to The Field Museum in the 1930s. Preserved in the copal were fragments of a white substance and blue pigment. Using The Field Museum's scanning electron microscope, the authors studied these inclusions and found signatures for palygorskite and indigo. From this they concluded that the Maya produced Maya Blue as part of their sacrificial ceremonies.

"This study documents the analytical value of museum collections for resolving long-standing research questions," said Gary Feinman, Curator of Anthropology at The Field Museum and co-author of the study.

But other knowledge was necessary to understand the significance of the bowl and the hardened copal it contains.

"This study required documentary, ethnographic and experimental research to establish the full context and use of the artifacts," Feinman said. "Our work emphasizes the potential rewards of scientific work on

old museum collections. It also shows that scientific analysis is necessary but not sufficient for understanding museum objects."

It is this broad knowledge coupled with the scientific analysis that has enabled the scientists to finally -- after more than 100 years -- explain the thick layer of blue precipitate at the bottom of the Sacred Cenote at Chichén Itzá.

Already knowing that Maya Blue was central to Maya ritualistic sacrifices together with discovering that the pigment was produced right beside the Cenote solved the mystery of the 14-foot layer of blue precipitate: So many sacrifices -- from pots to more than 100 human beings -- were thrown into the Sacred Cenote that ultimately a layer of the pigment washed off the sacrifices and settled at the bottom of the well. (Although fully formed Maya Blue is extremely durable, it can be washed off with water, especially if there is no binder to help it adhere to the object on which it is placed.)

Other objects in The Field Museum's collections may reveal more information about Maya Blue, the scientists said. For example, identification of the plant materials on the bottom of the copal incense in other bowls dredged from the Sacred Cenote at Chichén Itzá could reveal which portions of the indigo plant were used to make Maya Blue.

"The Field Museum's collection was critical in solving this mystery," Arnold concluded. "This bowl has been in the collection for 75 years yet only now have we been able to use it in discovering the ancient Maya technology of making Maya Blue."

The other co-authors of this research are Jason Branden from Northwestern University, and Patrick Ryan Williams and J.P. Brown, both from The Field Museum.

Adapted from materials provided by Field Museum, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com:80/releases/2008/02/080226162953.htm

Rats On Islands Disrupt Ecosystems From Land To Sea, Researchers Find

Graduate student Carolyn Kurle holds one of the many rats of Rat Island. The rat was trapped and anesthetized as part of a tracking study. Photo by Shauna Reisewitz. (Credit: Image courtesy of University of California - Santa Cruz)

ScienceDaily (Feb. 28, 2008) — Seabird colonies on islands are highly vulnerable to introduced rats, which find the ground-nesting birds to be easy prey. But the ecological impacts of rats on islands extend far beyond seabird nesting colonies, according to a new study by researchers at the University of California, Santa Cruz.

The study* has already helped make the case for the first major rat eradication effort in the Aleutian Islands. Planned to begin this summer, the project will target rats on the appropriately named Rat Island.

The UCSC researchers found that the presence of rats on islands in the Aleutian Archipelago dramatically alters the intertidal zone, reducing the amount of seaweed and increasing the numbers of snails, barnacles, and other invertebrates. These changes result from the decimation of seabird populations by the rats, according to graduate student Carolyn Kurle, who led the study.

"When you're on an island with rats, there are so few birds it's silent, in contrast to the cacophony on the islands without rats," Kurle said.

Some of the affected birds--sea gulls and oystercatchers, in particular--are major predators of invertebrates in the intertidal zone. In their absence, the snails, limpets, and other grazers increase in abundance, eat more algae, and clear more space for other invertebrates to settle and grow. The result is a shoreline practically stripped bare of the usual cover of fleshy algae (i.e., seaweed).

"Where there are no rats, we found plenty of birds, fewer invertebrates, and a lot more algal cover," Kurle said.

Kurle's coauthors are associate professor Donald Croll and assistant adjunct professor Bernie Tershy of UCSC's Department of Ecology and Evolutionary Biology. Croll and Tershy are also the cofounders of Island Conservation, a nonprofit organization dedicated to the protection and restoration of island ecosystems. For the Aleutian Island rat eradication project, Island Conservation has teamed up with the Nature Conservancy and the U.S. Fish and Wildlife Service.

"Our research is giving us a better understanding of the impacts of introduced rats, and by working directly with government agencies and nongovernmental organizations we're able to do something about it," Croll said.

The study describes an elegant example of an ecological phenomenon known as a trophic cascade. "In a trophic cascade, you have an apex predator--in this case, the rat--and because of what that predator eats, you get a cascade of effects that go down through lower levels of the food chain," Kurle said. "This is a clear example of a trophic cascade that crosses between terrestrial and marine ecosystems."

Kurle spent three summers conducting intertidal surveys on 32 islands in the Aleutian Archipelago--17 with rats and 15 without. At first, camping on rat-infested islands was disconcerting, she said. She had to wear ear plugs the first few nights because the sound of rats rustling around outside the tent was keeping her awake. But she soon got used to it.

"We had to be careful with food and trash, but they never got into the tent or anything," Kurle said. "They come out as soon as it starts to get dark, and we would see them running around everywhere. We spent several nights watching them through night-vision binoculars." The researchers found large numbers of dead birds partially eaten by rats on the islands. The rats mainly attack the chicks, but may also go after adults, Kurle said. Very few birds manage to breed successfully on the rat-infested islands.

Another recent paper from Croll and Tershy's group provides a global overview of the direct effects of invasive rats on seabirds. Published in the February issue of Conservation Biology, the paper reviews the findings of 94 published studies. First author Holly Jones was an intern with Island Conservation as an undergraduate at UCSC and is now a graduate student at Yale University. Coauthors include Croll, Tershy, and Erika Zavaleta, assistant professor of environmental studies at UCSC.

"This is a large-scale analysis showing that rats have preyed on 75 species of seabirds in 10 families on islands throughout the world. The hardest hit seabirds are the small, hole-nesting species like petrels and auklets," Croll said.

The good news is that rats can be eradicated from islands. Island Conservation has led successful eradication efforts on islands off the coast of Mexico and on Anacapa Island, one of the Channel Islands off southern California, Croll said. Worldwide, rats have been removed from more than 274 islands, according to the Nature Conservancy.

"It's been done many times," Croll said. "What's interesting is the synergy between the research and the conservation efforts. Academic researchers tend to do studies and publish them, and then nothing happens. So it's very exciting for our students to see that their research can tie in directly with the conservation mission of a large organization like the Nature Conservancy."

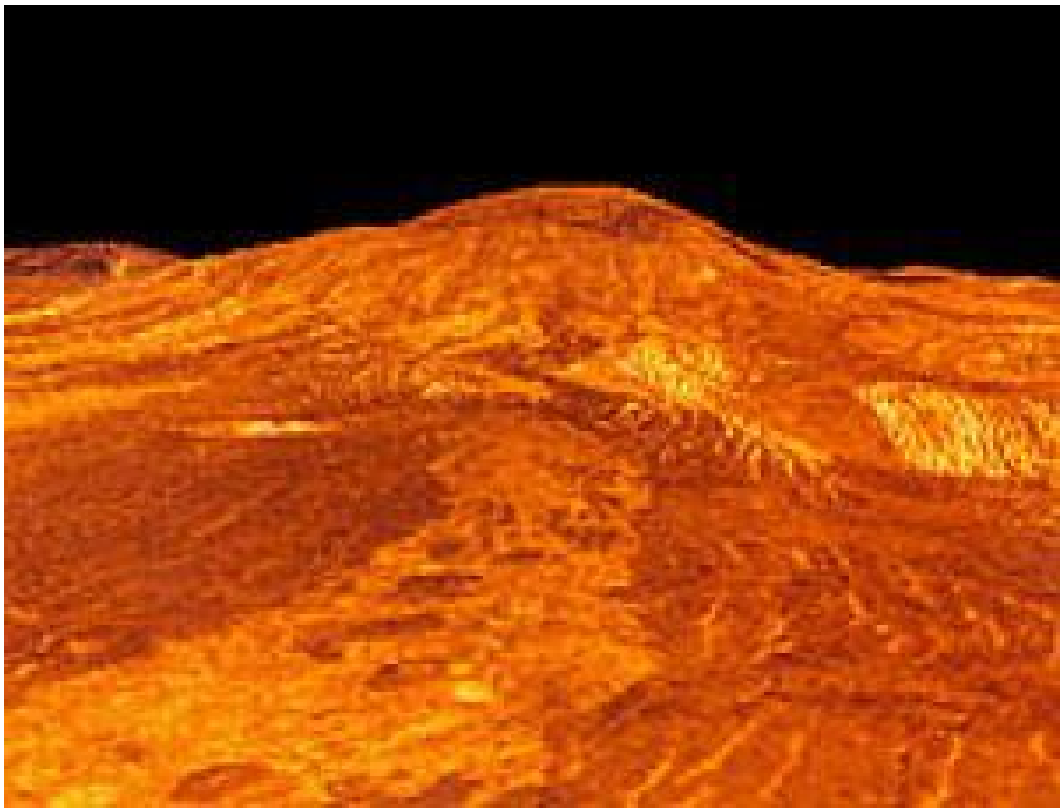
The Aleutian Islands are part of the Alaska Maritime National Wildlife Refuge managed by the U.S. Fish and Wildlife Service (USFWS). Kurle's research was supported in part by grants from USFWS and the National Science Foundation and by an EPA STAR Fellowship.

*This research will be published the week of February 25, 2008, in the Proceedings of the National Academy of Sciences.

Adapted from materials provided by University of California - Santa Cruz.

http://www.sciencedaily.com:80/releases/2008/02/080225213745.htm

Did A Mega-collision Alter Venus?



NASA radar image of Venus. (Credit: JPL, NASA)

ScienceDaily (Feb. 27, 2008) — A mega-collision between two large embryonic planets could have created Venus as we know it, according to a new paper by a Cardiff University scientist.

Venus is a sister planet to Earth. It is nearly the same size and density yet it has a surface temperature of 720 K, an atmosphere dominated by carbon dioxide and no evidence of oceans or ridges. It has been described as "Earth's evil twin".Dr Huw Davies, of the School of Earth and Ocean Sciences argues that a mega-collision could explain these differences. In particular the collision could explain why the interior of Venus is dry, the odd rotation of the planet and the carbon dioxide atmosphere.Dr Davies of the School of Earth and Ocean Sciences said: "A collision theory has been explored by scientists previously but was abandoned as the planet Venus has no moon usually expected from such an impact. However, a mega-impact could have created Venus, since the head-on collision I propose does not produce a moon."The hot ball of gas and liquid that would result immediately following the collision would allow iron to react away the water, leaving Venus a dry planet. Significant suggested consequences of a dry planet include the lack of plate tectonics, continents and life.Dr Davies' research is published in the journal Earth and Planetary Science Letters.

Adapted from materials provided by Cardiff University.

http://www.sciencedaily.com:80/releases/2008/02/080226160017.htm

Youngest Patient Worldwide To Have Auditory Implant In The Brain Stem

Child with her parents. University Hospital of Navarra successfully operated on the youngest patient worldwide to have auditory implant in the brain stem. (Credit: Image courtesy of Basque Research)

ScienceDaily (Feb. 27, 2008) — A team of ear, nose and throat specialists and neurosurgeons at the University Hospital of Navarra, led by doctors Manuel Manrique Rodríguez, specialist in ear, nose and throat surgery and Bartolomé Bejarano Herruzo, specialist in paediatric neurosurgery, have successfully operated on a 13 month-old girl from Murcia, who had been born deaf due to the lack of auditory nerves. She is the youngest patient in the world who has received an auditory implant in the brain stem. As a result of the operation, the child has begun to hear and started language development.

Previously, the medical centre had carried out, also successfully, a similar procedure on girl of eight years. Throughout the world there have only been 38 brain stem implants in children under the age of 12.

In the case in hand, the child was born with a congenital illness characterised by the absence of the cochlear (auditory) nerves which have the task of transmitting to the brain the sound stimuli received by the auditory passage from the exterior. It is notable that the rate of this disorder in the overall population is very low, estimated at one in every 100,000 newly born babies.

Surgical procedure

The auditory nerves which, in the case of the girl from Murcia were nonexistent, connect the most external part of the auditory passage (outer, middle and inner ear) with the cochlear nuclei located in the brain stem, one of the centres of the auditory passage where information received from the outside is processed.

The absence of the cochlear or auditory nerve makes it impossible for the brain of those affected by this pathology to process the sound arriving from the exterior. This is why the treatment consists of directly stimulating the cochlear nuclei and the operation involves implanting electrodes onto these nuclei, in the

brain stem of the brain, so that the complete auditory passage function is restored, enabling the electric impulses to arrive at the auditory cortex (of the brain), where meaning is conferred to the stimuli arriving.

Thus, the first phase of the operation, undertaken by the University Hospital team last October, involved implanting a plate of electrodes into the cochlear nuclei of the child. In order to place these electrodes there, access to the brain stem was effected by means of open cranial surgery of 3cm x 3 cm, thus enabling the brain surgeon to slightly retract the cerebellum to gain access to the exact spot where the implant had to be placed.

Once the electrodes' system is installed and while the operation was taking place, stimulation tests on the device were undertaken in order to confirm the exact position where it had to be placed. One by one the 22 electrodes making up the implant were stimulated in order to check the auditory response. To this end, electroneurophysiological control was carried out in which Audiology and Neurophysiology teams took part. This intraoperational control of the stimulation of the electrodes and the auditory response obtained by each one of these enabled to reposition the implant 'in situ', during the operation, until getting the right spot.

Very important activations

The operations with children carried out to date at the University Hospital have achieved highly favourable activations of the electrodes. Generally speaking, of the 22 electrodes implanted, the average activation without side effects is about 10. In both the operations they have undertaken they managed to stimulate 15 and 18 electrodes respectively.

During this operation a receiver-emitter was placed subcutaneously in the head of the patient and connected by a wire to the electrode device. This receiver is what obtains the sound of the other device located on the outside of the head of the child and which transmits sound to the interior by radio-frequency waves.

The external apparatus also has a microphone located behind the ear of the patient and which, in turn, is connected to a processor, required to modulate the characteristics of the sound signals received through the microphone.

The task of the internal receptor is to decode the signal received from the exterior and transform it into electrical impulses that arrive codified at each one of the electrodes. This is when the child receives a stimulus that propagates through the auditory passage to the brain, where the electrical impulses received are processed.

In the last phase of the procedure, carried out in January 2008, the parameters of stimulation to be imprinted in the implanted device, namely intensity and velocity, were determined.

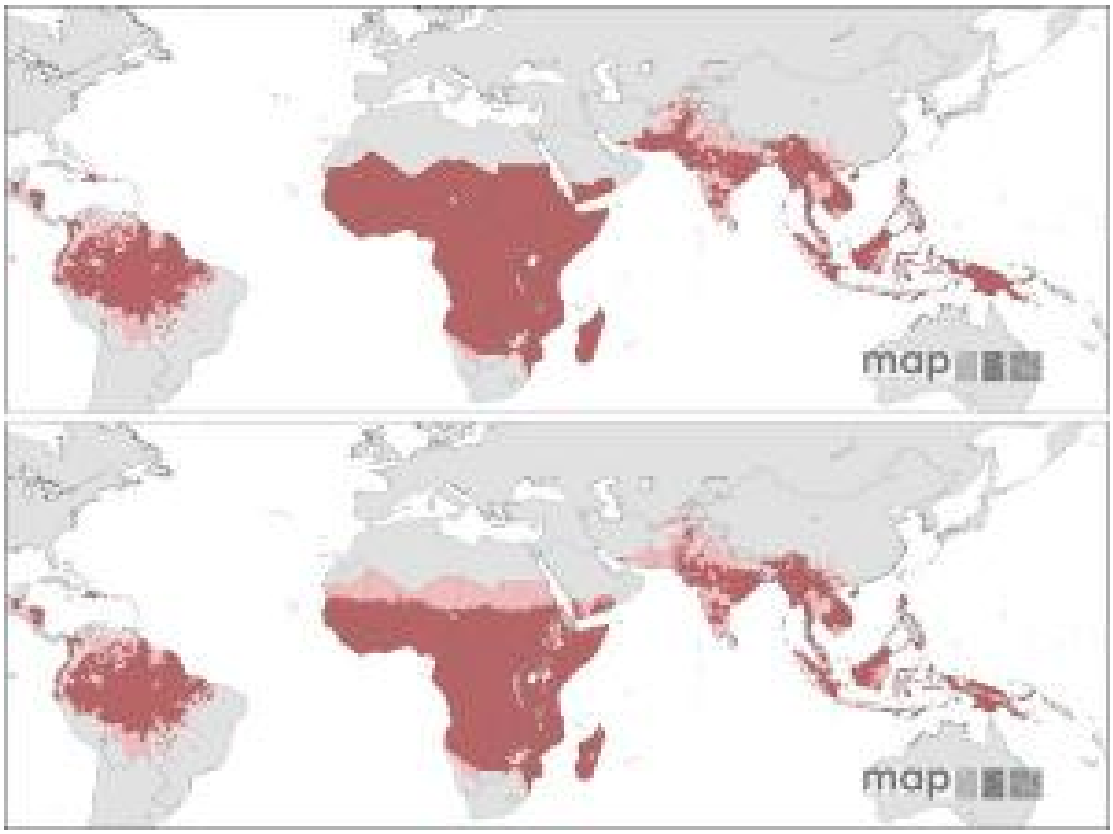
Auditory verifications

During the post-operational monitoring of this patient, it was observed that the child has begun to receive sounds and has even started to produce them. This is highly encouraging. The specialists have emphasised the importance of carrying out these operations at an early age when the capacity for learning is greater and the functional structure of the auditory centres is better prepared for receiving acoustic information.

Adapted from materials provided by Basque Research.

http://www.sciencedaily.com:80/releases/2008/02/080226101342.htm

First Global Malaria Map In Decades Shows Reduced Risk



P. falciparum Malaria Risk Defined by Annual Parasite Incidence (top), Temperature, and Aridity (bottom). (Credit: The Limits and Intensity of Plasmodium falciparum Transmission: Implications for Malaria Control and Elimination Worldwide Guerra CA, Gikandi PW, Tatem AJ, Noor AM, Smith DL, et al. PLoS Medicine Vol. 5, No. 2, e38 doi:10.1371/journal.pmed.0050038)

ScienceDaily (Feb. 27, 2008) — About 35 percent of the world's population is at risk of contracting deadly malaria, but many people are at a lower risk than previously thought, raising hope that the disease could be seriously reduced or eliminated in parts of the world.

So concludes a group of researchers, including a scientist in the University of Florida Emerging Pathogens Institute, who spent three years producing the first spatial map of global malaria risk in four decades.

The Malaria Atlas Project, or MAP, found that 2.37 billion people were at risk of contracting malaria from Plasmodium faciparum, the most deadly malaria parasite for humans transmitted through the bites of infected Anopheles mosquitoes. Of that number, about 1 billion people live under a much lower risk of infection than was assumed under the previous historical maps. The lower than expected risk extends across Central and South America, Asia and even parts of Africa, the continent where malaria kills the vast majority of its victims and where risk has historically been classified as universally high.

The MAP also highlights potential problems facing countries currently aiming to eliminate malaria. For example, Saudi Arabia is currently providing substantial financial support for the elimination of malaria in its neighbour, Yemen. However, the new research shows how high rates of population inflow from Somalia will pose a continued concern due to the potential reintroduction of the parasite. Similar dilemmas are faced by countries in south east Asia.

"This gives some hope of pursuing malaria elimination because the prevalence isn't as universally high as many people suppose," said David Smith, a UF associate professor of zoology and a co-author of the

paper. "It's reasonable to think we can reduce or interrupt transmission in many places, but the prospects for success will improve if we make plans that are based on good information about malaria's distribution."

The MAP effort, a collaboration between Oxford University and the Kenyan Medical Research Institute, compiled information from national health statistics, tourist travel advisories, climate, mosquito vectors and surveys of malaria infection in nearly 5,000 communities and 87 countries. The project also incorporated information about how climatic conditions affect mosquito life cycles, and thus the likelihood of active transmission.

"One of my contributions was to help standardize prevalence estimates," Smith said.

The new map is important in part because it offers hope that malaria could be eliminated in certain areas using currently available tools, such as bed nets treated with insecticide that kills mosquitoes, the researchers said. It will also help donors and international agencies target investments in control measures where they are most likely to achieve the biggest gains.

More than 500 million cases of malaria are reported annually. Of those afflicted, about one million die; 80 percent of them are children in sub-Saharan Africa.

"Making data and maps more accessible on the worldwide web is a large part of the MAP's philosophy of getting the science accessed, critiqued and used by a much wider range of users," said the lead author of the paper, Carlos Guerra, of the University of Oxford.

Journal reference: Guerra CA, Gikandi PW, Tatem AJ, Noor AM, Smith DL, et al. (2008) The limits and intensity of Plasmodium falciparum transmission: Implications for malaria control and elimination worldwide. PLoS Med 5(2): e38 (doi=10.1371/journal.pmed.0050038)

The research was funded by the Wellcome Trust. In accordance with the trust's philosophy on open access, all the data and techniques tapped in the MAP are freely accessible via the project's Web site at http://www.map.ox.ac.uk.

Adapted from materials provided by University of Florida.

http://www.sciencedaily.com:80/releases/2008/02/080225213650.htm

New Gadget Lets You Track Your Carbon Footprint

Carbon Hero, a personal carbon calculator, consists of a sensor (left) which detects movements by use of satellite navigation data. The carbon footprint is then displayed on a mobile phone (right). (Credit: www.CarbonHero.net)

ScienceDaily (Feb. 27, 2008) — An innovation called Carbon Hero may help reduce global warming by making people more aware of their carbon footprint. Regional prize winner in the 2007 European Satellite Navigation Competition, sponsored by ESA's Technology Transfer Programme, the device uses satellite navigation technology to track journeys.

Concerned about global warming, many people are now looking for ways to reduce their generation of carbon dioxide (CO_2). One option is to use public transport and limit journeys by car and plane; however, although this can significantly reduce each person's carbon footprint, until now the benefits have been difficult to measure.

"With Carbon Hero calculating your carbon footprint is easy," explains Andreas Zachariah, a graduate student from the Royal College of Art in London and inventor of Carbon Hero. "This easy-to-use mobile system uses satellite navigation data to calculate the environmental impact of travel. With its specialist database and algorithm, it can determine the mode of transport and its environmental impact with almost no user input."

It was back in 2006, that Andreas Zachariah came up with the idea of a small and practical device to track personal CO_2 emissions during travel. It determines the carbon footprint of travellers using different modes of transport by using satellite navigation data to measure the distance, identify the type of transportation and calculate the amount of CO_2 released into the atmosphere through travel.

In April 2007, Oxford graduate student Nick Burch joined Zachariah in his effort to bring Carbon Hero to life. Burch has produced a number of open source, mobile and navigation location-based applications and with this expertise the team developed the device.

"We have now tested our application using GPS and it has proved to be very efficient. Once Galileo, the European global navigation satellite system, becomes fully operational its increased accuracy will aid Carbon Hero to measure journeys and then determine their carbon footprint," says Zachariah.

Galileo, a joint initiative of the European Commission and ESA, will provide a highly accurate, guaranteed global positioning service under civilian control. The system will deliver real-time positioning accuracy down to better than one metre, a range unprecedented for a publicly available system, and by using dual frequencies Galileo will guarantee worldwide high-integrity (Safety-of-Live Service) for

safety-critical applications, such as maritime, aviation and rail, where guaranteed accuracy and availability is essential.

Calculating journeys in carbon terms

With Carbon Hero, to see the effect a journey is having on the environment you just need to look at your mobile phone. “The feedback loop is almost immediate,” says Zachariah.

It is also educational in that by giving an idea of the environmental impact of different types of transport - whether by train, plane, bike or by foot - it allows users to easily compare one kind of travel with another and calculate the environmental benefits daily, weekly and monthly.

“If you go on a diet you want to see if all that effort has made a difference so you weigh yourself. The beauty of our system is that it’s easy; you have a ’weighing scale’ on you all the time giving you your carbon footprint. When you make the effort to walk instead of taking the car you can immediately see the result, so it feels more worthwhile doing it and you are more likely to stick with it,” says Zachariah.

To be tested in industry

Zachariah and Burch have filed a patent for their invention and they plan to have Carbon Hero ready for beta-testing in a company by the beginning of the next UK financial year in April 2008. It will then be used to track a team, a department or the whole company throughout the financial year.

“We are now in a closed beta-testing phase verifying that all works well, fixing problems and improving the application. It is a live and kicking application working on mobile cellular phones; it has already been tested on the Nokia platform now we are moving to Blackberry,” says Burch.

Sustainability is an important issue for governments, consumers, businesses and employees. Companies now want to show the efforts they are taking to reduce their carbon footprint.

“Green credentials don't just attract customers; they also attract employees who may have gone elsewhere," says Zachariah. “Companies that use Carbon Hero could present the results in their annual report, together with other ways in which they are helping the environment. It is easy to document carbon emissions from heating and electricity; now with Carbon Hero, companies can also document CO_2 emissions from business travel. I'm also immensely proud that the EU has shown leadership with its '20% by 2020' carbon reduction goal”.

In addition to winning a regional prize in the 2007 European Satellite Navigation Competition, Carbon Hero was awarded the British Standards Institute (BSI) prize for Sustainability Design in July last year. It was a finalist in the 2007 Oxygen Awards and Deutsche Bank Pyramid Awards, and also invited to enter the Saatchi & Saatchi World-Changing Ideas Awards. It is now in the closing rounds of the 2008 St. Andrews Environmental Prize.

Adapted from materials provided by European Space Agency.

http://www.sciencedaily.com:80/releases/2008/02/080225122328.htm