Infoteca's E-Journal

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

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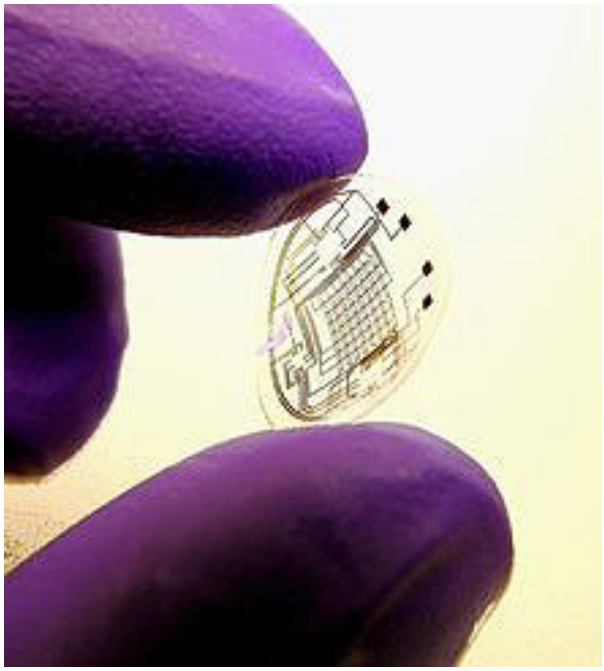
How to Build a Bionic Eye
Researchers have created an electronic contact lens that could be used as a display or a medical sensor.
By Kate Greene



People don't think twice about wearing a Bluetooth headset to have conversations on their cell phones. Well, one day it might not be unusual to wear a contact lens that projects the phone's display directly onto the eye. Researchers at the University of Washington have taken an important first step toward building contact lenses that could do just that. By incorporating metal circuitry and light-emitting diodes (LEDs) into a polymer-based lens, they have created a functional circuit that is biologically compatible with the eye.

"If you look at the structure of a lens, it's just a simple polymer," says Babak Parviz, professor of electrical engineering at the University of Washington. A number of researchers are putting electronics into polymers to build flexible circuits or displays, for instance. "What we realized was, we can make a lot of functional devices that are really tiny, and they can be incorporated into a contact lens to do a lot more than just improve vision," Parviz says.

The team created the electronic lens with two main purposes in mind, he says. One of the goals was to see if it would be possible to build a heads-up display that could superimpose images onto a person's field of view, while still allowing her to see the real world. It would be a sort of augmented reality, explains Parviz. (See "TR10: Augmented Reality.") Soldiers could use the technology to see information about their environment, collected from sensors. Or civilians could use the electronic lens as a cell-phone display, to see who is calling and to watch videos during a commute, although these goals are long term, he says.

Another possible application is to use the lens as a sensor that could monitor chemical levels in the body and notify the user if they indicate signs of disease. Although Parviz won't go into details about the specific sensors that his team is making, he explains that many indicators of health can be monitored from the surface of the eye. The live cells on the eye, he says, are in indirect contact with blood serum, which contains biomarkers for diseases. If a sensor designed to pick up these biomarkers was built into a lens, then doctors could have a completely new, noninvasive tool for disease tests. In addition, the lens could continually monitor changes over time, providing a more complete view of a person's health.

Admittedly, these applications are years away. But Parviz and his team have laid the foundation for the work. In a paper presented at the International Conference of Micro Electric Mechanical Systems in Tucson, AZ, last week, the researchers describe how they created a lens with 16 working LEDs. The lens was made from a polyethylene tetraphthalate substrate--the kind of plastic used in beverage bottles--which was covered with metal wires for connecting the LEDs.

In addition to wires, the researchers used chemicals to carve out circular indentations in which the LEDs would be placed. Parviz notes that one challenge in building working electronics and opto-electronics into plastic is that these devices must be made with high heat that would melt the plastic. To get around this problem, his team fabricated LEDs on a separate substrate, ensuring that the devices could easily be removed and transferred onto the plastic lens.

Next, the researchers coated the fully assembled electronic lenses with polymethyl methacrylate (PMMA), a biocompatible material. PMMA is also used to coat hard contact lenses, says Parviz, making his lenses more similar to hard contacts than the soft contacts worn by most people today. In the final step, the researchers molded the plastic into the shape of a lens.

When the team tested the lenses, the circuit was viable and the LEDs lit up. The researchers also placed the lens in a rabbit's eye for 20 minutes and found no adverse effects. However, they did not turn on the electronics while the lens was in the rabbit's eye. "I think we have to be careful about what happens to the eye when it turns on," says Parviz. "It's a functioning circuit. It could generate some heat. We need to take all the possible precautions to make sure this is safe." While it's true that the human body can withstand a range of temperatures, ultimately the circuits must be designed to consume ultralow amounts of power.

"The idea of building a circuit into a contact lens is interesting--it catches the attention," says George Whitesides, a professor of chemistry at Harvard who is not affiliated with the project. "It has been something that others have certainly talked about, but I, at least, have never seen any kind of implementation." Whitesides adds that this is an early step, and there is still the issue of providing power to the lens while it is in the eye. In addition, the University of Washington prototype does not have a clear function.

One of the next steps for the team will be to increase the number of LEDs on the lens to a couple hundred, in the hope of making a viable display. Right now, the LEDs are about 300 micrometers in diameter, which obviously limits the number of them that can be put on a lens. In addition, LEDs this size tend to break in the lens-shaping process. Parviz's team will try to shrink the LEDs to 30 micrometers in future experiments, which could enable the lens to display a few hundred pixels, he says.

http://www.technologyreview.com:80/Infotech/20113/?a=f

DANCE

Time to Retire Those Sets and Tutus
By CLAUDIA LA ROCCO

THE aggressively angled, jazzy bodies and sexual playfulness in "Rubies," the centerpiece of George Balanchine's 1967 ballet "Jewels," still make audiences' eyes pop. Like much of his choreography in New York City Ballet's current season, they seem ever fresh.

Then there is the matter of what surrounds this fabulous movement: the extra-choreographic elements that contribute to a complete artwork. From tiaras and puffed sleeves to backdrops that make the dancers look as if they have been plunked inside precious stones, the designs, for some, are at odds with Balanchine's sophisticated choreography. (The "Jewels" set was updated four years ago by the original designer, Peter Harvey. The Karinska costumes remain.) "It's embarrassing to everybody who has visual taste," the Italian choreographer Luca Veggetti said with a laugh.

In the early 20th century the impresario Serge Diaghilev employed artists like Picasso and Matisse for his Ballets Russes. The results were not always successful, and Balanchine's Ballets Russes tenure may have exhausted his interest in extravagant designs, which sometimes overwhelmed the choreography. But the attempt at innovation was there. Too often today, in a field beset by box office pressures and fealty to tradition, it is not.

"Ballet remains trapped in 19th-century conventions," said Mr. Veggetti, who regularly collaborates with filmmakers, photographers and videographers but usually designs his own sets and costumes. "Those big productions we see — really, they're just not very good, even as stage design."

Christopher Wheeldon, who is concluding his residency with City Ballet to focus on Morphoses/The Wheeldon Company, said people in ballet "almost have been trained, particularly in the house of Balanchine, to disregard the design.

"It's O.K. that it's not that great because what's within it is just so beautiful," said Mr. Wheeldon, whose first collaborating artist in Morphoses was the couture designer Narciso Rodriguez. But insiders, he added, forget that the public sees the overall picture.

"I put a lot of thought into how the light corresponds with the hue of the costumes and, if we can only do a leotard, how can we make it sculptural and interesting?" he said, referring to his company's tight finances. "If the design is good, it can hold the interest in another way."

The success of any art is subjective, and most viewers can list their choices for hideously ill-conceived designs. But to some, ballet visuals are particularly stodgy.

In opera "people expect and anticipate and argue" about new stagings, the choreographer Mark Morris said. "Hooray. A civilization exists." But "a ballet crowd, as defined, won't accept a new thing," he added. "It's like, 'How dare they use those black tutus for 'Swan Lake'?"

Mr. Morris blames "sheltered dancers," "crazy balletomanes" and "traditionally conservative boards and ballet masters." He also pointed to gatekeepers like the Balanchine Trust, whose control has led to work he called "very much ossified."

Not all dancers prefer the status quo. "There's nothing worse than wearing Easter-egg yellow and the blue tights," Mr. Wheeldon said. "You just think, 'Oh really, you want me to put that on?' "

He said that visual innovation is often "frowned upon" in the field and that commissioned scores eat up budgets, leaving little money for design elements. "There's a little bit of an attitude, 'Oh, well, they're just doing that to hide some kind of weakness choreographically,' " he said. "There's a snobbery that ballet doesn't need that; it's just fine as it is."

He cited the influence of Balanchine, who was not particularly attuned to décor, as a factor. Many of his works — the "leotard ballets" — are famously stripped down; others feature variations on "the chiffon skirt and standard ballet bodice," Mr. Wheeldon said. "People became really invested in that aesthetic, and nobody questions the fact that all the girls in the corps are wearing bubble-gum pink and that they look like meringues."

City Ballet's general manager, Kenneth Tabachnick, who has worked extensively as a lighting designer, cautioned against generalizing about a Balanchine aesthetic (his catalog lists 465 dances) or his impact on an entire field. But Betsy Erickson, a ballet master at San Francisco Ballet, also noted Balanchine in talking about the greater emphasis on design in European ballet, as opposed to American.

She further hypothesized that "there is not as much crossover with the modern world" in the United States as there is in Europe, so innovation has been slower to reach American ballet. Modern dance — from Martha Graham's, Merce Cunningham's and Trisha Brown's collaborations with major visual artists to periodic re-examinations of the proscenium stage to today's do-it-yourself aesthetic — has more consistently addressed design.

Leslie Norton, an associate professor of dance at Hamilton College in Clinton, N.Y., agreed. "As far as anything innovative in art, it's not happening in ballet the way I think it's happening in modern dance," she said. "Ballet is in a very conservative mode right now."

She cited productions like American Ballet Theater's new "Sleeping Beauty" last spring, which drew unfavorable comparisons with Thomas Kinkade's paintings and Disney animation. "Surely Walt's artists would have imitated Corot much less crudely," Alastair Macaulay wrote in The New York Times.

Ballet Theater's artistic director, Kevin McKenzie, defended the production. "It was a conscious choice to go storybook," he said. "We try as much as possible, at American Ballet Theater, to keep things relevant but stay close to the original concept. The classics are the springboard."

This emphasis, Professor Norton said, is a problem. As companies rely on classic story ballets for box office hits, she said, art gets left behind.

"People want to go see full-length ballets and spectacle, the same way they want to see 'Phantom of the Opera,' " she said. "The level of ballet technique keeps getting higher and higher, but you look back to some of the Diaghilev ballets, and they brought in the latest artistic concepts, the latest literary concepts, and really challenged you. They weren't geared toward children, even with fairy tales."

High-profile collaborations still occur. The painter Chuck Close designed backdrops for Jorma Elo's "C. to C. (Close to Chuck)," which had its premiere with Ballet Theater in the fall and boasted Ralph Rucci costumes and a Philip Glass score. Mr. Close called the work a true collaboration, but it was striking to hear the disparity between his description of design meetings for the ballet, orchestrated by Ballet Theater, and the beliefs he shared with the artists he worked with in his youth. Some critics questioned the ballet's overall coherence.

Peter Martins of City Ballet worked with the Danish painter Per Kirkeby for his "Swan Lake" in 1996 and "Romeo and Juliet" last spring, but the designs were not well received. In tinkering with existing war horses or engineering inorganic collaborations, ballet too often puts itself in an awkward in-between place, neither here nor there. This is hardly a recipe for good art, innovative or not.

"A visual artist has his own universe," Mr. Veggetti said. "If you want to approach it, you have to understand it, first of all, and see how that universe can approach yours."

"The art of the theater," he said, "is an art apart."

http://www.nytimes.com/2008/01/27/arts/dance/27laro.html?_r=1&ex=1359176400&en=06700eaae4b6ce6f&ei=5088&partner=rssnyt&emc=rss&oref=slogin

Sundance win for immigrant film
Frozen River, a story about smuggling immigrants into the US, has won a top prize at the Sundance Film Festival.

Jury member Quentin Tarantino said the film, written and directed by Courtney Hunt, "was one of the most exciting thrillers I am going to see this year". The film won the grand jury prize for drama at the independent US festival.

Tia Lessin's and Carl Deal's film Trouble the Water won best US documentary for its portrayal of the aftermath of Hurricane Katrina.

30th anniversary

The audience award for best drama, voted for by festival-goers, went to Jonathan Levine's The Wackness. The film focuses on the relationship between a teenage marijuana dealer and his pot-smoking psychiatrist - played by Sir Ben Kingsley. Environmental film Fields of Fuel won the audience prize for best US documentary.

"May we work together to create a green and sustainable planet for our children," said director Josh Tickell. The festival, launched by Robert Redford as a low-key event for arthouse films in 1978, now attracts Hollywood stars including Tom Hanks, Robert De Niro and Sir Ben Kingsley.

Tom Hanks came for the premiere of The Great Buck Howard, in which he co-stars with his son Colin.

Redford's own daughter Amy made her directorial debut with The Guitar at this year's event.

The festival has gained a reputation for being the place where low-key independent movies are discovered before going on to great things.

Little Miss Sunshine, The Blair Witch Project and Reservoir Dogs are among the films that have used Sundance as a springboard to success.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/entertainment/7211833.stm

Published: 2008/01/27 13:05:08 GMT

Baryshnikov at 60: Dancer extraordinaire still on a quest for the next challenge
Sunday, January 27, 2008
By Jane Vranish, Pittsburgh Post-Gazette

Stephanie Berger
Mikhail Baryshnikov

Happy birthday, Misha.

Today Mikhail Baryshnikov celebrates his 60th, a landmark that some of us greet with a sigh of relief, which is generally accompanied by a few extra creaks in the joints. But the dance superstar who once thrilled audiences with unidentifiable jumps doesn't seem to be prone to prop his feet up anytime soon.

The gypsy in this dancer's soul has taken him on an unparalleled journey, as actor, artistic director and producer -- and with his name attached to a line of dancewear and a signature fragrance, Misha.

This grandfather's original ballet partners are long gone from the stage. So are many of his modern dance peers. He has crossed so many artistic boundaries that they simply could not keep up: an Oscar nomination for "The Turning Point," the Emmy Award-winning "Baryshnikov on Broadway," performances on Broadway in "Metamorphosis" and the recent "Beckett Shorts" (which finished Jan. 20), and Carrie's love interest on HBO's "Sex and the City."

In an art form where bodies generally mingle, he has had to go it alone by virtue of his adventuresome artistic nature. Despite a long-term relationship with former dancer Lisa Rinehart, four children, two grandchildren and a few close friends, Baryshnikov's primary love in life has been dance, in any way, shape or form. But he still does a barre every day, and that's where the journey began.

News of a remarkable young dancer began leaking out of the then Soviet Union in the '60s. Pittsburgh Ballet Theatre artistic director Terrence Orr, then a dancer on tour with American Ballet Theatre, sneaked into the men's class, taught by famed teacher Alexander Pushkin. There he saw the young Baryshnikov, set to make his debut with the company a few days later.

"I can still see him, even now," Orr says, recalling Baryshnikov's moves after the class, where he executed a slicing series of double cabrioles across the floor, punctuated by a cambre or back bend. "I had never seen anyone do it quite like that."

New York Times dance critic Clive Barnes also saw Pushkin's class and was the first to write about Baryshnikov, calling him "the most perfect dancer I have ever seen."

But this most perfect dancer was thirsty for new choreography, something that he couldn't find at the Kirov, a company steeped in the tradition and repetition of the classics. By 1974, with the Cold War still an obstacle, he had defected to the West while on tour in Canada.

Baryshnikov joined American Ballet Theatre, where he would spend his golden years, setting new standards for male dancing technique. "He would invent new jumps with a different way of coming down," Orr says. "He never got injured -- he was like a cat."

Audiences flocked to see him, gasping at his newfangled leaps while dance writers scrambled to describe them. Male dancers scrambled, too, to catch up with the Russian star.

But Baryshnikov was proving that he was more than a wind-up doll who could spin like a top and perform a laundry list of acrobatic maneuvers.

When his usual partner, Gelsey Kirkland, was injured, he requested a young Marianna Tcherkassky, now ballet mistress with PBT, to take her place in "Giselle." It would be her debut, at no less a showplace than The Kennedy Center, with only five days to prepare.

It would become Tcherkassky's signature role, and she readily recalls that "he was incredibly supportive in the rehearsal period. I felt like he carried me through that first performance."

She would go on to dance with him many times, most notably in the world premiere of Twyla Tharp's "Push Comes to Shove." Although he was a wonderful partner -- "Everyone could turn with him. ... He understood a woman's center." -- Tcherkassky reveals that "you had to be absolutely on top of your game, just to keep up with him." And he could be moody, but "his soul came out on stage."

Tharp's piece was probably the most successful of his forays into contemporary dance. Critics would consider most other pieces to be beneath his talent. But Baryshnikov persisted, reinventing himself along the way. Tcherkassky and others already knew that he "wanted to push buttons, open envelopes, challenge himself."

In the '70s, he worked with venerable choreographers like Martha Graham and George Balanchine and with rising stars like Eliot Feld. That thirst seemed to be unquenchable. Orr points out that Baryshnikov's brain seemed to go "300 miles an hour."

By the '80s, Baryshnikov was his own boss, artistic director of American Ballet Theatre. One time Orr, now a ballet master, was rehearsing some soloists in the tap dance from Agnes de Mille's "Rodeo." Baryshnikov walked in and picked up the steps in 15 minutes, while the men had been rehearsing for several days.

The Russian also cleaned up the company's technique, offering "brilliant" classes and directing the dancers in the nuances of ballets such as "Raymonda" and his own version of "The Nutcracker."

He quit in 1990 but, never stagnant for long, he paired with young American choreographer Mark Morris in the White Oak Project. Ballet was now behind him, and modern dance, with its contemporary sculptural landscape, loomed ahead. They played arenas at first, appearing here at Star Lake Amphitheatre. McMurray native Emily Coates joined the company in 2002, when Baryshnikov was in the midst of "Pastforward," an exploration of "pedestrian" movement that came to the Byham Theater.

Some audience members grumbled and left. They still expected the princely airs and high-flying jumps.

But Baryshnikov was on a mission, reinventing himself once more. His curiosity was such that any exploration could never be pedestrian to him. His fame was such that he really didn't have to please the audiences. His intelligence was such that he needed to feed it with more and more unfamiliar territory.

Now a graduate of and instructor at Yale University and artistic director of the World Performance Project there, Coates feels fortunate to have joined White Oak just as Baryshnikov was shifting his repertory, downsizing from ultra-large venues to more intimate showcases, moving from showy athletic dancing to more introspective portraits. He "took a leap of faith" with the former New York City Ballet dancer but was pleasantly surprised with her choreographic hunger, not unlike his. Coates was surprised to find that he was at "a really interesting place in his career," taking a still "virtuosic precision" and subjugating it to the psychological undercurrents of the choreography.

For example, Coates was Baryshnikov's partner in Morris' "Duet," which she calls "an onstage dialogue that was as subtle as it was physically rigorous." She equated it to "playing tennis with a partner. You have to up your game out of necessity." Coming from a ballet repertory, she had to learn "how to be more me."

Coates says that Baryshnikov, for all of his fame, was "a remarkably down-to-earth individual. Clearly a lot of the attention was on him in every way. But he still took the bus with us."

When the White Oak Project folded in 2006, Baryshnikov began to devote more time to the Baryshnikov Arts Center, which had opened in 2005 in the heart of Hell's Kitchen in New York City. Geared to the development of young and mid-career artists, collaboration and experimentation were the keys. The veteran dancer formed Hell's Kitchen Dance, created with 13 Juilliard students and using younger choreographers.

Baryshnikov would perform with them.

Aszure Barton, a Canadian dancer, was among the first resident choreographers in this "warm environment." She created "Come In," a solo for Baryshnikov orchestrated by 12 dancers. "It played in and against his age," says Barton.

It was an odd but "incredible experience" working with someone she had idolized since she was a child. But, as an "ego-less" Baryshnikov told Barton, "I'm your dancer -- you tell me what to do." With that he handed the responsibility over to her and never wavered.

Tcherkassky saw him this past summer in Reno, performing with Hell's Kitchen. "To me he looked the happiest he's been in a long time," she says.

Coates adds, "He loves to dance. I'm sure that's what gets him up in the morning. I perhaps have never met anyone who loves to dance as much as Misha does. It's fused with living -- it's how he lives."

She calls Baryshnikov's movement, even after so many years, "poetry."

"Not all dancers embody poetry, but some in their very essence in movement do. And he's the poet laureate."

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First published on January 27, 2008 at 12:00 am

http://www.post-gazette.com/pg/08027/852003-42.stm?cmpid=entertainment.xml#

Who Is Grady Harp?

Amazon's Top Reviewers and the fate of the literary amateur.

By Garth Risk Hallberg
Posted Tuesday, Jan. 22, 2008, at 7:33 AM ET

Full disclosure: It was late at night, in a fit of furtive self-Googling, that I discovered the first Amazon customer review of my debut book of fiction. "Superb," wrote Grady Harp of Los Angeles. "Fascinating ... addictive." Not to mention "profound." Such extravagance should have aroused suspicion, but I was too busy basking in the glow of a five-star rave to worry about the finer points of Harp's style. Sure, he'd spelled my name wrong, but hadn't he also judged me "a sensitive observer of human foibles"? Only when I noticed the "Top 10 Reviewer" tag did I wonder whether Grady Harp was more than just a satisfied customer. After a brief e-mail exchange, my publicist confirmed that she'd solicited Grady Harp's review.

I suppose I shouldn't have been surprised, but I had imagined Amazon's customer reviews as a refuge from the machinations of the publishing industry: "an intelligent and articulate conversation ... conducted by a group of disinterested, disembodied spirits," as James Marcus, a former editor at the company, wrote in his memoir, *Amazonia: Five Years at the Epicenter of the Dot.Com Juggernaut*. Indeed, with customers unseating salaried employees like Marcus as the company's leading content producers, Amazon had been hailed as a harbinger of "Web 2.0"—an ideal realm where user-generated consensus trumps the bankrupt pieties of experts. As I explored the murky understory of Amazon's reviewer rankings, however, I came to see the real Web 2.0 as a tangle of hidden agendas—one in which the disinterested amateur may be an endangered species.

On the surface, Grady Harp seems just the sort of enlightened consumer who might lead us out of Web 1.0's darkness. A 66-year-old gallerist, retired surgeon, and poet, he has reviewed over 3,500 books, CDs, and movies for Amazon. In turn, he has attained a kind of celebrity: a No. 7 ranking; a prominent profile on the Web site; and, apparently, a following. In the week after his endorsement of my work appeared, more than 100 readers clicked on a button that said, "I found this review helpful." His stated mission is to remain "ever on the lookout for the new and promising geniuses of tomorrow." At present, Dr. Harp's vigil runs to about 500,000 words—a critical corpus to rival Dr. Johnson's—and his reviews are clearly the product of a single, effusive sensibility. Jose Saramago's *Blindness* is "A

Searing, Mesmerizing Journey" (five stars); The Queer Men's Erotic Art Workshop's *Dirty Little Drawings*, "A Surprisingly Rich Treasure Trove" (five stars).

Such efforts have led a quorum of enthusiasts to hail Harp as a standard-bearer for literary amateurism. "Keep your pen hot, Grady!" one comments. Yet an equally energetic chorus of detractors carps that Harp's Amazon reviews are more self-interested than they might appear. The comment threads accompanying Harp postings devolve into litanies of accusation: GH engages in back-scratching; GH is unduly influenced by publishers; GH has failed to read the book under review.

My own research suggests that GH is no more or less credible than Amazon's other "celebrity reviewers." Harriet Klausner, No. 1 since the inception of the ranking system in 2000, has averaged 45 book reviews per week over the last five years—a pace that seems hard to credit, even from a professed speed-reader. Reviewer No. 3, Donald Mitchell, ceaselessly promotes "the 400 Year Project," which his profile identifies only as "a pro bono, noncommercial project to help the world make improvements at 20 times the normal rate." John "Gunny" Matlock, ranked No. 6 this spring, took a holiday from Amazon, according to Vick Mickunas of the *Dayton Daily News*, after allegations that 27 different writers had helped generate his reviews.

Absent the institutional standards that govern (however notionally) professional journalists, Web 2.0 stakes its credibility on the transparency of users' motives and their freedom from top-down interference. Amazon, for example, describes its Top Reviewers as "clear-eyed critics [who] provide their fellow shoppers with helpful, honest, tell-it-like-it-is product information." But beneath the just-us-folks rhetoric lurks an unresolved tension between transparency and opacity; in this respect, Amazon exemplifies the ambiguities of Web 2.0. The Top 10 List promises interactivity—"How do *I* become a Top Reviewer?"—yet Amazon guards its rankings algorithms closely. A spokeswoman for the company would explain only that a reviewer's standing is based on the number of votes labeling a review "helpful," rather than on the raw number of books reviewed by any one person. The Top Reviewers are those who give "the most trusted feedback," she told me, echoing the copy on the Web site.

As in any numbers game (tax returns, elections) opacity abets manipulation. Amazon's rankings establish a formal, public competition for power—or its online equivalent, recognition—wherein each competitor follows his own private sense of fair play. Or not. On the tongue-in-cheek *Harriet Klausner Appreciation Society* blog, I found allegations that Grady Harp's 92,000 "helpful votes" are the product of collusion—that Amazon reviewers often strike e-mail bargains to "yes" one another's reviews. Klausner herself told the *New York Times* in 2004 of a conspiracy to unseat her. Though Amazon officials assured me that they do their best to "weed out" loyalty votes when calculating the reviewer standings, recent software innovations seem to come down on the side of the weeds. A social-networking feature allows a reviewer to identify hundreds of other reviewers as "friends"; an RSS option lets them track his feedback in real-time. Certainly, Harp has been generous to his Amazon "friends," among whom are authors he has reviewed and others for whose self-published books he has provided jacket copy. ("A book that is well worth the attention of our weary state in America today."—Grady Harp, Amazon.com.) The watchdogs of HKAS point to Harp's staggering vote total—a tally surpassed only by Klausner's—as evidence that this generosity has been repaid.

Given Amazon's lack of greater transparency, it's hard to judge the merits of the vote-swapping claims. What is clear is the corruptibility of democracy, Web 2.0-style. Then again, from a shareholder's perspective, the fact that anyone cares may indicate the rankings' success. Qualitative research affirms that "books with more and better reviews sell better," according to Cornell sociologists Shay David and Dr. Trevor Pinch, co-authors of a 2006 analysis of online recommendation systems. To the extent that competitive energies drive Top Reviewers and their nemeses to generate content, and to spend time on and publicize Amazon.com, the chief beneficiary of misuse of Amazon's rankings system is Amazon itself.

This is not to say that a Top 10 ranking doesn't come with some sub rosa incentives for the reviewer. Free books, first and foremost; in an e-mail, Grady Harp told me he was "inundated with books from new writers and from publishers who know I love to read first works." This fall, when it invited select

Top Reviewers to join its Vine program—an initiative, still in beta-testing, to generate content about new and prerelease products—Amazon extended the range of perks. "Vine Voices" like Mitchell and Harp can elect to receive items ranging from electronics to appliances to laundry soap. As long as they keep reviewing the products, Amazon's suppliers will keep sending them.

However, by refashioning Web 2.0 as a proprietary marketplace, Amazon's reviewer rankings subject enthusiasts like Grady Harp to the same pressures that confront the professionals they were supposed to replace. To keep writing, lest another reviewer usurp one's spot. To say something nice, in hopes that someone will say something nice about you. And to read for work, rather than for pleasure. "I have a tall stack of books staring at me," Harp wrote, in a wistful moment.

"At times this sense of obligation prevents me from having time to read the things I personally want to read—the works of McEwan, Toibin, Crace, White, Bolaño, Sebald ..."

Like celebrity bloggers and Wikipedia "Gnomes," then, the Top Amazon Reviewer heralds the arrival of a curious hybrid: part customer, part employee. This feels like a loss. But perhaps it means that in the coming age, every writer will be a salesman: up past dark, sifting through the data stream for evidence that somewhere, some honest soul is buying.

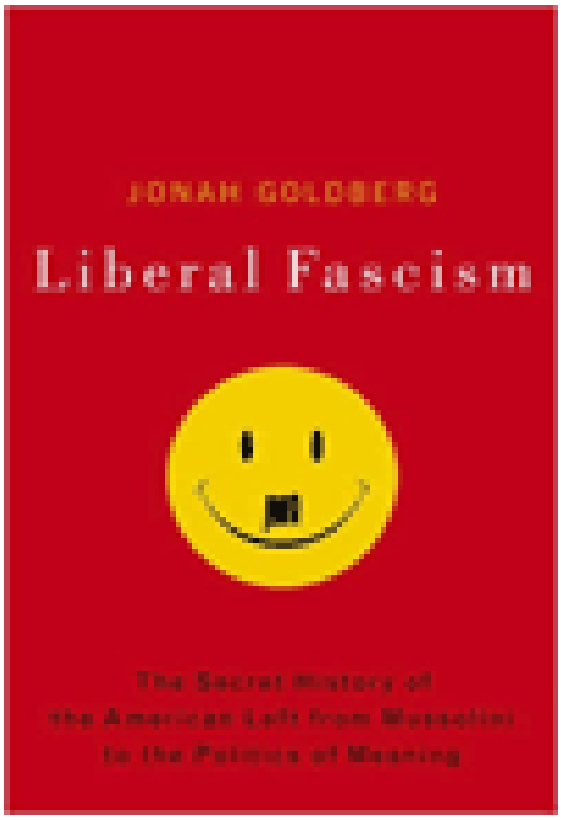
Garth Risk Hallberg is the author of A Field Guide to the North American Family. *He blogs, amateurishly, at The Millions.*

Article URL: http://www.slate.com/id/2182002/

Am I a Fascist?

Jonah Goldberg's tendentious history of liberalism.

By Timothy Noah
Posted Monday, Jan. 28, 2008, at 7:49 AM ET



Why did Jonah Goldberg write *Liberal Fascism*? To find out, you must wade through 391 pages of tendentious scholarship. A mighty jackbooted procession—Herbert Croly, John Dewey, Adolf Hitler, Benito Mussolini, Herbert Marcuse, John F. Kennedy, Saul Alinsky, Ralph Nader, Hillary Clinton—goose-steps across the page to illustrate Goldberg's apparent belief that, with the exception of Adam Smith's *The Wealth of Nations* and everything published in *National Review* (where Goldberg is contributing editor), every word previously written or spoken in favor of mobilizing the citizenry was either proto-fascist, fascist, or heavily influenced by fascism. On Page 392, though, Goldberg emerges from his dusty carrel and gives it to us straight:

> Ever since I joined the public conversation as a conservative writer, I've been called a fascist and a Nazi by smug, liberal know-nothings, sublimely confident of the truth of their ill-informed prejudices. Responding to this slander is, as a point of personal privilege alone, a worthwhile endeavor.

Liberal Fascism, then, is a howl of rage disguised as intellectual history. Some mean liberals called Goldberg hurtful names, so he's responding with 400 pages that boil down to: I know you are, but what am I?

Among the liberals I know, you don't, in fact, hear the word *fascist* bandied about much, and if somebody blurts it out to describe contemporary conservatism, the most common reaction is a rolling of the eyes. It's a provocation rather than an argument, much overused by the left during the 1960s and now mostly absent from mainstream political discourse. The only exception would be the term *Islamofascism*, adopted mainly (though not entirely) by the *right* to describe the reactionary views of violent Muslims intoxicated with hatred for the West. Weirdly, that word doesn't appear once in *Liberal Fascism*.

Before proceeding further, I should disclose that previously I've written about *Liberal Fascism* as a publishing phenomenon, speculating from the promotional material that Goldberg—who, when he was an editor for *National Review Online*, fired Ann Coulter for writing about Muslims, "We should invade their countries, kill their leaders, and convert them to Christianity"—was now adopting Coulter's uncivil, ranting style as his own. That got under Goldberg's apparently thin skin, and in a recent interview he called me a "jabbering fraction of a man" for making the comparison, an outburst that went a long way toward proving my point. (When Coulter ran afoul of Goldberg and *National Review* Editor Rich Lowry, she called them "girly boys.") So did Goldberg's provocative book title and his red-meat chapter headings: "Franklin Roosevelt's Fascist New Deal," "The 1960s: Fascism Takes to the Streets," "Brave New Village: Hillary Clinton and the Meaning of Liberal Fascism," etc.

On the other hand, it's inconceivable that Coulter would put as much effort into one of her screeds as Goldberg has clearly put into his. For the most part, Goldberg lays out his argument knowledgeably and calmly. He seems to have done his homework, which was not inconsiderable. He means to be taken seriously by people who care about ideas. All right, then. Let's take him seriously.

Goldberg's argument begins with the observation that well into the 1930s, the American progressive movement had more admiration than scorn for Benito Mussolini, who coined the words *fascist* and *totalitarian*, and even for Adolf Hitler. This isn't news to anyone with even a glancing familiarity with American history. Goldberg further argues that fascism initially evolved from and positioned itself as a muscular brand of socialism (hence *Nazi*, an abbreviation for "National Socialist German Workers Party"). Also true, and also known to most educated people.

Goldberg then points out that the wartime presidency of the progressive Woodrow Wilson curtailed free speech to a frightening degree and argues that this had something to do with Wilson's admiration for Otto von Bismarck, who fathered both the modern welfare state and the fascist *Kulturkampf*. According to Goldberg, Wilson's belief in an expansive role for government (example: creation of the Federal Trade Commission) was linked to his less-admired taste for government repression (example: the Palmer raids). Well, maybe. A simpler explanation for the latter would be that throughout American history, presidents have tended to trample on the Bill of Rights during times of unrest, starting with the Alien and Sedition Acts, which was signed into law by President John Adams 17 years before Bismarck was born.

"Woodrow Wilson," Goldberg declares, "was the twentieth century's first fascist dictator." That would be news to Sen. Henry Cabot Lodge, the Massachusetts Republican who successfully opposed U.S. entry into the League of Nations. Throughout *Liberal Fascism*, the respect-hungry scholar wrestles with the invective-spouting provocateur. Here Goldberg is, for instance, trying *very hard* not to call Franklin Roosevelt a fascist:

This is not to say that the New Deal was evil or Hitlerian. But the New Deal was a product of the impulses and ideas of its era. And these ideas and impulses are impossible to separate from the fascist moment in Western civilization. … Franklin Rosevelt was no fascist, at least not in the sense that he thought of himself in this way. But many of his ideas and policies were indistinguishable from fascism. And today we live with the fruits of fascism, and we call them liberal.

Thirty-five pages later, Goldberg can hold back no longer. "[I]t seems impossible to deny that the New Deal was objectively fascistic," he crows, imposing without irony a Marxist analysis.

The rest of Goldberg's argument unfolds as follows: Wilson begat FDR, who begat contemporary liberalism. The only reason the United States didn't remain a fascist country like Italy or Germany or Spain was "American exceptionalism," i.e., the public's resistance to tyranny over the long term. But Democratic presidents from Roosevelt to John F. Kennedy to Lyndon Johnson to Bill Clinton continued either to impose fascism or to bring the country terrifyingly close to it. To demonstrate this, Goldberg is obliged to render an ever-more-flexible definition of the word *fascist*.

Was Bill Clinton a fascist president? Well, he certainly believed in the primacy of emotion and the supremacy of his own intellect. … But I think if we are going to call him a fascist, it must be in the sense that he was a sponge for the ideas and emotions of liberalism. To say that he was a fascist is to credit him with more ideology and principle than justified. He was the sort of president liberal fascism could only produce during unexciting times.

Who knew fascism could be boring?

By this point, Goldberg's reasoning has progressed from unconvincing to incoherent. Modern liberalism, he argues, is linked to Nazism because both contain a cult of the organic (Hitler was a vegetarian) and both embrace sexual freedom (Himmler ordered his men "to father as many children as possible without marrying" in order to achieve the Aryan ideal). Eventually, Goldberg backs himself into asserting, in effect, that *any* government that does more than prevent abortions and provide for the common defense is inherently fascist. Granted, he gives a wide berth to the common defense. In a token criticism of President George W. Bush, Goldberg cites as evidence of fascist influence not the de facto suspension of habeas corpus and refusal to follow the Geneva Conventions, which go unmentioned, but rather Bush's extension of Medicare to cover prescription drugs.

So, what's more fascist, liberalism or conservatism? It's a moronic question. The United States is not, nor has ever been, anything close to a fascist country. But if compelled to choose, I should think it's more useful to consider what political thinkers had to say about fascism not *before* the full extent of its horrors became known to the world but *after*. As it happens, the Canadian Web site Sans Everything unearthed two obituaries for Francisco Franco, the fascist Spanish dictator, in the Nov. 21, 1975, issue of Goldberg's beloved *National Review*. One, by F.R. Buckley (William's brother) called Franco

a Spaniard out of the heroic annals of the nation, a giant. He will be truly mourned by Spain because with all his heart and might and soul, he loved his country, and in the vast context of Spanish history, did well by it.

The other, by James Burnham, stated, "Francisco Franco was our century's most successful ruler." If John Kenneth Galbraith said anything like this, I missed it.

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Article URL: http://www.slate.com/id/2182871/

A museum for the 21st century

By Sir Nicholas Serota | From Editorial & Commentary | Posted: 24.1.08

The announcement by the British government that it is putting £50m towards the costs of the new development of Tate Modern is one of the most significant moves in public cultural policy in recent years. Not since the building of the British Library in the 1980s and 90s has there been such a statement of confidence in Britain's cultural future. Fifty million pounds is a substantial sum, but it represents only about a quarter of the total cost of the project, so we hope that others will follow the government's lead, and that private donors, corporations, trusts and foundations will also recognize the confidence that the government's commitment demonstrates.

In 2000, an investment of £137m of public and private money created Tate Modern. In seven years, it has become the most popular museum of modern and contemporary art in the world, and the second leading free tourist attraction in Britain. What makes it unique among museums is that 50% of its visitors are under 35 years old. But in spite of this success, much of the real potential of Tate Modern has yet to be realized. Amazingly, a whole third of the original power station remains derelict and is crying out to be brought into use. The gallery was originally designed for 1.8m visitors a year. With present audiences at nearly five million, that means there can at times be serious overcrowding, particularly at weekends, and there is an urgent need to improve and extend all our facilities.

We need more room for people, but more importantly, we need new and different spaces for art. Visual culture is constantly changing, as artists seek new forms of expression and develop new visual technologies. We need different kinds of galleries to show art forms new to Tate, based on photography, video, film and performance, as well as additional space to show some larger exhibitions in their entirety. We also need larger spaces to meet the requirements of our growing number of large-scale works and installations. With additional space, more of Tate's collection can go on view and key paintings, sculptures and installations can be brought out of storage and displayed on a more permanent basis.

The new development, by Swiss architects Herzog & de Meuron who revealed the potential of a derelict power station in the first place, will increase Tate Modern's size by 60%, adding approximately 21,000 sq. m of new space. We have many ideas for using it in new and exciting ways that will keep London at the centre of international critical attention.

The opening of Tate Modern celebrated the achievements of artists working in the 20th century. This new building provides a platform from which we will be able to serve artists and audiences in the 21st.

The writer is the director of Tate

http://www.theartnewspaper.com:80/article.asp?id=7402

Architectural Conservation Comes to College Campuses
By CATESBY LEIGH
January 24, 2008; Page D8


David Gothard

ANNAPOLIS, Md. -- While Uncle Sam foots the bill for the general upkeep of the U.S. Naval Academy campus, known as the Yard, there are certain architectural icons to whose meticulous care alumni can be relied upon to contribute. Heading the list are the domed chapel, the Yard's crown jewel, and the crypt below -- where John Paul Jones's body reposes in a beautiful marble sarcophagus. Then comes Memorial Hall, the spaciously barrel-vaulted, sky-lit ceremonial room fitted out with gorgeous plasterwork ornament and chandeliers as well as lunette paintings of naval battles, portraits in paint and bronze, plaques and flags.

Mainly the work of Ernest Flagg, a brilliant Paris-trained classicist, these century-old venues lie in the Yard's historic core and epitomize the midshipman's experience. But the Yard now includes about 400 other structures, ranging from a hospital designed by Flagg to '60s-vintage academic buildings by John Carl Warnecke, and until now the academy has lacked an adequate planning framework for their conservation. Thanks to a $190,000 Campus Heritage grant from the Getty Foundation that the U.S. Naval Academy Foundation -- the USNA's private, nonprofit fund-raising arm -- obtained in 2006, the academy now has a comprehensive catalog of its buildings as well as templates for the detailed evaluation of their historic significance and conservation needs.

After six annual grant-making cycles, the Getty Foundation's $13.5 million Campus Heritage Initiative has come to a close. The foundation awarded grants ranging from $45,000 to $250,000 to 86 American colleges and universities. "We'd been funding architectural conservation all over the world for years, including grants to universities for individual buildings on their campuses," Getty Foundation director Deborah Marrow says. "We found that preservation wasn't very well incorporated into campus planning. Master plans needed to factor in the conservation of buildings more fully. The moment seemed right for the Campus Heritage Initiative. And it took off immediately. Sometimes grant programs take years to catch on."

Historic campus buildings and landscapes form an important part of the nation's cultural patrimony. Campuses of high architectural quality, New Urbanist town planner and University of Miami architecture dean Elizabeth Plater-Zyberk says, have a big impact on students raised in unexceptional suburbs. At the same time, modernism's lengthy postwar predominance has challenged the established character and identity of many American campuses. This has provoked the wrath of alumni, as noted in "Campus Heritage Preservation: Traditions, Prospects, and Challenges," a booklet that served as the foundation for the Getty initiative.

"Campus Heritage Preservation" documents a 2002 Chicago roundtable involving designers, scholars, planners, preservation professionals and administrators. The booklet reflects the academic doctrine that preservation is about documenting what is typical of a given historical period and conserving it for the future. This doctrine casts the campus as a palimpsest, the locus of successive stylistic layers accruing over time.

The historic core campus of the University of California at Berkeley, for example, displays three distinct epochs of development, elucidated in an informative Web site the university has posted about its Getty-funded Landscape Heritage Plan. The Berkeley campus started out, in the decades following the Civil War, as a picturesque landscape sparsely populated with buildings. Then an impressive array of classical edifices in more formal settings was grafted onto that landscape in the first decades of the 20th century.

The postwar period, in turn, has brought a more urban, densely built-up campus, including some insensitively designed and sited modernist structures.

As Notre Dame architecture Prof. Steven W. Semes notes, the latent danger in academic preservation doctrine is that *time*, or the evaluation of a building's or landscape's significance within its historical frame of reference, can take precedence over *place* -- whether the building or landscape enriches or detracts from the historic character of its setting. Though Mr. Warnecke attempted to play off elements of Flagg's architecture in designing his four Naval Academy buildings, employing variants of Flagg's mansard roofs for instance, his buildings break the vivid scenographic spell Flagg cast. Stylistically akin to Philip Johnson's "ballet-classical" New York State Theater at Lincoln Center in Manhattan, Mr. Warnecke's buildings may be "of their time," but it is unlikely many visitors to the Yard would say they're worthy of their place. Ms. Marrow emphasizes that the Getty program was not intended to be prescriptive -- that it was formulated on the understanding that different campus constituencies have different takes on design issues, a key theme of the Chicago roundtable.

As a result, what is most striking about the Campus Heritage Initiative is the range of settings it has covered. These include older, moneyed academies like Brown, Bryn Mawr and Middlebury with stylistically variegated campuses; architecturally distinguished state institutions from coast to coast; and several historically black institutions in the South where simple Georgian architecture has traditionally predominated. New York University, Boston's Emerson College and the Savannah, Ga., College of Art and Design have received grants largely or exclusively targeting originally nonacademic buildings they have acquired in historic districts. The initiative also has funded historical research on and the development of conservation strategies for noted landscapes at numerous schools besides Berkeley -- from Pittsburgh's Chatham College, a small women's institution, to the University of Hawaii at Manoa. Bronx Community College of the City University of New York, formerly the site of NYU's University Heights campus, received the most significant Getty grant specifically intended to aid the preservation of older campus buildings. The $238,000 grant allowed the college to develop a conservation master plan for Stanford White's majestic but frayed and underutilized Gould Memorial Library plus the open-air Hall of Fame colonnade behind it, and two adjacent White buildings. Institutions receiving grants targeted at preservation of the "recent past" include the University of Chicago, whose mid-20th-century academic buildings on the city's South Side were designed by the likes of Eero Saarinen and Skidmore Owings and Merrill.

But perhaps the most interesting recipient in the modernist category is Florida Southern College in Lakeland, whose west campus consists of a dozen structures, including a covered pedestrian circulation network 1.5 miles long, designed by Frank Lloyd Wright. This complex was erected over a two-decade period starting in 1939. The building material, a buff-colored "textile block" consisting of cement with a sand aggregate, proved problematic both in its composition and in the way it was laid up, according to restoration architect Jeff Baker of Mesick, Cohen, Wilson, Baker Architects in Albany, N.Y. Moisture has permeated the blocks and their steel reinforcement, causing serious deterioration. Many of the little pieces of glass embedded in Wright's masonry to infuse interiors with colored light have fallen out or been pilfered by souvenir hunters. These problems are daunting but "definitely solvable," Mr. Baker says.

The Getty initiative funds only the planning stage of campus preservation, the idea being that this will serve to leverage funds for implementation. Some recipient institutions will apply their historical research to applications for state, national or even international landmark registers with a view to enhancing their campuses' prestige and fund-raising effectiveness.

Ms. Marrow believes the variety of schools and priorities targeted for grants will yield a range of preservation precedents that will, over time, benefit a far wider circle of academic institutions. To that end, the Getty Foundation is funding a Society for College and University Planning effort to disseminate the lessons learned through the Campus Heritage Initiative. The initiative may not have settled the time versus place issue, but its results will surely be percolating on American campuses for years to come.

Mr. Leigh is at work on a book about monuments.

http://online.wsj.com:80/article/SB120113931846012073.html?mod=opinion_journal_leisure_art

Scientists Look At Those In Evolutionary Race Who Don't Make It 'Out Of The Gate'

Side-blotched lizards are the topic of a long-term study of evolution in the wild. (Credit: Photo courtesy of Barry Sinervo, University of California – Santa Cruz.)

ScienceDaily (Jan. 25, 2008) — In the race of evolution, scientists until now have only looked at winners and losers. Now, they've come up with a way to look at the contenders who never made it out of the gate.

It's the organisms -- in this case lizards -- that die early in life, before scientists can even assess what they might bring to the reproduction game, and that have gone uncounted in the effort to quantify genetic fitness. This group has been dubbed the "invisible fraction." Andrew McAdam, assistant professor of fisheries and wildlife and zoology at Michigan State University, has co-authored a paper in the Jan. 23 Proceedings of the Royal Society which brings that elusive fraction to light.

"Measuring the invisible fraction is important because some organisms don't make it to adulthood," McAdam said. "They lost the race before they even got out of the gate."

McAdam and Barry Sinervo, an ecology and evolutionary biology professor at University of California -- Santa Cruz, explored the invisible fraction in a study of side-blotched lizards appearing in a special issue of the journal about long-term studies of evolution in the wild.

Measuring this group is difficult, but the approach outlined in the paper shows it can be done when detailed pedigrees are available for the animals.

Sinervo, who is the lead author on the paper, has been studying side-blotched lizards in California for more than 20 years and has more than 7,000 lizards pedigreed in the same way as thoroughbred racehorses or prized cattle.

Sinervo and McAdam have figured out how many eggs a female would have laid even if she did not survive long enough to reproduce. The trick is to use this extensive lizard pedigree to see how many eggs her relatives laid.

This enabled them to measure the cost of producing large and small clutches of eggs during the process of maturation -- even for the females that didn't survive long enough to produce a clutch. A clutch is the number of eggs that a female produces at a single time.

"What we are really trying to estimate here is a female's genetic value for her clutch size," McAdam said. This genetic value is called a breeding value, and it is estimated by measuring a female's clutch size and the clutch size of her sisters, daughters and other relatives.

"What we are searching for is that portion of a female's clutch size that is reliably passed down across generations," McAdam said. It is this genetic value that allowed Sinervo and McAdam to predict what a female's clutch size would have been had she survived long enough to reproduce.

Surprisingly, they found that females producing large clutches often survived better as they matured than females with smaller clutch sizes, even though they are larger and slower when they are carrying eggs.

In a strange twist of gender bending, they also used this technique to see how clutch-size genes affected male survival during maturation.

"People may think this is a little crazy, but we can essentially do the same thing for males even though they don't produce eggs," McAdam said.

Clutch size is inherited, so males carry the genes for clutch size in their DNA. By measuring the clutch size of a male's sisters and daughters, McAdam estimated the effects of genes that a lizard was carrying for this female trait. Even though they don't have clutches, the same hormones that affect clutch size in females affect development and behavior in males.

In males, the hormones change how the lizards mature and cause them to interact differently with other lizards. These hormonal differences affect the survival rates.

The study found that male lizards, unlike females, survive better with the hormones that lead to small clutch sizes in females. This tug of war between the sexes is called "ontogenetic conflict."

"The invisible fraction used to be a giant black box," McAdam said. "With these new techniques, we are starting to be able to see inside."

The work is supported by the National Science Foundation.

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

http://www.sciencedaily.com:80/releases/2008/01/080122203059.htm

Handwashing Can Reduce Diarrhea Episodes By About One Third

ScienceDaily (Jan. 25, 2008) — Promoting the simple act of hand washing can save lives in many developing countries, according to a new systematic review of studies.

The review, led by Regina Ejemot of the University of Caliber, in Nigeria, shows that teaching people about hand washing can reduce the incidence of diarrhea by up to 30 percent and might have as great an affect as providing access to clean water.

"Our review specifically assessed the effects of interventions to promote hand washing and not the effectiveness of improving sanitation," Ejemot said. "However, common sense would suggest that there has to be water for hand washing to happen, regardless of community awareness of benefits or willingness to wash hands."

The review appears in the current issue of The Cochrane Library, a publication of The Cochrane Collaboration, an international organization that evaluates research in all aspects of health care. Systematic reviews draw evidence-based conclusions about medical practice after considering both the content and quality of existing trials on a topic.

The researchers summed up the results of 14 studies of hygiene promotion practices in institutions, community organizations and homes. Eight studies monitored 7,711 participants in institutions such as day care centers in high-income countries. Five community-based studies with 8,055 participants took place in low and middle-income countries and one study looked at the practices of 148 members of a high-risk group of AIDS patients.

The review found that interventions promoting hand washing resulted in a 29 percent reduction in diarrhea episodes in high-income countries and a 31 percent reduction in such episodes in communities in low- and middle-income countries.

"Poor access to safe water is directly linked with increased morbidity and mortality from waterborne and fecal-oral diseases — especially diarrhea," Ejemot said.

Water availability alone does not ensure hand washing. Hygiene promotion requires trained personnel to lead programs, the involvement of community organizations as well as providing soap and water.

Hygiene promotion methods studied included small group discussions and larger meetings, multimedia communications campaigns with posters, radio and TV campaigns, leaflets, comic books, songs, slide shows, use of T-shirts and badges, stories, drama and games.

"It is difficult for people in developed countries to realize that diarrhea is still a major cause of deaths in developing countries, killing more children than AIDS and malaria combined," said Dr. Olivier Fontaine, a specialist with Child and Adolescent Health and Development with the World Health Organization (WHO).

WHO estimates that diarrhea is responsible for over 2.2 million deaths annually, especially in children under the age of five. It is an important cause of malnutrition in resource-poor countries and, if persistent, can contribute to decreased resistance to infection and hamper children's growth and development.

Infection by the germs that cause diarrhea occur by consuming contaminated food and drink, by person-to-person contact or by direct contact with feces. In many resource-poor countries, people do not have the toilets and the infrastructure to support them.

In some cases, the whole family might simply dip their hands in the same bowl of water before eating, making it likelier that they will spread germs.

One study found that hand contact with ready-to-eat food consumed without further washing or cooking could be even more effective at transmitting germs than food that is prepared and cooked at home.

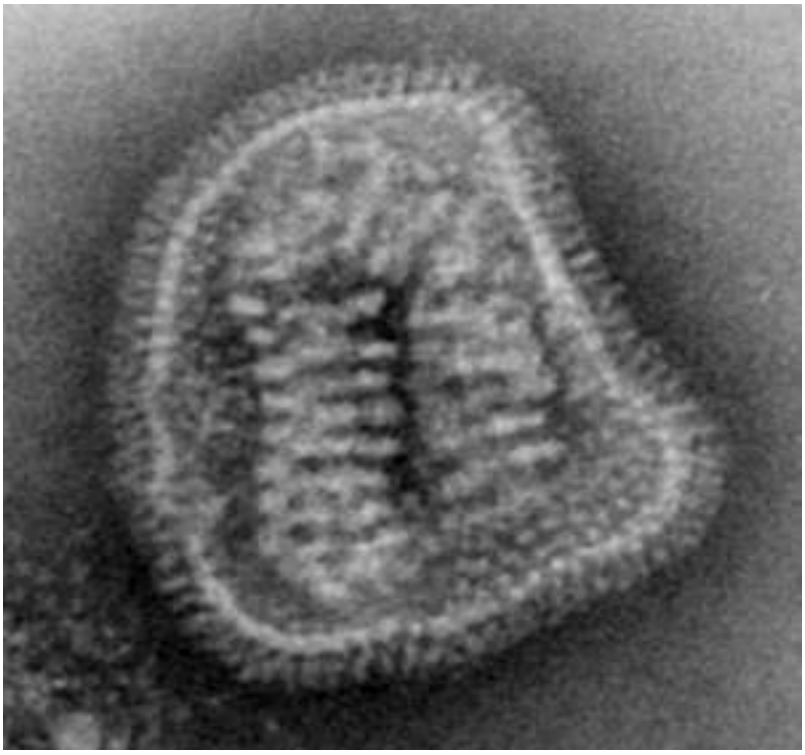
In some settings, cultural attitudes can be part of the problem.

"Hand washing is influenced by community perception of what is hygienic or not," Ejemot said. "For instance, stools passed by infants are considered harmless, probably as harmless as the baby. This perception makes hand washing following disposal of the baby's stool not a necessary hygiene practice. Such a community would need cultural and behavioral change to accept hand washing."

Adapted from materials provided by Center For The Advancement Of Health.

http://www.sciencedaily.com:80/releases/2008/01/080122203221.htm

Universal Influenza Vaccine Tested Successfully In Humans



This negative-stained transmission electron micrograph (TEM) depicts the ultrastructural details of an influenza virus particle, or "virion". A member of the taxonomic family Orthomyxoviridae, the influenza virus is a single-stranded RNA organism. (Credit: Cynthia Goldsmith)

ScienceDaily (Jan. 25, 2008) — The British-American biotech company Acambis reports the successful conclusion of Phase I trials of the universal flu vaccine in humans. The universal influenza vaccine has been pioneered by researchers from VIB and Ghent University. This vaccine is intended to provide protection against all 'A' strains of the virus that causes human influenza, including pandemic strains. Therefore, this vaccine will not need to be renewed annually.

Influenza

Influenza (flu) is an acute infection of the bronchial tubes and is caused by the influenza virus. Flu is highly contagious and causes people to feel severely ill. An average of 5% of the world's population is annually infected with this virus. In Belgium, an average of 1500 people die of flu each year. A "more severe flu year" − such as the winter of 1989-1990 − claimed in Belgium alone, 4500 victims. Moreover, occasionally pandemics occur.These are caused by significantly different virus strains which overwhelm the immunity in the human population. Three pandemics occurred in the previous century, the first one, the "Spanish Flu" in 1918-1919, was responsible for at least 50 million human deaths worldwide. There is a fear that the avian H5N1-influenza strain could adapt to humans and cause the next pandemic.

Every year, another vaccination

Today's flu vaccines need to be adapted every year to new virus strain variants and, consequently, they must also be administered again every year. This is needed because the external structure of the flu virus mutates regularly, giving rise to new strains of flu. Due to these frequent changes, the virus is able to elude the antibodies that have been built up in the population during a previous infection or vaccination.This is why we run the risk of catching a flu infection each year. To prevent an infection, we need yearly a new influenza vaccination adapted to currently circulating flu strains. A universal flu

vaccine that provides broad and lifelong protection − like the vaccines we have for polio, hepatitis B or measles − is not yet available.

One vaccination for life

In the 1990s, VIB researchers connected to Ghent University, under the direction of Prof. Walter Fiers, invented a universal flu vaccine. This vaccine targets M2e, a conserved region of influenza "A" strains.About two thirds of seasonal epidemics are due to type "A"strains, and also all pandemic influenza strains are type "A". Therefore the universal, M2e-based vaccine is expected to provide protection against pandemics. Previously, the universal vaccine had been successfully tested in mice and other laboratory animals: the M2 vaccine provided total protection against "A" strains of flu, without side effects.

Successful clinical trials in humans

Acambis − a British-American biotech company that specializes in the development of vaccines − has been exclusively licensed rights to VIB's influenza vaccine patent portfolio for human applications, and has entered into a collaboration with VIB for further research and development. In the randomized, double-blind, placebo-controlled phase I trial of the universal vaccine, now named ACAM-FLU-ATM, the vaccine's safety and ability to generate an immune response was evaluated. The vaccine was tested at multiple centers in the US and involved 79 healthy volunteers. The trial results demonstrate that ACAM- FLU-ATM is well tolerated and immunogenic, and no significant side-effects were observed.Acambis also tested whether an M2-based vaccination could protect ferrets from a deadly infection by the highly lethal avian H5N1 influenza strain "Vietnam 2004". 70% of the vaccinated animals survived, while all the placebo-treated animals succumbed to the viral infection.Michael Watson, Acambis Executive Vice President, Research & Development, said: “M2e is one of the most discussed new approaches for universal influenza vaccination. These are exciting data as they show that our ACAM-FLU-ATM vaccine can generate a robust M2e antibody response and that M2e-based vaccines can protect against H5N1 avian influenza. We believe that these results confirm we have an approach worthy of further development.”

Promising future

Dr Xavier Saelens, and Prof. Emeritus Walter Fiers are leading the basic research forward with respect to protection against influenza epidemics and pandemics. This involves, amongst other, supporting research required for the planned Phase II and III clinical trials, as well as optimizing the vaccine for response against a potential pandemic caused by a highly pathogenic strain such as the H5N1 avian flu virus. Through their collaboration with Acambis, they hope that annually renewed flu vaccines can be replaced by the universal influenza vaccine. The goal is that two immunizations would suffice to protect people for a long time against all "A" strains of flu.

Relevant scientific publications

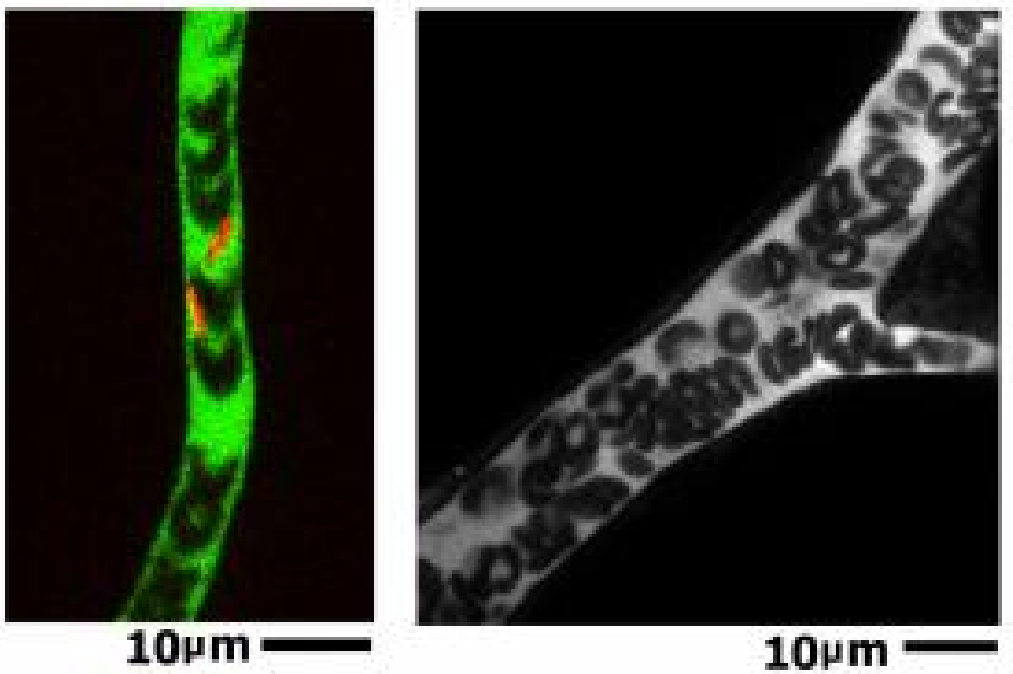
- De Filette et al., Vaccine 24, 544-551, 2006.
- De Filette et al., Virology 337, 149-161, 2005.
- Fiers et al., Virus Research 103, 173-176, 2004.
- Fiers et al., Philos T Roy Soc B 356, 1961-1963, 2001.
- Neirynck et al., Nature Medicine 5, 1157-1163, 1999.

This research is being funded by Acambis, the National Institutes of Health (US), IWT, FWO, UGent and VIB.

Adapted from materials provided by Flanders Institute for Biotechnology.

http://www.sciencedaily.com:80/releases/2008/01/080124185522.htm

Seeing Is Believing: Visualizing Inflammation In Fat Tissue



Adipose tissue microcirculation visualized by in vivo molecular imaging. The erythrocyte, leukocyte and platelet cell dynamics can be visualized with high time and spatial resolutions in adipose tissue by in vivo molecular imaging method. Left: Capillary microcirculation visualized by FITC-dextran (green), and anti-CD41 (red). Right: Post capillary visualized by FITC-dextran. Scale bars represent 10 μm. (Credit: Copyright Satoshi Nishimura, Department of Cardiovascular Medicine, the University of Tokyo)

ScienceDaily (Jan. 25, 2008) — Individuals who are obese are at increased risk of developing a combination of medical disorders associated with type 2 diabetes and heart disease known as the metabolic syndrome. Recent studies have suggested that adipose (fat) tissue obesity induces an inflammatory state that is crucial to the development of the metabolic syndrome.

In a new study, Satoshi Nishimura, Ichiro Manabe, and colleagues at the University of Tokyo, Japan have developed a technique based on confocal laser microscopy to visualize cellular interactions within mouse adipose tissue in vivo with high spatiotemporal resolution. Changes indicative of inflammation were observed in the adipose tissue of both mice that were obese through genetic mutations and mice that were obese as a result of being fed a high-fat diet.

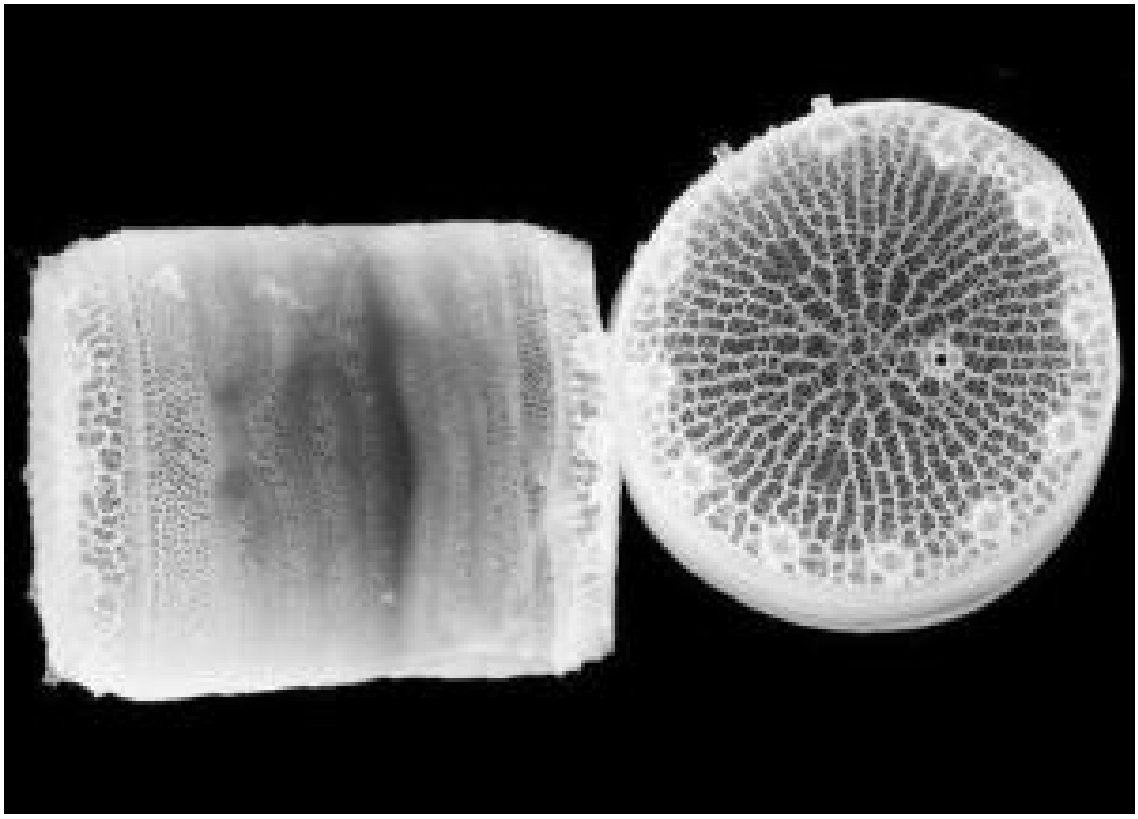
In addition, endothelial cells of the adipose tissue could be seen interacting with inflammatory cells known as macrophages, indicating a central role for interplay between these two cell types in the activation of inflammation within the adipose tissue.The authors therefore concluded that adipose tissue obesity is an inflammatory disease and suggested that this technique might allow the efficacy of potential therapeutics for the treatment of individuals with diseases stemming from adipose tissue obesity to be evaluated in vivo in mice.

Journal article: In vivo imaging in mice reveals local cell dynamics and inflammation in obese adipose tissue. Journal of Clinical Investigation. Jan. 17, 2008

Adapted from materials provided by Journal of Clinical Investigation, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com:80/releases/2008/01/080118093619.htm

Could Tiny Diatoms Help Offset Global Warming?



Thalassiosira pseudonana -- with a hard outer shell of silica shaped like a hatbox and marked with pores -- is 3 to 4 microns in size, making it among the smallest diatoms. (Credit: University of Washington)

ScienceDaily (Jan. 26, 2008) — Diatoms -- some of which are so tiny that 30 can fit across the width of a human hair -- are so numerous that they are among the key organisms taking the greenhouse gas carbon dioxide out of the Earth's atmosphere.

The shells of diatoms are so heavy that when they die in the oceans they typically sink to watery graves on the seafloor, taking carbon out of the surface waters and locking it into sediments below.

Scientists have reported the discovery of whole subsets of genes and proteins that govern how one species of diatom builds its shell. For oceanographers, the work might one day help them understand how thousands of different kinds of diatoms -- and their ability to remove carbon dioxide from the atmosphere -- might be affected by something like global climate change. Material scientists involved in the work are interested in the possibilities of manipulating the genes responsible for silica production as a way of fabricating more efficient computer chips.

Diatoms, most of which are far too tiny to see without magnification, are incredibly important in the global carbon cycle, says Thomas Mock, a University of Washington postdoctoral researcher in oceanography and lead author of the paper. During photosynthesis, diatoms turn carbon dioxide into organic carbon and, in the process, generate oxygen. They are responsible for 40 percent of the organic carbon produced in the world's oceans each year.

The new work took advantage of the genomic map of the diatom Thalassiosira pseudonana published in 2004 by a team led by UW oceanography professor Virginia Armbrust, who is corresponding author of the new PNAS paper.* Thalassiosira pseudonana is encased in a hatbox-shaped shell comprised of a rigid cell wall, made mainly of silica and delicately marked with pores in patterns distinctive enough for scientists to tell it from other diatoms.

Armed with the genomic map, the researchers changed environmental conditions in laboratory cultures of Thalassiosira pseudonana, for example limiting the amount of silicon and changing the temperatures. Then researchers used what's called "whole genome expression profiling" to determine which parts of the genome were triggered to compensate.

Think of a plant on a windowsill that starts getting a lot more sunlight, Mock says. The new set of conditions will cause genes in the plant to turn on and off to help the plant acclimate to the increased light as best it can.

Scientists since the late 1990s have found only a handful of genes that influence diatom shell formation. The work with Thalassiosira pseudonana identified large, previously unknown subsets. A set of 75 genes, for example, was triggered to compensate when silicon was limited.

The researchers were surprised to find another subset of 84 genes triggered when either silicon or iron were limited, suggesting that these two pathways were somehow linked. Under low-iron conditions, the diatoms grew more slowly and genes involved in the production of the silica shell were triggered. Individual diatoms also tended to clump together under those conditions, making them even heavier and more likely to sink.

The response of thin and thick cell walls depending on the amount of iron available had been observed at sea but "no one had a clue about the molecular basis," Mock says.

Considering that 30 percent of the world's oceans are iron-poor, some scientists have suggested fertilizing such areas with iron so diatoms become more numerous and absorb more carbon dioxide from the atmosphere, thus putting the brakes on global warming. If, however, adding iron causes diatoms to change the thickness of their shells then perhaps they won't be as likely to sink and instead would remain in the upper ocean where the carbon they contain might be released back to the atmosphere as they decay or are eaten.

"Iron increases primary production by diatoms but our study adds another concern about the efficiency of iron fertilization," Mock says.

Along with helping scientists understand implications for climate change and absorption of carbon dioxide, diatoms can manipulate silica in ways that engineers can only dream about.

University of Wisconsin professor Michael Sussman, the co-corresponding author on the paper, says the new findings will help his group start manipulating the genes responsible for silica production and potentially harness them to produce lines on computer chips. This could vastly increase chip speed because diatoms are capable of producing lines much smaller than current technology allows, he says.

*This research was published recently in the online edition of the Proceedings of the National Academy of Sciences.

Other co-authors from the University of Washington are Vaughn Iverson, Chris Berthiaume, Karie Holtermann and Colleen Durkin; from Systemix Institute is Manoj Pratim Samanta; and from University of Wisconsin are Matthew Robinson, Sandra Splinter BonDurant, Kathryn Richmond, Matthew Rodesch, Toivo Kallas, Edward Huttlin and Franceso Cerrina.

Funding for the research came from the Gordon and Betty Moore Foundation, National Science Foundation, German Academic Exchange Service, National Institutes of Health Genomic Sciences Training Center and the University of Wisconsin.

Adapted from materials provided by University of Washington.

http://www.sciencedaily.com:80/releases/2008/01/080123150516.htm

Does Mood Matter? What About The Order Of Choices?

ScienceDaily (Jan. 26, 2008) — Sure, you're more likely to give things a favorable evaluation when you're happy, and a negative evaluation when you're sad. But how does mood influence your choices among items?

A new study finds that consumers in a good mood are more likely than unhappy consumers to choose the first item they see, especially if all the choices are more or less the same.

"It is surprising that little research has been done to examine how affect influences comparisons and choices," say Cheng Qiu (University of Hong Kong) and Catherine W. M. Yeung (National University of Singapore). "Our research fills this gap by demonstrating a systematic influence of mood on choice, which contrasts with the general assumption that mood is unlikely to influence choice."

Participants were first asked to write about either a happy or a sad event in their lives, to help establish their mood. They were then presented with several mango-flavored desserts, and 69 percent of happy participants chose the first option they saw, compared to only 38.5 percent of unhappy participants.

The researchers also found that when happy consumers were asked to withhold judgment until all options were presented, they tended to prefer the last option they saw. In another study, three dessert options -- blueberry, almond, and plum pie -- were presented sequentially, and consumers were explicitly asked to withhold judgment until all options had been presented. Happy consumers chose the last item 48 percent of the time, compared to just 26 percent of unhappy participants.

"If consumers are exposed to multiple options that differ only in global aesthetic aspects, they tend to evaluate each option spontaneously at the time they first encounter it," explain the researchers. "On the other hand, if consumers are exposed to multiple options that differ in important descriptive features, they may withhold their evaluation until they have seen all the options available and evaluate the last presented (most recent) option first."

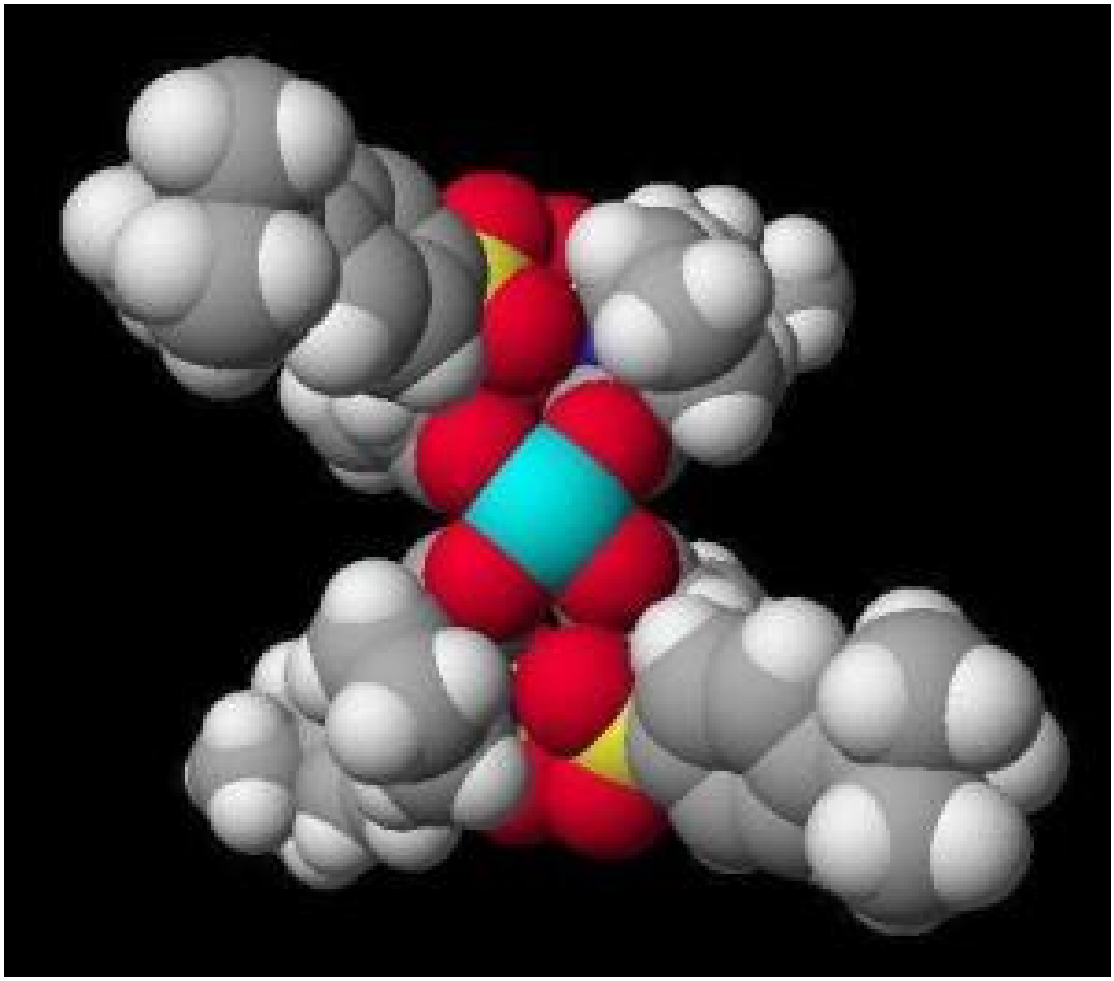
They conclude: "Altogether, these findings suggest that the influence of mood on comparison depends on which alternative in a choice set is the one being evaluated first."

Journal reference: Cheng Qiu and Catherine W. M. Yeung, "Mood and Comparative Judgment: Does Mood Influence Everything and Finally Nothing?" Journal of Consumer Research: February 2008.

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

http://www.sciencedaily.com:80/releases/2008/01/080123125558.htm

New Method Enables Design, Production Of Extremely Novel Drugs



Computational model of the rhodium catalyst developed by the UB researchers. (Credit: Image courtesy of University at Buffalo)

ScienceDaily (Jan. 28, 2008) — A new chemical synthesis method based on a catalyst worth many times the price of gold and providing a far more efficient and economical method than traditional ones for designing and manufacturing extremely novel pharmaceutical compounds is described by its University at Buffalo developers in a review article in the journal Nature.

The chemistry, the basis of a new biotech startup company called Dirhodium Technologies, LLC in Buffalo, has the potential to improve dramatically the design and production of new drugs based on small molecule organic compounds, which comprise the great majority of new drug applications.

"If you tend to make things by methods that have been around for 100 years, there's a decent chance that you'll make something that's already known or is very close to something that is," said Huw M.L. Davies, Ph.D., UB Distinguished Professor in the Department of Chemistry and lead author on the Nature paper. "But if you use an entirely new strategy like the one we developed, virtually every reaction you run will result in a new structural entity. That's critical to drug development."

The chemical strategy Davies developed depends on the use of proprietary catalysts his company manufactures.Minute amounts of the rhodium-based catalyst can have a major impact, he explained, with 1 gram capable of producing 10 kilograms of a pharmaceutical product.

"So it's like a bit of 'golden dust' to get everything going," said Davies, a researcher at UB's New York State Center of Excellence in Bioinformatics and Life Sciences and president and chief executive officer of Dirhodium Technologies.

"As rhodium metal costs 10 times the price of gold, the catalyst is a high-value material," he said.

Available through chemical supply companies, the reagents are being used by pharmaceutical scientists in both industry and academia.Already, one major pharmaceutical company is using the reagents to synthesize a compound now in clinical trials.

"Demand for our catalysts has gone from gram to kilogram quantities, from fractions of an ounce to multiple pounds," said Davies.So far, the new synthesis strategy has generated compounds that have potential activity against a broad range of disease states, from cancer to central nervous system disorders, such as depression, to inflammatory and microbial diseases and medications for treating cocaine addiction.

"This method is like an enabling technology, making available new targets and materials that previously were out of range," said Davies.

Its ability to result in never-before-seen chemical structures is making Davies' collaborations with scientists in partner institutions on the Buffalo Niagara Medical Campus especially fruitful.

"We're using this as a platform for drug discovery, collaborating through the Center of Excellence with biologists at UB, Roswell Park and Hauptman Woodward Medical Research Institute," said Davies.

Davies' company is one of 10 life sciences spinoffs based in the Center of Excellence, which has the dual mission of promoting life sciences research while facilitating economic development in Upstate New York.In addition to helping drug companies design novel leads for new products, the new chemistry also allows pharmaceutical companies to synthesize efficiently and economically large quantities of novel compounds.

Through catalysis, the chemical synthesis method the UB researchers developed allows for highly unusual functionalizations of carbon-hydrogen bonds, Davies explained."The method allows you to transform a molecule from a simple structure to a much more elaborate, drug-like material," he said, "so it goes from a cheap building block to a potential drug-like candidate. Without a catalyst, it won't happen."

A major advantage of Davies' chemical strategy is that the resulting compounds are produced selectively as single mirror images.Pharmaceutical companies prefer to develop new chiral drugs (chiral meaning "handed") as a single isomer because opposite mirror images can have different biological effects and may be harmful.

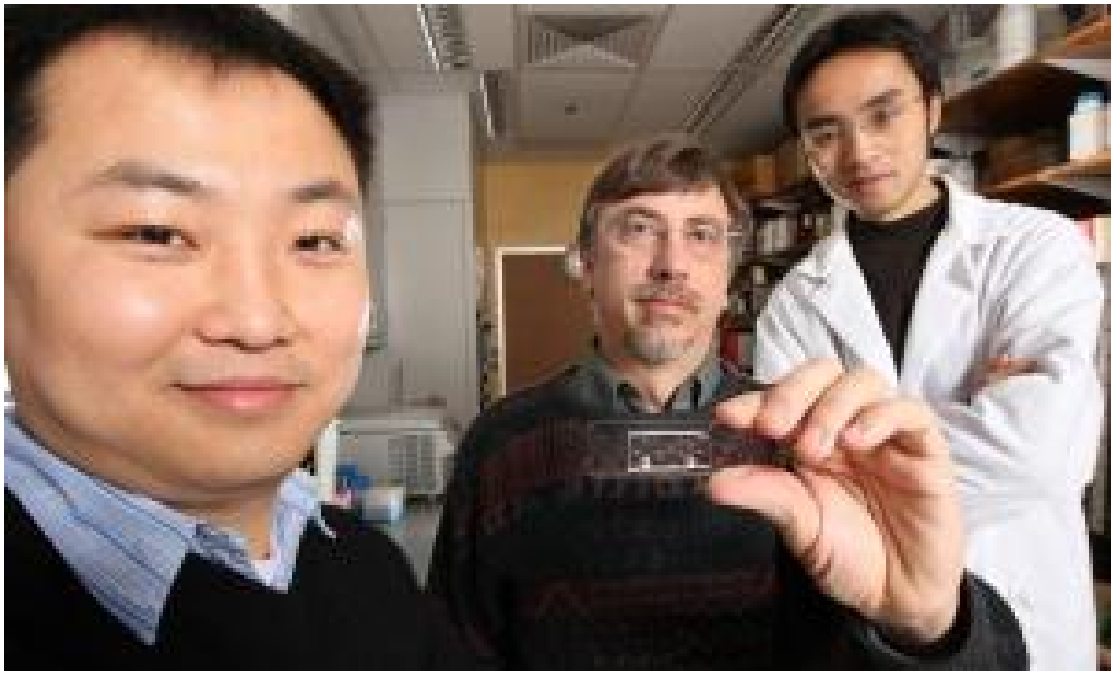
"A small amount of our catalyst can be used to generate large amounts of the active mirror image of the pharmaceutical ingredient," Davies said.The UB research has been funded by the National Institutes of Health and the National Science Foundation, both of which were recently renewed for a total of $1.6 million. The work also has been supported by the UB Center for Advanced Biomedical and Bioengineering Technology (UB CAT), located in the Center of Excellence.

The Nature paper was co-authored by James R. Manning, a graduate student in the Department of Chemistry in the UB College of Arts and Sciences.

Adapted from materials provided by University at Buffalo.

http://www.sciencedaily.com:80/releases/2008/01/080123161246.htm

New Technique Quickly Detects Cancer



A new method developed by Purdue researchers, from left, Chang Lu, Robert Geahlen and Jun Wang allows them to detect movement of proteins within cells, important for cancer cell development and other cell processes. Geahlen holds the microchip through which cells are pumped during the technique. (Credit: Purdue Agricultural Communication photo/Tom Campbell)

ScienceDaily (Jan. 28, 2008) — Researchers have developed a new way to detect protein movements inside cells, which signal a variety of cellular changes such as those in cancer cell development. The method could help diagnose cancer in the future.

By combining two distinct techniques, the technology can examine large numbers of cells individually, a feat not previously possible, said Chang Lu, a Purdue University assistant professor of agricultural and biological engineering.

"We really have bridged the gap between different technologies, allowing us to do science on a whole new level," he said.

In a study published this month in Analytical Chemistry, Lu demonstrated that the technique can detect a handful of protein movements, or translocations, within entire populations of cells.

These movements are important to detect because they are involved in many disease processes, such as oncogenesis, wherein a normal cell becomes malignant, said Robert Geahlen, a study co-author and researcher in the Department of Medicinal Chemistry and Molecular Pharmacology.

"Protein translocations are involved in the activation of tumor cells," he said. "Detecting these movements could help diagnose the type and stage of cancer in the future."

Lu's method uses two existing technologies: electroporation - used to determine protein location - and flow cytometry, a technique capable of rapidly examining individual cells but blind to intracellular protein locations on its own.

The Purdue technique, called "electroporative flow cytometry," harnesses the discerning power of the first method with the speed of the second, Geahlen said.

The method involves cells being sent through tiny channels within a microchip and undergoing electroporation, wherein electrical pulses open pores in cell membranes and protein is released from inside. Then, sensors measure protein concentrations. Since a protein's subcellular location can directly influence the amount of protein leaving the cell, as Lu and Geahlen have shown, this method is capable of indirectly determining location, Geahlen said.

If proteins are in their original position, floating freely in the cell's interior, or cytoplasm, a large percentage of them will flow out of the cell upon electroporation, Lu said. If translocation has occurred, in which proteins migrate from the cytoplasm to tightly bind to the interior of the cell membrane, few will be able to leave.

Previous technologies detect either protein movement in a few individual cells via slow imaging techniques or take average measurements from larger groups of cells, data usually irrelevant to protein location in individual cells, Lu said.

"When looking at a few cells, you see the trees but not the forest," he said. "When you take average measurements from large groups, you see the forest but not the trees. Our method allows us to know something about each tree in the forest."

The technology has the potential to be scaled up significantly, Lu said. In the study, 100-200 cells were processed per second, but that rate could potentially increase to speeds typical of flow cytometry, which goes through 10,000 cells per second. Speed increases can be achieved by optimizing the technology he said.

The study examines the movement of a certain type of protein called kinases. Kinases and their translocations are important for activating and deactivating cells and sending signals to one another, Geahlen said.

"There are many important kinases, enzymes and other proteins that become activated by translocation to the plasma membrane, and we've shown that we can detect one type of translocation," he said. "It's a first step."

Lu has filed a provisional patent for the technique and said that he could see it being used in a clinical setting in five to 10 years.

Study co-authors include graduate students Jun Wang, Leela Paris, Hsiang-Yu Wang, and postdoctoral researcher Ning Bao.

Lu and Geahlen received funding from Purdue and the National Cancer Institute for the study. Lu plans to further develop the technology in the future.

Adapted from materials provided by Purdue University.

http://www.sciencedaily.com:80/releases/2008/01/080123101254.htm

Maya Mask Splendor Enhanced With Sparkling Mica

Reconstruction of the Rosalila in the Copan museum. The Rosalila is still entombed within another pyramid. Ms Goodall said the mica was applied over the red paint of stucco masks on the corners of Copan's well-preserved Rosalila temple, found buried under another pyramid. (Credit: Dr. Jay Hall)

ScienceDaily (Jan. 27, 2008) — Ancient Mayan temple builders discovered and used lustrous pigments to make their buildings dazzle in the daylight, a Queensland University of Technology researcher has discovered.

Studying tiny shards of paint from the Mayan city of Copan, QUT physical and chemical sciences PhD researcher Rosemary Goodall found evidence of mica that would have made the buildings glitter when hit by the sun.

Ms Goodall said the mica was applied over the red paint of stucco masks on the corners of Copan's well-preserved Rosalila temple, found buried under another pyramid.

"The Rosalila would have been one of the highest buildings of the valley in its time, built by the Maya ruler to exhibit his power and impress his subjects," Ms Goodall said.

Using a novel analysis technique to examine tiny paint samples, Ms Goodall found two new pigments at the famous Maya archaeological and tourist site in Honduras, Central America.

"I discovered a green pigment and a mica pigment that would have had a lustrous effect," she said.

"I'm sure that when the sun hit it, it must have sparkled. It must have had the most amazing appearance."

She said site of Copan was first populated in 1600 BC, but it wasn't until the cultural heyday of AD 400-800 that the Rosalila was built. Mystery surrounds the Maya people, who had largely disappeared by about AD 900.

"I used an infrared analysis technique, called FTIR-ATR spectral imaging, which has not been used for archaeology before," she said.

"Using this technique and Raman spectroscopy I found the 'signature' of each mineral in paint samples only millimetres in size.

"The Rosalila has more than 15 layers of paint and stucco. Knowing the mineral make-up of the pigments tells us what colours were painted on each layer.

"I also found the stucco changed over time. It became more refined and changed in colour from grey to white."

Ms Goodall said the Rosalila is a fine example of the Copan buildings, which were painted in red and white, with beautiful masks and carvings painted in multiple colours.

She said it the temple was coated in stucco then filled with rubble and a larger pyramid was built around it, keeping it brilliantly preserved inside. "The next step of my research will be to take a portable Raman spectrometer to Copan to undertake more paint analysis," she said.

"The research will help determine the best ways to conserve the Copan ruins - by understanding what's there, you can suggest ways to stop damage, and the tests do not destroy the samples."

Ms Goodall and her PhD supervisor Peter Fredericks are working in collaboration with Dr Jay Hall (University of Queensland) and Dr Rene Viel (Copan Formative Project, Honduras), who are directing the long-term UQ-led archaeological field research program at Copan.

Adapted from materials provided by Queensland University of Technology.

http://www.sciencedaily.com:80/releases/2008/01/080123085308.htm

Low Vitamin E Levels Associated With Physical Decline In Elderly

Florence, Italy. (Credit: Benedetta Bartali, Yale University)

ScienceDaily (Jan. 27, 2008) — Researchers at Yale School of Medicine have found that a low concentration of vitamin E in the blood is linked with physical decline in older persons.

The study included 698 people age 65 or older who were randomly selected from the population registry in two municipalities close to Florence, Italy. The researchers, led by first author Benedetta Bartali of Yale, collected blood samples to measure the levels of micronutrients including folate, iron and vitamins B6, B12, D and E. They assessed physical decline in the study participants over a three-year period using an objective test of three tasks: walking speed, rising repeatedly from a chair, and standing balance.

"We evaluated the effects of several micronutrients and only vitamin E was significantly associated with decline in physical function," said Bartali, a nutritionist and a Brown-Coxe Postdoctoral Fellow at Yale School of Medicine. "The odds of declining in physical function was 1.62 times greater in persons with low levels of vitamin E compared with persons with higher levels."

Bartali added, "It is unlikely that vitamin E is simply a marker for poor nutrition because our results are independent of energy intake, and the effect of low levels of other micronutrients was not significant. Our results suggest that an appropriate dietary intake of vitamin E may help to reduce the decline in physical function among older persons. Since only one person in our study used vitamin E supplements, it is unknown whether the use of vitamin E supplements would have the same beneficial effect."

Bartali stresses that vitamin E was the only antioxidant measured in the study and further studies are needed to determine whether low levels of other antioxidants would yield the same results.

As an antioxidant, vitamin E may prevent or reduce the propagation of free radicals in the human body, which are associated with physical decline. This may help reduce muscle or DNA damage and the development of pathological conditions like atherosclerosis. Bartali said further studies are needed to determine the mechanisms of how low levels of vitamin E contributes to a decline in physical function.

Journal reference: JAMA. 2008;299[3]:308-315.

Other authors on the study included Edward A. Frongillo, Jack M. Guralnik, M.D., Martha H. Stipanuk, Heather G. Allore, Antonio Cherubini, M.D., Stefania Bandinelli, M.D., Luigi Ferrucci, M.D., and Thomas M. Gill, M.D.

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

http://www.sciencedaily.com:80/releases/2008/01/080122165555.htm

Soft Contact Lens Corneal Infections Fueled By Resistant Microbes

ScienceDaily (Jan. 29, 2008) — In 2006, Bausch & Lomb withdrew its ReNu with MoistureLoc contact lens solution because a high proportion of corneal infections were associated with it. Now in a new study from University Hospitals Case Medical Center, researchers show that these infections were fueled and made resistant to treatment by the formation of a highly resistant structure of microbial cells held together with a glue-like matrix material. Scientists call this conglomeration of cells biofilms."Once they live in that type of state, the cells become resistant to lens solutions and immune to the body's own defense system," said Mahmoud A. Ghannoum, Ph.D., director of the Center for Medical Mycology at University Hospitals Case Medical Center and senior investigator of the study which appears in the January 2008 issue of the journal Antimicrobial Agents and Chemotherapy. "This study should alert contact lens wearers to the importance of proper care for contact lenses to protect against potentially virulent eye infections," he said.

"Biofilms are a constellation of resistant organisms," Dr. Ghannoum said. They were suspected with the spate of infections in 2005-2006, but until this study, there were no data to prove this. This is the first in-vitro model for cornea keratitis infections caused by the fungus Fusarium, which was one of the main culprits in the ReNu with Moisture Loc cases, and another fungus called Candida albicans.The researchers also discovered that the strain of fungus (ATCC 36031) used for testing the effectiveness of lens care solutions is a strain that does not produce biofilms as the clinical fungal strains do. Lens care solutions currently are tested against an old and rare genotype fungal strain obtained in the 1970s from a patient from Nigeria. The contact lens solutions, therefore, are effective in the laboratory, but fail when faced with strains in real-world situations. "The multipurpose contact lens solutions cannot kill these germs, to put it simply," said Dr. Ghannoum.

"We recommend that solutions be tested for biofilms produced by more recent clinical isolates," said Dr. Ghannoum. "One of the underlying reasons for ReNu with MoistureLoc not being effective against the outbreak of keratitis is that the solution is not effective against biofilms and the organisms contained in biofilms."The researchers tested six kinds of contact lenses made by three different manufacturers and two lens care solutions (Bausch & Lomb's MoistureLoc and MultiPlus) against three fungal strains (two recent clinical strains and the one from the 1970s) of Fusarium and one strain of C. albicans.

Since biofilm contamination of contact lens cases is a common finding, and ReNu with MoistureLoc is ineffective against fungal biofilm, the industry must ensure that their multipurpose solutions are effective against biofilms, said Dr. Ghannoum. In the meantime, extreme caution must be taken to ensure the contact lens care case is not contaminated with biofilm.Dr. Ghannoum recommends that soft contact lens wearers use only fresh lens care solution, not add fresh solution to old solution, a phenomenon known as topping off, and use solution by expiration dates written on the package. He also recommends a rub and rinse method, regardless of which cleaning or disinfecting solution used (which also is recommended by the Centers for Disease Control and Prevention). An additional preventative measure to prohibit the development of biofilms is to ensure that the bottle caps and tips of multipurpose solutions are clean.

The study involved researchers in the Center for Medical Mycology, Department of Dermatology, and Department of Ophthalmology and Visual Sciences at University Hospitals Case Medical Center and Case Western Reserve University in Cleveland. The strains of fungus tested in the study were obtained from patients with fungal keratitis at University Hospitals Case Medical Center, the Cleveland Clinic Foundation, and the American Type Culture Collection (Manassas, Va.). This work was supported by funding from the National Institutes of Health.

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

http://www.sciencedaily.com:80/releases/2008/01/080128113204.htm

Scientists Call For Urgent Research Into 'Real' Impacts Of Invasive Species

Kudzu is an invasive vine that grows extremely quickly in the Southern US. (Credit: USFWS)

ScienceDaily (Jan. 29, 2008) — Scientists warn that unless more research is carried out to highlight the damage caused by invasive species, more livelihoods and natural ecosystems will be ruined as a consequence of their effects. Invasive alien species are those that occur outside their natural range and threaten the existence of native plants and animals. They can be plants, animals or microorganisms that are introduced intentionally for economic or agricultural purposes, or accidentally, through tourism, travel or trade, or when domestic animals become feral.

As well as drawing attention to the rising cost of invasive species on a global scale –estimated at US$1.4 trillion in damage – GISP stresses that too much emphasis has been placed on the problems faced by the agricultural sector in developed countries rather than in developing countries and on the "full range of environmental, social and economic costs." The report also emphasises that due to the lack of knowledge and research available on the severity of individual pests and the options for best controlling them, policy makers are being left in the dark.

Dennis Rangi, Chair of GISP says: "With the increase in global trade, invasive species are gaining more and more prominence around the world. However the level of awareness amongst decision-makers, and in particular those in developing countries is still relatively low. "

He goes on to say that to enable informed policy making on the prevention, eradication and control of invasive species, it is critical that studies are expanded to show the extent of the problem and in

particular the impact that these weeds, pests and diseases have on people's lives. He says "numbers are not enough; decision makers need to know the tangible effects invasive species are having on the individual farmers and their crops."

To help address the issues, GISP and one of its lead organisations, CABI, has undertaken a number of case studies of problem invasive species in Africa – a country with a current lack of analysis. As well as highlighting the overall economic damage to the affected countries, the studies show the estimated monetary loss to farmers, the cost of prevention and control and the potential consequences if action is not taken.

CABI is world-renowned for its extensive work in working with countries to help prevent and control invasive species. As well as advising on how to control invasive weeds and pests using a complementary array of pest management approaches, CABI specialises in natural control methods. This focuses on finding and developing natural enemies from the species' country of origin and introducing them to the environment where it has invaded. One example is the Rastrococcus mealybug which devastated mangoes in West Africa. CABI introduced a highly specific wasp from Asia, which proved extremely effective in controlling the mealybug. Natural control methods for other weed species such as Mikania micrantha and Water Hyacinth have also been successfully used.

Among GISP's case studies is the Triffid weed (Chromolaena odorata), a plant native to the Americas which has severely impacted natural areas in Africa and reduces crop productivity in agriculture and grazing. In Ghana the study showed that the weed occupies 59% of all arable lands, and in Ubombo, South Africa it greatly reduces the grazing capacity of animals. Effective control would see an increase in production by 34% and a gain of US$25.6 per hectare for each farmer.

Another example is the Larger Grain Borer which has been recorded in over 18 African countries. The Borer is a major pest of staple food in Africa, especially farm-stored maize and cassava. By studying the Borer, GISP reported that "its impact is greatest in rural, small-holder farming systems where yield losses range from 23-60%."

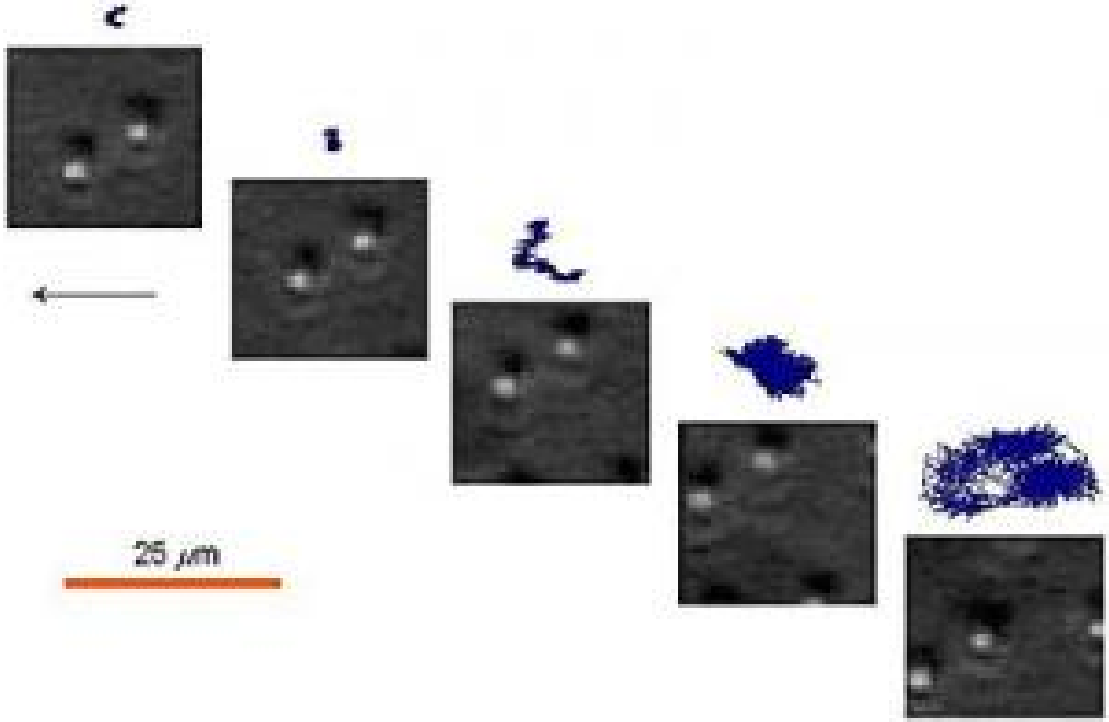
Sarah Simons, Global Director of Invasives Species at CABI concludes: "By concentrating on a number of specific problem weeds in Africa, we are able to identify the effects they have on a country's overall economy and also on the farmers and their families. This sort of information is essential if governments are to understand the extent of the problem and develop effective strategies to tackle them.

The report "Economic Impacts of Invasive Alien Species: A Global Problem with Local Consequences" is authored by the Global Invasives Species Programme.

Adapted from materials provided by CABI.

http://www.sciencedaily.com:80/releases/2008/01/080123180747.htm

Videos Extract Mechanical Properties Of Liquid-gel Interfaces



Microscopic beads embedded in a gel surface were used to trace the motion of a gel forming an interface with a liquid. As the gel/liquid interface was stirred, the beads followed a complicated trajectory (patterns above photos), which the researchers broke down into a range of small, fast movements to large, slow movements in order to determine the gel's underlying mechanical properties. As the strength of the flow is increased (from left to right), the scale of the motion increases. (Credit: NIST)

ScienceDaily (Jan. 29, 2008) — Blood coursing through vessels, lubricated cartilage sliding against joints, ink jets splashing on paper--living and nonliving things abound with fluids meeting solids. However important these liquid/solid boundaries may be, conventional methods cannot measure basic mechanical properties of these interfaces in their natural environments. Now, researchers at the National Institute of Standards and Technology (NIST) and the University of Minnesota have demonstrated a video method that eventually may be able to make measurements on these types of biological and industrial systems.*

Optical microrheology--an emerging tool for studying flow in small samples--usually relies on heat to stir up motion. Analyzing this heat-induced movement can provide the information needed to determine important mechanical properties of fluids and the interfaces that fluids form with other materials. However, when strong flows overwhelm heat-based motion, this method isn't applicable.

Motivated by this, researchers developed a video method that can extract optically basic properties of the liquid/solid interface in strong flows. The solid material they chose was a gel, a substance that has both solid-like properties such as elasticity and liquid-like properties such as viscosity (resistance to flow).

In between a pair of centimeter-scale circular plates, the researchers deposited a gel of polydimethylsiloxane (a common material used in contact lenses and microfluidics devices). Pouring a liquid solution of polypropylene glycol on the gel, they then rotated the top plate to create forces at the liquid/gel interface. The results could be observed by tracking the motion of styrene beads in the gel.

The researchers discovered that the boundary between the liquid and gel became unstable in response to "mechanical noise" (irregularities in the motion of the plates). Such "noise" occurs in real-world

physical systems. Surprisingly, a small amount of this mechanical noise produced a lot of motion at the fluid/gel interface. This motion provided so much useful information that the researchers could determine the gel's mechanical properties--namely its "viscoelasticity"--at the liquid/gel interface.

The encouraging results from this model system show that this new approach could potentially be applied to determining properties of many useful and important liquid/solid interfaces. The NIST/Minnesota approach has possible applications in areas as diverse as speech therapy where observing the flow of air over vocal cords could enable noninvasive measures of vocal tissue elasticity and help clinicians detect problems at an early stage. Also, this research may help clarify specific plastics manufacturing problems, such as "shear banding," in which flow can separate a uniformly blended polymer undesirably into different components.

* E.K. Hobbie, S. Lin-Gibson, and S. Kumar Non-Brownian microrheology of a fluid-gel interface, To appear in Physical Review Letters.

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

http://www.sciencedaily.com:80/releases/2008/01/080123173143.htm

Sedentary Lifestyles Associated With Accelerated Aging Process

"Inactivity may diminish life expectancy not only by predisposing to aging-related diseases but also because it may influence the aging process itself," researchers report in the January 28 issue of Archives of Internal Medicine. (Credit: iStockphoto/Gary Martin)

ScienceDaily (Jan. 29, 2008) — Individuals who are physically active during their leisure time appear to be biologically younger than those with sedentary lifestyles, according to a report in the January 28 issue of Archives of Internal Medicine, one of the JAMA/Archives journals.

Regular exercisers have lower rates of cardiovascular disease, type 2 diabetes, cancer, high blood pressure, obesity and osteoporosis, according to background information in the article. "A sedentary lifestyle increases the propensity to aging-related disease and premature death," the authors write. "Inactivity may diminish life expectancy not only by predisposing to aging-related diseases but also because it may influence the aging process itself."

Lynn F. Cherkas, Ph.D., of King's College London, and colleagues studied 2,401 white twins, administering questionnaires on physical activity level, smoking habits and socioeconomic status. The participants also provided a blood sample from which DNA was extracted. The researchers examined the length of telomeres--repeated sequences at the end of chromosomes--in the twins' white blood cells (leukocytes). Leukocyte telomeres progressively shorten over time and may serve as a marker of biological age.

Telomere length decreased with age, with an average loss of 21 nucleotides (structural units) per year. Men and women who were less physically active in their leisure time had shorter leukocyte telomeres than those who were more active. "Such a relationship between leukocyte telomere length and physical activity level remained significant after adjustment for body mass index, smoking, socioeconomic status and physical activity at work," the authors write. "The mean difference in leukocyte telomere length between the most active [who performed an average of 199 minutes of physical activity per week] and least active [16 minutes of physical activity per week] subjects was 200 nucleotides, which

means that the most active subjects had telomeres the same length as sedentary individuals up to 10 years younger, on average." A sub-analysis comparing pairs in which twins had different levels of physical activity showed similar results.

Oxidative stress--damage caused to cells by exposure to oxygen--and inflammation are likely mechanisms by which sedentary lifestyles shorten telomeres, the authors suggest. In addition, perceived stress levels have been linked to telomere length. Physical activity may reduce psychological stress, thus mitigating its effect on telomeres and the aging process.

"The U.S. guidelines recommend that 30 minutes of moderate-intensity physical activity at least five days a week can have significant health benefits," the authors write. "Our results underscore the vital importance of these guidelines. They show that adults who partake in regular physical activity are biologically younger than sedentary individuals. This conclusion provides a powerful message that could be used by clinicians to promote the potential anti-aging effect of regular exercise."

Journal reference: Arch Intern Med. 2008;168[2]:154-158.

This study was supported in part by a grant from the Welcome Trust, grants from the National Institutes of Health and a grant from The Healthcare Foundation of New Jersey.

Editorial: More Research Needed to Verify Exercise-Aging Link

Additional work needs to be done to show a direct relationship between aging and physical activity, writes Jack M. Guralnik, M.D., Ph.D., of the National Institute on Aging, Bethesda, Md., in an accompanying editorial.

"Persons who exercise are different from sedentary persons in many ways, and although certain variables were adjusted for in this analysis, many additional factors could be responsible for the biological differences between active and sedentary persons, a situation referred to by epidemiologists as residual confounding," Dr. Guralnik writes. "Nevertheless, this article serves as one of many pieces of evidence that telomere length might be targeted in studying aging outcomes."

Editorial reference: Arch Intern Med. 2008;168[2]:131-132.

This work was supported by the Intramural Research Program, National Institute on Aging, National Institutes of Health.

Adapted from materials provided by JAMA and Archives Journals.

http://www.sciencedaily.com:80/releases/2008/01/080128165734.htm

New Experimental Website Converts Photos Into 3D Models

A three-dimensional "fly around" image, above, was created from a two-dimensional image using an algorithm developed by Stanford computer scientists. (Credit: Ashutosh Saxena / courtesy of Stanford University)

ScienceDaily (Jan. 28, 2008) — An artist might spend weeks fretting over questions of depth, scale and perspective in a landscape painting, but once it is done, what's left is a two-dimensional image with a fixed point of view. But the Make3d algorithm, developed by Stanford computer scientists, can take any two-dimensional image and create a three-dimensional "fly around" model of its content, giving viewers access to the scene's depth and a range of points of view.

"The algorithm uses a variety of visual cues that humans use for estimating the 3-D aspects of a scene," said Ashutosh Saxena, a doctoral student in computer science who developed the Make3d website with Andrew Ng, an assistant professor of computer science. "If we look at a grass field, we can see that the texture changes in a particular way as it becomes more distant."

The applications of extracting 3-D models from 2-D images, the researchers say, could range from enhanced pictures for online real estate sites to quickly creating environments for video games and improving the vision and dexterity of mobile robots as they navigate through the spatial world.

Extracting 3-D information from still images is an emerging class of technology. In the past, some researchers have synthesized 3-D models by analyzing multiple images of a scene. Others, including Ng and Saxena in 2005, have developed algorithms that infer depth from single images by combining assumptions about what must be ground or sky with simple cues such as vertical lines in the image that represent walls or trees. But Make3d creates accurate and smooth models about twice as often as competing approaches, Ng said, by abandoning limiting assumptions in favor of a new, deeper analysis of each image and the powerful artificial intelligence technique "machine learning."

Restoring the third dimension

To "teach" the algorithm about depth, orientation and position in 2-D images, the researchers fed it still images of campus scenes along with 3-D data of the same scenes gathered with laser scanners. The algorithm correlated the two sets together, eventually gaining a good idea of the trends and patterns associated with being near or far. For example, it learned that abrupt changes along edges correlate well with one object occluding another, and it saw that things that are far away can be just a little hazier and more bluish than things that are close.

To make these judgments, the algorithm breaks the image up into tiny planes called "superpixels," which are within the image and have very uniform color, brightness and other attributes. By looking at a superpixel in concert with its neighbors, analyzing changes such as gradations of texture, the algorithm makes a judgment about how far it is from the viewer and what its orientation in space is. Unlike some previous algorithms, the Stanford one can account for planes at any angle, not just horizontal or vertical. This allows it to create models for scenes that have planes at many orientations, such as the curved branches of trees or the slopes of mountains.

On the Make3d website, the algorithm puts images uploaded by users into a processing queue and will send an e-mail when the model has been rendered. Users can then vote on whether the model looks good, and can see an alternative rendering and even tinker with the model to fix what might not have been rendered right the first time.

Photos can be uploaded directly or pulled into the site from the popular photo-sharing site Flickr.

Although the technology works better than any other has so far, Ng said, it is not perfect. The software is at its best with landscapes and scenery rather than close-ups of individual objects. Also, he and Saxena hope to improve it by introducing object recognition. The idea is that if the software can recognize a human form in a photo it can make more accurate distance judgments based on the size of the person in the photo.

A paper on the algorithm by Ng, Saxena and a fellow student, Min Sun, won the best paper award at the 3-D recognition and reconstruction workshop at the International Conference on Computer Vision in Rio de Janeiro in October 2007.

For many panoramic scenes, there is still no substitute for being there. But when flat photos become 3-D, viewers can feel a little closer—or farther. The algorithm runs at http://make3d.stanford.edu.

Adapted from materials provided by Stanford University.

http://www.sciencedaily.com:80/releases/2008/01/080126100444.htm

What Gives Us Fingertip Dexterity?

Quick finger movement is the result of a complex neuro-motor-mechanical process orchestrated with precision timing by the brain, nervous system and muscles of the hand, researchers have found. (Credit: iStockphoto/Stephanie Phillips)

ScienceDaily (Jan. 28, 2008) — Quickly moving your fingertips to tap or press a surface is essential for everyday life to, say, pick up small objects, use a BlackBerry or an iPhone. But researchers at the University of Southern California say that this seemingly trivial action is the result of a complex neuro-motor-mechanical process orchestrated with precision timing by the brain, nervous system and muscles of the hand.

USC Viterbi School of Engineering biomedical engineer Francisco Valero-Cuevas is working to understand the biological, neurological and mechanical features of the human hand that enable dexterous manipulation and makes it possible for a person to grasp and crack an egg, fasten a button, or fumble with a cell phone to answer a call.

"When you look at the hand, you think, 'five fingers, what could be more straightforward?' " Valero-Cuevas said, "but really we don't understand well what a hand is bio-mechanically, how it is controlled neurologically, how disease impairs it, and how treatment can best restore its function. It is difficult to know how each of its 30-plus muscles contributes to everyday functions like using a cell phone or performing the many finger tasks it takes to dress yourself."

Valero-Cuevas and co-author Madhusudhan Venkadesan of Cornell University's Department of Mathematics asked volunteers to tap and push against a surface with their forefinger while the researchers recorded the fingertip force and electrical activity in all of the muscles of the hand.

These researchers, in a first-of-a-kind experiment, recorded 3D fingertip force plus the complete muscle coordination pattern simultaneously using intramuscular electromyograms from all seven muscles of the index finger. Subjects were asked to produce a downward tapping motion, followed by a well-directed vertical fingertip force against a rigid surface. The researchers found that the muscle coordination pattern clearly switched from that for motion to that for force (~65 ms) before contact.

Venkadesan's mathematical modeling and analysis revealed that the underlying neural control also switched between mutually incompatible strategies in a time-critical manner.

"We think that the human nervous system employs a surprisingly time-critical and neurally demanding strategy for this common and seemingly trivial task of tapping and then pushing accurately, which is a necessary component of dexterous manipulation," said Valero-Cuevas, who holds a joint appointment in the USC School of Dentistry's division of Biokinesiology and Physical Therapy.

"Our data suggest that specialized neural circuitry may have evolved for the hand because of the time-critical neural control that is necessary for executing the abrupt transition from motion (tap) to static force (push)," he said. "In the tap-push exercise, we found that the brain must be switching from the tap command to the push command while the fingertip is still in motion. Neurophysiological limitations prevent an instantaneous or perfect switch, so we speculate that there must be specialized circuits and strategies that allow people to do so effectively.

"If the transition between motor commands is not well timed and executed, your initial forces will be misdirected and you simply won't be able to pick up an egg, a wine glass or a small bead quickly," he said.

The findings begin to explain why it takes young children years to develop fine finger muscle coordination and skills such as precision pinching or manipulation, and why fine finger manipulation is so vulnerable to neurological diseases and aging, Valero-Cuevas said.

But perhaps even more importantly, he said, the findings suggest a functional explanation for an important evolutionary feature of the human brain: its disproportionately large sensory and motor centers associated with hand function.

"If, indeed, the nervous system faced evolutionary pressures to be able to anticipate and precisely control routine tasks like rapid precision pinch, the cortical structures for sensorimotor integration for finger function would probably need to be pretty well developed in the brain," Valero-Cuevas said.

"That would give us the neural circuits needed for careful timing of motor actions and fine control of finger muscles," he said. "Thus, our work begins to propose some functional justifications for the evolution of specialized brain areas controlling dexterous manipulation of the fingertips in humans."

By understanding the neuromuscular principles behind dexterous manipulation, Valero-Cuevas hopes to help those who have lost the use of their hands by guiding rehabilitation and helping to develop the next generation of prosthetics. In addition, the work will allow industry to build machines that have versatility comparable to that of the human hand.

"As an analogy, I ask people to imagine going through life wearing winter gloves," he said. "If you can grasp things in only the grossest of ways without fine manipulation, life is pretty difficult. Yet millions of people worldwide go through life without the full use of their hands. Diseases and aging processes that affect the hand function tend to disproportionately degrade the quality of life, and we want to reverse that."

This study, entitled "Neural Control Of Motion-to-Force Transitions with the Fingertip" was published online January 23 in The Journal of Neuroscience. The research was supported by the Whitaker Foundation, the National Science Foundation and the National Institutes of Health.

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

http://www.sciencedaily.com/releases/2008/01/080123085319.htm

Earth's Getting 'Soft' In The Middle, Geologists Note

Material in part of Earth's lower mantle appears to have unusual electronic characteristics that make sound propagate more slowly. (Credit: NASA/GSFC)

ScienceDaily (Jan. 28, 2008) — A new study suggests that material in part of the lower mantle has unusual electronic characteristics that make sound propagate more slowly, suggesting that the material there is softer than previously thought. The results call into question the traditional techniques for understanding this region of the planet.

Since we can't sample the deepest regions of the Earth, scientists watch the velocity of seismic waves as they travel through the planet to determine the composition and density of that material. Now a new study suggests that material in part of the lower mantle has unusual electronic characteristics that make sound propagate more slowly, suggesting that the material there is softer than previously thought. The results call into question the traditional techniques for understanding this region of the planet.

The lower mantle extends from about 400 miles to 1800 miles (660-2900 kilometers) into Earth and sits atop the outer core. Pressures and temperatures are so brutal there that materials are changed into forms that don't exist in rocks at the planet's surface and must be studied under carefully controlled conditions in the laboratory. The pressures range from 230,000 times the atmospheric pressure at sea level (23 GPa), to 1.35 million times sea-level pressure (135 GPa). And the heat is equally extreme--from about 2,800 to 6,700 degrees Fahrenheit (1800K--4000K).

Iron is abundant in the Earth, and is a major component of the minerals ferropericlase and the silicate perovskite in the lower mantle. In previous work, researchers found that the outermost electrons of iron in ferropericlase are forced to pair up under the extreme pressures creating a so-called spin-transition zone within the lower mantle.

"What happens when unpaired electrons--called a high-spin state--are forced to pair up is that they transition to what is called a low-spin state. And when that happens, the conductivity, density, and chemical properties change," explained Goncharov. "What's most important for seismology is the acoustic properties--the propagation of sound. We determined the elasticity of ferropericlase through the pressure-induced high-spin to low-spin transition. We did this by measuring the velocity of acoustic waves propagating in different directions in a single crystal of the material and found that over an extended pressure range (from about 395,000 to 590,000 atmospheres) the material became 'softer'--that is, the waves slowed down more than expected from previous work. Thus, at high temperature corresponding distributions will become very broad, which will result in a wide range of depth having subtly anomalous properties that perhaps extend through most of the lower mantle."

The results suggest that scientists may have to go back to the drawing board to model this region of the Earth.

The authors, including Alexander Goncharov from the Carnegie Institution's Geophysical Laboratory, present their results in the January 25, 2008, issue of Science.

This research was partly funded by Carnegie Institution of Washington, the National Science Foundation and the U.S. Department of Energy/National Nuclear Security Agency through the Carnegie/DOE Alliance Center' and the W. M. Keck Foundation.

Adapted from materials provided by Carnegie Institution.

http://www.sciencedaily.com:80/releases/2008/01/080124145022.htm

Water Repellent Wood Fiber Products Developed

Wood fiber samples (Credit: Image courtesy of Technical Research Centre of Finland)

ScienceDaily (Jan. 28, 2008) — VTT Technical Research Centre of Finland has developed a method that opens up new opportunities for the use of lignin-containing wood fibres and other natural fibres as well as fibre products. The method offers an innovative, environmentally friendly approach to customize or even to introduce completely new properties - such as moisture repellency or electric conductivity - to fibre-containing products.

The new chemo-enzymatic modification method of fibre materials enables manufacturers to better tailor the fibre properties according to the desired end product. The method can be used to enhance the original properties or even to introduce new properties to lignin-containing fibre materials. To achieve the desired modification, suitable chemical compounds are attached to the material in a chemical or enzymatic process.

Wood fibre products are moisture absorbent by nature. The new method makes it possible to control the moisture resistance properties of lignin-containing fibre materials even to a degree where they become water-resistant. This opens up new opportunities for the use of wood fibres e.g. in the packaging industry.

Manufacturers in branches of industry such as the biocomposites, building and speciality paper and packaging industries, utilising materials containing lignocellulosic fibres in composite structures, can benefit from VTT's method for developing various product properties. For example, the process can be used to make antistatic filter papers.

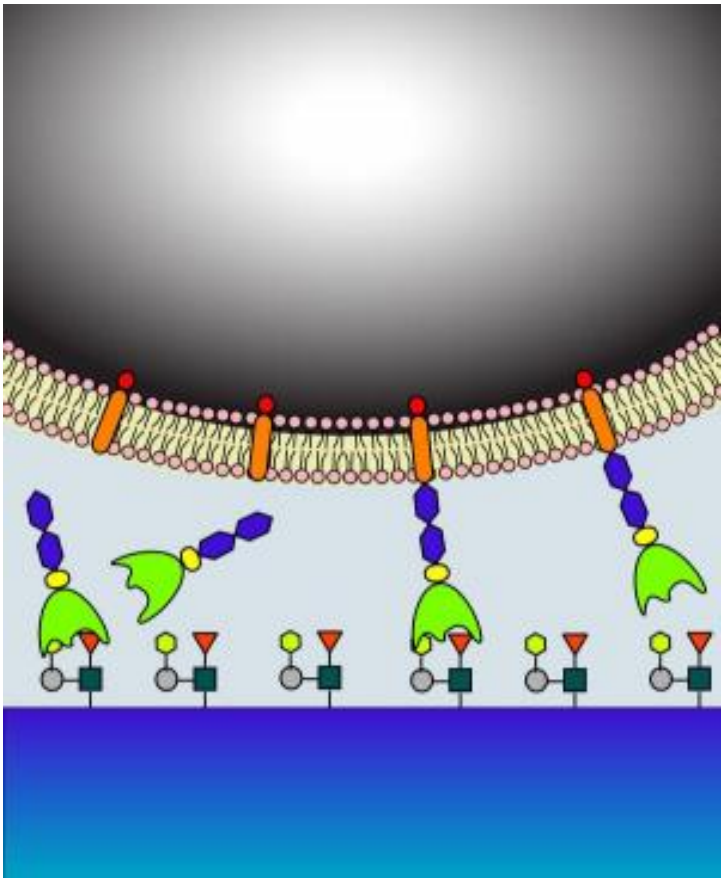
VTT's chemo-enzymatic method differs from the available chemical modifications in its surface targeted and gentle action. It can also easily be integrated in existing manufacturing and finishing processes of fibres and fibre materials.

"Chemo-enzymatic fibre modification creates new opportunities for the processing of existing fibre products and for manufacturing innovative, tailored fibre products in the paper and packaging process. In the future, tailored wood fibres may present a viable alternative for example to synthetic fibres in various industrial composites," says Anna Suurnäkki, Senior Research Scientist at VTT.

Adapted from materials provided by Technical Research Centre of Finland.

http://www.sciencedaily.com:80/releases/2008/01/080123163554.htm

Engineers Use Blood's Hydrodynamics To Manipulate Stem, Cancer Cells



Closeup of how selectins work inside microtube. (Credit: Image courtesy of University of Rochester)

ScienceDaily (Jan. 28, 2008) — A tiny, implantable device has pulled adult stem cells out of a living rat with a far greater purity than any present technique.The test of the device designed by Michael R. King, associate professor of biomedical engineering at the University of Rochester, will be reported in the March 3 issue of the British Journal of Haematology.

"It's the kind of research that, before we tried it, we never would have expected such a remarkable result straight out of the gate," says King. "We're finding we can play off the hydrodynamics of moving blood to isolate and manipulate specific cell populations with great efficiency."King is at the forefront of a new field; manipulating stem cells, white blood cells, and even cancer cells by exploiting the mechanics of the cells' movement with such precision that he is having success capturing and even reprogramming several cell types as they pass through the device, he says.

A chance encounter between an engineer and a hematology clinician gave rise to the field in 2002. King was studying how certain white blood cells, called neutrophils, know how to migrate to a point of infection. He observed how, near an injury site, the walls of the nearby blood vessels expressed an adhesive protein called a selectin, and if passing neutrophils brushed against these selectins, they stuck to the vessel wall.But the cells did not remain stuck—they rolled. With a precise balance between the adhesion of the selectins and the forces of the flowing bloodstream, the cells could move much more slowly as they approached the infection site. With that slowed pace, the cell can look for a second signal on the vessel wall that tells the cell to exit the vessel by squeezing between cells in the wall and moving directly to the site of infection.

One reason the system is so effective is that only the neutrophils respond to those selectins, so only neutrophils slow down in the blood. King was working out the physical dynamics of this neutrophil

rolling in his office one day when Jane Liesveld, a hematology clinician doing work on bone marrow stem cells at the University of Rochester, walked by and noticed a poster of King's work in the hallway outside his office.

"She dropped in and said, 'I have a pretty plentiful source of primary stem cells from patients. Can you think of any biophysical research to do with that?'" says King. "The stem cell angle just fell from the sky."As King worked with Liesveld he found that the basic rolling mechanism was the foundation of a number of other processes, including stem cell transplantation—a natural phenomenon where stem cells move in and out of bone tissue via the blood. In 2004, he found that he could coat a material with specific adhesive selectins and capture living stem cells. This collaboration resulted in two human stem cell papers published just within the last month: in Biotechnology Progress (Charles et al., 2007) and Clinical Chemistry (Narasipura et al., 2007).

In the new British Journal of Haematology paper, King and colleagues show they can take the process a step further by implanting the device in a living rat with the selectin coating remaining active for 1-2 hours. When the tube was removed, King found he'd indeed captured cells straight out of the bloodstream, including contaminants—non-stem cells—as expected. What he didn't expect was how many of the cells were viable stem cells.

"I was astounded," says King. "More than 25 percent of the sample was stem cells. It's amazing because even when you use drugs to increase the number of free stem cells in the blood, they still only make up less than 1 percent of all cells. If you use traditional methods to collect stem cells, centrifuging the rat's blood, even in these drug-treated rats you might get 3 or 4 percent stem cells—meaning only 3 or 4 percent of the cells you obtain are stem cells."King points out that centrifugal methods currently produce an overall higher stem cell yield because they start with far more blood material, but he believes his microscale device can be scaled up to significantly larger capacity.

King is even more enthusiastic about his work in reprogramming cells that pass through his device. As the cell rolls across the adhesive surface, it can be forced to contact other proteins on the surface. King says these proteins can be designed to steer a stem cell's development, forcing it to become a specific type of blood, bone, or muscle cell.

King hopes someday an implantable device could continuously reprogram errant neutrophils, but he is already hard at work on a device that holds the same promise for cancerous cells.

Cancer cells use the same rolling mechanism to travel around the body and lodge in interstitial tissue, so King has already focused on isolating the selectins that cancer cells respond to. His lab is working to create a microscale tube that might attract cancer cells and use "permanent" receptor-mediated triggering proteins to reprogram them to self-destruct. With his microscale tube device, King has already verified that he can control the rolling adhesion of various types of cancer cells, including leukemias, prostate, retinoblastoma, and colorectal cancer cells."One of our ultimate goals is to develop an implantable device that will selectively remove metastatic cells from the blood," says King. "Those cells can predate detectable tumors by years, so we might catch them before they become dangerous."

This research was funded by the New York State Foundation for Science, Technology and Innovation, and by CellTraffix, a company in which King holds a financial interest. Other authors on the British Journal of Haematology paper include University of Rochester postdoctoral students Joel C. Wojciechowski and Srinivas D. Narasipura, doctoral student Nichola Charles, Deanne Mickelsen, laboratory technician, and Martha L. Blair, professor in the Department of Pharmacology and Physiology.

Adapted from materials provided by University of Rochester.

http://www.sciencedaily.com:80/releases/2008/01/080123125615.htm

Don't Worry, Be Moderately Happy, Research Suggests

ScienceDaily (Jan. 28, 2008) — Could the pursuit of happiness go too far?Most self-help books on the subject offer tips on how to maximize one's bliss, but a new study suggests that moderate happiness may be preferable to full-fledged elation.

The researchers, from the University of Virginia, the University of Illinois and Michigan State University, looked at data from the World Values Survey, a large-scale analysis of economic, social, political and religious influences around the world. They also analyzed the behaviors and attitudes of 193 undergraduate students at Illinois.

Their findings challenge the common assumption that all measures of well-being go up as happiness increases. While many indicators of success and well-being do correspond to higher levels of happiness, the researchers report, those at the uppermost end of the happiness scale (people who report that they are 10s on a 10-point life satisfaction score) are in some measures worse off than their slightly less elated counterparts.

To put the findings in perspective, it is important to note that happiness generally correlates with all kinds of positive measures, said Illinois psychology professor Ed Diener, an author of the study. In general, the happier you are the more successful you are in terms of money, employment and relationships.

"Happy people are more likely (than unhappy people) to get married, are more likely to stay married, are more likely to think their marriage is good," Diener said. "They're more likely to volunteer. They're more likely to be rated highly by their supervisor and they're more likely to make more money."

Happy people are also, on average, healthier than unhappy people and they live longer, Diener said. And, he said, some research indicates that happiness is a cause of these sources of good fortune, not just a result.

"But there is a caveat, and that is to say: Do you then have to be happier and happier" How happy is happy enough?"

The research team began with the prediction that mildly happy people (those who classify themselves as eights and nines on the 10-point life satisfaction scale) may be more successful in some realms than those who consider themselves 10s. This prediction was based on the idea that profoundly happy people may be less inclined to alter their behavior or adjust to external changes even when such flexibility offers an advantage.

Their analysis of World Values Survey data affirmed that prediction.

"The highest levels of income, education and political participation were reported not by the most satisfied individuals (10 on the 10-point scale)," the authors wrote, "but by moderately satisfied individuals (8 or 9 on the 10-point scale)."

The 10s earned significantly less money than the eights and nines. Their educational achievements and political engagement were also significantly lower than their moderately happy and happy-but-not-blissful counterparts.

In the more social realms, however, the 10s were the most successful, engaging more often in volunteer activities and maintaining more stable relationships.

The student study revealed a similar pattern in measures of academic and social success. In this analysis, students were categorized as unhappy, slightly happy, moderately happy, happy or very

happy. Success in the categories related to academic achievement (grade-point average, class attendance) and conscientiousness increased as happiness increased, but dropped a bit for the individuals classified as very happy. In other words, the happy group outperformed even the very happy in grade-point average, attendance and conscientiousness.

Those classified as very happy scored significantly higher on things like gregariousness, close friendships, self-confidence, energy and time spent dating.

The data indicate that happiness may need to be moderated for success in some areas of life, such as income, conscientiousness and career, Diener said.

"The people in our study who are the most successful in terms of things like income are mildly happy most of the time," he said.

In an upcoming book on the science of well-being, Diener notes that being elated all the time is not always good for one's success -- or even for one's health. Reviews of studies linking health and emotions show that for people who have been diagnosed with serious illnesses, being extremely happy doesn't always improve survival rates, Diener said. This may be because the elated don't worry enough about issues that can have profound implications for their ability to survive their illness, he said.

"Happy people tend to be optimistic and this might lead them to take their symptoms too lightly, seek treatment too slowly, or follow their physician's orders in a half-hearted way," he writes.

All in all, Diener said, the evidence indicates that happiness is a worthy goal for those who lack it, but the endless pursuit of even more happiness for the already happy may be counterproductive.

"If you're worried about success in life, don't be a 1, 2, 3 or 4 (on the 10-point scale)," Diener said. "If you are unhappy or only slightly happy, you may need to seek help or read those self-help books or do something to make yourself happier. But if you're a 7 or 8, maybe you're happy enough!"

This research was published in the December 2007 Perspectives on Psychological Science.

Adapted from materials provided by University of Illinois at Urbana-Champaign.

http://www.sciencedaily.com:80/releases/2008/01/080124132506.htm

New Discoveries At The Ash Altar Of Zeus Offer Insights Into Origins Of Ancient Greece's Most Powerful God

Top: Altar of Zeus at Mt. Lykaion. Left to right: Dan Diffendale, University of Pennsylvania, Dr. Arthur Rhon, Wichita State University, and Arvey Basa, University of Arizona. Bottom Left: Crystal lentoid seal of a bull, Late Minoan I or II, ca. 1400 B.C. Diameter 3 cm. Bottom Right: Reverse of Arcadian League silver stater, Zeus Lykaios seated on a throne with an eagle in his left hand. 5th century B.C. Diameter 2 cm. (Credit: Image courtesy of University of Pennsylvania Museum)

ScienceDaily (Jan. 28, 2008) — The Greek traveler, Pausanias, living in the second century, CE, would probably recognize the spectacular site of the Sanctuary of Zeus at Mt. Lykaion, and particularly the altar of Zeus. At 4,500 feet above sea level, atop the altar provides a breathtaking, panoramic vista of Arcadia."On the highest point of the mountain is a mound of earth, forming an altar of Zeus Lykaios, and from it most of the Peloponnesos can be seen," wrote Pausanias, in his famous, well-respected multi-volume Description of Greece. "Before the altar on the east stand two pillars, on which there were of old gilded eagles. On this altar they sacrifice in secret to Lykaion Zeus. I was reluctant to pry into the details of the sacrifice; let them be as they are and were from the beginning."

What would surprise Pausanias—as it is surprising archaeologists—is how early that "beginning" actually may be. New pottery evidence from excavations by the Greek-American, interdisciplinary team of the Mt. Lykaion Excavation and Survey Project indicates that the ash altar—a cone of earth located atop the southern peak of Mt Lykaion where dedications were made in antiquity— was in use as early as 5,000 years ago—at least 1,000 years before the early Greeks began to worship the god Zeus.In addition, a rock crystal seal, bearing an image of a bull, of probable Late Minoan times (1500-1400 BCE) and also found on the altar, suggests an intriguing early connection between the Minoan isle of Crete and Arcadia, and bears witness to another chapter in what now appears to be an especially long history of activity atop the mountain.

"Mt. Lykaion, Arcadia is known from ancient literature as one of the mythological birthplaces of Zeus, the other being on Crete," noted Dr.Romano. David Gilman Romano is Senior Research Scientist at the University of Pennsylvania Museum of Archaeology and Anthropology and a co-director of the Mt. Lykaion Excavation and Survey Project."The fact that the ash altar to Zeus includes early material dating back to 3000 BCE suggests that the tradition of devotion to some divinity on that spot is very ancient. The altar is long standing and may in fact pre-date the introduction of Zeus in the Greek

world. We don't yet know how the altar was first used, and whether it was used in connection with natural phenomena such as wind, rain, light or earthquakes, possibly to worship some kind of divinity male or female or a personification representing forces of nature." Below the altar in a mountain meadow is an ancient hippodrome, a stadium and buildings related to the ancient athletic festival that rivaled the neighboring sanctuary of Zeus at Olympia.

Although the Sanctuary of Zeus at Mt. Lykaion, just 22 miles from the extensively-studied Sanctuary of Zeus at Olympia, has been well known since antiquity, no excavations had taken place there in a century. The Mt. Lykaion Excavation and Survey Project, begun in 2004 with the first seasons of excavation work in 2006 and 2007, is a collaborative project of the Greek Archaeological Service, 39th Ephoreia in Tripolis, the University of Pennsylvania Museum of Archaeology and Anthropology, and the University of Arizona.David Gilman Romano of the University of Pennsylvania Museum co-directs the project with Michaelis Petropoulos of the Greek Archaeological Service in Tripolis, and Mary Voyatzis of the University of Arizona.

High in the Arcadian mountains, the sanctuary at Mt. Lykaion was well known in antiquity as one of the most famous Zeus shrines in ancient Greece, as well as a site of early athletics in honor of the Greek's greatest god. The site, which features an ancient hippodrome, a stadium and buildings related to the ancient athletic festival that rivaled the neighboring sanctuary of Zeus at Olympia, is known to have served as an important Pan Arcadian as well as Pan Hellenic Sanctuary that attracted pilgrims, athletes and dignitaries from all over the Greek world from the Archaic period to the Hellenistic period, ca. 700-200 BCE.

Last summer, a small excavation trench in the altar yielded Early, Middle and Late Helladic, ca. 3000-1200 BCE pottery sherds, indicating activity in this region from as early as 3000 BCE. The new material creates a vastly different account of the history of the altar and the site.

The intriguing discovery of one rock crystal lens-shaped seal bearing the image of a bull with full frontal face, likely of Late Minoan I or Late Minoan II date (1500-1400 BC), has, as of yet, no related materials to accompany it—but it does show at least some early connection between the two cultural areas.

Early 20th century excavations of the Greek Archaeological Society at the altar suggested the earliest activity there to be about 700 BCE, and the Mt. Lykaion Excavation and Survey Project excavation found much evidence for activity in later periods: pottery and objects from the Geometric, Archaic, Classical and Hellenistic periods (900-200 BCE), including miniature vases, bronze tripods and rings, iron blades, an iron spit, and silver coins, were excavated from the trench.Several ancient authors mention that human sacrifice was practiced at the altar of Zeus—Pausanias alludes to mysterious sacrificial practices in his Descriptions of Greece—but to date, no evidence has been found. A considerable amount of animal bones was recovered from the altar excavations, with analysis underway, but preliminary results indicate large and small animal bones of various kinds, and no human bones.

The Mt. Lykaion Excavation and Survey Project boasts a Greek-American, interdisciplinary team of archaeologists, geologists, geophysicists, architects, topographical surveyors and students working throughout the site. The project will continue excavations at the altar, and other areas of the sanctuary, in 2008, with plans to continue work through 2010, and a long-range proposal under consideration to develop an archaeological park to unify and protect nearly 300 square kilometers of land in and around the site.

Adapted from materials provided by University of Pennsylvania Museum.

http://www.sciencedaily.com:80/releases/2008/01/080123114601.htm

Why The Web Tells Us What We Already Know

ScienceDaily (Jan. 28, 2008) — The Internet is not the font of all knowledge, despite the plethora of information available at your fingertips.

Researchers from the University of New South Wales (UNSW) in Australia have found that while Internet searches do bring up a variety of useful materials, people pay more attention to information that matches their pre-existing beliefs.

"Even if people read the right material, they are stubborn to changing their views," said one of the authors, UNSW Professor Enrico Coiera. "This means that providing people with the right information on its own may not be enough."

The research considered how people use Internet search engines to answer health questions.

"We know that the web is increasingly being used by people to help them make healthcare decisions," said Professor Coiera. "We know that there can be negative consequences if people find the wrong information, especially as people in some countries can now self-medicate by ordering drugs online. Australians can order complementary medicines online and these can interfere with other medications."

"Our research shows that, even if search engines do find the 'right' information, people may still draw the wrong conclusions -- in other words, their conclusions are biased."

What also matters is where the information appears in the search results and how much time a person spends looking at it, according to the research which has been published in the Journal of the American Medical Informatics Association.

"The first or the last document the user sees has a much greater impact on their decisions," said Professor Coiera, who is the Director of the Centre for Health Informatics at UNSW.

Dr Annie Lau worked with Professor Coiera to design an interface to help people make sense of the information which they are presented with and to break down these decision biases.

"The new search engine interface we have designed could be a part of any search engine and allows people to organise the information they find, and as a result organise their thoughts better," said Professor Coiera.

While the research was conducted in the area of health, Professor Coiera said the results -- and the technology -- are applicable to other fields too.

The research on the interface will be publicly available within a year.

Adapted from materials provided by University of New South Wales, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com:80/releases/2008/01/080124092536.htm

Move Over US -- China To Be New Driver Of World's Economy And Innovation

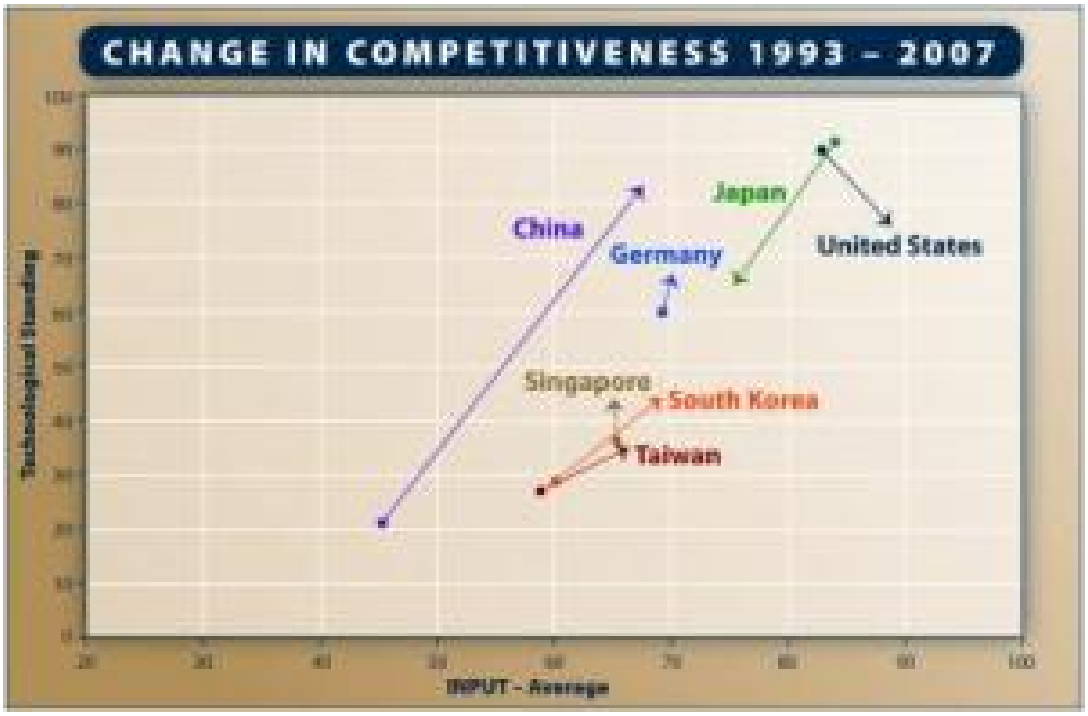


Chart shows the change in technological standing for several nations from 1993 to 2007. (Credit: High Tech Indicators study)

ScienceDaily (Jan. 28, 2008) — A new study of worldwide technological competitiveness suggests China may soon rival the United States as the principal driver of the world's economy -- a position the U.S. has held since the end of World War II. If that happens, it will mark the first time in nearly a century that two nations have competed for leadership as equals.The study's indicators predict that China will soon pass the United States in the critical ability to develop basic science and technology, turn those developments into products and services -- and then market them to the world. Though China is often seen as just a low-cost producer of manufactured goods, the new "High Tech Indicators" study done by researchers at the Georgia Institute of Technology clearly shows that the Asian powerhouse has much bigger aspirations.

"For the first time in nearly a century, we see leadership in basic research and the economic ability to pursue the benefits of that research -- to create and market products based on research -- in more than one place on the planet," said Nils Newman, co-author of the National Science Foundation-supported study. "Since World War II, the United States has been the main driver of the global economy. Now we have a situation in which technology products are going to be appearing in the marketplace that were not developed or commercialized here. We won't have had any involvement with them and may not even know they are coming."Georgia Tech has been gathering the high tech indicators since the mid-1980s, when the concern was which country would be the "next Japan" as a competitive producer and exporter of technology products. The current "HTI-2007" information was gathered for use in the NSF's biennial report, "Science and Engineering Indicators," the most recent of which was released January 15.

Georgia Tech's "High Tech Indicators" study ranks 33 nations relative to one another on "technological standing," an output factor that indicates each nation's recent success in exporting high technology products. Four major input factors help build future technological standing: national orientation toward technological competitiveness, socioeconomic infrastructure, technological infrastructure and productive capacity. Each of the indicators is based on a combination of statistical data and expert opinions.

A chart showing change in the technological standing of the 33 nations is dominated by one feature -- a long and continuous upward line that shows China moving from "in the weeds" to world technological leadership over the past 15 years.The 2007 statistics show China with a technological standing of 82.8, compared to 76.1 for the United States, 66.8 for Germany and 66.0 for Japan. Just 11 years ago, China's score was only 22.5. The United States peaked in 1999 with a score of 95.4.

"China has really changed the world economic landscape in technology," said Alan Porter, another study co-author and co-director of the Georgia Tech Technology Policy and Assessment Center, which conducted the research. "When you take China's low-cost manufacturing and focus on technology, then combine them with the increasing emphasis on research and development, the result ultimately won't leave much room for other countries."

The United States and Japan have both fallen in relative technological standing -- though not absolute measures -- because of the dramatic rise of China and other nations such as the "Asian Tigers:" South Korea, Singapore and Taiwan. Japan has faltered a bit over time, and if the increasingly-integrated European Union were considered one entity instead of 27 separate countries, it would surpass the United States."We are seeing consistent gains for China across all the criteria we measure," Newman said. "As a percentage mover relative to everyone else, we have not seen a stumble for China. The gains have been dramatic, and there is no real sense that any kind of leveling off is occurring."

Most industrialized countries reach a kind of equilibrium in the study, moving up slightly in one data set, or down slightly in another. But the study shows no interruptions in China's advance.Recent statistics for the value of technology products exported -- a key component of technological standing -- put China behind the United States by the amount of "a rounding error:" about $100 million. If that trend continues, Newman noted, China will shortly pass the United States in that measure of technological leadership.

China's emphasis on training scientists and engineers -- who conduct the research needed to maintain technological competitiveness -- suggests it will continue to grow its ability to innovate. In the United States, the training of scientists and engineers has lagged, and post-9/11 immigration barriers have kept out international scholars who could help fill the gap."For scientists and engineers, China now has less than half as many as we do, but they have a lot of growing room," noted Newman. "It would be difficult for the United States to get much better in this area, and it would be very easy for us to get worse. It would be very easy for the Chinese to get better because they have more room to maneuver."

China is becoming a leader in research and development, Porter noted. For instance, China now leads the world in publications on nanotechnology, though U.S. papers still receive more citations.On the input indicators calculated for 2007, China lags behind the United States. In "national orientation," China won a score of 62.6, compared to 78.0 for the United States. In "socioeconomic infrastructure," China rated 61.2, compared to 87.9 for the United States. In the other two factors, China also was behind the U.S., 60.0 versus 95.5 for "technological infrastructure" and 85.2 versus 93.4 for "productive capacity."

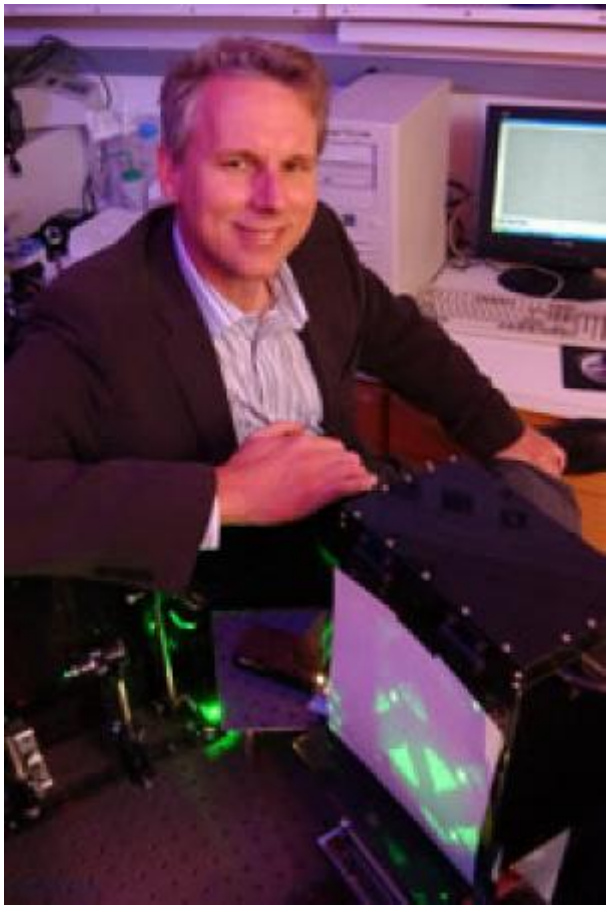
China has been dramatically improving its input scores, which portends even stronger technological competitiveness in the future.

"It's like being 40 years old and playing basketball against a competitor who's only 12 years old -- but is already at your height," Newman said. "You are a little better right now and have more experience, but you're not going to squeeze much more performance out. The future clearly doesn't look good for the United States."

Adapted from materials provided by Georgia Institute of Technology.

http://www.sciencedaily.com:80/releases/2008/01/080124103159.htm

Computer-based Tool Aids Research, Helps Thwart Questionable Publication Practices



Dr. Harold "Skip" Garner. (Credit: UT Southwestern Medical Center)

ScienceDaily (Jan. 28, 2008) — A new computer-based text-searching tool developed by UT Southwestern Medical Center researchers automatically -- and quickly -- compares multiple documents in a database for similarities, providing a more efficient method to carry out literature searches, as well as offering scientific journal editors a new tool to thwart questionable publication practices.

The eTBLAST computer program is efficient at flagging publications that are highly similar, said Dr. Harold "Skip" Garner, a professor of biochemistry and internal medicine at UT Southwestern who developed the computer code along with his colleagues. Not only does the code identify duplication of key words, but it also compares word proximity and order, among other variables.

The tool is especially useful for investigators who wish to analyze an unpublished abstract or project idea in order to find previous publications on the topic or identify possible collaborators working in the same field.

Another application of eTBLAST is to aid journal editors in detecting potentially plagiarized or duplicate articles submitted for publication. Dr. Garner and his colleagues explored that application in two recent articles: in a scientific paper in the Jan. 15 issue of Bioinformatics and in a commentary in the Jan. 24 issue of Nature.

In the first phase of the study, published in Bioinformatics, researchers used eTBLAST to analyze more than 62,000 abstracts from the past 12 years, randomly selected from Medline, one of the largest databases of biomedical research articles. They found that 0.04 percent of papers with no shared authors were highly similar and cases representing potential plagiarism. The small percentage found in

the sample may appear insignificant, but when extrapolated to the 17 million scientific papers currently cited in the database, the number of potential plagiarism cases grows to nearly 7,000.

The researchers also found that 1.35 percent of papers with shared authors were sufficiently similar to be considered duplicate publications of the same data, another questionable practice.

In the second phase of the study, outlined in the Nature commentary, Dr. Garner and Dr. Mounir Errami, an instructor in internal medicine, refined their electronic search process so that is was thousands of times faster. An analysis of more than seven million Medline abstracts turned up nearly 70,000 highly similar papers.

Plagiarism may be the most extreme and nefarious form of unethical publication, Dr. Garner said, but simultaneously submitting the same research results to multiple journals or repeated publication of the same data may also be considered unacceptable in many circumstances.

When it comes to duplicate or repeated publications, however, there are some forms that are not only completely ethical, but also valuable to the scientific community. For example, long-term studies such as clinical trial updates and longitudinal surveys require annual or bi-annual publication of progress, and these updates often contain verbatim reproductions of much of the original text.

"We can identify near-duplicate publications using our search engine," said Dr. Garner, who is a faculty member in the Eugene McDermott Center for Human Growth and Development at UT Southwestern. "But neither the computer nor we can make judgment calls as to whether an article is plagiarized or otherwise unethical. That task must be left to human reviewers, such as university ethics committees and journal editors, the groups ultimately responsible for determining legitimacy."

Dr. Garner said eTBLAST not only detects the prevalence of duplicate publications, but also offers a possible solution to help prevent future unethical behavior.

"Our objective in this research is to make a significant impact on how scientific publications may be handled in the future," Dr. Garner said. "As it becomes more widely known that there are tools such as eTBLAST available, and that journal editors and others can use it to look at papers during the submission process, we hope to see the numbers of potentially unethical duplications diminish considerably."

Other UT Southwestern researchers in the McDermott Center who were involved in the research are computer programmer Justin Hicks, postdoctoral researcher Dr. Wayne Fisher, network analyst David Trusty and staff member Tara Long. Dr. Jonathan Wren at the Oklahoma Medical Research Foundation also participated.

The research was funded by the Hudson Foundation and the National Institutes of Health.

Adapted from materials provided by UT Southwestern Medical Center.

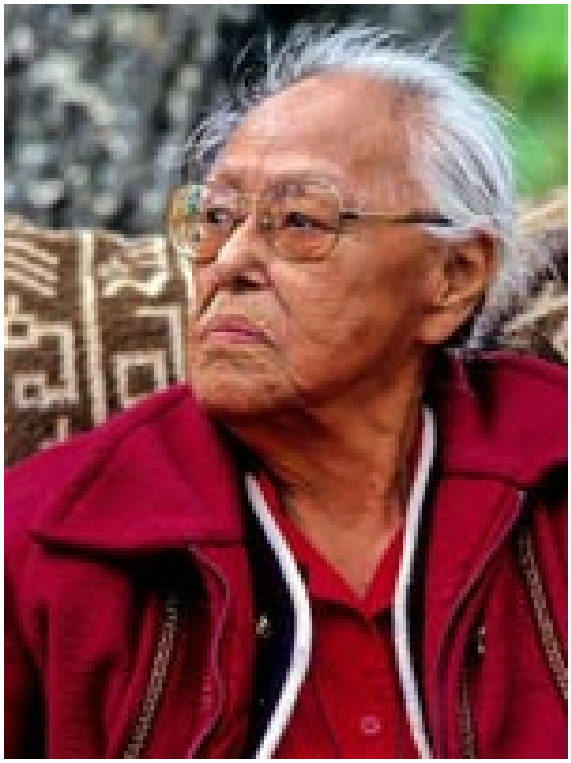
http://www.sciencedaily.com:80/releases/2008/01/080123131740.htm

How Do You Learn a Dead Language?

If you can't find a word, just borrow one ...

By Christine Cyr
Posted Monday, Jan. 28, 2008, at 5:16 PM ET

Last week, Chief Marie Smith Jones, the only remaining native speaker of the Eyak language, died in her home in Anchorage, Alaska. Chief Jones' death makes Eyak—part of the Athabascan family of languages—the first known native Alaskan tongue to go extinct. Linguists fear that 19 more will soon follow the same fate. Fortunately, starting in 1961, Chief Jones and five other native-speaking Eyaks worked with Michael Krauss, a linguist at the University of Alaska in Fairbanks, to document Eyak in case future generations want to revive it. How would you go about learning a language that nobody speaks?



It depends. A well-documented language would have a dictionary, grammar book, a body of literature (such as folk tales or religious texts), and, in some cases, videos and recordings that a dedicated student could learn from. Eyak, for example, has all of these. Ideally, the grammar book and dictionary would spell out the sounds of the vowels (and tone, if there is any). If there isn't good documentation, linguists must reconstruct the language using whatever written stories or religious texts remain, and then borrow words, grammatical structures, and pronunciation from closely related languages, patching together their best guess at what they think the language sounded like.

In some cases, a language that's classified as "extinct" is still spoken in certain contexts. Latin, for example, is considered extinct, or dead, but is taught in schools and used in religious ceremonies. A language is generally considered extinct if it's no longer used in daily conversation. To be a living—or native—language, people must use it as a primary means of communication.

For almost 2,000 years Hebrew was extinct, but Jews around the world continued to use it daily in a limited capacity in prayer, religious ceremonies, and writing. The rise of Jewish nationalism in the 19th century spawned the movement to revive Hebrew as a native language. Because no Hebrew dictionary

or grammar books existed (the only written documentation was the Old Testament and a few other pieces of literature), people had to borrow words from other languages or create new ones to fill in gaps in the ancient Hebrew. Proponents of reviving Hebrew realized that the health of a language depends on children speaking it. In the 1890s, parents in Palestine started using Hebrew exclusively at home and sending their children to schools that used only Hebrew. By the early 1900s, couples that had attended these schools started to marry, and their children became native Hebrew speakers.

Sometimes linguists must borrow liberally from a family of languages. Cornish, the language of Cornwall, England, went extinct in the 18th century. It was revived starting in the 1920s using only a collection of Cornish passion plays and words and pronunciation borrowed from Breton and Welsh—two closely related Celtic languages. A few hundred people now speak Cornish, and some children are raised with it as a first language. When filming *The New World*, a movie about the founding of Jamestown, Va., director Terrence Malick hired a linguist to recreate Virginia Algonquian, which had died nearly 200 years ago. Using a skimpy 550-word vocabulary that settlers had recorded, and borrowing heavily from other Algonquian languages, the linguist recreated enough of the Virginia Algonquian for the actors to perform.

Got a question about today's news? Ask the Explainer.

Christine Cyr is an editor at Martha Stewart Living Omnimedia, where she edits cookbooks and magazines.

Article URL: http://www.slate.com/id/2182949/

Books 'most popular online buy'
More books are sold on the internet than any other product and the number is increasing, research suggests.

Polling company Nielsen Online surveyed 26,312 people in 48 countries. 41% of internet users had bought books online, it said. This compares with two years ago when 34% of internet users had done so.

The company said much of the increase was in emerging markets, such as South Korea and India, with British consumers in 10th place. Nielsen says more than eight out of ten internet users purchased something in the last three months. That is a 40% increase on two years ago, to about 875 million shoppers.

GLOBAL BOOK BUYERS
1. South Korea - 58%
2. Germany - 55%
3. Austria - 54%
4. Vietnam - 54%
5. Brazil - 51%
6. Egypt - 49%
7. China - 48%
8. India - 46%
9. Taiwan - 45%
10. UK - 45%

Percentage of internet users buying books online. Source: Nielsen

The largest percentage of people buying books in any country was South Korea at 58%. Nielsen estimated that equated to 18m people. In the US, 57.5m customers were estimated to have bought books. But that only equated to 38% of internet users. In the UK it was calculated to be 14.5m people, or 45% of those online.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/entertainment/7213686.stm

Published: 2008/01/28 17:33:39 GMT

Why the nation needs an Angel of the South

We have a growing need for statement public art. It can tell a story about a place, capture its essence

Rachel Cooke
Sunday January 27, 2008
The Observer

In the late 1960s the artist Victor Pasmore, who was then teaching in nearby Newcastle, was invited to put his mark on the new town of Peterlee. He did so by designing the Apollo Pavilion, a reinforced concrete structure, named for the optimism of the Apollo space programme, which formed a bridge over an artificial lake. It was made of disjointed rectangles and decorated with nothing more fancy than a couple of reliefs, and Pasmore had high hopes for his modernist extravaganza. He hoped people would 'linger' and 'play' in it, and called it 'a free and anonymous monument which, because of its independence, can lift the activity and psychology of an urban housing community on to a universal plane'. Fat chance. The pavilion quickly and predictably became the focus of discontent: local people disliked it, especially when their youth began spraying it with graffiti and filling it with cider bottles. Access to its interior was sealed off in the 1980s. Today, though it has escaped demolition, it is in a desperate state of disrepair, an attempt at gaining grade II* listed status having failed in 1998. But times change. In the four decades since the Apollo was built, our attitude to public art has been transformed. Much of the credit can go to the Angel of the North, which will be 10 years old next month, and is greatly loved, not least by me. This is not to say that when Antony Gormley's sculpture was first proposed, it wasn't the object of suspicion. Even as it made the seven-hour journey from Hartlepool, where it was built, to Gateshead, the city it would gaze down upon, a local councillor, Martin Callanan, now a Conservative MEP, was still moaning about what a waste of money it was.

But who's complaining in 2008? More even than the Tyne bridge itself, the Angel of the North has become an iconic symbol: of the North-East's glorious industrial past, of its people's grit and determination, but also of their warmth (it is built of steel, like a ship, but its arms are angled to give a sense of embrace). No matter how often I go that way, I childishly anticipate it, the same way I look forward to catching a first glimpse of the sea.

No wonder then that in Ebbsfleet Valley in Kent, where work has begun to create a new town comprising 9,500 homes, its stakeholders are in the process of holding a competition for a commission for another massive piece of public art, one twice the size of Gormley's masterpiece: the Angel of the

South, as the local press is already calling it. At the moment, the area - 1,000 acres of open land on former cement quarries - is known for just one thing: Bluewater shopping centre. By the spring, when the winning commission is chosen, that will already have begun to change, a shift that will do Ebbsfleet more good, as its sponsors must surely know, than any marketing campaign. The shortlist of artists competing for this prize is announced tomorrow. Though it is still secret as I write, I gather that Mark Wallinger, winner of the 2007 Turner Prize, is among those on the list. How will he, or anyone, capture this transient corner of Kent, the fugitive county? I cannot wait to find out.

We have a growing need for statement public art, and it is perfectly obvious why. To watch the news, you'd think that we define ourselves only by how and when we shop. A reporter stands in a pedestrian precinct, and behind him the flow - or not - of people in and out of Boots is supposed to indicate our wellbeing as a nation. When the tills ring, all is well.

In a way, of course, this is how we define ourselves: everyone knows what volumes a sofa speaks of its owner, what subtle hints the cut of a suit can drop. But, as a theory, it is also riddled with holes. For one thing, even the most dedicated shopper cannot distinguish himself in a world of chain stores. For another, for all that urban Britain increasingly looks the same wherever you go, this is just surface. Behind its Ikea blinds, a place still has a pulse, a beating heart, even if listening to it grows trickier by the hour.

This is when public art comes into its own. The best isn't just beautiful or moving in its own right; as we are fast learning, it can tell a story about a place, capture its visceral essence, in a way that the ad men - 'Visit sunny Harlow!' - can only dream of. This is what the Angel does, and the people at Ebbsfleet will be hoping that their sculpture will pull off a similar magic trick.

Meanwhile, in Peterlee, the Twentieth Century Society and others are still hoping to restore the Apollo Pavilion to something of its former glory. In 2006, for the first time, signs went up telling visitors how to find it. I'm a Pasmore nut, and for that reason have always loved it, for all that it looks so tear-stained. But I have a hunch, too, that its time is coming. If it didn't tell a story 40 years ago, it surely does now.

http://arts.guardian.co.uk:80/art/visualart/story/0,,2247502,00.html?gusrc=rss&feed=40

Cells' internal clocks revealed

By Helen Briggs
BBC News science reporter

A person's preference for being a "lark" or a "night-owl" is largely determined by genes, a study suggests.

Scientists have found that each cell of the body has an internal "clock", which can be affected by various genes.

Research in the Proceedings of the National Academy of Sciences shows that skin cells can be used to measure the speed of a person's body clock.

The work could lead to better diagnosis of sleep disorders and conditions such as Seasonal Affective Disorder.

Master clock

It has long been known that the body has a biological clock that regulates sleeping, digestion and brain performance to fit in with the different demands of day and night-time living.

> **It now appears that virtually all cells in the body have their own ticking circadian clock, including skin cells**
> Dr Simon Archer
> University of Surrey

The brain has overall control of this time-keeping mechanism, but individual cells appear to have their own "clocks", which can be affected by a series of clock genes.

A German-Swiss team led by Dr Steven Brown of the University of Zurich took skin biopsies from 28 volunteers and grew their cells up in the lab.

They measured how fast the "clocks" in the skin cells "ticked", then compared these results with questionnaires showing whether each subject was an early type ("lark") or a late type ("owl").

They found that the "clocks" in the skin cells matched up with behaviour in most of the subjects.

Some of the remaining volunteers appeared to be suffering from Seasonal Affective Disorder (Sad), a type of winter depression.

Sleep disorders

The work could be used as a basis for the diagnosis of certain sleep disorders, said Dr Simon Archer, Senior Lecturer in Molecular Neuroscience at the Surrey Sleep Research Centre at the University of Surrey, Guildford.

He said previous research at the University of Surrey had shown that genetic differences in clock genes could explain why some people are night lovers and others are early risers.

His group has identified a mutation in a gene known as Period3 that makes someone more likely to be a morning person.

The mutation makes them more prone to tiredness during the day, so they prefer to go to bed early.

Traditional studies of such genes have been carried out in controlled conditions in specialised sleep labs, and these are time-consuming and costly to perform.

"What Steve Brown has developed is a much more economic way of making some of those clock period measurements without having to keep people in a lab for three days," Dr Archer explained.

"He basically takes a sample of their skin cells, keeps them alive in culture and measures the period of the oscillating clock genes."

Molecular clues

The central circadian clock resides in the hypothalamus in the brain, he added.

It keeps in touch with the outside world by means of light signals from the eyes, and then synchronises numerous other peripheral clocks in tissues around the body such as the heart, liver and gut.

"The reason why the Brown experiment works is because it now appears that virtually all cells in the body have their own ticking circadian clock, including skin cells," said Dr Archer.

"So, the skin cell assay is just a way of easily getting a handle on someone's body clock. But in more molecular detail than just knowing if they are a lark or an owl, which can be determined quite easily."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/7212362.stm

Published: 2008/01/28 23:39:05 GMT

Can the novella save literature?

They're no less artful than full-length books, but they need less of your time. The perfect form for today's lifestyles

Jean Hannah Edelstein

January 29, 2008 11:00 AM

In terms of provoking stimulating book club debate, Ethan Frome was not necessarily the best choice: it's a sharp little novella, with nary a spare word or thought, and thus it wasn't really possible to pick at it in the way one can almost arbitrarily locate flaws in any kind of more substantial book. Our only point of contention was really who loved it the most: we sat round the table, munched cake and waxed lyrical about how much we adored each perfectly executed sentence.

And then I had an epiphany: could it be that we should look to classics like Ethan Frome to find the key to saving fiction from the worrisome tides of publishing sturm and drang, the statistics that indicate that people distracted by the trillions of choices provided by digital media are giving up on fiction? Might the way to stop our atrophied attention spans becoming terminally distracted be to simply publish more short books?

The vast majority of new writers - even the very good ones - trying to crack in to publishing with their first novel are inevitably told that times are hard for fiction right now. And indeed they are: the chance of publishers successfully launching a novel by an unknown writer on the reading public are indeed slim in an information culture where we struggle to get through 10 pages without losing focus to the buzz of media white noise. Several hundred pages can feel like too much of a commitment when there is so much information to consume.

And who could deny that the actual experience of reading a long book can feel a little arduous if it doesn't really make your heart sing? It is much like eating a delicious meal in an American restaurant - lovely, but you have to leave at least quarter of the portion behind or else you'll explode. More than once I've been making my way through an 800-page novel only to conclude around the page 600 mark that I'm perfectly satisfied with my reading experience, indeed would recommend the book to others, but feel no particular inclination to finish.

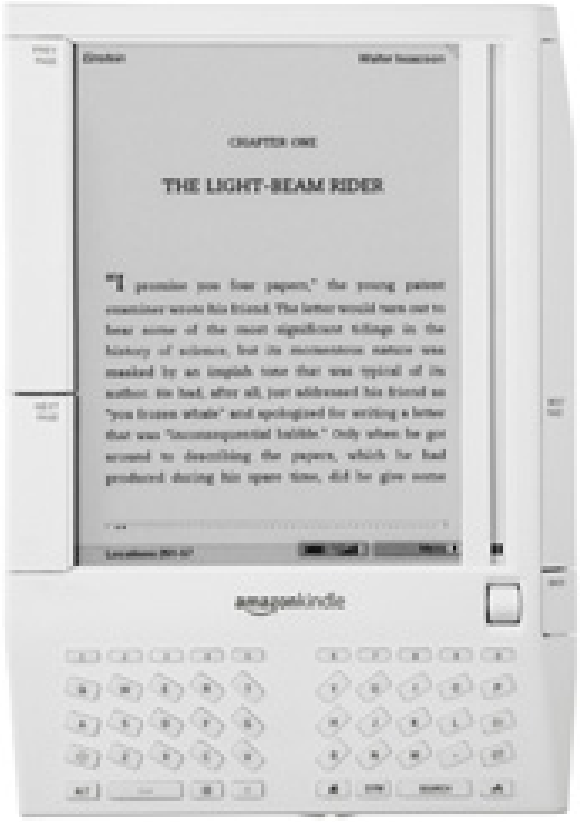
Readable in a couple of hours, a novella demands far less time than a full-length novel: you can get through them in the same amount of time it takes to watch a film or two reality television programmes. If you read one in bed you can actually finish it in one go, as opposed to reading the same few chapters repeatedly because you keep forgetting what you covered the night before.

And best all, an upswing in the publication of novellas would not confirm the prejudices of those who rail against the dumbing-down of literature: novellas require an intelligent author and an intelligent reader to appreciate the power of brevity. Without exacting quite the level of austerity presented by the task of writing a good short story, novellas challenge writers to use words like wartime rations: with care and thought and the extra level of creative gusto required to ensure that they stretch to make a miniature read that is just as satisfying as something more substantial. And the economics are right: they're cheaper to produce (less paper, naturally), can be sold at enticing low price points, and can more easily be stocked in non-traditional outlets - whereas I'd be loth to pick up a £20 first edition of a book at a newsagent, I'd much rather purchase a £5 novella than yet another soul-destroying glossy magazine to accompany me on an hour-long train trip.

What's not to like? But with the exception of a few notable titles, most publishers' upcoming catalogues continue to be dominated by books that adhere to the traditional long form. A lack of affection towards the novella endures, with it still being considered a sort of fringe, experimental form - evidenced by criticism levelled at Ian McEwan's On Chesil Beach for being too brief to deserve its nomination for the Man Booker prize last year. But as Edith Wharton demonstrated so aptly nearly 100 years ago, there's no reason for us to be sizeist.

http://blogs.guardian.co.uk:80/books/2008/01/can_the_novella_save_literatur.html

Freed From the Page, but a Book Nonetheless
By RANDALL STROSS



PRINTED books provide pleasures no device created by an electrical engineer can match. The sweet smell of a brand-new book. The tactile pleasures of turning a page. The reassuring sight on one's bookshelves of personal journeys.

But not one of these explains why books have resisted digitization. That's simpler: Books are portable and easy to read.

Building a portable electronic reader was the easy part; matching the visual quality of ink on paper took longer. But display technology has advanced to the point where the digital page is easy on the eyes, too. At last, an e-reader performs well when placed in page-to-page competition with paper.

As a result, the digitization of personal book collections is certain to have its day soon.

Music shows the way. The digitization of personal music collections began, however, only after the right combination of software and hardware — iTunes Music Store and the iPod — arrived. And as Apple did for music lovers, some company will devise an irresistible combination of software and hardware for book buyers. That company may be Amazon.

Amazon's first iteration of an electronic book reader is the Kindle. Introduced in November, it weighs about 10 ounces, holds more than 200 full-length books and can display newspapers, magazines and blogs. It uses E Ink technology, developed by the company of that name, that produces sharply defined text yet draws power only when a page is changed, not as it is displayed.

Sony uses E Ink in its e-book Reader, which it introduced in 2006, but the Kindle has a feature that neither Sony nor many e-reader predecessors ever possessed: books and other content can be loaded wirelessly, from just about anywhere in the United States, using the high-speed EVDO network from Sprint.

This may turn out to be a red-letter day in the history of convenience — our age's equivalent of that magical moment FedEx introduced next-day delivery and people asked, "How was life possible before this?"

The Kindle is expensive — $399 — but it sold out in just six hours after its debut on Nov. 19. Since then, supplies have consistently lagged behind demand, and a waiting list remains in place.

The Kindle gets many things right, or at least I assume it does. I haven't had much of a chance to test out my demonstration unit. My wife, skeptical that a digital screen could ever approach the readability of ink on paper, was so intrigued by the Kindle when it arrived last week that she snatched it from my grasp. I haven't been able to pry it away from her since.

I can see that the text looks splendid. But when one presses a bar to "turn" a page, the image reverses in a way I found jarring: the light background turns black and the black text turns white, then the new page appears and everything returns to normal. My wife said she wasn't bothered by this at all, and I didn't have enough of a chance to see if I would soon get used to it.

Steven P. Jobs, the chief executive of Apple, has nothing to fear from the Kindle. No one would regard it as competition for the iPod. It displays text in four exciting shades of gray, and does that one thing very well. It can do a few other things: for instance, it has a headphone jack and can play MP3 files, but it is not well suited for navigating a large collection of music tracks.

Yet, when Mr. Jobs was asked two weeks ago at the Macworld Expo what he thought of the Kindle, he heaped scorn on the book industry. "It doesn't matter how good or bad the product is; the fact is that people don't read anymore," he said. "Forty percent of the people in the U.S. read one book or less last year."

To Mr. Jobs, this statistic dooms everyone in the book business to inevitable failure.

Only the business is not as ghostly as he suggests. In 2008, book publishing will bring in about $15 billion in revenue in the United States, according to the Book Industry Study Group, a trade association.

One can only wonder why, by the Study Group's estimate, 408 million books will be bought this year if no one reads anymore?

A survey conducted in August 2007 by Ipsos Public Affairs for The Associated Press found that 27 percent of Americans had not read a book in the previous year. Not as bad as Mr. Jobs's figure, but dismaying to be sure. Happily, however, the same share — 27 percent — read 15 or more books.

In fact, when we exclude Americans who had not read a single book in that year, the average number of books read was 20, raised by the 8 percent who read 51 books or more. In other words, a sizable minority does not read, but the overall distribution is balanced somewhat by those who read a lot.

If a piece of the book industry's $15 billion seems too paltry for Mr. Jobs to bother with, he is forgetting that Apple reached its current size only recently. Last week, Apple reported that it posted revenue of $9.6 billion in the quarter that spanned October to December 2007, its best quarter ever, after $24 billion in revenue in the 2007 fiscal year, which ended in September.

But as recently as 2001, before the iPhone and the iPod, Apple was a niche computer company without a mass market hit. It was badly hurt by the 2001 recession and reported revenue of only $5.3 billion for the

year. This is, by coincidence, almost exactly what Barnes & Noble reported in revenue for its 2007 fiscal year. In neither case did the company owners look at that number, decide to chain the doors permanently shut and call it quits.

Amazon does not release details about revenue for books, but books were its first business. And Andrew Herdener, a company spokesman, said that Amazon's book sales "have increased every year since the company began."

The book world has always had an invisible asset that makes up for what it lacks in outsize revenue and profits: the passionate attachment that its authors, editors and most frequent customers have to books themselves. Indeed, in this respect, avid book readers resemble avid Mac users.

The object we are accustomed to calling a book is undergoing a profound modification as it is stripped of its physical shell. Kindle's long-term success is still unknown, but Amazon should be credited with imaginatively redefining its original product line, replacing the book business with the reading business.

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http://www.nytimes.com/2008/01/27/business/27digi.html?_r=1&ex=1359349200&en=8d9b90f6059f9c52&ei=5088&partner=rssnyt&emc=rss&oref=sloging

A life of their own

From Jane Eyre to Jean Brodie, David Copperfield to David Brent, whether solidly realised or lightly sketched, fictional figures can be as vivid to us as real people. But just what, exactly, is a character, asks James Wood

Saturday January 26, 2008
The Guardian

At once real and unreal ... Maggie Smith as Jean Brodie in the 1969 film. Photograph: Kobal

There is nothing harder than the creation of fictional character. I can tell it from the number of apprentice novels I read that begin with descriptions of photographs. You know the style: "My mother is squinting in the fierce sunlight and holding, for some reason, a dead pheasant. She is dressed in old-fashioned lace-up boots, and white gloves. She looks absolutely miserable. My father, however, is in his element, irrepressible as ever, and has on his head that grey velvet trilby from Prague I remember so well from my childhood." The unpractised novelist cleaves to the static, because it is much easier to describe than the mobile: it is getting these people out of the aspic of arrest and mobilised in a scene that is hard.
But how to push out? How to animate the static portrait? Ford Madox Ford writes wonderfully about getting a character up and running - what he calls "getting a character in". Ford and his friend Joseph Conrad loved a sentence from a Guy de Maupassant story: "He was a gentleman with red whiskers who always went first through a doorway." Ford comments: "that gentleman is so sufficiently got in that you need no more of him to understand how he will act. He has been 'got in' and can get to work at once."

Ford is right. Very few brushstrokes are needed to get a portrait walking; and surely, as a corollary, the reader can get as much from small, short-lived, even rather flat characters as from large, "round", towering heroes and heroines. To my mind, Gurov, the adulterer in Anton Chekhov's "The Lady with the Little Dog", is as vivid, rich and sustaining as F Scott Fitzgerald's Gatsby or Theodore Dreiser's Hurstwood, or even Charlotte Brontë's Jane Eyre.

But a great deal of nonsense is written about characters in fiction - from those who believe too much in character and from those who believe too little. Those who believe too much have an iron set of prejudices about what characters are: we should get to "know" them; they should not be "stereotypes", they should "grow" and "develop"; and they should be nice. So they should be pretty much like us. A glance at the thousands of foolish "reader reviews" on Amazon, with their complaints about "dislikeable characters", confirms a contagion of moralising niceness. Again and again, in book clubs

up and down the country, novels are denounced because some feeble reader "couldn't find any characters to identify with", or "didn't think that any of the characters 'grow'".

On the other side, among those with too little belief in character, we hear that characters do not exist at all. The novelist and critic William Gass comments on the following passage from Henry James's The Awkward Age: "Mr Cashmore, who would have been very red-headed if he had not been very bald, showed a single eyeglass and a long upper lip; he was large and jaunty with little petulant ejaculations that were not in the line of type." Of this, Gass says: "We can imagine any number of other sentences about Mr Cashmore added to this one. Now the question is: what is Mr Cashmore? Here is the answer I shall give: Mr Cashmore is (1) a noise, (2) a proper name, (3) a complex system of ideas, (4) a controlling perception, (5) an instrument of verbal organisation, (6) a pretended mode of referring, and (7) a source of verbal energy. He is not an object of perception, and nothing whatever that is appropriate to persons can be correctly said of him."

But of course characters are assemblages of words, because literature is such an assemblage of words: this tells us absolutely nothing, and is like elaborately informing us that a novel cannot really create an imagined "world", because it is just a bound codex of paper pages. Gass claims that "nothing whatever that is appropriate to persons can be correctly said of him", but that is exactly what James has just done: he has said of him things that are usually said of a real person. He has told us that Mr Cashmore looked bald and red, and that his "petulant ejaculations" seemed out of keeping with his large jauntiness.

Still, even if there must clearly be a reasonable middle position, somewhere between the book-club self-identifier and the full-blown postmodern sceptic such as Gass, the difficult question remains: just what is a character? If I say that a character seems connected to consciousness, to the use of a mind, the many superb examples of characters who seem to think very little bristle up (Gatsby, Captain Ahab, Becky Sharp, Jean Brodie). If I refine the thought by repeating that a character at least has some essential connection to an interior life, to inwardness, is seen "from within", I am presented with the nicely opposing examples of those two adulterers, Anna Karenina and Effi Briest, the first of whom does a lot of reflection, and is seen internally as well as externally, the second of whom, in Theodor Fontane's eponymous novel, is seen almost entirely from the outside, with little space set aside for represented reflection. No one could say that Anna is more vivid than Effi simply because we see Anna doing more thinking.

The truth is that the novel is the great virtuoso of exceptionalism: it always wriggles out of the rules thrown around it. And the novelistic character is the very Houdini of that exceptionalism. There is no such thing as "a novelistic character". There are just thousands of different kinds of people, some round, some flat, some deep, some caricatures, some realistically evoked, some brushed in with the lightest of strokes.

Some of them are solid enough that we can speculate about their motives: why does Hurstwood steal the money in Dreiser's Sister Carrie? Why does Isabel Archer return to Gilbert Osmond in James's The Portrait of a Lady? What is Julien Sorel's true ambition in Stendhal's The Red and The Black? In Dostoevsky's The Possessed, why does Kirilov want to commit suicide? What does Mr Biswas want in VS Naipaul's novel? But there are plenty of fictional characters who are not fully or conventionally evoked who are also alive and vivid.

My own taste tends towards the sketchier fictional personage, whose lacunae and omissions tease us, provoke us to wade in their deep shallows: why does Eugene Onegin reject Tatiana and then provoke a fight with Lenski? Pushkin offers us almost no evidence on which to base our answer. Is Italo Svevo's Zeno mad? Is the narrator of Knut Hamsun's Hunger mad? We have only their unreliable narration of events.

Perhaps because I am not sure what a character is, I find especially moving those postmodern novels, such as Vladimir Nabokov's Pnin, Muriel Spark's The Prime of Miss Jean Brodie or José Saramago's The Year of the Death of Ricardo Reis, in which we are confronted with characters at once real and unreal. In these novels, the authors ask us to reflect on the fictionality of the heroes and heroines who

give the books their titles. And in a fine paradox, it is precisely such reflection that stirs in the reader a desire to make these fictional characters "real", to say, in effect, to the authors: "I know that they are only fictional - you keep on telling me this. But I can only know them by treating them as real." That is how Pnin works, for instance. An unreliable narrator insists that Professor Pnin is "a character" in two senses of the word: a type (clownish, eccentric émigré), and a fictional character, the narrator's fantasy. Yet precisely because we resent the narrator's condescension towards his fond and foolish possession, we insist that behind the "type" there must be a real Pnin, who is worth "knowing" in all his fullness and complexity. And the novel is constructed in such a way as to excite that desire in us for a real Professor Pnin, a "true fiction" with which to oppose the false fictions of the overbearing and sinister narrator.

So what, then, does it mean to "love" a fictional character, to feel that you know her? What kind of knowledge is this? Miss Jean Brodie is probably one of the "best-loved" novelistic characters in postwar British fiction, and one of the very few to be something of a household name. But if you dragged a microphone down Princes Street in Edinburgh and asked people what they "know" about Miss Brodie, those who had read Spark's novel would likely recite a number of her aphorisms: "I am in my prime"; "you are the crème de la crème"; "the philistines are upon us, Mr Lloyd", and so on. These are Jean Brodie's famous sayings. Miss Brodie, in other words, is not really "known" at all. We know her just as her young pupils knew her: as a collection of tags, a rhetorical performance, a teacher's show. Around her very thinness as a character we tend to construct a thicker interpretative jacket.

Spark was intensely interested in how much we can know about anyone, and interested in how much a novelist, who most pretends to such knowledge, can know about her characters. By reducing Miss Brodie to no more than a collection of maxims, Spark forces us to become Brodie's pupils. In the course of the novel we never leave the school to go home with Miss Brodie. We never see her in private, off-stage. Always, she is the performing teacher, keeping a public face. We surmise that there is something unfulfilled and even desperate about her, but the novelist refuses us access to her interior. Brodie talks a great deal about her prime, but we don't witness it, and the nasty suspicion falls that perhaps to talk so much about one's prime is by definition no longer to be in it.

Spark always exercises ruthless control over her fictional characters, and here she flaunts it: she spikes her story with a series of "flash-forwards", in which we learn what happened to the characters after the main action of the plot (Miss Brodie will die of cancer, Mary Macgregor will die at the age of 23 in a fire, another pupil will join a convent, another will never again be quite as happy as when she first discovered algebra). These coldly prophetic passages strike some readers as cruel; they are such summary judgments. But they are moving, because they raise the idea that if Miss Brodie never really had a prime, then for some of the schoolgirls their primes occurred in their schooldays.

These flash-forwards do something else: they remind us that Spark has ultimate control over her creations; and they remind us of . . . Miss Brodie. This tyrannical authority is precisely what Miss Brodie's most intelligent pupil, Sandy Stranger, hates, and finally exposes, in her teacher: that she is a fascist and a Scottish Calvinist, predestining the lives of her pupils, forcing them into artificial shapes. Is this what the novelist does, too? That is the question that interests Spark. The novelist adopts God-like powers of omniscience, but what can she really know of her creations?

To argue that we can know Jean Brodie just as deeply as we can know George Eliot's Dorothea Brooke in Middlemarch, to argue that lacunae are as deep as solidities, that absence in characterisation can be a form of knowing as profound as presence, that Spark's and Saramago's and Nabokov's characters can move us as much as James's and Eliot's, is to concede nothing to Gass's scepticism. Not all of these characters have the same amount of realised "depth", but all of them are objects of perception, to use Gass's words, and things that can be correctly said of persons can also be said of them. They are all "real", but in different ways. That reality level differs from author to author, and our hunger for the particular depth or reality level of a character is tutored by each writer, and adapts to the internal conventions of each book. This is how we can read WG Sebald one day and Virginia Woolf or Philip Roth the next, and not demand that each resemble the other. It would be an obvious category error to accuse Sebald of not offering us "deep" or "rounded" characters. I think that novels tend to fail not when the characters are not vivid or "deep" enough, but when the novel in question has failed to teach

us how to adapt to its conventions, has failed to manage a specific hunger for its own characters, its own reality level. In such cases, our appetite is quickly disappointed, and surges wildly in excess of what we are provided, and we tend to blame the author, unfairly, for not giving us enough - the characters, we complain, are not alive or round or free enough.

Even the characters we think of as "solidly realised" in the conventional realist sense are less solid the longer we look at them. There is probably a basic distinction to be made between novelists such as Tolstoy or Trollope or Dickens, who seem unselfconsciously to create galleries of various people who are nothing like them, and those writers either less interested in or perhaps less naturally gifted at this faculty, but who nevertheless have a great deal of interest in the self - James, Flaubert, DH Lawrence, Saul Bellow, Roth, Michel Houellebecq. Iris Murdoch is the most poignant member of this second category, precisely because she spent her life trying to get into the first. In her essays, she often stresses that the creation of free and independent characters is the mark of the great novelist; yet her own characters never have this freedom. She knew it, too: "How soon," she wrote, "one discovers that, however much one is in the ordinary sense 'interested in other people', this interest has left one far short of possessing the knowledge required to create a character who is not oneself. It is impossible, it seems to me, not to see one's failure here as a sort of spiritual failure."

But Murdoch is too unforgiving of herself. There are scores of novelists whose characters are basically like each other, or rather like the novelist who created them, and yet whose creations stream with a vitality that it would be hard not to call free. Does The Rainbow possess any characters who don't sound like each other, and ultimately like Lawrence? Tom Brangwen, Will, Anna, Ursula, even Lydia - they are all variations on a Lawrencian theme, and despite differences in articulacy and education, their inner lives vibrate very similarly. When they speak, which is rarely, they sound the same. Nevertheless, they do possess blazing inner lives, and always one feels how important this inquiry into the state of the soul is for the novelist himself.

In the same way, it often seems that James's characters are not especially convincing as independently vivid authorial creations. But what makes them vivid is the force of James's interest in them, his manner of pressing into their clay with his examining fingers: they are sites of human energy; they vibrate with James's anxious concern for them.

The vitality of literary character has then, perhaps, less to do with dramatic action, novelistic coherence and even plain plausibility - let alone likeability - than with a larger, philosophical or metaphysical sense, our awareness that a character's actions are profoundly important, that something profound is at stake, with the author brooding over the face of that character like God over the face of the waters. That is how readers retain in their minds a sense of the character "Isabel Archer", even if they cannot tell you what she is exactly like. We remember her in the way we remember an obscurely significant day: something important has been enacted here.

In Aspects of the Novel, EM Forster used the now-famous term "flat" to describe the kind of character who is awarded a single, essential attribute, which is repeated without change as the person appears and reappears in a novel. Often, such characters have a catchphrase or tagline or keyword, as Mrs Micawber, in David Copperfield, likes to repeat "I will never desert Mr Micawber". She says she will not, and she does not. Forster is genially snobbish about flat characters, and wants to demote them, reserving the highest category for rounder, or fuller, characters. Flat characters cannot be tragic, he asserts, they need to be comic. Round characters "surprise" us each time they reappear; they are not flimsily theatrical. Flat ones can't surprise us, and are generally monochromatically histrionic. Forster mentions a popular novel by a contemporary novelist whose main character, a flat one, is a farmer who is always saying "I'll plough up that bit of gorse". But, says Forster, we are so bored by the farmer's consistency that we do not care whether he does or doesn't.

But is this right? If by flatness we mean a character, often but not always a minor one, often but not always comic, who serves to illuminate an essential human truth or characteristic, then many of the most interesting characters are flat. I would be quite happy to abolish the very idea of "roundness" in characterisation, because it tyrannises us - readers, novelists, critics - with an impossible ideal. "Roundness" is impossible in fiction, because fictional characters, while very alive in their way, are not

the same as real people. It is subtlety that matters - subtlety of analysis, of inquiry, of concern, of felt pressure - and for subtlety a very small point of entry will do. Forster's division grandly privileges novels over short stories, since characters in stories rarely have the space to become "round". But I learn more about the consciousness of the soldier in Chekhov's 10-page story "The Kiss" than I do about the consciousness of Waverley in Walter Scott's eponymous novel, because Chekhov's inquiry into how his soldier's mind works is more acute than Scott's episodic romanticism.

Forster struggles to explain how we feel that most of Dickens's characters are flat and yet, at the same time, that these cameos obscurely move us - he claims that Dickens's own vitality makes them "vibrate" a bit on the page. But this vibrating flatness is true not only of Dickens, but of Proust, who also likes to tag many of his characters with favourite sayings and catchphrases, of Tolstoy to some extent, of Thomas Hardy's minor characters, of Thomas Mann's minor characters (he, like Proust and Tolstoy, uses a method of mnemonic leitmotif - a repeated attribute or characteristic - to secure the vitality of his characters), and supremely of Jane Austen.

Take Shakespeare's Henry V. If you asked most people to separate King Harry and the Welsh captain Fluellen into Forsterian camps, they would award Harry roundness and Fluellen flatness. The King is a large part, Fluellen a minor one. Harry talks and reflects a lot, he soliloquises, he is noble, canny, magniloquent and surprising: he goes among his soldiers in disguise, to talk freely with them. He complains of the burden of kingship. Fluellen, by contrast, is a comic Welshman, a pedant of the kind Henry Fielding or Cervantes would nimbly satirise, always banging on about military history, and Alexander the Great, and leeks, and Monmouth. Harry rarely makes us laugh, Fluellen always does. Harry is round, Fluellen flat.

But the categories could easily go the other way. The King Harry of this play, unlike the Harry of the two Henry IV plays, is merely kingly, in rather a dull fashion. He is very eloquent, but it seems like Shakespeare's eloquence, not his own (it's formal, patriotic, august). His complaints about the burdens of kingship are a bit formulaic and self-pitying, and tell us little about his actual self (except, in a generic way, that he is self-pitying). He is an utterly public figure. Fluellen, however, is a little terrier of vividness. His speech, despite the "Welshisms" that Shakespeare puts in - "look you", and so on - is idiosyncratically his own. He is a pedant, but an interesting one. In Fielding, a pedantic doctor or lawyer speaks like a pedantic doctor or lawyer: his pedantry is professionally bound up with his occupation. But Fluellen's pedantry has a limitless and slightly desperate quality about it: why does he know so much about the classics, about Alexander the Great and Philip of Macedon? Why has he appointed himself the army's military historian? He surprises us, too: at first we think his windiness will replace valour on the field, as Falstaff's did, because we think we recognise a type - the man who speaks about military action rather than performing it. But he turns out to possess a touching valour and loyalty; and his rectitude - another inversion of type - is not merely hypocritical. And there is something piquant about a man who is at once an omnivorous roamer of the world's knowledge and literatures, and a little Welsh provincial. His monologue on how Monmouth resembles the classical city of Macedon is both funny and moving:

I tell you, captain, if you look in the maps of the world I warrant you shall find comparisons between Macedon and Monmouth, that the situations, look you, is both alike. There is a river in Macedon, and there is also more- over a river at Monmouth.

All of us still meet people like Fluellen; and when a garrulous bloke on a train starts talking up his home town, and says something like "we've got one of those" - shopping mall, rugby stadium, violent pub - "in my town, too, you know", you are apt to feel, as towards Fluellen, both mirth and an obscure kind of sympathy, since this kind of importuning provincialism is always paradoxical: the provincial simultaneously wants and does not want to communicate with you, simultaneously wants to remain a provincial and abolish his provincialism by linking himself with you. Almost 400 years later, in a story called "The Wheelbarrow", VS Pritchett revisits Fluellen. A Welsh taxi driver, Evans, is helping a lady clear out a house. He finds an old volume of verse in a box and suddenly bursts out, scornfully: "Everyone knows that the Welsh are the founders of all the poetry in Europe."

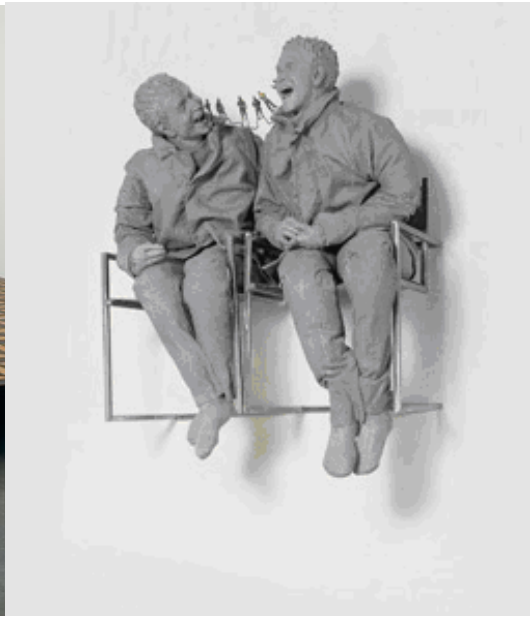
In fact, the ubiquitous flat character of the English and Scottish novel, from Mr Collins in Austen's Pride and Prejudice to Charles Ryder's father in Evelyn Waugh's Brideshead Revisited, tells us something deep about the dialectic of British reticence and sociability. From Shakespeare descends a self-theatricalising, somewhat solipsistic, flamboyant, but also essentially shy type who can be found in Fielding, Austen, Dickens, Hardy, Scott, Thackeray, George Meredith, HG Wells, Henry Green, Waugh, Pritchett, Spark, Angus Wilson, Martin Amis, Zadie Smith, and on into the superb pantomimic embarrassments of Monty Python and Ricky Gervais's David Brent. He is typified by Mr Omer in David Copperfield, the tailor whom David visits to get his funeral suit. Mr Omer is an English soliloquist, and prattles on without embarrassment as he blunders his way all over David's grief. He shows David a roll of cloth which he says is too good for mourning anyone short of parents, and then windily opines: "But fashions are like human beings. They come in, nobody knows when, why or how; and they go out, nobody knows when, why, or how. Everything is like life, in my opinion, if you look at it in that point of view."

Something true is revealed here about the self and its irrepressibility or irresponsibility. Mr Omer is determined to be himself, even if that means likening fashions in clothes to patterns of morbidity. No one would call Mr Omer a "round" character. He exists for a bare minute. But contra Forster, the flat character like Mr Omer is indeed capable of "surprising us" - the point is, he only needs to surprise us once, and can then disappear off the stage.

Mrs Micawber's catchphrase "I will never desert Mr Micawber" tells us something true about how she keeps up appearances, how she maintains a theatrical public fiction, and so it tells us something true about her; but the farmer who says "I'll plough up that bit of gorse" is not maintaining any similarly interesting fiction about himself - he is just being stoical or habitual - and so we know nothing about his true self behind the catchphrase. He is simply stating his intentions. That is why he is boring; "consistency" has nothing to do with it. And we all know people in real life who, like Mrs Micawber, do indeed use a series of jingles and tags and repetitive gestures to maintain a certain kind of performance. The insight afforded us into the secret costs of this type of comic public performance - think again of Gervais's David Brent - seems to me one of the central treasures of British tragicomedy.

http://books.guardian.co.uk:80/review/story/0,,2246855,00.html

JUAN MUNOZ EXHIBITION AT TATE MODERN



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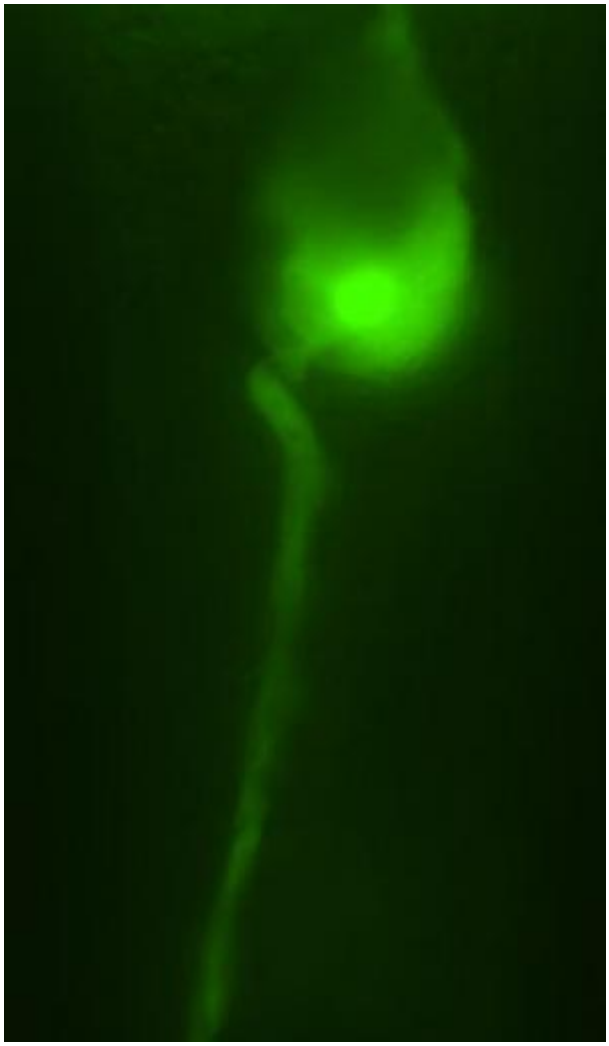
New Method Exploits Ancient Mechanism To Switch Genes On And Off At Will



Warm glow. By exploiting a cell's heat shock response, scientists use transgenes to express green fluorescent protein exclusively in amphid sheath cells, a type of nervous system cell in C. elegans. These cells do not fluoresce until scientists raise the temperature to 34 degrees Celsius. (Credit: Image courtesy of Rockefeller University)

ScienceDaily (Jan. 30, 2008) — Since our ancestors first harnessed fire, we've used heat to cook burgers, forge steel and power rockets. Now, Rockefeller University researchers are using heat for another purpose: turning genes on and off at will. By exploiting the heat shock response, an ancient mechanism that protects cells from dangerously high temperatures, researchers have developed a new method to introduce foreign genes, called transgenes, into an organism and control when and where these transgenes are expressed. Unlike other techniques, which are labor intensive and inefficient, this new method makes controlling transgene expression as easy as turning the dial on an oven.

During heat shock, a protein called heat shock factor-1 travels from a cell's cytoplasm to the nucleus, where it binds to a specific sequence of DNA. This interaction initiates the transcription of heat shock protein, a shield that deflects excess heat from cells and protects them from damage. Since these two proteins are expressed at a specific time — when organisms experience heat shock at a specific temperature — scientists had long designed transgenes to be expressed the moment heat shock factor-1 binds to this sequence of DNA. However, while scientists could know when this transgene was expressed, they couldn't limit its expression in specific cell types and study a particular protein's effect on them. To do so, they would have to target a single cell with a laser beam until the heat shock

response kicked in for the transgene to be expressed. In Caenorhabditis elegans, that's 34 degrees Celsius.

"If you're good, each animal would take a couple of minutes," says Shai Shaham, head of the Laboratory of Developmental Genetics. "And you would need to repeat this many times if you wanted to study a cell's function and that cell's role in behavior."

To bypass this time-intensive work, Shaham and Taulant Bacaj, a graduate student in his lab, used two transgenes — one called the driver, the other the responder — to transform mutant worms that had a deficient heat shock response in every one of their cells into those that had an intact heat shock response in just one cell type. The cell type with the intact response depended on the transgenes being used. In this two-part system, the driver consisted of a portion of DNA that was exclusively expressed in one cell type as well as the gene that encoded heat shock factor-1; the responder consisted of the promoter of a heat shock reponsive gene as well as the gene of interest. Whenever Bacaj turned the dial of the incubator to 34 degrees, the specific cells expressed heat shock factor-1, which induced the expression of the gene of interest.

They first tested this method on glia, cells of the nervous system that are tightly associated with nerve cells and that have been extensively studied in the Shaham lab. They went on to show that the method works in nerve and muscle cells as well, suggesting that it is likely to be generally applicable.

"So, instead of using a laser beam to ablate cells," says Bacaj, "you could create a responder with a gene that encoded a toxin, one that killed the cells whose function you want to specifically study. Since the heat shock response only occurs in those cells, all you have to do after you create these transgenic animals is turn up the heat to 34 degrees."

Journal reference: Genetics 176(4): 2651–2655 (August 2007)

Adapted from materials provided by Rockefeller University.

http://www.sciencedaily.com/releases/2008/01/080124135504.htm

Weird Water: Discovery Challenges Long-held Beliefs About Water's Special Properties

Scientists have long marveled over counter-intuitive properties that set water apart from other solids and liquids commonly found in nature. (Credit: iStockphoto)

ScienceDaily (Jan. 30, 2008) — Beyond its role as the elixir of all life, water is a very unusual substance: Scientists have long marveled over counter-intuitive properties that set water apart from other solids and liquids commonly found in nature.

The simple fact that water expands when it freezes -- an effect known to anyone whose plumbing has burst in winter -- is just the beginning of a long list of special characteristics. (Most liquids contract when they freeze.)

That is why chemical engineer Pablo Debenedetti and collaborators at three other institutions were surprised to find a highly simplified model molecule that behaves in much the same way as water, a discovery that upends long-held beliefs about what makes water so special.

"The conventional wisdom is that water is unique," said Debenedetti, the Class of 1950 Professor in Engineering and Applied Science. "And here we have a very simple model that displays behaviors that are very hard to get in anything but water. It forces you to rethink what is unique about water."

While their water imitator is hypothetical -- it was created with computer software that is commonly used for simulating interactions between molecules -- the researchers' discovery may ultimately have implications for industrial or pharmaceutical research. "I would be very interested to see if experimentalists could create colloids (small particles suspended in liquid) that exhibit the water-like properties we observed in our simulations," Debenedetti said. Such laboratory creations might be useful in controlling the self-assembly of complex biomolecules or detergents and other surfactants. .

More fundamentally, the research raises questions about why oil and water don't mix, because the simulated molecule repels oil as water does, but without the delicate interactions between hydrogen and oxygen that are thought to give water much of its special behavior.

The discovery builds on an earlier advance by the same researchers. It had previously been shown that simple molecules can show some water-like features. In 2006, the collaborators published a paper showing that they could induce water-like peculiarities by adjusting the distance at which pairs of particles start to repel each other. Like water, their simulated substance expanded when cooled and became more slippery when pressurized. That finding led them to investigate more closely. They decided to look at how their simulated molecule acts as a solvent -- that is, how it behaves when other materials are dissolved into it -- because water's behavior as a solvent is also unique.

In their current paper, they simulated the introduction of oily materials into their imitator and showed that it had the same oil-water repulsion as real water across a range of temperatures. They also simulated dissolving oily polymers into their substance and, again, found water-like behavior. In particular, the polymers swelled not only when the "water" was heated, but also when it was super-cooled, which is one defining characteristic of real water. Proteins with oily interiors also behave in this way.

In real water, these special behaviors are thought to arise from water's structure -- two hydrogen atoms attached to an oxygen atom. The arrangement of electrical charges causes water molecules to twist and stick to each other in complex ways.

To create their simulation, the researchers ignored these complexities. They specified just two properties: the distance at which two converging particles start to repel each other and the distance at which they actually collide like billiard balls. Their particles could be made of anything -- plastic beads, for example -- and so long as the ratio between these two distances was correct (7:4), then they would display many of the same characteristics as water.

"This model is so simple it is almost a caricature," Debenedetti said. "And yet it has these very special properties. To show that you can have oil-water repulsion without hydrogen bonds is quite interesting."

Debenedetti noted that their particles differ from water in key aspects. When it freezes, for example, the crystals do not look anything like ice. For that reason, the research should not be viewed as leading toward a "water substitute."

As a next step, Debenedetti said he would like to see if experimentalists could create particles that have the same simple specifications as their model and see if their behavior matches the computer simulation.

The researchers published their findings Dec. 12 in the Proceedings of the National Academy of Sciences. The team also included lead author Sergey V. Buldyrev of Yeshiva University, Pradeep Kumar and H. Eugene Stanley of Boston University, and Peter J. Rossky of the University of Texas. The research was funded by the National Science Foundation through a grant shared by Debenedetti, Rossky and Stanley.

Adapted from materials provided by Princeton University, Engineering School.

http://www.sciencedaily.com:80/releases/2008/01/080118101913.htm

Mental And Physical Exercise Delays Dementia In Fatal Genetic Disease

L to R: Mari Kondo, Dr Jess Nithianantharajah and Dr Laura Gray are investigating how an enriched environment can cause changes in the brain. (Credit: Image courtesy of Howard Florey Institute)

ScienceDaily (Jan. 29, 2008) — Scientists at Melbourne's Howard Florey Institute have discovered that mental and physical stimulation delays the onset of dementia in the fatal genetic disease, Huntington's disease.

This Australian research opens up new therapeutic possibilities for other devastating and difficult to treat brain diseases, including Alzheimer's disease where dementia is a key component.

The Florey's Dr Jess Nithianantharajah and Dr Anthony Hannan showed mice with the Huntington's disease gene displayed impairments on learning and memory tests at an early stage of the disease, prior to the obvious signs of movement problems. This closely correlates with observations in Huntington's disease patients.

However, Dr Jess Nithianantharajah said by providing the mice with an enriched environment that enhanced their mental and physical stimulation, the mice performed better on these memory tests.

"This discovery is quite remarkable because we have shown that an enriched environment not only delayed the onset of dementia, but it also slowed the progression of memory loss in these mice," Dr Jess Nithianantharajah said.

"We also showed that in the Huntington's disease mice, specific molecular changes occur that relate to communication between brain cells (synapses) in a region of the brain called the hippocampus, which plays a significant role in the formation of memories.

"The Huntington's disease mice without increased mental and physical activity showed decreased levels of specific proteins that are expressed at the synapse, which are essential for normal brain function.

"But the Huntington's disease mice exposed to increased mental and physical activity did not show this decrease," she said.

Huntington's is a very powerful model for nature-versus-nurture investigations. This discovery implies that gene-environment interactions and how they affect changes in the brain's pathways is important for all brain diseases.

Treatments for complex psychiatric disorders, like depression and schizophrenia, may also benefit from these research efforts.

This research was recently published in the international Journal of Neurobiology of Disease and involved collaborations between the Howard Florey Institute and the University of Melbourne.

Huntington's disease is an inherited disease that affects specific areas of the brain. It is caused by a mutation in a single gene and is inherited by 50 percent of the offspring of patients. A common symptom is the jerky movement of the arms and legs, known as 'chorea', but patients also have difficulties with concentration and memory, as well as psychiatric symptoms such as depression. These symptoms gradually become more severe over the years, inevitably leading to death.

Adapted from materials provided by Howard Florey Institute.

http://www.sciencedaily.com:80/releases/2008/01/080124092540.htm

Virtual Reality Teaches Autistic Children Street Crossing, Study Suggests

ScienceDaily (Jan. 29, 2008) — Recent research conducted at the University of Haifa found that children with autism improved their road safety skills after practicing with a unique virtual reality system. "Children with autism rarely have opportunities to experience or to learn to cope with day-to-day situations. Using virtual simulations such as the one used in this research enables them to acquire skills that will make it possible for them to become independent," said Profs. Josman and Weiss, from the Department of Occupational Therapy at the University of Haifa.

The independence of children with autism depends on their receiving treatment in natural settings. One of the main problems they face is their inability to learn how to safely cross the street, a necessary skill for independent living. While acquiring this skill could greatly improve these children's independence, most of the methods for teaching street-crossing have been designed for use within the classroom, and they have been shown as insufficiently effective among autistic children.

The best way to teach children with autism skills is through repeated practice in natural settings, but the danger of learning to cross the street in a natural setting obviously prohibits this method. This is where virtual reality is very effective, as demonstrated by the research team which included Hadass Milika Ben-Chaim, then a student in the Occupational Therapy master's program and Shula Friedrich, the principal of the Haifa Ofer School for Children with Autism as well as Profs. Josman and Weiss.

Six autistic children, ages 7-12, spent one month learning how to cross virtual streets, to wait for the virtual light at the crosswalk to change and to look left and right for virtual cars using a simulation programmed by Yuval Naveh. The children in the study showed substantial improvement throughout the learning process: at the beginning of the study, the average child was able to use the 2nd level of the software while by the end they mastered the 9th level, which is characterized by more vehicles traveling at a higher speed.

However, the research team was not looking to teach a virtual skill; they wanted to see if the children were able to transfer the skills they had mastered in a virtual environment to the real world. A local practice area with a street and crosswalk, complete with traffic signals, was used for this purpose. The children's ability to cross the street safely was tested in this area evaluating, for example, whether they stopped to wait on the sidewalk or waited for a green light before crossing. The children were brought to the practice area before and after their virtual learning. Here too, the children exhibited an improvement in their skills, following the training on the virtual street, with three of the children showing considerable improvement.

One of the study participants, 16 years old, had participated in the past in a road safety program in the school, but he was not able to learn how to cross the street safely. Following learning the skill in a virtual environment, he learned how to stop on the sidewalk before stepping into the street, to look at the color of the traffic light, to cross only when the light was green and to cross without waiting too long.

"Previous studies have shown that autistic children respond well to computer learning. In this research we learned that their intelligence level or severity of their autism doesn't affect their ability to understand the system and therefore this is an important way to improve their cognitive and social abilities," summarized Profs. Josman and Weiss.

Adapted from materials provided by University of Haifa.

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Nowhere To Hide: New Ultra-powerful Microscope Probes Atomic World

The SuperSTEM 2 with Mhairi Gass of Liverpool University. (Credit: Image courtesy of Science and Technology Facilities Council)

ScienceDaily (Jan. 29, 2008) — A unique electron microscope, the first of its kind in the world, was unveiled recently at the STFC Daresbury Laboratory in Warrington. It will enable scientists to study atoms within materials in a way that has never before been possible and will pave the way for pioneering research relating to every aspect of our lives, from research into liver disease, to the creation of the mobile phones and computers of the future. Sponsored by the EPSRC and led by the University of Liverpool, the SuperSTEM 2 has been created by a collaboration of leading scientists from the universities of Liverpool, Glasgow and Leeds and the Daresbury Laboratory.

Atoms are the building blocks of matter and the study of these atoms is known as nanotechnology. The SuperSTEM 2 can show an atom at 20 million times its size. At 20 million times its size an atom would measure approximately 5mm across. To put this into context, if a person were magnified by this much they would be able to hug the Earth! However, it is not just the scale of magnification that makes SuperSTEM 2 unique -- it is also the sharpness of the image, its capability to provide elemental and chemical data about atoms and its stability. Built on sandstone bedrock, the incredibly stable geological conditions at the Daresbury Laboratory is one of the key reasons for its location -- the system is so stable that any sample in the microscope would move no more than half a millimetre in 100 years. In other words, 2000 times slower than continental drift.

The SuperSTEM 2, or Scanning Transmission Electron Microscope, works by scanning a beam that has been focussed down to the size of an atom, across a sample, providing chemical information on the sample at the same time. Although scanning transmission electron microscopy has been used as a technique for some years, detailed imaging of atoms was previously impossible due to defects that all lenses suffer from. SuperSTEM 2 is a great advance on traditional techniques as it has an inbuilt computer-controlled system corrects these defects, much in the same way that glasses correct the defects in people's eyes.

SuperSTEM also has applications in medicine and is being used to aid understanding of diseases such as the inherited disease haemochromatosis, where the liver becomes overloaded with iron. The tiny particles that hold iron within the body are being examined as their structure will shed light on how iron is transported, stored and released in the body and why they become toxic to the body when there is too much of it.

The University of Liverpool's Dr Andrew Bleloch, Technical Director of SuperSTEM 2 at the Daresbury Laboratory said: "Our society places huge value on making things smaller, cheaper, faster and more effective. This often requires the creation of new materials, new ways of making materials and the understanding of the atoms within them. Progression in nanotechnology makes this all possible, but with this comes the responsibility of ensuring that these products are safe to use. The behaviour of atoms can change, depending on the size of the particle they are in. SuperSTEM 2 means that researchers can now study how these atoms behave in their 'native' form and how they might perform as components of different products that come into contact with human beings. An example of this would be how face creams or sun lotions work and how our bodies will react with the atoms found within them."

The SuperSTEM 2 is now being applied to a whole raft of projects, including medical research to achieve a deeper understanding of liver disease. It is also being used in the future development of mountain bike tyres and the next generation of computer chips in the quest to make smaller, yet more powerful, computers and mobile phones.

Adapted from materials provided by Science and Technology Facilities Council.

http://www.sciencedaily.com:80/releases/2008/01/080124100300.htm

Carbon Monoxide May Cause Long-lasting Heart Damage

ScienceDaily (Jan. 29, 2008) — Lack of oxygen isn't the only way that carbon monoxide (CO) damages the heart, say researchers at Rhode Island Hospital.

According to the findings of a new study, published in the January issue of Academic Emergency Medicine, CO also causes direct damage to the heart muscle, separate from the effects of oxygen deprivation, which reduces the heart's pumping capacity and permanently impairs cardiac function.

"These findings suggest that heart damage caused by carbon monoxide may have long-lasting effects even after its been eliminated from the blood, making the diagnosis of carbon monoxide poisoning even more critical," said lead author Selim Suner, M.D., M.S., director of emergency preparedness and disaster medicine at Rhode Island Hospital.

"While this research puts us one step in the right direction, there is still much more we need to know about the underlying mechanisms if we hope to someday develop targeted treatments," added Suner, who's also an associate professor of emergency medicine, surgery and engineering at The Warren Alpert Medical School of Brown University.

The study is the first to show that CO's effect on heart muscle is unrelated to oxygen deprivation in the recovery phase, even when all CO is out of the system.

When inhaled, CO -- the leading cause of accidental poisoning deaths across the country -- displaces oxygen in the blood and deprives organs such as the heart, brain and other vital organs of life-sustaining oxygen. Based on previous studies, researchers have speculated that there may be other mechanisms besides oxygen deprivation that lead to CO-related heart damage, although these have not been clearly defined.

In the study, Suner and colleagues examined an animal model in which blood and other systemic factors were eliminated in order to determine the direct effects of CO on cardiac function in the recovery phase. This model used three groups: a control group; a nitrogen control group designed to induce oxygen deprivation; and a group exposed to a combination of CO and oxygen, which best simulates the environmental conditions of CO poisoning. The pressure generated in the left ventricle of the heart was used as an indicator of heart function.

Left ventricular-generated pressure was decreased in both the nitrogren control and CO groups compared to the control group. However, the group exposed to CO did not recover cardiac function -- including blood pressure -- to the extent that the nitogren control group did after treatment with 100 percent oxygen. These findings suggest that CO has an independent toxic effect on the heart separate from oxygen deprivation.

Known as the "invisible killer," CO exposure is responsible for an estimated 15,000 emergency department visits and 500 unintentional deaths each year. It is an odorless, colorless gas produced by common household appliances that burn fuel, such as gasoline, oil and wood. When not properly ventilated or used incorrectly, CO emitted by these appliances can build up to dangerous levels. CO poisoning can be very difficult to diagnose, since its symptoms resemble those of the flu and other common illnesses. Pregnant women, children and the elderly are most susceptible to CO poisoning.

Gregory Jay, M.D., an emergency physician at Rhode Island Hospital and an associate professor of emergency medicine and engineering at Brown, was co-author of the study.

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

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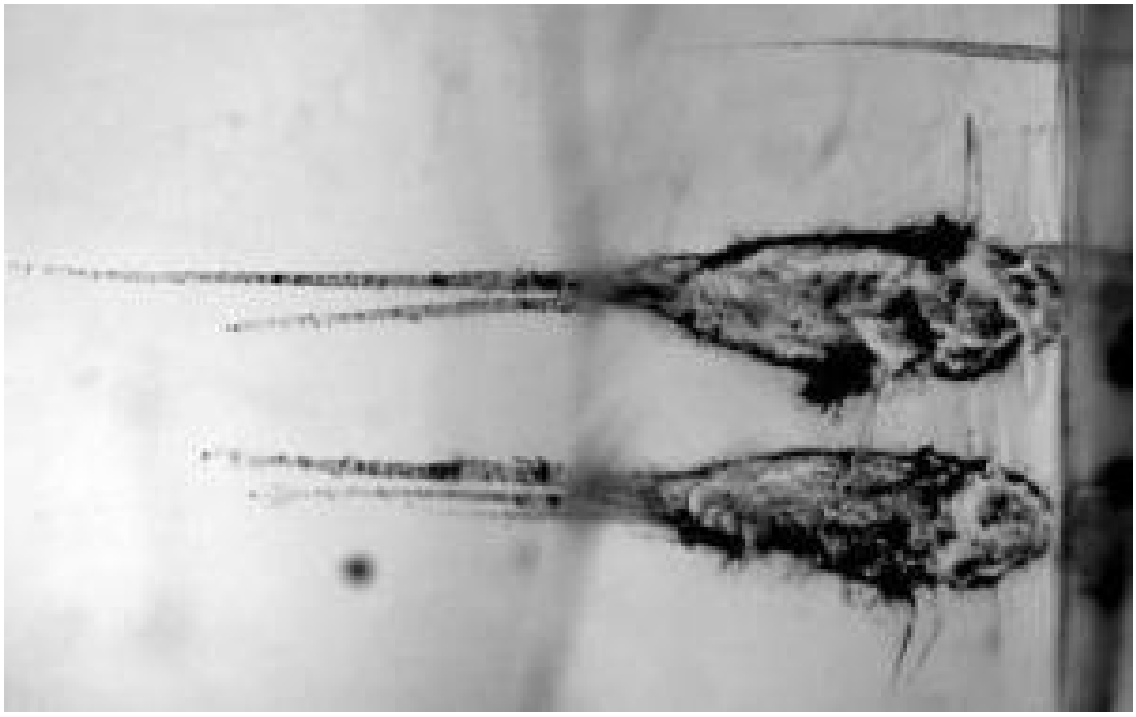
Stardust Comet Dust Resembles Asteroid Materials



Stardust impact tracks created by comet dust entering silica aerogel at 6 km/s. (Credit: NASA/JPL)

ScienceDaily (Jan. 29, 2008) — Contrary to expectations for a small icy body, much of the comet dust returned by the Stardust mission formed very close to the young sun and was altered from the solar system's early materials.

When the Stardust mission returned to Earth with samples from the comet Wild 2 in 2006, scientists knew the material would provide new clues about the formation of our solar system, but they didn't know exactly how.

New research by scientists at Lawrence Livermore National Laboratory and collaborators reveals that, in addition to containing material that formed very close to the young sun, the dust from Wild 2 also is missing ingredients that would be expected in comet dust.Surprisingly, the Wild 2 comet sample better resembles a meteorite from the asteroid belt rather than an ancient, unaltered comet.

Comets are expected to contain large amounts of the most primitive material in the solar system, a treasure trove of stardust from other stars and other ancient materials. But in the case of Wild 2, that simply is not the case.

By comparing the Stardust samples to cometary interplanetary dust particles (CP IDPs), the team found that two silicate materials normally found in cometary IDPs, together with other primitive materials including presolar stardust grains from other stars, have not been found in the abundances that might be expected in a Kuiper Belt comet like Wild 2. The high-speed capture of the Stardust particles may be partly responsible; but extra refractory components that formed in the inner solar nebula within a few astronomical units of the sun, indicate that the Stardust material resembles chondritic meteorites from the asteroid belt.

"The material is a lot less primitive and more altered than materials we have gathered through high altitude capture in our own stratosphere from a variety of comets," said LLNL's Hope Ishii, lead author of the research that appears in the Jan. 25 edition of the journal, Science. "As a whole, the samples look more asteroidal than cometary."

Because of its tail formed by vaporizing ices, Wild 2 is, by definition, a comet. "It's a reminder that we can't make black and white distinctions between asteroids and comets," Ishii said. "There is a continuum between them."

The surprising findings contradict researchers' initial expectations for a comet that spent most of its life orbiting in the Kuiper Belt, beyond Neptune. In 1974, Wild 2 had a close encounter with Jupiter that placed it into its current orbit much closer to Earth. Comets formed beyond the so-called frost line where water and other volatiles existed as ices. Because of their setting far from the sun, they have been viewed as a virtual freezer, preserving the original preliminary ingredients of the solar system's formation 4.6 billion years ago. The Stardust spacecraft traveled a total of seven years to reach Wild 2 and returned to Earth in January 2006 with a cargo of tiny particles for scientist to analyze.

This is one of the first studies to closely compare Stardust particles to CP IDPs. This class of IDPs is believed to contain the most primitive and unaltered fraction of the primordial material from which our planets and other solar system objects formed. They are highly enriched in isotopically anomalous organic and inorganic outer solar nebula materials inherited – through the presolar molecular cloud – from dust produced around other stars. IDPs are gathered in the stratosphere by high altitude airplanes (ER-2s and WB-57s) that are typically more than 50 years old.

The Livermore team specifically searched for two silicate materials in Stardust that are believed to be unique to cometary IDPs: amorphous silicates known as GEMS (glass with embedded metal and sulfides); and sliver-like whiskers of the crystalline silicate enstatite (a rock-forming mineral). Surprisingly, the team found only a single enstatite whisker in the Stardust samples, and it had the wrong crystallographic orientation – a form typical of terrestrial and asteroidal enstatite.

Objects similar to GEMS were found, but Ishii and the team showed they were actually created during the high speed 6-kilometer per second impact of Wild 2 comet dust with the Stardust spacecraft's collector by making similar material in the laboratory.

In analyzing the Stardust material, Ishii's team used Livermore's SuperSTEM (scanning transmission electron microscope). Ishii said future analyses should focus on larger-grained materials, so-called micro-rocks, which suffered less alteration.

"The material found in primitive objects just wasn't there in the samples," said John Bradley, another LLNL author. "I think this is science in action. It's really exciting because it's just not what we expected."

"Wild 2 doesn't look like what we thought all comets should look like," Ishii said. "The Stardust mission was a real success because without it, we would never have learned these things about our solar system. The sample return was vital for us to continue to unravel how our solar system formed and evolved."

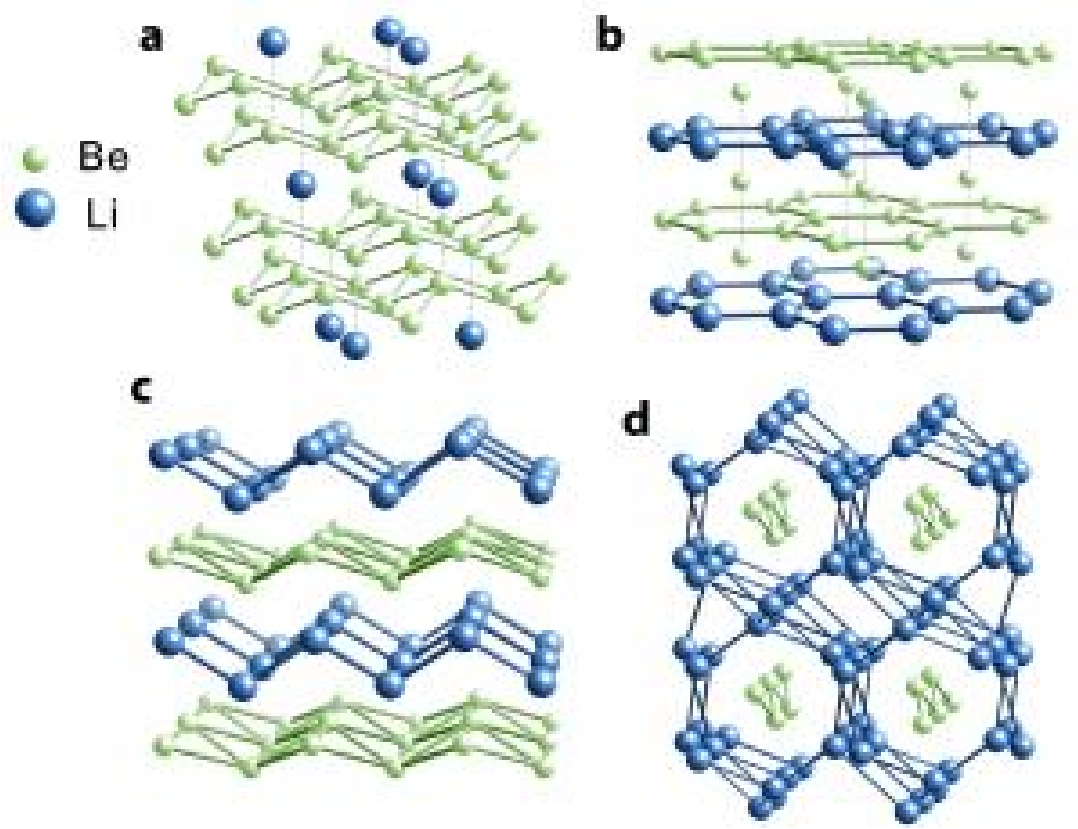
In addition to Ishii and Bradley, other LLNL researchers include Zu Rong Dai, Miaofang Chi and Nigel Browning. Other institutions involved include UC Davis, the Natural History Museum of London, the University of Kent and the Netherlands Organization for Scientific Research (NWO).

Stardust is a part of NASA's series of Discovery missions and is managed by the Jet Propulsion Laboratory. Stardust launched in February 1999 and set off on three giant loops around the sun. It began collecting interstellar dust in 2000 and met Wild 2 in January 2004, when the spacecraft was slammed by thousands of comet particles including some the size of BBs that could have compromised the mission. It is the first spacecraft to safely make it back to Earth with cometary dust particles in tow.

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

http://www.sciencedaily.com:80/releases/2008/01/080124161617.htm

Lithium And Beryllium Alloys Could Bond And Result In Superconductivity



Lithium (Li) and beryllium (Be) form no compounds under normal atmospheric pressure. But under high pressure at least four ordered alloys of these elements are predicted. The bottom left structure is the most unexpected predicted alloy and may have potential for superconductivity. (Credit: Ji Feng, Richard G. Hennig, N.W. Ashcroft, and Roald Hoffmann)

ScienceDaily (Jan. 29, 2008) — Even though the lightest known metals in the universe, lithium (Li) and beryllium (Be), do not bind to one another under normal atmospheric or ambient pressure, an interdisciplinary team of Cornell scientists predicts in the Jan. 24 issue of Nature that Li and Be will bond under higher levels of pressure and form stable Li-Be alloys that may be capable of superconductivity. Superconductivity is the flow of electricity with zero resistance.

The Inorganic, Bioinorganic and Organometallic Chemistry program at the National Science Foundation (NSF) supported the research because little work had been done to predict the properties of metals under high pressure.

"We found that chemists working on inorganic compounds and inorganic reactions under high pressure were interested in the predictions and felt it would stimulate useful interactions between theorists and experimentalists," said NSF Program Manager Michael Clarke.

Of the four stable Li-Be alloys predicted by the scientists' computational study, the alloy with the ratio of one Li atom to one Be atom (LiBe) shows the greatest potential for superconducting applications.

A most unexpected finding in the study is the predicted existence of two-dimensional electron gas layers within a tightly compressed three-dimensional LiBe compound.

"It's like taking a nice layer cake, squeezing the hell out of it, and lo and behold, out of what would be expected to be a jumbled-up mess, there emerges a neat hazelnut cream layer," said co-author Roald

Hoffmann, the 1981 chemistry Nobel laureate and Cornell's Frank H.T. Rhodes Professor in Humane Letters Emeritus.

But it makes sense, according to co-author Neil Ashcroft, Cornell's Horace White Professor of Physics Emeritus. When layers of Li and Be are squeezed together at elevated pressures ranging from five to 10 times greater than the pressure at which diamond forms, outer electrons from the Li layer get squeezed into the vicinity of the Be layer, forming two-dimensional gas layers.

"It is extraordinary that such remarkably two-dimensional behavior emerges from the conjunction of two such ‘simple' constituents. It is actually a fine example of ‘emergent' phenomena," Ashcroft said. He added that they do not yet know whether their theoretical Li-Be alloys will become notable superconductors but creating and testing the compounds would be relatively simple.

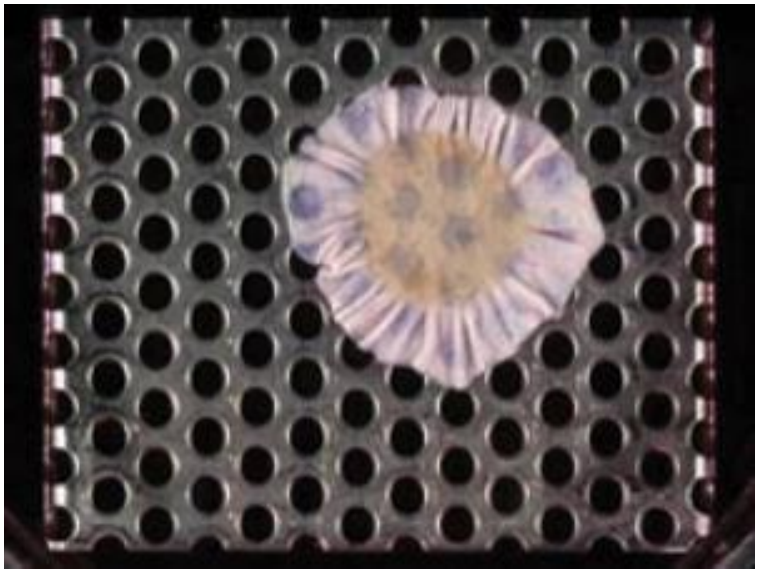
Ji Feng, now a postdoctoral researcher at Harvard, is lead author of the Nature paper. Richard Hennig, a Cornell assistant professor in materials science and engineering, is an additional co-author of the paper.

The research was supported by NSF Division of Chemistry; Division of Materials Research grant; and Division of Earth Sciences.

Adapted from materials provided by National Science Foundation.

http://www.sciencedaily.com:80/releases/2008/01/080128113356.htm

Polymer Gel Prevents Skin Grafts From Shrinking



Engineered tissue. (Credit: Copyright Kroto Research Institute, University Of Sheffield, UK)

ScienceDaily (Jan. 29, 2008) — A gel that could prevent the painful and disfiguring contractions of skin grafts used to treat burns has been developed by British scientists.

When skin is irreparably damaged by burns, skin taken from other areas of the patient's body – or created by tissue engineering – is grafted onto the burned area. Although grafts often heal successfully, the skin shrinks significantly in nearly a third of patients. The process is painful and disabling, and particularly common in children. Karima Bertal and colleagues at the University of Sheffield have now developed an enzyme-inhibiting drug which can halve this contraction, and loaded it into a biocompatible polymer gel to smear onto the graft. Bertal presented the group's preliminary results at the Royal Society of Chemistry's Biomaterials conference in Manchester, UK, earlier this month.

Sheila MacNeil, the scientist who leads the research, told Chemistry World that currently the only accepted treatment for graft contraction is to have the patient wear pressure garments – extremely tight clothing that pushes down on the dermis to prevent it forming bumps of contracted tissue. Her research team found that an enzyme called lysyl oxidase is involved in causing the graft contraction, as it ties together collagen fibres in the deep dermal layer of the skin. Then they identified a compound that inhibits the enzyme, called 3-aminopropionitrile, and combined it with a biocompatible polymer gel invented by chemist Steve Armes, also at Sheffield.

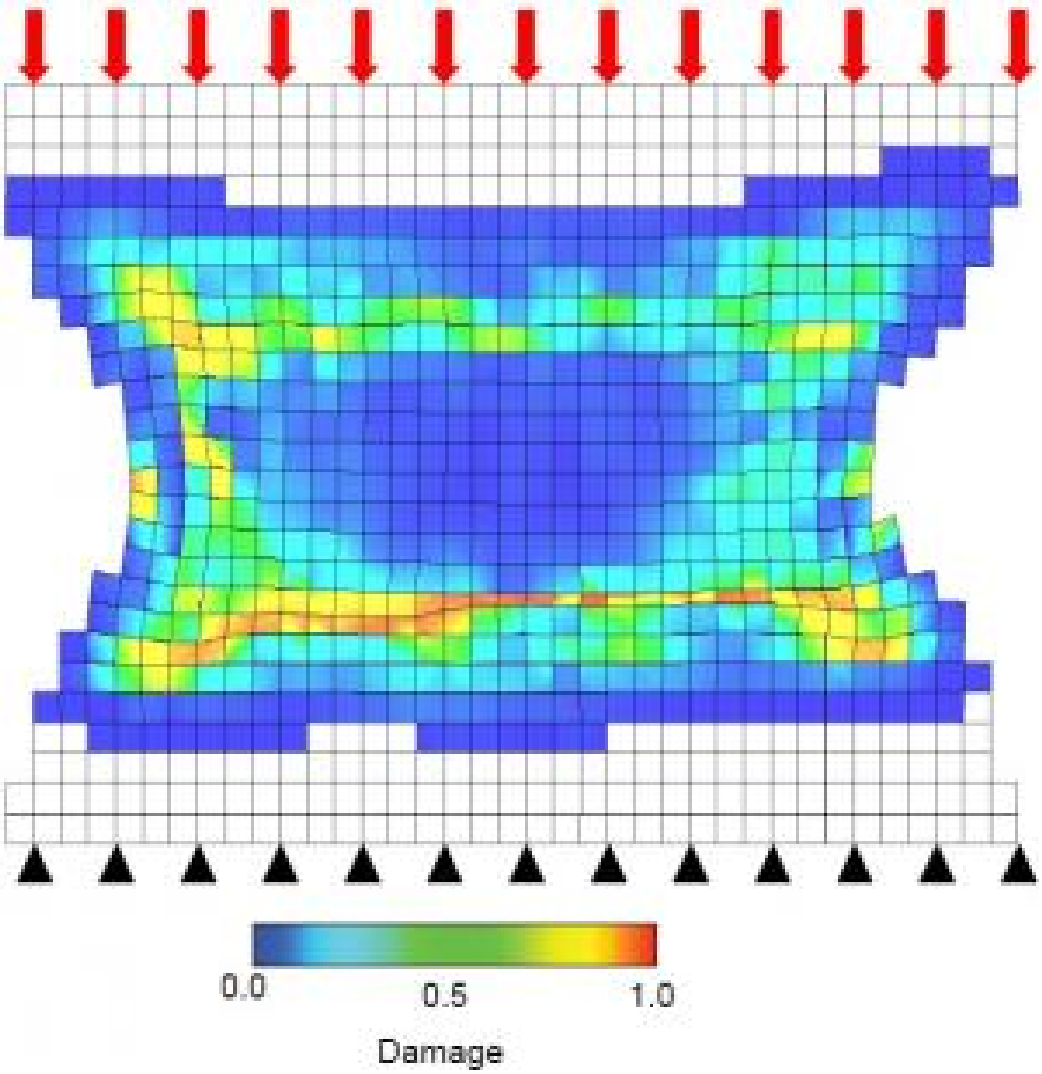
Tests of the drug on human skin samples were successful: 'The control grafts contract to about 60 per cent of their original size, but [when the drug is applied] they only contract down to 80 per cent,' Bertal told Chemistry World.

The gel also works as they hoped: 'Our polymer gel is well tolerated by the skin and releases the drug in a controlled manner over about 48 hours,' she said. The team has now started testing the drug-gel combination itself on human skin samples, and early results looks promising, said MacNeil. 'If they're successful, we would like to move into the clinic,' she said.

Adapted from materials provided by Royal Society of Chemistry.

http://www.sciencedaily.com:80/releases/2008/01/080124111033.htm

Computer Model Developed For Osteoporosis Diagnostics



Model of damage to vertebral bone. (Credit: Image courtesy of Vienna University of Technology)

ScienceDaily (Jan. 29, 2008) — Osteoporosis, a common age-related disease, is being investigated by a group of biomechanical engineers at Vienna University of Technology (TU Vienna). In the frame of a clinical study, the evolution of vertebral bone density was monitored in patients. The researchers developed a simulation model, and computed the increase in bone strength on the basis of the measured bone density. Looking for the effect of Teriparatide medication, they demonstrated with the help of high-resolution CT images an increase in bone strength of up to 30%.

Vienna (TU). Nowadays, information about bone density are obtained with the help of the DXA measurement method, where two low-intensity x-ray beams are sent through bones in the hip and in the lumbar spine. Based on the collected data, the World Health Organisation defines the degree of osteoporosis and predictions can be made about the risk of fracture. A new 'anabolic' medication, based on the recombinant human parathormone fragment Teriparatide, should help people suffering from an advanced stage of bone loss.

This anabolic treatment holds the promise of bone growth. "We were asked to monitor the mechanical effects of this growth over a period of two years by applying the finite element method to the recorded patient data. In collaboration with Prof. Claus Glüer of Schleswig-Holstein University Hospital, we used three-dimensional images from computer tomography to gain informations about the geometry

and the material properties of the bone ", explains Professor Philippe Kurt Zysset from the Institute of Lightweight Design and Structural Biomechanics at TU Vienna.

From such images, Zysset and his team develop mechanical models and simulate the mechanical behaviour of bones under various loading conditions. The reliability of these numerical simulations is continuously examined in the laboratory through biomechanical tests. Lilly, the international pharmaceutical company, used the results obtained by TU's biomechanical engineers to interpret a two-year clinical study in which 44 patients were treated with Teriparatid products and bone growth was to be demonstrated.

Zysset says: "The patients' thoracic vertebra T12 was examined using computer tomography before the start of treatment and after 6, 12 and 18 months,. This allowed us to calculate the change in vertebral strength, and we established that it has increased as a result of the treatment. This method provides more meaningful results than pure density measurements (DXA). After two years we demonstrated a mean increase of 30% in bone strength."

Another medication, already available on the market for some time and known as an 'antiresorptive', employs the strategy of preventing or delaying bone loss in osteoporosis patients. There are plans to continue these investigations by comparing the effect of 'antiresorptives' with that of 'anabolic' drugs in patients with glucocorticoid-induced osteoporosis.

Adapted from materials provided by Vienna University of Technology.

http://www.sciencedaily.com/releases/2008/01/080123175838.htm

Synthesis Of Natural Molecule Could Lead To Better Anti-cancer Drugs

Karl Scheidt has synthesized a natural molecule with cancer-fighting properties that was isolated from this deep-sea sponge, a member of the family Neopeltidae. (Credit: Harbor Branch Oceanographic Institution)

ScienceDaily (Jan. 29, 2008) — In early 2007, Northwestern University chemist Karl Scheidt's interest was piqued when marine chemist Amy Wright reported in the Journal of Natural Products that a new natural compound derived from an uncommon deep-sea sponge was extremely effective at inhibiting cancer cell growth.

As a synthetic chemist fascinated by natural products and their potential in medicine, Scheidt knew what he had to do: Make that molecule.

After six months of intense effort, Scheidt, graduate student Daniel Custar and postdoctoral fellow Thomas Zabawa successfully built the molecular structure reported in the paper. That's when they discovered something strange and unexpected when they compared the spectra, or unique molecular fingerprints, of their structure and that of the natural compound: The spectra did not match, which meant that the structures did not match. Something was wrong.

This story and how the Northwestern team solved the mystery and determined the real structure of neopeltolide, the natural compound derived from the marine sponge, is reported in a paper published in the Jan. 23 issue of the Journal of the American Chemical Society (JACS). Knowing neopeltolide's structure will help researchers learn how the new compound works, which could lead to new, more-effective anti-cancer drugs.

"The reported biological activity of this new natural compound was fantastic -- two to three orders of magnitude more potent for some cancer cells than Taxol®, a common chemotherapy drug," said Scheidt, assistant professor of chemistry in the Weinberg College of Arts and Sciences at Northwestern. (Taxol® also has its origins in nature, having been extracted from the Pacific yew tree.)

"Synthetic chemists are inspired by such structures. Because of the potential benefits to human health, these are the compounds you want to go after."

Marine sponges can't move and escape predators, and they don't have claws, teeth or quills, so they have developed a different kind of defense mechanism: chemical protection. The sponge and/or bacteria hosted by the sponge produce poisonous compounds to ward off enemies. This chemical factory makes sponges rich sources of interesting natural products, many with cell-killing abilities.

After discovering the spectrum of their first built molecule did not match the natural compound's spectrum, Scheidt and his team faced two possibilities -- either they had done something wrong while building the molecule or the structure was reported incorrectly.

The researchers double checked their methods, found they were "spot on" and concluded the structure was reported incorrectly. Which meant the right structure still needed to be determined. Custar and Zabawa decided to set up a cot in the lab's computer room to cut down on their commute to the lab and set to work.

Again, using simple starting materials and complex chemical synthesis, the team built a new molecule, just slightly different from the first one. This time they perturbed just two carbon atoms, making them "down" instead of "up," in chemist speak. The researchers compared the spectrum of this new structure with that of the natural compound, and this time the spectra matched perfectly. These results are those published in the JACS article.

To construct the compound, Scheidt, Custar and Zabawa used an efficient, convergent synthesis, a bit akin to how a car is put together on an assembly line -- with major parts, like the engine, built separately and then put together in the final piece. "Our approach brings three equal fragments together to form the whole, which is better than building in a linear sequence," said Scheidt. "We pushed the envelope of what can be done with organic chemistry to do it."

Unbeknownst to the Northwestern researchers, a group led by James S. Panek, an organic chemist at Boston University, was working on the neopeltolide structure at the same time as Scheidt and his team. In their work, Panek's group also discovered the original published structure to be incorrect and determined the correct structure, using steps different from Scheidt's to get there. Panek's results were published a few weeks after the time Scheidt submitted his paper to JACS.

"The synthetic chemists have done an amazing job in such a short time," said Wright, who works at the Harbor Branch Oceanographic Institution. Wright isolated neopeltolide from a sponge she collected near Jamaica in 1993; she and her team reported its biological activity and structure in the 2007 article that inspired Scheidt's work.

"I was impressed with the molecular modeling work that Karl's group did to propose a variety of structures," said Wright. "The beauty is that we can find a compound in nature, and synthetic chemists can then build the structure in the lab. That structure and related compounds can then be tested for drug discovery."

"Nature is the biggest pharmacy around," said Scheidt. "Sixty to seventy percent of pharmaceuticals are inspired by natural products. We learn from nature, but we want to improve on nature, too."

Neopeltolide stops cell division in an unusual place, and this activity is different from that of other commonly known and utilized chemotherapies. "We know there is something different going on with this new molecule, and we want to start figuring out if this behavior is the beginning of a new way to treat cancer," said Scheidt.

In addition to the original structure, Scheidt and his team currently have six or seven other synthetic compounds to test. The researchers want to see if they can make a smaller, simpler molecule that is just

as effective against cancer cells but also more selective, leaving healthy cells alone. A few small chemical tweaks may be all that is needed.

With the new compound's correct structure in hand, the real journey can begin, says Scheidt. He plans to work with Wright and Professor Craig Crews, a molecular biologist at Yale University, to screen the tweaked molecules against different cancer cell lines and to discover how they work so new pathways for treating cancer can be identified.

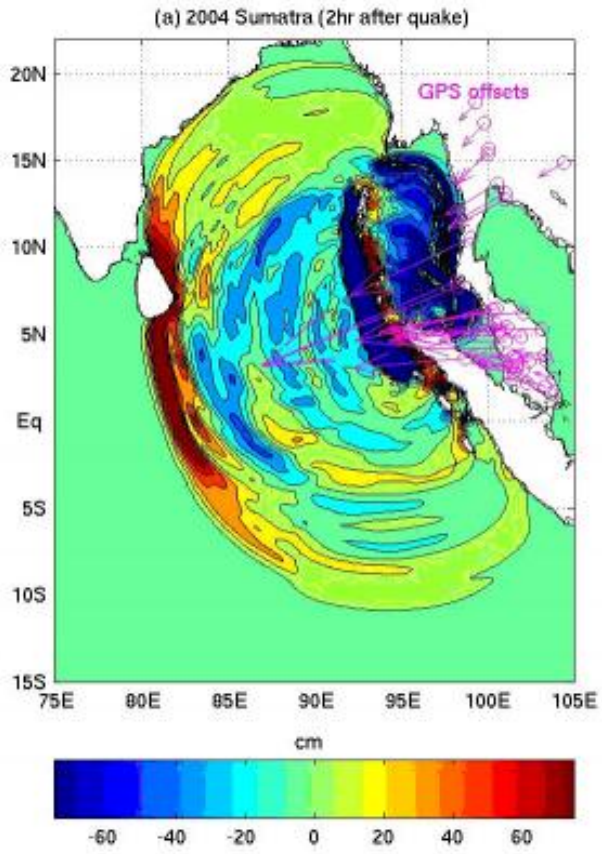
The JACS paper, titled "Total Synthesis and Structural Revision of the Marine Macrolide Neopeltolide," was first published Dec. 28, 2007, online.

The Northwestern research was supported by the Sloan Foundation, Abbott Laboratories, Amgen, AstraZeneca, 3M, GlaxoSmithKline and Boehringer-Ingelheim.

Adapted from materials provided by Northwestern University.

http://www.sciencedaily.com/releases/2008/01/080123165309.htm

Innovative Method Improves Tsunami Warning Systems, Offers New Insights



Using GPS data (purple arrows) to measure ground displacements, scientists replicated the December 2004 Indian Ocean tsunami, whose crests and troughs are shown here in reds and blues, respectively. The research showed GPS data can be used to reliably estimate a tsunami's destructive potential within minutes. (Credit: NASA/JPL)

ScienceDaily (Jan. 29, 2008) — A wave of new NASA research on tsunamis has yielded an innovative method to improve existing tsunami warning systems, and a potentially groundbreaking new theory on the source of the December 2004 Indian Ocean tsunami.

In one study, published last fall in Geophysical Research Letters, researcher Y. Tony Song of NASA's Jet Propulsion Laboratory, Pasadena, Calif., demonstrated that real-time data from NASA's network of global positioning system (GPS) stations can detect ground motions preceding tsunamis and reliably estimate a tsunami's destructive potential within minutes, well before it reaches coastal areas. The method could lead to development of more reliable global tsunami warning systems, saving lives and reducing false alarms.

Conventional tsunami warning systems rely on estimates of an earthquake's magnitude to determine whether a large tsunami will be generated. Earthquake magnitude is not always a reliable indicator of tsunami potential, however. The 2004 Indian Ocean quake generated a huge tsunami, while the 2005 Nias (Indonesia) quake did not, even though both had almost the same magnitude from initial estimates. Between 2005 and 2007, five false tsunami alarms were issued worldwide. Such alarms have negative societal and economic effects.

Song's method estimates the energy an undersea earthquake transfers to the ocean to generate a tsunami by using data from coastal GPS stations near the epicenter. With these data, ocean floor

displacements caused by the earthquake can be inferred. Tsunamis typically originate at undersea boundaries of tectonic plates near the edges of continents.

"Tsunamis can travel as fast as jet planes, so rapid assessment following quakes is vital to mitigate their hazard," said Ichiro Fukumori, a JPL oceanographer not involved in the study. "Song and his colleagues have demonstrated that GPS technology can help improve both the speed and accuracy of such analyses."

Song's method works as follows: an earthquake's epicenter is located using seismometer data. GPS displacement data from stations near the epicenter are then gathered to derive seafloor motions. Based upon these data, local topography data and new theoretical developments, a new "tsunami scale" measurement from one to 10 is generated, much like the Richter Scale used for earthquakes. Song proposes using the scale to make a distinction between earthquakes capable of generating destructive tsunamis from those unlikely to do so.

To demonstrate his methodology on real earthquake-tsunamis, Song examined three historical tsunamis with well-documented ground motion measurements and tsunami observations: Alaska in 1964; the Indian Ocean in 2004; and Nias Island, Indonesia in 2005. His method successfully replicated all three. The data compared favorably with conventional seismic solutions that usually take hours or days to calculate.

Song said many coastal GPS stations are already in operation, measuring ground motions near earthquake faults in real time once every few seconds. "A coastal GPS network established and combined with the existing International GPS Service global sites could provide a more reliable global tsunami warning system than those available today," he said.

The theory behind the GPS study was published in the December 20 issue of Ocean Modelling. Song and his team from JPL; the California Institute of Technology, Pasadena, Calif.; University of California, Santa Barbara; and Ohio State University, Columbus, Ohio, theorized most of the height and energy generated by the 2004 Indian Ocean tsunami resulted from horizontal, not vertical, faulting motions. The study uses a 3-D earthquake-tsunami model based on seismograph and GPS data to explain how the fault's horizontal motions might be the major cause of the tsunami's genesis.

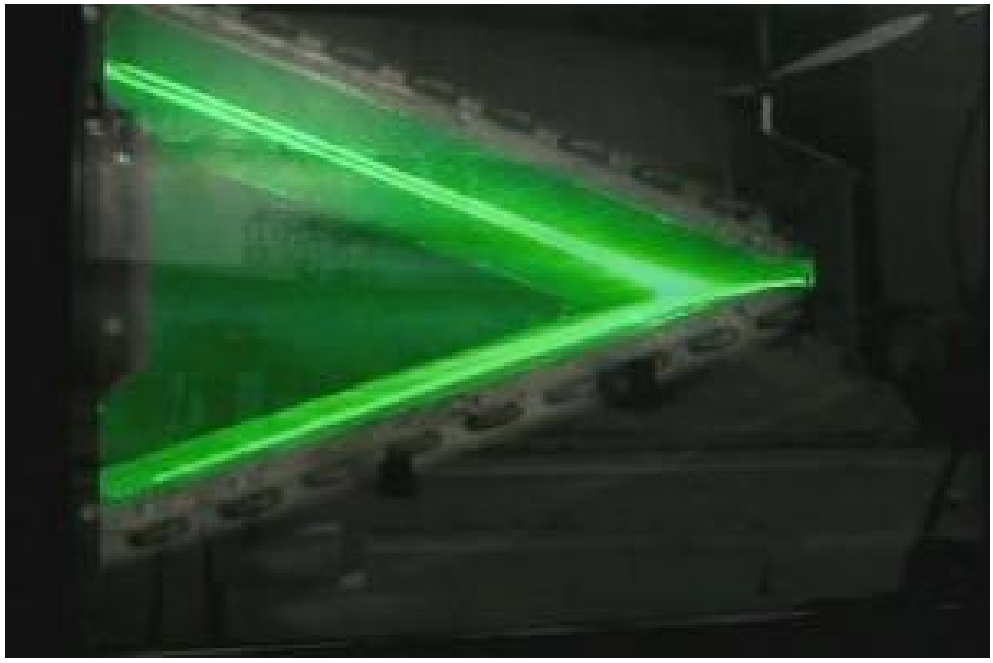
Scientists have long believed tsunamis form from vertical deformation of seafloor during undersea earthquakes. However, seismograph and GPS data show such deformation from the 2004 Sumatra earthquake was too small to generate the powerful tsunami that ensued. Song's team found horizontal forces were responsible for two-thirds of the tsunami's height, as observed by three satellites (NASA's Jason, the U.S. Navy's Geosat Follow-on and the European Space Agency's Environmental Satellite), and generated five times more energy than the earthquake's vertical displacements. The horizontal forces also best explain the way the tsunami spread out across the Indian Ocean. The same mechanism was also found to explain the data observed from the 2005 Nias earthquake and tsunami.

Co-author C.K. Shum of Ohio State University said the study suggests horizontal faulting motions play a much more important role in tsunami generation than previously believed. "If this is found to be true for other tsunamis, we may have to revise some early views on how tsunamis are formed and where mega tsunamis are likely to happen in the future," he said.

Adapted from materials provided by NASA/Jet Propulsion Laboratory.

http://www.sciencedaily.com:80/releases/2008/01/080123182522.htm

Heat Pumps 'Go With The Flow' To Boost Output



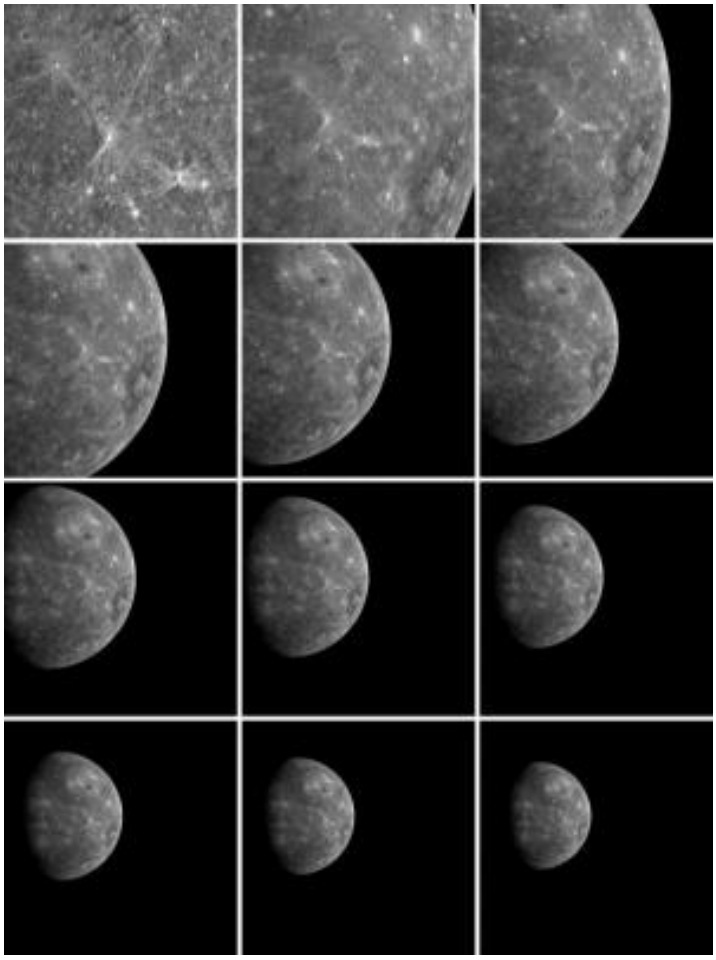
A sheet of laser light illuminating the surface of the heat exchanger during the air velocity measurement experiment. (Credit: NIST)

ScienceDaily (Jan. 29, 2008) — Air-source heat pumps typically deliver 1 1/2 to three times more heating energy to a home than the electric energy they consume. This is possible because heat pumps move heat rather than convert it from a fuel (as combustion heating systems do). National Institute for Standards and Technology (NIST) researchers are working to improve the performance of these energy superstars even further by providing engineers with computer-based tools for optimizing heat exchanger designs.In a typical air-source heat pump, air flows over two refrigerant-filled heat exchangers (known as coils): one indoor and the other outdoor, both of which have metal fins to aid heat transfer. In the heating mode, liquid refrigerant within the outside coil extracts heat from the air and the refrigerant evaporates into a gas. The indoor coil releases heat from the refrigerant as it condenses back into a liquid. A valve near the compressor can change the direction of the refrigerant flow for cooling.Performance of air-to-refrigerant heat exchangers can be reduced by uneven air flow distribution. However, performance degradation can be significantly avoided by design changes that increase refrigerant flow in areas that receive more air. To achieve this, one must ascertain the actual air distribution in a given system.NIST researchers have developed a testing apparatus that uses a high-resolution camera to track--with laser-illuminated dust particles--the motion and distribution of air flow in finned-tube heat exchangers. Data from these highly accurate laboratory experiments are being compared with computer simulations of air flow performed with computational fluid dynamics (CFD) software. Once accurate CFD models are developed and validated, engineers could use them as the basis for design changes to coil assemblies and refrigerant circuitries to accommodate the existing air distribution.The NIST program, partially sponsored by the Air-Conditioning and Refrigeration Technology Institute (ARTI) under a Cooperative Research and Development Agreement (CRADA), could increase finned-tube heat exchanger heating or cooling capacity by five percent, resulting in improved heat pump efficiency. Additionally, such improvements could allow manufacturers to reduce the heat exchanger size, thereby reducing material cost and the amount of refrigerant needed. The NIST study results on home air-source heat pumps will be issued in 2009 and are also expected to be applicable to large heat exchangers used in commercial buildings and refrigeration systems.

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

http://www.sciencedaily.com:80/releases/2008/01/080123173146.htm

Mercury's Magnetosphere Fends Off Solar Wind



Departing shots: The top left image was taken when MESSENGER was about 34,000 kilometers (21,000 miles) from Mercury, and the bottom right image was snapped from a distance of about 400,000 kilometers (250,000 miles). Mercury and Earth are the only two terrestrial planets in the solar system with magnetospheres produced by an intrinsic magnetic field. (Credit: NASA/Johns Hopkins University Applied Physics Laboratory/Carnegie Institution of Washington)

ScienceDaily (Jan. 31, 2008) — The planet Mercury's magnetic field appears to be strong enough to fend off the harsh solar wind from most of its surface, according to data gathered in part by a University of Michigan instrument onboard NASA's MESSENGER spacecraft.

U-M's Fast Imaging Plasma Spectrometer (FIPS) on Jan. 14 took the first direct measurements of Mercury's magnetosphere to determine how the planet interacts with the space environment and the Sun.

The solar wind, a stream of charged particles, fills the entire solar system. It interacts with all planets, but bears down on Mercury, 2/3 closer than the Earth to the Sun.

Earth's magnetosphere is strong enough to protect us from the solar wind's radiation, but Mercury's magnetic field is comparatively weaker.

"From our magnetic measurements, we can tell that Mercury is managing to stand up to a lot of the solar wind and protect the surface of the planet, at least in some spots. Even though the magnetic field was weak, it was enough," said Thomas Zurbuchen, FIPS instrument project leader and a professor in the U-M Department of Atmospheric, Oceanic and Space Science.

Zurbuchen said scientists can tell Mercury is putting up a good fight because instruments detected a layer of much slower-moving magentospheric plasma around the planet.

It's possible that the magnetosphere shield has holes. Scientists found ions in the magnetosphere that may have been knocked off the surface by the solar wind at the poles, for example. The source and chemical composition of the ions is still unclear, Zurbuchen said. The particles could also be from the planet's thin atmosphere.

"Mercury's magnetosphere is more similar to Earth's than we might have thought," Zurbuchen said.

The spacecraft did find one major difference. Mercury has no Van Allen Belts, wing-shaped regions of energetic particles trapped by Earth's magnetic field.

"We flew through the region they would be in and they just weren't there," Zurbuchen said. "It could be that they're intermittent, but when we were there, they weren't."

Mercury and Earth are the only two terrestrial planets in the solar system with magnetospheres produced by an intrinsic magnetic field.

This was the first of three planned flybys of Mercury. MESSENGER is scheduled to enter orbit in 2011.

Adapted from materials provided by University of Michigan.

http://www.sciencedaily.com:80/releases/2008/01/080130140130.htm

Newborn Brain Cells Modulate Learning And Memory

ScienceDaily (Jan. 31, 2008) — Boosted by physical and mental exercise, neural stem cells continue to sprout new neurons throughout life, but the exact function of these newcomers has been the topic of much debate. Removing a genetic master switch that maintains neural stem cells in their proliferative state finally gave researchers at the Salk Institute for Biological Studies some definitive answers.

Without adult neurogenesis -- literally the "birth of neurons" --genetically engineered mice turned into "slow learners" that had trouble navigating a water maze and remembering the location of a submerged platform, the Salk investigators report in the Jan. 30 Advance Online Edition of Nature. The findings suggest that, one day, researchers might be able to stimulate neurogenesis with orally active drugs to influence memory function, the researchers say.

"Our study directly establishes that neurogenesis plays an important role in a defined process, the acquisition and storage of spatial memory," says Howard Hughes Medical Investigator Ronald M. Evans, Ph.D., a professor in the Salk Institute's Gene Expression Laboratory, who, together with his Salk colleague Fred H. Gage, Ph.D., a professor in the Laboratory of Genetics, directed the study.

"This finding puts us in a new and important position to exploit the potential of stem cell-based therapies to improve brain function in neurodegenerative diseases such as Alzheimer's that are accompanied by a loss of memory," Evans says.

In an earlier collaboration, Evans and Gage had discovered that TLX, a so-called orphan receptor is crucial for maintaining adult neural stem cell in an undifferentiated, proliferative state. Orphan receptors are structurally related to the well-known hormone receptors that mediate steroid and thyroid signaling. In contrast, a TLX regulatory molecule has not yet been identified.

Now, the Salk team wanted to learn more about TLX's biology and function. However, the global deletion of TLX leads to a variety of developmental problems, so postdoctoral fellow and first author Chun-Li Zhang, Ph.D., had to devise a strategy that would allow them to control when to shut off the gene coding for TLX in neural stem cells kept in Petri dishes as well as in live animals. When he cultured mouse neural stem cells without the gene encoding TLX, the proliferation rate of these cells plummeted and the activity of hundreds of genes changed.

Explains Zhang, "This experiment confirmed that TLX specifically induces the genetic program necessary for maintaining neural stem cells in their stem-like state," handing the Salk researchers the perfect tool to track the contribution of newborn neurons to normal brain function -- a question Gage is particularly interested in.

"In the past, methods to knock out neurogenesis, such as radiation and mitotic inhibitors that block all cell division have been rather crude," he says. "So, maybe not surprisingly the literature is riddled with contradictory results."

Adult neural stem cells continually generate new brain cells or neurons in two small areas of mammalian brains: the olfactory bulb, which processes odors, and the central part of the hippocampus, which is involved in the formation of memories and learning. Some of these newborn cells die shortly after they are born but many of them become functionally integrated into the surrounding brain tissue. Whether they live or die is regulated by the animals' experience.

Combining mouse genetics and gene transfer techniques, Zhang genetically engineered mice that allowed him to specifically delete TLX in the brains of adult mice and thus shut down neurogenesis. He then put the mice through a battery of standard behavioral tests.

The mice passed with flying colors in all but one test: the Morris water maze, a common behavioral test in which mice have to rely on visual cues on the surrounding walls to find and remember the

location of a submerged platform hidden in a pool of milky water. This task draws on many cognitive abilities, including analytical skills, learning and memory, and the ability to form strategies.

The more challenging Zhang made the test, the more difficult the altered mice found it to navigate the maze and remember the location of the platform. "The mice showed both learning and memory deficits," he says. "It's not that they didn't learn, they were just slower at learning the task and didn't retain as much as their normal counterparts," observes Zhang.

"Whatever these new neurons are doing it is not controlling whether or not these animals learn," explains Gage. "But these new cells are regulating the efficiency and the strategy that they using to solve the problem."

Research assistant Yuhua Zou, M.Sc., and postdoctoral researcher Weimin He, Ph.D., both in the Gene Expression laboratory at the Salk also contributed to the study.

Adapted from materials provided by Salk Institute, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com:80/releases/2008/01/080130150525.htm

Nanochemists Discover Novel, Semi-Conducting Nanotube Needed For Next Generation Electronics

ScienceDaily (Jan. 31, 2008) — A University of Arkansas at Little Rock chemistry professor, his post-doctoral student, and colleagues at Stanford University, have developed a technique that could break through bottleneck that so far has stymied the scientific quest to create a new generation of electronic systems on the nano-scale.

Dr. Wei Zhao, professor in UALR's Department of Chemistry in the College of Science and Math, and his graduate student Xiaomin Tu, now a postdoctoral fellow at DuPont Central Research and Development, Wilmington, Del., are co-authors of an article in the Journal of the American Chemistry Society on the ability to achieve near single type purity nanotube production.

The UALR professor said semi-conducting single-walled carbon nanotubes (SWNTs) with diameter of about one nanometer have attracted the most attention as a new generation material, a possible replacement for silicon for nanoelectronics. Scientists have been unable produce the kind of uniform type of nanotubes the electronic systems would need. The UALR team found a way.

"Our current work combines selective growth of a few nanotubes with chromatographic separation to achieve near single type purity nanotube production - a big step toward the SWNT applications," Zhao said.

"The semiconductor industry has been improving the performance of electronic systems for more than four decades by making ever-smaller devices down to nanometer scale. However, this approach will soon encounter both scientific and technical limits."

Semiconducting single-walled carbon nanotubes have attracted the most attention as a new generation material, a possible replacement for silicon for nanoelectronics. However, the structural heterogeneity with various types of nanotubes of different diameters and chiralities is the bottleneck for SWNT electronic, photonic, and optoelectronic applications where single type nanotube purity is required, Zhou said. His work combines selective growth of few nanotubes with chromatographic separation to achieve near single type purity nanotube production, a big step toward the SWNT applications.

Dr. Michael Gealt, dean of the College of Science and Mathematics at UALR, said the availability of pure single-wall nanotubes will greatly enhance the creation of new products useful for the consumer.

"Dr. Zhao's technique promises to provide industry with a critical starting material for development of manufactured goods with greater electrical efficiency, thereby helping to conserve electricity while making products that work better," Gealt said.

Adapted from materials provided by University of Arkansas at Little Rock.

http://www.sciencedaily.com:80/releases/2008/01/080126095824.htm

Haptics: New Software Allows User To Reach Out And Touch, Virtually

European researchers have pioneered a breakthrough interface that allows people to touch, stretch and pull virtual fabrics that feel like the real thing. (Credit: Image courtesy of ICT Results)

ScienceDaily (Jan. 31, 2008) — European researchers have pioneered a breakthrough interface that allows people to touch, stretch and pull virtual fabrics that feel like the real thing. The new multi-modal software linked to tactile hardware and haptics devices have enormous potential for shopping, design and human-machine interaction.

A revolutionary new interface allows users to really feel virtual textiles. The system combines a specially designed glove, a sophisticated computer model and visual representation to reproduce the sensation of cloth with an impressive degree of realism.

"It is a multi-modal approach that has never been tried before," says Professor Nadia Magnenat-Thalmann, coordinator of the HAPTEX project. HAPTEX stands for Haptic sensing of virtual textiles.

The new system is a major breakthrough achieved through highly focused work of a small consortium of five research institutes. In just three years, they have created a pre-commercialisation prototype of the device and its related multi-modal software.

But it was not easy. Creating the realistic sensation of deformable textiles required a huge amount of modelling. "That was our first big challenge," says Magnenat-Thalmann, taking precise measurements of the tensile, bending and stretching properties of the material.

"You also need very high resolution; the visual system will give a realistic impression of movement with just 20 frames a second, but touch is much more sensitive. You need a thousand samples a second to recreate touch," she tells ICT Results.

Major challenges

In the end, the team created two models. One global model tracks the overall properties of the material. A second, fine-resolution model then maps the actual sensation on skin. All this information had to be combined with a detailed visual representation of the textile.

"That was another major problem," notes Magnenat-Thalmann, "because the two must be in sync or the sensation will not be realistic." Like a video with the audio out of sync, any latency between the visual and the sensual destroys the effect.

These were three major challenges from the outset, but they were just the beginning. "We had major jobs to do with the hardware, too. Nobody has combined a force-feedback device with a tactile one," reports Magnenat-Thalmann.

HAPTEX overcame this problem by developing a powered exoskeleton glove with a pair of pin arrays that provide tactile sensation to two fingers. The glove gives the sensation of bending and stretching the fabric, while the pin arrays convey texture. Then this integrated device is combined with the visual and tactile database to give an overall impression.

Feeling is believing

"We have a working prototype device and we have validated it. It gives a reliable and reproducible sensation of real fabrics in a virtual world," says Magnenat-Thalmann.

Reviewers were very impressed with the project's results, but Magnenat-Thalmann says the project did not achieve all that they hoped for. "Originally, our vision was to create a system that allowed users to distinguish between, say, cotton, wool and silk in a blind test. The system is not that sensitive yet."

It is, however, in pre-commercialisation form. The team now hopes to secure funding for a second project that will take the device from prototype stage to full commercialisation. If they succeed, it will be a first of its kind.

It will also mean entirely new markets. The textile industry and online shopping are obvious examples, but Magnenat-Thalmann also sees applications in gaming, where it could be used to make virtual worlds more realistic.

Adapted from materials provided by ICT Results.

http://www.sciencedaily.com:80/releases/2008/01/080125233408.htm

Blue-eyed Humans Have A Single, Common Ancestor

Variation in the colour of the eyes from brown to green can all be explained by the amount of melanin in the iris, but blue-eyed individuals only have a small degree of variation in the amount of melanin in their eyes. (Credit: iStockphoto/Cristian Ardelean)

ScienceDaily (Jan. 31, 2008) — New research shows that people with blue eyes have a single, common ancestor. A team at the University of Copenhagen have tracked down a genetic mutation which took place 6-10,000 years ago and is the cause of the eye colour of all blue-eyed humans alive on the planet today.

What is the genetic mutation

"Originally, we all had brown eyes", said Professor Eiberg from the Department of Cellular and Molecular Medicine. "But a genetic mutation affecting the OCA2 gene in our chromosomes resulted in the creation of a "switch", which literally "turned off" the ability to produce brown eyes". The OCA2 gene codes for the so-called P protein, which is involved in the production of melanin, the pigment that gives colour to our hair, eyes and skin. The "switch", which is located in the gene adjacent to OCA2 does not, however, turn off the gene entirely, but rather limits its action to reducing the production of melanin in the iris – effectively "diluting" brown eyes to blue. The switch's effect on OCA2 is very specific therefore. If the OCA2 gene had been completely destroyed or turned off, human beings would be without melanin in their hair, eyes or skin colour – a condition known as albinism.

Limited genetic variation

Variation in the colour of the eyes from brown to green can all be explained by the amount of melanin in the iris, but blue-eyed individuals only have a small degree of variation in the amount of melanin in their eyes. "From this we can conclude that all blue-eyed individuals are linked to the same ancestor," says Professor Eiberg. "They have all inherited the same switch at exactly the same spot in their DNA." Brown-eyed individuals, by contrast, have considerable individual variation in the area of their DNA that controls melanin production.

Professor Eiberg and his team examined mitochondrial DNA and compared the eye colour of blue-eyed individuals in countries as diverse as Jordan, Denmark and Turkey. His findings are the latest in a decade of genetic research, which began in 1996, when Professor Eiberg first implicated the OCA2 gene as being responsible for eye colour.

Nature shuffles our genes

The mutation of brown eyes to blue represents neither a positive nor a negative mutation. It is one of several mutations such as hair colour, baldness, freckles and beauty spots, which neither increases nor reduces a human's chance of survival. As Professor Eiberg says, "it simply shows that nature is constantly shuffling the human genome, creating a genetic cocktail of human chromosomes and trying out different changes as it does so."

Adapted from materials provided by University of Copenhagen.

http://www.sciencedaily.com/releases/2008/01/080130170343.htm

Developing Better Forage For Feeding Hungry Cattle Year Round

Technician Dana Smith (left) and geneticist Jason Goldman evaluate new bluegrass hybrid seedlings at Woodward. (Credit: Photo by Jason Goldman)

ScienceDaily (Jan. 31, 2008) — A herd of hungry cattle isn't a pretty sight. So scientists with the Agricultural Research Service (ARS) are developing forage grasses that provide nutritious forage to livestock in the southern Great Plains throughout the year.A key goal of this work is producing both warm-season and cool-season forage grasses that can live for long periods on highly erodible lands. Candidates need to be able to withstand major challenges from extended dry spells, insect pests and plant diseases.

ARS rangeland scientist Phillip Sims, agronomist Tim Springer and plant geneticist Jason Goldman work at the ARS Southern Plains Range Research Station (SPRRS), Woodward, Okla. Research at Woodward revolves around three grasses native to the southern Plains—Texas bluegrass (Poa arachnifera), eastern gamagrass (Tripsacum dactyloides) and sand bluestem (Andropogon hallii).In 2005, the Woodward station released an important new eastern gamagrass called "Verl." It was the first gamagrass release that had been selected from a hybrid breeding program. In field trials, Verl equaled or surpassed standards set by "Pete," a highly productive gamagrass released in 1988.

Springer was a driving force behind a new sand bluestem variety called "Chet." This grass has a forage dry matter yield almost 9 percent greater than that of "Woodward," a key sand bluestem variety developed during the 1950s.Hardy Texas bluegrass has survived heat and drought for centuries. But it is susceptible to diseases like leaf rust, and the seed is difficult to harvest and plant.Goldman and Sims are developing useful forage hybrids for the southern Plains by cross-breeding Texas bluegrass with other grass species and with bluegrasses from other regions. They have produced more than 80 hybrid types, many of which are complex hybrids of three different species. Although these species are not released yet, they offer great promise as feed for cattle in U.S. Southern Plains.

Adapted from materials provided by US Department of Agriculture.

http://www.sciencedaily.com:80/releases/2008/01/080126082643.htm

Toward A Cleaner, More Effective Method For Destroying Hormone-like Pollutants In Wastewater

ScienceDaily (Jan. 31, 2008) — Researchers report effectiveness of a powerful, environmentally-friendly catalyst in destruction of various estrogens that currently escape complete removal in our wastewater treatment plants.

In the new study, Nancy Shappell and colleagues explain that endocrine disruptors, both natural hormones and hormone-like compounds, have been detected in the surface waters. Many of these endocrine disruptors have estrogenic activity.

Ethinylestradiol, for instance, is an active ingredient in both the birth control pill and the newly-introduced "no period pill." It is a major source of environmental estrogenic activity.

To address this problem, the researchers tested a new catalyst called Fe-TAML or Fe-B*. In the presence of hydrogen peroxide, the catalyst quickly and effectively destroyed various forms of estrogens typically found in post-treatment wastewater, removing 95 percent of the chemicals -- including Ethinylestradiol -- in 15 minutes.

Estrogenic activity was also diminished to a similar extent. Further research will evaluate Fe-B*'s efficacy on actual wastewater, in addition to more extensive evaluation of byproduct toxicities. Usefulness in wastewater treatment could be doubly beneficial, as Fe-B* has been reported to destroy harmful bacterial spores.

The article "Destruction of estrogens using Fe-TAML/peroxide catalysis" is scheduled for the Feb. 15 issue of ACS' Environmental Science & Technology.

Adapted from materials provided by American Chemical Society, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com:80/releases/2008/01/080128120622.htm

Could An Asteroid Hit Planet Earth, Again?

Asteroid impact on early Earth. Some scientists believe that impacts such as this during the Late Heavy Bombardment period, 4 billion years ago, may have delivered primitive life to Earth. (Credit: Copyright Don Davis)

ScienceDaily (Jan. 30, 2008) — Earth dodged a bullet today, when asteroid TU24 passed within 540,000 kilometers of our planet, which is just down the street on a galactic scale. Tomorrow, another asteroid – 2007 WD5 – will zip past Mars at a distance of only 26,000 kilometers away. Will we dodge the bullet the next time a near-Earth object (NEO) hurtles dangerously close to our home planet?

To mark the 100th anniversary of the Tunguska event, when an exploding asteroid leveled 2000 square kilometers of Siberian forest, The Planetary Society today kicked off a year-long focus on Target Earth. The asteroid believed responsible for the cataclysm on June 30, 1908 became a fireball from the sky and knocked pine trees over like matchsticks near the Podkamennaya Tunguska River in Russia. Such an explosion today over more populated areas could lay waste an entire city.

"The solar system is a busy place," said Louis Friedman, Executive Director of The Planetary Society. "In fact, we live in a dangerous neighborhood, and keeping track of NEOs is like organizing a Neighborhood Watch in our corner of space."

Earth has been hit by NEOs many times in the past; ancient craters are still visible in landforms around the world. The famed Meteor Crater in Arizona and Canada's Lake Manicouagan are only two examples.

Target Earth will focus on a variety of NEO projects supported by The Planetary Society, including the Apophis Mission Design Competition, the Gene Shoemaker Near Earth Object Grants, NEO mission advocacy, and a one-hour HD TV "Daily Planet" special on asteroids being produced by Discovery Canada.

In mid-to late February, the Society will announce the winners of the Apophis Mission Design Competition, which invited participants to compete for $50,000 in prizes by designing a mission to rendezvous with and "tag" a potentially dangerous near-Earth asteroid. The competition received 37 mission proposals from 19 countries on 6 continents.

Tagging may be necessary to track an asteroid accurately enough to determine whether it will impact Earth, thus helping space agencies to decide whether to mount a deflection mission to alter its orbit. Apophis is an approximately 400-meter NEO, which will come closer to Earth in 2029 than the orbit of our geostationary satellites – close enough to be visible to the naked eye. If Apophis passes through a several hundred-meter wide "keyhole" in 2029, it will impact Earth in 2036. While current estimates rate the probability of impact as very low, Apophis is being used as an example to enable design of a broader type of mission to any potentially dangerous asteroid.

"Target Earth encompasses The Planetary Society's three-pronged approach to NEO research," said Director of Projects Bruce Betts. "We fund researchers who discover and track asteroids, advocate greater NEO research funding by the government, and help spur the development of possible ways to avert disaster should a potentially dangerous asteroid be discovered."

The Society will call for another round of Shoemaker grant proposals in the summer of 2008. One past grant recipient, Roy Tucker from Arizona, co-discovered Apophis. Many other past recipients from around the world continue to discover, track, and characterize NEOs.

NASA currently has no plans to study methods of asteroid deflection, or how to tag an asteroid for precise tracking. NASA and the European Space Agency (ESA) have co-sponsored the Society's Apophis competition and will study the best mission designs offered.

The $50,000 in prize money for the Apophis Mission Design competition was contributed by The Planetary Society's Chairman of the Board, Dan Geraci, together with donations from Planetary Society members around the world. Funding for the Gene Shoemaker NEO Grant program comes from Planetary Society members.

Adapted from materials provided by Planetary Society.

http://www.sciencedaily.com:80/releases/2008/01/080129212723.htm

Climate Change Poses A Huge Threat To Human Health

Shanty town near the docks, Dhaka, Bangladesh. The risks to health are many, and include the impact of heat waves, floods and wildfires, changes in infectious disease patterns, the effect of worsening food yields and loss of livelihoods. (Credit: iStockphoto/Niels van Gijn)

ScienceDaily (Jan. 30, 2008) — Climate change will have a huge impact on human health and bold environmental policy decisions are needed now to protect the world's population, according to the author of an article published in the British Medical Journal.

The threat to human health is of a more fundamental kind than is the threat to the world's economic system, says Professor McMichael, a Professor of public health from the Australian National University. "Climate change is beginning to damage our natural life-support system," he says.

The risks to health are many, and include the impact of heat waves, floods and wildfires, changes in infectious disease patterns, the effect of worsening food yields and loss of livelihoods.

The World Health Organisation estimates that a quarter of the world's disease burden is due to the contamination of air, water, soil and food -- particularly from respiratory infections and diarrhoeal disease.

Climate change, says Professor McMichael, will make these and other diseases worse. While it is unlikely to cause entirely new diseases it will alter the incidence, range and seasonality of many existing health disorders. So, for example, by 2080 between 20 and 70 million more people could be living in malarial regions due to climate change.

The adverse health impacts will be much greater in low-income countries and vulnerable sub-populations than in richer nations.

Professor McMichael says: "Poverty cannot be eliminated while environmental degradation exacerbates malnutrition, disease and injury. Food supplies need continuing soil fertility, climatic stability, freshwater supplies and ecological support (such as pollination). Infectious diseases cannot be stabilised in circumstances of climatic instability, refugee flows and impoverishment."

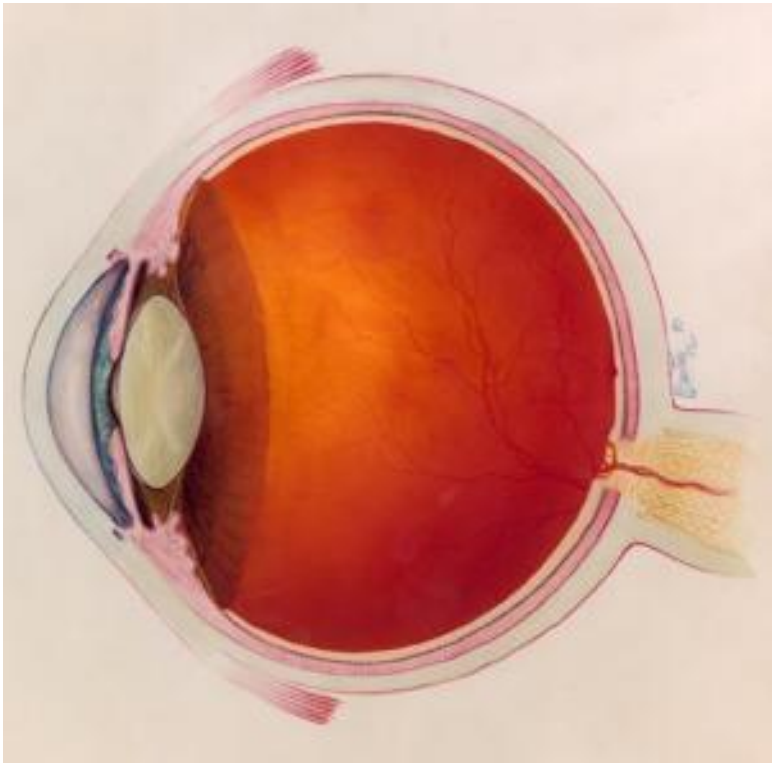
The relationship between the environment and health is complex. For example, as India modernises it expects the health of its population to improve, yet industrialisation also means a rapidly increased level of coal-burning and greater global emissions. This in turn leads to climate change, the impact of which is felt most by vulnerable populations.

Professor McMichael concludes that the global changes we are seeing now are unprecedented in their scale, and healthcare systems should develop strategies to deal with the resulting growing burden of disease and injury. More bold and far-sighted policy decisions need to be taken at national and international level to arrest the process and health professionals "have both the opportunity and responsibility to contribute to resolving this momentous issue."

Adapted from materials provided by BMJ-British Medical Journal.

http://www.sciencedaily.com:80/releases/2008/01/080124190814.htm

The Eyes Have It: Researchers Can Now Determine When A Human Was Born By Looking Into The Eyes Of The Dead



The lens of the eye is made up of transparent proteins called crystallins. These are packed so tightly together and in such a particular way, that they behave like crystals, allowing light to pass through the lens of the eye so that we can see. (Credit: National Eye Institute, National Institutes of Health)

ScienceDaily (Jan. 30, 2008) — Using the radiocarbon dating method and special proteins in the lens of the eye, researchers at the University of Copenhagen and Aarhus can now establish, with relatively high precision, when a person was born. This provides a useful tool for forensic scientists who can use it to establish the date of birth of an unidentified body and could also have further consequences for health science research.

The lens of the eye is made up of transparent proteins called crystallins. These are packed so tightly together and in such a particular way, that they behave like crystals, allowing light to pass through the lens of the eye so that we can see. From conception and up until a human being is 1-2 years of age, the cells in the lens build these crystalline proteins. Once this organic construction work is done, however, the lens crystallins remain essentially unchanged for the rest of our lives. This is a fact that researchers can now put to good use.

A minute quantity of Carbon (C-12) in the carbon-dioxide content of the atmosphere contains two extra neutrons and is therefore called Carbon-14 (C-14). This isotope is radioactive, but decays so slowly and harmlessly into nitrogen, that this small carbon element, which occurs quite naturally in nature, is in no way harmful to humans, plants or animals.

At the same time, carbon is one of the principal organic elements, and constantly moves in and out of the food chain. The same is true for the tiny quantity of C-14 in the atmosphere. As long as an organism is part of the food chain, the amount of C-14 in its cells will remain constant and stay at the same level as the C-14 atmospheric content. When the organism dies, however, the quantity of C-14 will slowly but surely drop over the course of thousands of years, while it transforms into nitrogen. This is they key to the Carbon 14 method known as radiocarbon dating, which scientists use to date up to 60, 000 year old biological, archaeological finds.

From the end of World War II and up until about 1960, the superpowers of the Cold War era, conducted nuclear tests, detonating bombs into the atmosphere. These detonations have affected the content of radioactive trace materials in the air and created what scientists refer to as the C-14 bomb pulse. From the first nuclear detonation and, until the ban on nuclear testing was evoked, the quantity of C-14 in the atmosphere doubled. Since 1960, it has only slowly decreased to natural levels.

This sudden curve has left an impression in the food chain and therefore also in the lens crystallins of the eyes, which have absorbed the increased carbon content through food stuffs. Since the crystallins remain unchanged once they have been created, they reflect the content of C-14 present in the atmosphere at the time of their creation. An event occurring shortly after birth. Using a large nuclear accelerator, physicists at Aarhus University can now determine the amount of C-14 in as little as one milligram of lens tissue and thereby calculate the year of birth.

Associate Professor Niels Lynnerup from the Department of Forensic Sciences developed the forensic method, together with the Department of Eye Pathology and the Department of Physics and Astronomy at Arhus University, Denmark.

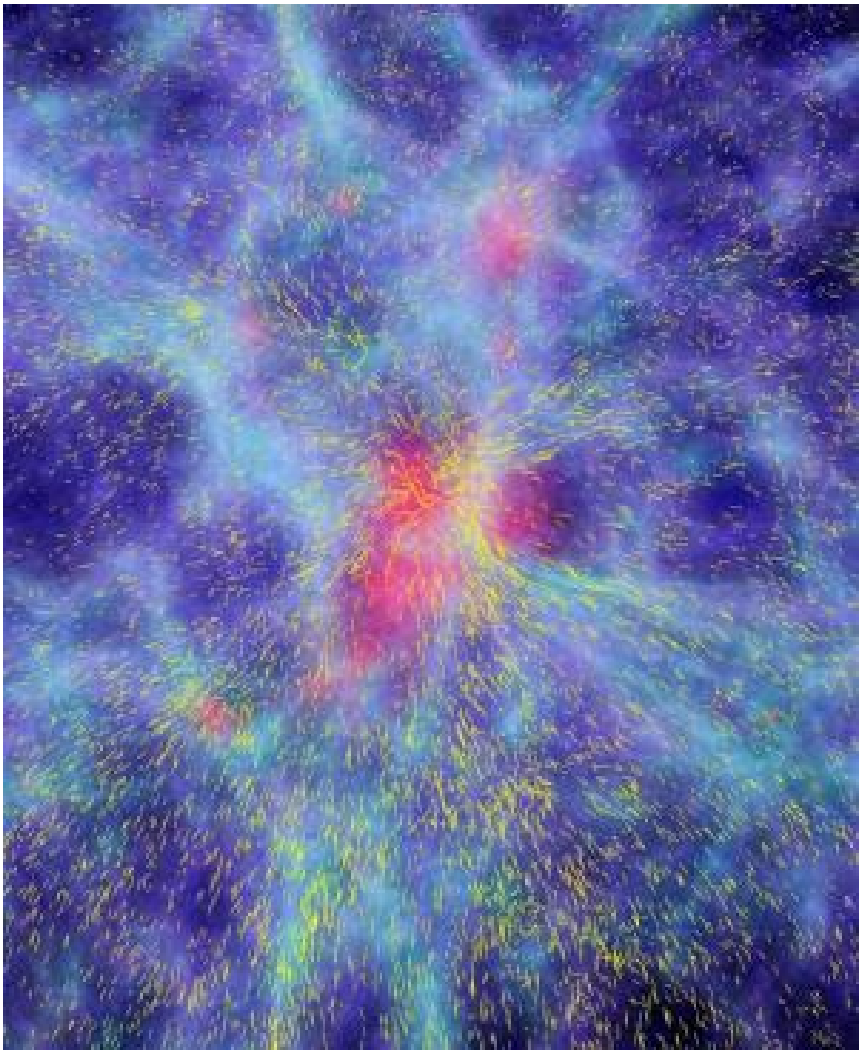
Professor Lynnerup explains that the technique can have several other applications: "As has been pointed out by other researchers, we think that the carbon dating of proteins and other molecules in the human body can also be used to study when certain kinds of tissue are generated and regenerated," he explains. "This could, for example, be applied to cancer tissue and cancer cells. Calculating the amount of C-14 in these tissues could perhaps tell us when the cancerous tissues formed, and this could further the understanding of cancer."

Citation: Lynnerup N, Kjeldsen H, Heegaard S, Jacobsen C, Heinemeier J (2008) Radiocarbon Dating of the Human Eye Lens Crystallines Reveal Proteins without Carbon Turnover throughout Life. PLoS One 3(1): e1529. doi:10.1371/journal.pone.0001529 http://www.plosone.org/doi/pone.0001529

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

http://www.sciencedaily.com:80/releases/2008/01/080129201238.htm

Probing The Cosmic Web Of The Universe: New Light On Dark Energy



Snapshot from a computer simulation of the formation of large-scale structures in the Universe, showing a patch of 100 million light-years and the resulting coherent motions of galaxies flowing towards the highest mass concentration in the centre. The snapshot refers to an epoch about 10 billion years back in time. The colour scale represents the mass density, with the highest density regions painted in red and the lowest in black. The tiny yellow lines describe the intensity and direction of the galaxy's velocities. Like compass needles, they map the infall pattern and measure the rate of growth of the central structure. This depends on the subtle balance between dark matter, dark energy and the expansion of the Universe. Astronomers can measure this effect using large survey of galaxies at different epochs in time, as shown by the new research. (Credit: Klaus Dolag and the VVDS team.)

ScienceDaily (Jan. 30, 2008) — Astronomers have used ESO's Very Large Telescope to measure the distribution and motions of thousands of galaxies in the distant Universe. This opens fascinating perspectives to better understand what drives the acceleration of the cosmic expansion and sheds new light on the mysterious dark energy that is thought to permeate the Universe.

"Explaining why the expansion of the Universe is currently accelerating is certainly the most fascinating question in modern cosmology," says Luigi Guzzo, lead author of a paper in this week's issue of Nature, in which the new results are presented. "We have been able to show that large surveys that measure the positions and velocities of distant galaxies provide us with a new powerful way to solve this mystery."

Ten years ago, astronomers made the stunning discovery that the Universe is expanding at a faster pace today than it did in the past.

"This implies that one of two very different possibilities must hold true," explains Enzo Branchini, member of the team. "Either the Universe is filled with a mysterious dark energy which produces a repulsive force that fights the gravitational brake from all the matter present in the Universe, or, our current theory of gravitation is not correct and needs to be modified, for example by adding extra dimensions to space."

Current observations of the expansion rate of the Universe cannot distinguish between these two options, but the international team of 51 scientists from 24 institutions found a way that could help in tackling this problem. The technique is based on a well-known phenomenon, namely the fact that the apparent motion of distant galaxies results from two effects: the global expansion of the Universe that pushes the galaxies away from each other and the gravitational attraction of matter present in the galaxies' neighbourhood that pulls them together, creating the cosmic web of large-scale structures.

"By measuring the apparent velocities of large samples of galaxies over the last thirty years, astronomers have been able to reconstruct a three-dimensional map of the distribution of galaxies over large volumes of the Universe. This map revealed large-scale structures such as clusters of galaxies and filamentary superclusters ", says Olivier Le Fèvre, member of the team. "But the measured velocities also contain information about the local motions of galaxies; these introduce small but significant distortions in the reconstructed maps of the Universe. We have shown that measuring this distortion at different epochs of the Universe's history is a way to test the nature of dark energy."

Guzzo and his collaborators have been able to measure this effect by using the VIMOS spectrograph on Melipal, one of the four 8.2-m telescopes that is part of ESO's VLT. As part of the VIMOS-VLT Deep Survey (VVDS), of which Le Fèvre is the Principal Investigator, spectra of several thousands of galaxies in a 4-square-degree field (or 20 times the size of the full Moon) at epochs corresponding to about half the current age of the Universe (about 7 billion years ago) were obtained and analysed.

"This is the largest field ever covered homogeneously by means of spectroscopy to this depth," says Le Fèvre. "We have now collected more than 13,000 spectra in this field and the total volume sampled by the survey is more than 25 million cubic light-years."

The astronomers compared their result with that of the 2dFGRS survey that probed the local Universe, i.e. measures the distortion at the present time.

Within current uncertainties, the measurement of this effect provides an independent indication of the need for an unknown extra energy ingredient in the 'cosmic soup', supporting the simplest form of dark energy, the so-called cosmological constant, introduced originally by Albert Einstein. The large uncertainties do not yet exclude the other scenarios, though.

"We have also shown that by extending our measurements over volumes about ten times larger than the VVDS, this technique should be able to tell us whether cosmic acceleration originates from a dark energy component of exotic origin or requires a modification of the laws of gravity," said Guzzo.

"VIMOS on the VLT would certainly be a wonderful tool to perform this future survey and help us answer this fundamental question. This strongly encourages our team to proceed with even more ambitious surveys of the distant Universe," says Le Fèvre.

The VLT VIsible Multi-Object Spectrograph (VIMOS) can observe spectra of about 1,000 galaxies in one single exposure. This cosmology science machine is installed at the 8.2-m MELIPAL telescope, the third unit telescope of the Very Large Telescope (VLT) at the ESO Paranal Observatory. (see ESO 02/02)

The team is composed of L. Guzzo, A. Iovino, and O. Cucciati (INAF Osservatorio Astronomico di Brera, Merate, Italy), M. Pierleoni, J. Blaizot, G.De Lucia, and K. Dolag (Max Planck Institut für Astrophysik, Germany), B. Meneux, B. Garilli, D. Bottini, D. Maccagni, M. Scodeggio, P. Franzetti, P. Memeo, and D. Vergani (INAF IASF, Milano, Italy), E. Branchini (Universita Roma III, Italy), O. Le Fèvre, V. LeBrun, L. Tresse, C. Adami, S. Arnouts, A. Mazure, and S. de la Torre (Laboratoire d'Astrophysique de Marseille, OAMP-CNRS - Université de Provence, France), A. Pollo (Laboratoire d'Astrophysique de Marseille, OAMP-CNRS - Université de Provence, France and Andrzej Soltan (Institute for Nuclear Research, Warsaw, Poland), C. Marinoni (Centre de Physique Théorique, CNRS-Université de Provence, Marseille, France), S. Charlot (Institut d'Astrophysique de Paris, CNRS-Université de Paris 6, France), H. J. McCracken (Institut d'Astrophysique de Paris, CNRS-Université de Paris 6, and Laboratoire d'étude du rayonnement et de la matière en astrophysique, CNRS - Observatoire de Paris, France), J. P. Picat, T. Contini, R. Pellò, and E. Perez-Montero (Laboratoire d'Astrophysique de Toulouse et Tarbes, OMP-CNRS-Université de Toulouse 3, France), G. Vettolani and A. Zanichelli (INAF IRA, Bologna, Italy), R. Scaramella (INAF Osservatorio Astronomico di Roma, Italy), S. Bardelli, M. Bolzonella, A. Cappi, P. Ciliegi, F. Lamareille, R. Merighi, G. Zamorani, E. Zucca, and L. Pozzetti (INAF Osservatorio Astronomico di Bologna, Italy), A. Bongiorno and B. Marano (Universitá di Bologna, Italy), L. Moscardini (Universitá di Bologna and INFN Sezione di Bologna, Italy), S. Foucaud (University of Nottingham, UK), I. Gavignaud (Astrophysikalisches Institut Potsdam, Germany), O. Ilbert (University of Hawaii, USA), S. Paltani (Geneva Observatory and Integral Science Data Centre, Versoix, Switzerland), and M. Radovich (INAF Osservatorio Astronomico di Capodimonte, Napoli, Italy). L. Guzzo is also associated with the MPE, MPA and ESO.

Adapted from materials provided by ESO.

http://www.sciencedaily.com:80/releases/2008/01/080130130650.htm

Saving Endangered Sea Turtles

Hatchling in Hand. (Credit: Copyright Frank Paladino)

ScienceDaily (Jan. 30, 2008) — Two leading environmental organizations, Earthwatch Institute and Ocean Conservancy, have partnered on the SEE Turtles project to promote conservation of the world's endangered sea turtle populations. As all seven of the planet's species are under threat, the goal of the project is to demonstrate how public involvement in turtle conservation can have a bigger economic impact on local communities than traditional hunting.

SEE Turtles formally launches at the 28th Annual Sea Turtle Biology and Conservation Symposium, held by the International Sea Turtle Society, in Loreto, Baja California Sur, Mexico, from January 19 to 26. Like the SEE Turtles campaign itself, many of this year's Symposium offerings will demonstrate both the environmental and economic benefits of turtle conservation.

Sea turtles—marine reptiles whose forms and lifecycles have been virtually unchanged for millions of years—are under threat from many angles, including increased human development that destroys coastal nesting habitats, ocean pollution, indiscriminate fishing practices, and hunting. As a result, some turtle populations have seen up to a 90% decline in recent decades. In response, the SEE Turtles project will work to bring together concerned members of the public with local communities as a way to underscore the economic value of conservation. Recent studies by the World Wildlife Fund suggest that turtle-based conservation experiences have the potential to bring in more than three times the income of egg poaching.

Both Earthwatch and Ocean Conservancy have already shown the proof of the concept in popular destinations ranging from Baja to the Northwest coast of Coast Rica and the Caribbean isles of

Trinidad and Tobago. These areas have well-established, ongoing sea-turtle studies in which volunteers can participate and help impact significant victories for the turtles.

Perhaps nowhere has success been more evident than on the Parque Nacional Las Baulas beaches of Costa Rica. When Dr. Frank Paladino of Indiana-Purdue University and Dr. James Spotila of Drexel University first arrived there in 1988 to study the leatherback sea turtles, they had to "rent" a territory from the local egg-poachers. That year, only a single leatherback hatchling made it to the sea. Years later, former poachers have become employed as proud and capable national park guards and guides, and virtually the entire community is invested in its leatherbacks.

"Local attitudes and awareness have improved immensely since we began working in Costa Rica," said Dr. Richard Reina of Monash University, another principal investigator of Costa Rican Sea Turtles. "Our education program in local schools has fostered an understanding of and appreciation for natural resources in the children. Local people now appreciate that long-term survival and sustainability of natural resources including turtles is far more desirable than the short-term exploitation without constraint."

Adapted from materials provided by Earthwatch Institute.

http://www.sciencedaily.com:80/releases/2008/01/080124201314.htm

Deep Brain Stimulation In Hypothalamus Triggers 'Déjà Vu' Memory Recall In Patient

Model of neurons firing in the brain. Researchers may have accidentally hit on a trigger spot for déjà vu in the hypothalamus. (Credit: iStockphoto/Kiyoshi Takahase)

ScienceDaily (Jan. 30, 2008) — Deep brain stimulation (DBS) surgery, which is used to treat Parkinson's disease and other movement disorders, is now being studied for its potential to treat a variety of conditions. A new study found that hypothalamic DBS performed in the treatment of a patient with morbid obesity unexpectedly evoked a sense of déjà vu and detailed personal memories.

Led by Andres Lozano, Professor of Neurosurgery and Canada Research Chair in Neuroscience and his team at the Toronto Western Hospital in Toronto, Ontario, researchers conducted an experimental study to treat a 50-year-old man with a lifelong history of obesity in whom a variety of treatment approaches had failed. While they were identifying potential appetite suppressant sites in the hypothalamus by stimulating electrode contacts that had been implanted there, the patient suddenly experienced a feeling of "déjà vu."

He reported the perception of being in a park with friends from when he was around 20 years old and as the intensity of the stimulation was increased, the details became more vivid. These sensations were reproduced when the stimulation was performed in a double-blinded manner. The contacts that most readily induced the memories were located in the hypothalamus and estimated to be close to the fornix, an arched bundle of fibers that carries signals within the limbic system, which is involved in memory and emotions. Stimulation was shown to drive the activity the temporal lobe and the hippocampus, important components of the brain's memory circuit.

At the first office visit two months after the patient was released from the hospital, the researchers were able to induce and videotape the memory effects seen in the operating room by turning on the electrical stimulation. They also tested the patient's memory during and without stimulation and found that after three weeks of continuous hypothalamic stimulation he showed significant improvements in two learning tests. In addition, the patient was much more likely to remember unrelated paired objects

when stimulation was on than when it was off. They conclude that "just as DBS can influence motor and limbic circuits, it may be possible to apply electrical stimulation to modulate memory function and, in so doing, gain a better understanding of the neural substrates of memory."

DBS of the hypothalamus has also been used to treat cluster headaches and aggressiveness in humans, and stimulating this area influences feeding behavior in animals.

Journal article: "Memory Enhancement Induced by Hypothalamic/Fornix Deep Brain Stimulation," Clement Hamani, Mary Pat McAndrews, Melanie Cohn, Michael Oh, Dominik Zumsteg, Colin M. Shapiro, Richard A. Wennberg, Andres M. Lozano, Annals of Neurology, January 2008.

Adapted from materials provided by Wiley-Blackwell, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com:80/releases/2008/01/080130092102.htm

Culture and the city

Dominic Cavendish

Published 30 January 2008

Introducing a new series investigating the connections between 'culture and urban regeneration' and to pose the question can the arts improve social cohesion?

Call me partisan - as a theatre critic by trade I would, naturally enough, flag up the contribution made to ongoing political debates by some of our best playwrights - but I'd say that Mark Ravenhill is a remarkably reliable locator of the 'zeitgeist'.

He caught the mood of the moment, in the mid-90s, with his anatomy of consumerism's dispossessed youth 'Shopping and Fucking'. He regularly hits the nail on the head in his columns for the Guardian. And, a couple of months before a selection from his epic new cycle of playlets ['Shoot/ Get Treasure /Repeat'] arrives in London, I can't think of a better way of introducing what this occasional column is going to be about - and why it's here - than by giving an outline of the last, and most satirically entertaining, work in the cycle: entitled 'Birth of a Nation'.

Addressing the audience as though it had signed up to some sort of participatory workshop in the wake of the withdrawal of occupying forces, a group of actors issues some friendly, challenging advice: 'You want inward investment? You want tourism? You want civilisation? You want freedom and democracy?… You want all that then let some culture in, sign up for some culture, embrace some culture, let some culture into the ruins of this shattered city.'

This fervent outpouring, stressing the regenerative and redemptive power of 'culture', mocks the naivety (and presumption) of do-gooding artists abroad in a war zone. But it also critiques assumptions far closer to home. For Baghdad - which we are invited to imagine is the site of this fictional colloquy - you could substitute, at certain points in the script, Hull, say, or Sheffield, or Liverpool. Any city in the UK, in fact, that has attempted, or is, attempting, after a period of post-industrial decline, to get back on its feet using enhanced cultural provision as a principal crutch.

Since the New Labour landslide of 1997 - the same year that Frank Gehry's Guggenheim museum opened in Bilbao, transforming that city's reputation - it has become an accepted wisdom that 'culture', specifically 'the arts', can bring about tangible socio-economic benefits. Thanks to participatory events, to public art and to flagship capital projects, places that were once blighted, or on the wane, can, so the belief runs, reverse their fortunes.

Ravenhill is right to pick up on these articles of faith and hold them up to some kind of mockery - but they need proper scrutiny. Is it as preposterous to think that 'culture' can improve social cohesion and restore economic vitality as it is to suppose that culture can, with a wave of a wand, heal the grief and devastation caused by war? It is incontestable when travelling the UK, particularly to cities in the north, that a decade of economic growth, combined with investment and infrastructural improvement, has created a renewed sense of civic pride and confidence - but how important a role has 'culture' played in that change; are the claims made on its behalf overstated?

What I propose to do, over the course of the coming months, is build up a sustained examination of the subject of culture and regeneration - talking to people involved in regeneration schemes across the UK and reporting back about what they've said, and what I've seen. The questions asked will be broadly the same: what is it about 'culture' that's driving urban change? Are there concrete examples of benefits? And if so, are those benefits lasting?

This can only be one person's attempt to cut a swathe through a vast topic and anyone with internet access will know a good deal of related research material is already available. One obvious starting-point is the 2004 report to the Department of Culture Media and Sport, 'The Contribution of Culture to Regeneration in the UK: A Review of Evidence' (Graeme Evans and Phyllida Shaw; www.culture.gov.uk), which I will be referring to in future articles.

On an immediate note, however, the report states: 'We have not undertaken any primary research or site visits' - and there, I hope, in the role of a peripatetic grassroots observer, I can be useful, bringing a touch of first-hand reportage into a topic field that can appear off-puttingly arid in complexion. I hope that Ravenhill's wit will act as a lode-star - steering me away from sentences like ''urban regeneration' has become a regulative policy concept providing a strategic articulation of planned socio-cultural transformation in its largest sense' - which you'll readily find if you starting digging around in published documents.

I'll report back, next time round, from the city that puts the issue of 'culture and urban regeneration' under the spotlight as nowhere else does this year, the EU's reigning Capital of Culture: Liverpool.

Dominic Cavendish is comedy critic and deputy theatre critic of the Daily Telegraph

http://www.newstatesman.com:80/200801300002

Working in a daily dose of the arts

With less money and more focus on testing, schools are looking for creative ways to teach music and art.
By Deanna Martin
Associated Press

January 30, 2008

INDIANAPOLIS -- Sixth-grader Camarry Hall adjusted her sheet music, waited for her teacher to give the go-ahead and then started belting out low notes on a bass clarinet nearly as big as she is.

Camarry is one of about a dozen students in an after-school music program at Indianapolis Public School 70, an arts magnet that has partnered with the city's Butler University to provide more arts instruction to youngsters in one of Indianapolis' poorest districts.

"We have a lot of fun playing notes and different songs," Camarry said before the group broke into small ensembles with Butler students to rehearse for a concert.

Arts have long been a part of education, but advocates say such classes are often first on the chopping block as schools face tight budgets and pressure to perform on academic tests. A Center on Education Policy poll released this year showed that more than 40% of the districts surveyed have cut time in elementary schools for non-tested subjects, including art and music.

Such moves have forced schools in cities such as Indianapolis, Los Angeles and Dallas to find creative ways to squeeze arts into the day -- such as partnering with arts groups, nonprofit organizations and universities to bring more cultural experiences to students.

"I think we're seeing a resurgence of the arts," said Mary Fulton, a policy analyst for the Education Commission of the States. "There's been a push-back by parents and others who want to keep the arts in schools and want their children to have a well-rounded education."

The National Assn. for Music Education says skills learned through the discipline of music transfer well into study skills, cognitive abilities and improved communication that are useful in other subjects. Studies have shown that students in high-quality music programs score higher than students in schools with deficient music programs on standardized tests, regardless of the school's socioeconomic factors.

Yet the No Child Left Behind education reform act, which requires schools to meet annual progress goals or face sanctions that include reorganization, has in many cases shifted the focus from musical scores to test scores.

The Center on Education Policy survey found that U.S. students have been spending more time on math and reading and less on other subjects since 2001. The 2007 report, which examined how No Child Left Behind had affected curriculum and instructional time, showed that 16% of districts surveyed had reduced class time for art and music.

"We've raised the stakes now for schools so high that the decisions are different," said Julie Bell, education program director for the National Conference of State Legislatures. "That ultimate determination of whether your school's going to succeed or not -- that's obviously what's driving the budgets."

Education Secretary Margaret Spellings said schools don't have to choose between reading and math and the arts.

"This notion that these things are mutually exclusive, I completely reject," she said.

Mike Blakeslee, deputy executive director of the National Assn. for Music Education, agrees.

Outside groups and after-school programs can't replace daily efforts by certified teachers, he contends.

"Music is a discipline like any other. It needs ongoing, planned, sequential delivery. If the kids are only getting nominal exposure to music education, that's frankly not enough."

In some districts, the solution is to partner with community groups to provide extra arts opportunities, such as field trips to museums or performances at school assemblies, while hiring more teachers to provide daily instruction.

The Los Angeles Unified School District uses community arts groups to work with teachers on professional development. The district is also working to put at least four arts teachers -- in dance, music, visual arts and theater -- in every elementary school. So far, 340 out of 500 schools have teachers in all of those subjects, said Richard Burrows, director of arts education for the district.

"It's the right thing to do," Burrows said. "When students see the arts as part of their daytime learning, they see it as equally important as math and reading."

The Dallas Independent School District, with help from community partners, is creating arts "hubs" in libraries and other community facilities. The district also plans to hire 140 new music and arts teachers in the next three years, with a goal of exposing elementary school students to 45 minutes of art and music in school each week. It will cost the district about $7 million out of its budget of more than $1 billion.

Advocates say it is money well spent.

"It's a huge need in urban areas," said Craig Welle, executive director of enrichment curriculum and instruction for the district. "It's not just about preparing kids for careers -- it's about preparing them to lead good lives."

These districts stand out as examples because school boards and superintendents carve out time and money for the arts, said John Abodeely, of the nonprofit Americans for the Arts. "Whether arts are provided or not -- or how much -- is a function of the will of the leadership of the school, not a function of money."

Chuck Flowers, who is Camarry's music teacher, agrees.

He said he's taught in more wealthy suburban schools where one of a student's two electives would be used for an additional math or reading class if the child didn't pass statewide tests.

Academics are important at Indianapolis Public School 70, which last year made the progress required by No Child Left Behind. But Flowers also sees a renewed focus on the arts.

"We're given the resources to succeed, and we are," Flowers said. "All schools are concerned about test scores. But our school -- we definitely are very interested in the arts as well."

Blakeslee, of the music educators group, said more schools must take that approach if the arts are to remain viable in schools.

"To some extent as a society, you get what you pay for," he said. "You've got to put some resources behind that."

http://www.latimes.com/entertainment/news/arts/la-et-artschool30jan30,1,4449896.story?track=rss&ctrack=3&cset=true

Six finalists named for first 'Arabic Booker'
State-owned Emirates Foundation is bankrolling Abu Dhabi's latest cultural foray, which seeks to bring a wider readership to Arabic fiction
By Kaelen Wilson-Goldie
Daily Star staff
Wednesday, January 30, 2008

BEIRUT: Six writers from Lebanon, Syria, Jordan and Egypt have been shortlisted for the first annual International Prize for Arabic Fiction, jury chief Samuel Shimon announced Tuesday during a news conference in London at the British Academy of Film and Television Arts.

The jury, whose six members were also revealed for the first time on Tuesday, selected Lebanese novelists Jabbour Douaihy and May Menassa, Syrian novelist Khaled Khalifa, Jordanian novelist Elias Farkouh and Egyptian novelists Mekkaoui Said and Baha Taher from an entry pool of 131 writers from 18 countries. The shortlisted writers win $10,000 each, and are now in the running for the final $50,000 prize, which will be announced during an awards ceremony in Abu Dhabi on March 10.

The International Prize for Arabic Fiction, which is funded by the government-owned but administratively and financially independent Emirates Foundation in the United Arab Emirates (UAE), is also known as the Arabic Booker due to its association with the UK's Booker Prize Foundation.

The 40-year-old Booker Prize is awarded annually to a full-length novel written by a citizen of the British Commonwealth or the Republic of Ireland. It is widely considered the most important - and, worth nearly $100,000 a pop, the most lucrative - literary prize in the English-speaking world. Past winners include Salman Rushdie, Ian McEwan, Arundhati Roy, Ben Okri, V.S. Naipaul, Kingsley Amis, J.M. Coetzee, Michael Ondaatje, Margaret Atwood and Iris Murdoch.

The Arabic Booker is the latest in an onslaught of arts and culture initiatives being launched on what seems like a daily basis in Abu Dhabi. It is also the latest in an onslaught of partnerships between the booming emirate and institutions that already exist elsewhere - such as the Abu Dhabi Guggenheim, the Abu Dhabi Louvre and the art fair Art Paris Abu Dhabi, a trend for which the emirate has been roundly criticized, suggesting a lack of originality and a tendency to buy rather than build prestige.

But Joumana Haddad, the Beirut-based poet and journalist who serves as the prize's administrator, offered a measured interpretation of this phenomenon on Sunday, speaking in her office in the An-Nahar building (she has been the newspaper's cultural editor for three years and on staff for 11).

"On the one hand," Haddad said, "why complain? People are motivated now for certain reasons that we will not discuss - they might be right or they might wrong - to improve the lives of writers. Writers in this part of the world cannot live from their books. Very few can live from the rights to their books. They all have to have other jobs and they can't concentrate exclusively on their writing. So why complain?

"On the other hand, we must complain," she added, to insure that such literary prizes are non-biased and based on merit.

"I really hope the Arabic Booker will make a difference," Haddad said. "I would like for it to be a more honest example of a literary prize, based on non-biased choices. I would like for it to be part of the promotion of Arabic contemporary literature abroad. So few writers have the chance to make it beyond the borders of their own countries," she said, to say nothing of making an impact across or even beyond the Arab world. "And I would like for it to give [the books] a chance for translation.

"Most of [the Arabic fiction that] is being translated now is only deepening the cliches," she explained, "and concretizing the exoticism of the Arab world instead of showing it as it is. You know what I mean, the 'Not Without My Daughter' style. I think Arabic contemporary literature should be able to survive in the world without these stereotypes."

The draw of the International Prize for Arabic Fiction, and the benefit it earns from its association with the Book Prize Foundation, is the likelihood that the winning titles will be translated into English and other European languages.

According to promotional material about the prize released late last week, a number of American and European publishing houses have already expressed interest in buying the foreign-language rights to the winning works.

The Arabic Booker is open to full-length novels originally written in Arabic and published within the previous year (it was two years for the inaugural prize). Submissions can only be made by publishers, who are limited to three entries a year (though publishers can recommend an additional three titles, just in case the entry pool is lackluster). Only one novel per writer can be fielded for consideration, and the writer must be living at the time of the award.

The prize is overseen by a 12-member board of trustees, including Margaret Obank (co-founder and editor of the literary journal Banipal), the Beirut-based publisher Riad al-Rayyes, Omar Saif Ghobash (one of the three partners behind Dubai's top-notch contemporary art gallery the Third Line, and the funder responsible for the Saif Ghobash Banipal Prize for Literary Translation), Farouk Mardam-Bey of the Institut du Monde Arabe in Paris and Jonathan Taylor, CEO of the Booker Prize Foundation, among others.

The board of trustees is responsible for recruiting the judges, who this year include Moroccan critics Mohammed Bennis and Mohammed Berrada, Palestinian writer and critic Feissal Darraj, Syrian journalist Ghalia Kabbani, British writer and translator Paul Starkey and jury chief Samuel Shimon, an Iraqi-born, London-based poet and novelist of Assyrian descent (who co-founded Banipal with his partner Obank 10 years ago).

There is one statistic about this year's submissions that is troubling but not especially surprising: 78 percent were novels by men and only 22 percent were novels by women, which is reflected in a shortlist boasting only one female writer.

May Menassa is in the running for her book "Walking in the Dust," which is published by Riad al-Rayyes. The sister of poet Venus Khoury-Ghata, Menassa is an art critic for An-Nahar and an established cultural figure in Beirut.

Though the prize is committed to discovering "new" writers and marginalized voices, the jury hasn't quite translated new as young. Most of the short-listed authors were born in the 1930s and 1940s. But at least one of the selections is daring. Khaled Khalifa's "In Praise of Hate," published by Amisa, is set in Syria in 1982 amid the army's brutal and comprehensive shelling of Hama, where members of the Muslim Brotherhood and other opposition groups were agitating against Hafez Assad's rule. The novel is banned in Syria.

Rounding out the shortlist, Jabbour Douaihy is nominated for "June Rain," published by Dar an-Nahar; Elias Farkouh for "The Land of Purgatory," published by Al-Mouassassa; Mekkaoui Said for "Swan Song," published by Al-Dar; and Baha Taher for "Sunset Oasis," published by Al-Shorooq.

For more information on the International Prize for Arabic Fiction, please check out

www.arabicfiction.org

http://www.dailystar.com.lb/article.asp?edition_id=10&categ_id=4&article_id=88500#

A Difficult Youth Is A Good Thing For A Fish

Bluehead Wrasse. (Credit: Kenneth Clifton)

ScienceDaily (Feb. 1, 2008) — A tough early life turns out to be a good thing for a fish, according to scientists at the University of California, Santa Barbara.

They discovered that fish larvae that survive a long, rough, offshore journey eventually arrive at a near shore reef in good condition, and that they thrive afterwards.

In contrast, locally produced young have a relatively easy life and they arrive on the reef (near the area where they were spawned) in a variety of conditions — from poor to good. Only the young that are in good condition survive after a month on the reef.

"This research delves into one of the major questions of how populations are connected through dispersal," said Scott Hamilton, a postdoctoral fellow in the Department of Ecology, Evolution, and Marine Biology (EEMB) at UC Santa Barbara. "We want to know where the young of many marine organisms are coming from and going to, and what factors determine whether they survive."

Hamilton is the first author of the report on the team's findings, published recently in the on-line version of the Proceedings of the National Academies of Science (PNAS). The results point to significant policy implications for the planning of marine protected areas, a topic of worldwide concern.

"It turns out that not all settlers arrive equally prepared for the rigors of the reef, and the probability that a new recruit will grow up to reproduce successfully may depend on where it came from," said Robert Warner, a professor of ecology, evolution, and marine biology.

The scientists used a powerful tool to detect this information: chemical analysis of the ear bone of the fish. The ear bones, also called otoliths, are hard calcium carbonate structures located behind the eyes and below the brain of the fish. The otoliths grow a ring every day from birth, and these rings, like tree

rings, hold vast amounts of information about the life of the fish. For example, the spacing of the rings indicates how quickly the fish grew at different periods in its life.

The otolith serves as an internal tag, or tracking device, that reveals the history and location of the fish during its travels. The chemical composition of the ring indicates the type of water in which the fish is located on any particular day.

A fish that is traveling near a populated shoreline collects a higher amount of trace metals, such as lead, in the rings of its otolith. The scientists explain that water near urban areas has higher concentrations of lead due to the run-off from human activities.

Each ocean area has a particular chemical "signature" or "fingerprint" that is incorporated into the ring of the otolith as the fish pass through. Thus scientists are able to map the history of the travels of the fish by chemical analysis of the otolith.

The results surprised the scientists. "This information went against our expectation," said Hamilton. "We expected near shore fish to get back and do well, particularly because they are in nutrient-rich waters, which is a good place to be."

As natural resource managers plan for marine protected areas and marine reserves, they need to know the source of the fish living there.

"We have been measuring ‘connectivity' — the proportional contribution of different sources to the population in any particular place — by the numbers arriving," said Warner. Survival may depend on where the fish originated, he explained.

It is generally agreed that a good knowledge of connectivity between marine populations is critical to spatial management of marine resources, including marine reserves.

The authors point out that connectivity measured by the numbers may be very different from "realized connectivity," which is determined in part by differing survival rates of the young recruits.

The fish that the scientists analyzed in this study is the bluehead Wrasse, a fish that is common in the Caribbean Sea. Warner has studied the bluehead Wrasse since the late 1970s.

A third author of the PNAS paper is James Regetz, a programmer and analyst with the National Center for Ecological Analysis and Synthesis (NCEAS) at UCSB.

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

http://www.sciencedaily.com:80/releases/2008/01/080129125507.htm

Cosmetics or Lotions May Cause Fatal Infections In Critically Ill Patients

ScienceDaily (Feb. 1, 2008) — Healthy consumers can handle the low levels of bacteria occasionally found in cosmetics. But for severely ill patients these bacteria may trigger life-threatening infections, as patients in the intensive care unit at one Barcelona hospital discovered after using contaminated body moisturiser. An outbreak caused by Burkholderia cepacia bacteria followed.

Five patients suffered from infection including bacteremia, lower respiratory tract infection and urinary tract infection associated with the bacterial outbreak in August 2006. Skin care products sold in the European Union are not required to be sterile, but there are limits to the amount and type of bacteria that are permitted.

The Hospital Universitari del Mar, Universitat Autònoma de Barcelona's routine infection control surveillance pinpointed the unwelcome bacteria in five patients' biological samples. Researchers tested a number of environmental samples, and discovered that moisturizing body milk used in the patients' care was a B. cepacia reservoir. Pulsed-field gel electrophoresis experiments confirmed that all of the strains of B. cepacia bacteria found in patient and environmental samples were from the same bacterial clone. Tests on sealed containers of the moisturizer confirmed that the bacteria had not invaded the product after it had been opened, but that it was contaminated during manufacturing, transportation or storage.

"This outbreak of nosocomial infection caused by B. cepacia in five severely ill patients supports a strong recommendation against the use cosmetic products for which there is no guarantee of sterilization during the manufacturing process," says study author Francisco Álvarez-Lerma.

B. cepacia is a group or "complex" of bacteria that can be found in soil and water. They have a high resistance to numerous antimicrobials and antiseptics and are characterised by the capacity to survive in a large variety of hospital microenvironments These bugs pose little medical risk to healthy people. However, those with weakened immune systems or chronic lung diseases, particularly cystic fibrosis, may be more susceptible to B. cepacia infection. B cepacia is a known cause of hospital infections.

Moisturizing body milk as a reservoir of Burkholderia cepacia: outbreak of nosocomial infection in a multidisciplinary intensive care unit. Francisco Alvarez-Lerma, Elena Marull, Roser Terradas, Concepcion Segura, Irene Planells, Pere Coll, Hernando Knobel and Antonia Vazquez. Critical Care (in press) http://ccforum.com/content/12/1/R10

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

http://www.sciencedaily.com:80/releases/2008/01/080131082247.htm

River Blindness Parasite Shows Signs Of Resistance To Only Effective Drug

As an adult, this Simulium sp. larva, or black fly, is a vector of the disease, onchocerciasis, or river blindness. (Credit: CDC)

ScienceDaily (Feb. 1, 2008) — Onchocerciasis is an infection caused by Onchocerca volvulus, a parasite nematode worm transmitted to humans by a species of black fly of the Simulium genus whose larvae develop in fast-flowing rivers. Infected subjects suffer not only from severe skin lesions but also eye damage that can lead to irreversible loss of sight, hence the name 'river blindness'. A huge majorityy -- 99% -- -of the 37 million people infected by the parasite live in SubSaharan Africa. Ivermectin, a medicine capable of killing the parasite embryos (the microfilariae) circulating in the organism of patients and temporarily interrupting the nematode's reproduction, is the only treatment used for onchocerciasis control.

Since 1995, the African Programme for Onchocerciasis Control (APOC) has been covering 19 of the continent's 28 countries hit by the disease. Access to this treatment is possible for 70 million people and has significantly diminished the onchocerciasis-induced morbidity. However, the doubling of cases of infection in certain communities of Ghana between 2000 and 2005, in spite of annual treatments, created fear of the emergence of ivermectin-resistant strains. Such apprehension appears particularly justified in that a high degree of therapeutic cover is achieved during mass distribution campaigns and hence only a tiny part of the parasite population targeted remains unexposed to drug treatment pressure.

Since 1994, a team of IRD researchers, working jointly with Cameroon researchers and others from McGill University of Montreal, has been monitoring a cohort of Cameroon patients benefiting from repeated treatments with ivermectin. Regular parasite sampling from these subjects was performed over a 13-year period in order to determine the changes in the genetic structure of Onchocerca volvulus populations. Each occasion involved measurement of the genotype frequency of heterozygotes and homozygotes for the gene coding ²-tubulin, a protein involved in the organization of the parasite's cells.

The team focused on this particular gene because it acts as a marker of resistance to ivermectin in other nematode species parasitic on cattle. As a control, they monitored the changes in genotype frequency of two other genes, known for their high evolutionary stability over time. The proportion of homozygotes and heterozygotes for these two genes remained stable throughout the investigation, but the situation was completely different for the ²-tubulin gene. Between 1994 and 1998, the percentage of parasites showing a genotype homozygous for this gene fell from 79 to 31% in subjects receiving quarterly treatment with ivermectin.

At the same time, the proportion of heterozygous genotypes changed in the opposite sense, rising from 21 to 69%. These results could be the sign of adaptation of nematode worm populations to repeated treatments using this drug. The research team inferred that the parasites showing a genotype homozygous for ²-tubulin are more susceptible to it. As courses of treatment progressed, they would therefore gradually disappear, to the benefit of the more resistant heterozygous strains. Ivermectin's effect on microfilariae, other than its direct one, is to prevent them from leaving the uterus of adult worms, for several months after treatment: this is its embryostatic effect.

Post-treatment, there were more microfilariae in the uterus of homozygous female parasites than in those of heterozygous females. This could mean that, in the latter, the microfilariae succeed in leaving the uterus, as they usually do in the absence of treatment, and therefore that the embryostatic effect of ivermectin would be diminished. Contrary to the effect anticipated, the repeated exposure to treatments could in this way select those worms more able to keep up the production of new generations. Nevertheless, the drug's direct action on the microfilariae appeared not to change, and hence, for the moment, there is no reason to call into question the current control strategy against the disease based on annual treatments with ivermectin.

Affirmation of the results requires further investigations1, starting from new cohorts subjects infected by Onchocerca volvulus who have not yet been treated with ivermectin. This type of approach should bring more information on the risks of the parasite's resistance to this drug. If such risks were confirmed, then the whole onchocerciasis control strategy would probably have to be revised. Nevertheless, for many years to come, ivermectin could well remain the sole drug applicable for mass treatment in measures to control river blindness.

A study coordinated by the IRD and financed by the French Agence nationale de la recherche (ANR), aiming to find more extensive information on possible resistance of the onchocerciasis parasite to ivermectin, is currently being conducted in Cameroon jointly with a team from INRA, research scientists from the universities of Yaoundé I and Buea (Cameroon), the Cameroon Ministry of Public Health, McGill University of Montreal (Canada) and Imperial College London (United Kingdom).

Adapted from materials provided by Institut de Recherche Pour le Développement.

http://www.sciencedaily.com:80/releases/2008/01/080131121753.htm

New Program Will Improve Pollution Monitoring From Many Sources

ScienceDaily (Feb. 1, 2008) — A new research program called CENSAM will develop pervasive environmental sensor networks to collect data on parameters such as air and water quality from many sources, and use this data to provide accurate, real-time monitoring, modeling and control of the environment.

One of the first goals of the research group is to provide proof of the feasibility of the concept in a carefully managed urban area like Singapore. The greater hope is that these concepts might one day be widely applied on different scales to provide up-to-the-minute data about the environment in areas as small as a building or as large as the Earth's biosphere.

Professor Andrew Whittle of MIT's Department of Civil and Environmental Engineering is head of the CENSAM research group. Whittle and an initial group of about 15 MIT faculty members from civil and environmental engineering, mechanical engineering, architecture and earth, atmospheric and planetary sciences will work with researchers from the National University of Singapore, the Nanyang Technological Institute, the Singaporean Public Utilities Board, and other governmental agencies and companies. CENSAM, the Center for Environmental Sensing and Modeling, is a research component of the Singapore-MIT Alliance for Research and Technology Centre (or SMART Centre), a joint project of MIT and the National Research Foundation of Singapore.

"Our grand challenge is to build up expertise in the general areas of environmental sensing and modeling. Our longer term goal is to develop a model representation of the built and natural environment that will seamlessly transition from the micro-scale of a building to the macro-scale, say of the South China Sea East Asia region," said Whittle, whose own expertise is in the underground construction of urban environments. He has already developed prototype sensor network technology to monitor underground water distribution and sewer pipes in Boston.

CENSAM research will fall into five broad areas: the built and natural environment; urban hydrology and water supply; coastal environment; marine environment; and development of ways to monitor and model Singapore's urban environment.

The initial set of research projects are:

Built & Natural Environment

- Urban Airshed Modeling
- Interactions between the Built and Natural Environment

Urban Hydrology & Water Supply

- Chemical Sensors for AUVs
- Distributed Hydrologic Modeling and Data Assimilation
- Continuous Monitoring of Water Distribution Systems
- Cyberinfrastructure for CENSAM to Encourage Data Fusion
- Systems for Measuring Subsurface Chemical Fluxes

Coastal Environment

- Algorithms for Adaptive Sampling in Coastal Zone Environment
- Algorithms for Creation of Solid Models from AUV Sensing Systems
- Experimental and Theoretical Modeling of Sediment Clouds
- Coastal Environment and Sediment Transport

Marine Environment

- Feature Based Navigation for AUVs in Very Shallow Water
- MEMS Pressure Arrays for Near-Field Flow Patterns
- Guided Wave Optics for Flow-Sensing MEMS Arrays
- Free-Space Optics for AUV Navigation and Map Generation
- Algorithms for Adaptive Sampling in Coastal Zone Environment
- Algorithms for Creation of Solid Models from AUV Sensing Systems

Integrated Modeling of Singapore's Environment (iMOSE) Regional Atmospheric Modeling

- Island-Scale Boundary Layer Modeling
- Ocean Modeling and Data Assimilation
- Ocean-Atmospheric Modeling and Climate Scenarios
- Basin Hydrologic Modeling and Transport
- Environmental Impacts of Large Scale Biofuel Development in SE Asia

Adapted from materials provided by Massachusetts Institute of Technology, Department of Civil and Environmental Engineering.

http://www.sciencedaily.com:80/releases/2008/01/080131123001.htm

Huge Drop In Preterm Birth-risk Among Women Taking Folic Acid One Year Before Conception

Healthy newborn baby with new mother. New research suggests that women who take folic acid supplements for at least one year before they become pregnant can cut their risk of having a premature baby by half. (Credit: iStockphoto/Martin Llad)

ScienceDaily (Feb. 1, 2008) — New research suggests that women who take folic acid supplements for at least one year before they become pregnant can cut their risk of having a premature baby by half.

Researchers at the 28th Annual Society for Maternal-Fetal Medicine (SMFM) meeting--The Pregnancy Meeting™-- unveiled a study linking pre-conceptional folate supplementation of at least one year to reduced early premature delivery rates of 50 to 70 percent, regardless of age, race or other factors. Of particular note is the drop in very early premature births, those babies who are at the greatest risk of complications such as cerebral palsy, mental retardation, chronic lung disease, and blindness.

The study is an observational analysis based on the self-reporting of folate supplementation by 38,033 participants in an earlier trial sponsored by the National Institutes of Health (NIH.) The current study only examined singleton pregnancies and excluded pregnancies in which there were medical or obstetrical complications such as preeclampsia, chronic hypertension, and congenital or chromosomal abnormalities.

"Thanks to the depth and breadth of the NIH study, which included an early pregnancy ultrasound of each participant, we had highly accurate evidence of the gestational ages of the preterm deliveries," said Radek Bukowski, M.D., Ph.D., assistant professor, Obstetrics and Gynecology, at the University of Texas Medical Branch at Galveston, the lead study author and SMFM member. "This evidence enabled us to determine that folate supplementation for at least one year is linked to a 70 percent decrease in very early preterm deliveries (20 to 28 weeks in gestational age) and up to a 50 percent reduction in early preterm deliveries of 28 to 32 weeks."

"We already knew that folic acid supplementation beginning before pregnancy and continuing into the first trimester helps prevent serious birth defects of the brain and spinal cord, such as spina bifida," said Alan R. Fleischman, M.D., senior vice president and medical director of the March of Dimes. "Now Dr. Bukowski's research makes us optimistic that taking folic acid for at least one year before

pregnancy also may greatly reduce the risk of premature birth. These findings add even greater weight to March of Dimes support for the U.S. Public Health Service's long-standing recommendation that every woman of childbearing age consume 400 micrograms of folic acid daily. We hope this new research also will spur more health care professionals to urge their female patients to make folic acid part of their daily routine as a simple step toward having a healthy baby in the future."

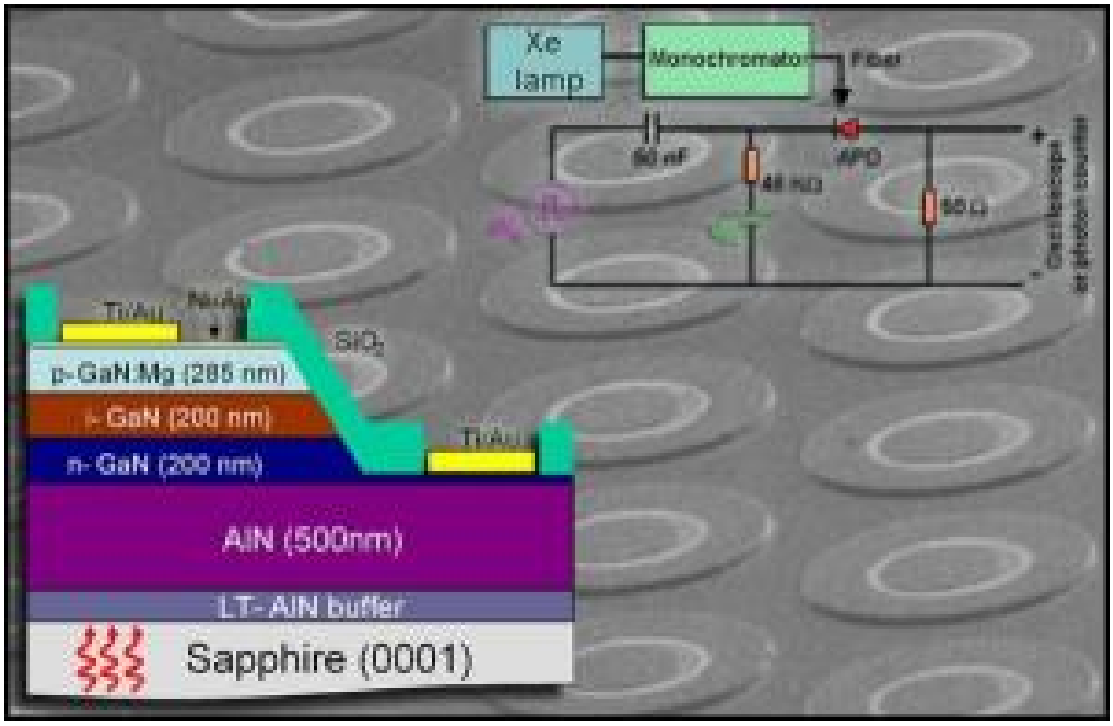
"In addition to its benefits in preventing pregnancy complications, previous studies have suggested that folic acid may also have beneficial effects in preventing stroke and cardiovascular disease in adults," said Katharine Wenstrom, M.D., president of the SMFM, "That's why everyone--men and women--should get into the habit of taking it."

The new abstract, Preconceptional Folate Prevents Preterm Delivery, represents the first and largest U.S. study to look at the effects of pre-conceptional folate supplementation on early preterm delivery.

Adapted from materials provided by March of Dimes Foundation, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com:80/releases/2008/01/080131111822.htm

Tiny Avalanche Photodiode Detects Single UV Photons



Lower left, schematic diagram of a back illuminated single photon detector; Upper right, biasing circuit used to drive the single photon detector; Background, scanning electron micrograph of a processed array of single photon detectors. (Credit: Image courtesy of Northwestern University) ScienceDaily (Feb. 1, 2008) — In a significant breakthrough, researchers at Northwestern University's Center for Quantum Devices (CQD) have demonstrated visible-blind avalanche photodiodes (APDs) capable of detecting single photons in the ultraviolet region (360-200 nm).

Previously, photomultiplier tubes (PMTs) were the only available technology in the short wavelength UV portion of the spectrum capable of single photon detection sensitivity. However, these fragile vacuum tube devices are expensive and bulky, hindering true systems miniaturization.

The Northwestern team, led by Manijeh Razeghi, Walter P. Murphy Professor of Electrical Engineering and Computer Science at Northwestern's McCormick School of Engineering, became the world's first to demonstrate back-illuminated single photon detection from a III-nitride photodetector. These back-illuminated devices, based on GaN compound semiconductors, benefit from the larger ionization coefficient for holes in this material. The back-illumination geometry will facilitate future integration of these devices with read-out circuitry to realize unique single-photon UV cameras. Towards that end, the team has already demonstrated excellent uniformity of the breakdown characteristics and gain across the wafer.

The devices are coupled with a quenching circuit and operated under large reverse bias, an arrangement termed in Geiger mode operation. The sensor system presents an effective photocurrent gain greater than 107, single photon detection efficiencies of 23 percent, dark count rates of less than 1 kHz, and no response to visible radiation.

Once optimized, discrete detectors could be combined with the ultraviolet LEDs already pioneered by the Center for Quantum Devices to create an inexpensive detection system capable of identifying the unique spectral fingerprints of a biological agent attack. They can also be paired with UV LEDs to create a new form of non-line of sight UV-communication, secure from remote eavesdropping.

These exciting new results were recently presented at the Defense Advanced Research Projects Agency (DARPA) during the Single Photon Detection Workshop hosted by Dr. Matthew Goodman, and held in Arlington, VA on Nov. 27, 2007 and at the SPIE Photonics West Conference held in San Jose, CA on Jan. 19-24, 2008. This work was also published in the July 23, 2007 issue of the journal Applied Physics Letters.

Adapted from materials provided by Northwestern University.

http://www.sciencedaily.com:80/releases/2008/01/080128113107.htm

Increased Hurricane Activity Linked To Sea Surface Warming

Composite satellite image of intense hurricanes Dennis, Emily, Katrina, Rita and Wilma in 2005. The storms all made landfall around the Gulf of Mexico causing nearly $180 billion in damage. (Credit: Image courtesy of Univ. of Wisconsin-CIMSS and UCL.)

ScienceDaily (Jan. 31, 2008) — The link between changes in the temperature of the sea's surface and increases in North Atlantic hurricane activity has been quantified for the first time. The research - carried out by scientists at UCL (University College London) and due to be published in Nature on January 31 - shows that a 0.5°C increase in sea surface temperature can be associated with an approximately 40 per cent increase in hurricane activity.

The study, conducted by Professor Mark Saunders and Dr Adam Lea of the Benfield UCL Hazard Research Centre and the UCL Tropical Storm Risk forecasting venture, finds that local sea surface warming was responsible for about 40 per cent of the increase in Atlantic hurricane activity (relative to the 1950-2000 average) between 1996 and 2005.

The study also finds that the current sensitivity of tropical Atlantic hurricane activity to sea surface warming is large, with a 0.5°C increase in sea surface temperature being associated with a ~40 per cent increase in hurricane activity and frequency.

The research focuses on storms that form in the tropical North Atlantic, Caribbean Sea and Gulf of Mexico -- a region which produced nearly 90 per cent of the hurricanes that reached the United States between 1950 and 2005. To quantify the role of sea warming it was necessary to first understand the separate contributions of atmospheric circulation and sea surface temperature to the increase in hurricane frequency and activity.

Professor Saunders, the lead author of the study, explained how this was done. "We created a statistical model based on two environmental variables -- local sea surface temperature and an atmospheric wind field - which replicated 75-80 per cent of the variance in tropical Atlantic hurricane activity and frequency between 1965 and 2005. By removing the influence of winds from the model we were able to assess the contribution of sea surface temperature and found that it has a large effect. "

"Our analysis does not identify whether greenhouse gas-induced warming contributed to the increase in water temperature and thus to the increase in hurricane activity. However, it is important that climate models are able to reproduce the observed relationship between hurricane activity and sea surface temperature so that we can have confidence in their reliability to project how hurricane activity will respond to future climate change."

Journal reference: Large contribution of sea surface warming to recent increase in Atlantic hurricane activity, by Prof Mark A. Saunders and Dr Adam S. Lea, appears in the 31 January issue of the journal Nature.

This work is supported by the TSR (Tropical Storm Risk) venture sponsored by Benfield (an independent reinsurance intermediary), Royal & Sun Alliance (an insurance group), and Crawford & Company (a claims management solutions company).

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

http://www.sciencedaily.com:80/releases/2008/01/080130130647.htm

Micro Chip Processor Design Gets Mathematical Sweetener

ScienceDaily (Jan. 31, 2008) — A breakthrough microchip specification language will allow ambiguous English to be replaced by a mathematically precise description of processor functions and design. Better yet, it applies to every stage of microprocessor design. The upshot could be millions of euros saved by microchip producers.

Microchip design is a tricky business. First, there is a question of functionality. Engineers describe, in minute detail, what a particular microchip must do, in plain English. It is an essential task detailing the chip specifications for each stage of the microchip creation process: design, fabrication and verification.

Unfortunately, English is not a mathematically precise language. So, problems of interpretation are rife. Worse, at each development stage engineers are obliged to render the English specification or 'spec' list into a mathematically precise function set.

But worst of all, each stage uses different languages, and those languages vary between microchip companies. It is hugely inefficient and prone to error.

That is all set to change. "Before property specification language (PSL), there was no industry standard for describing microchip properties," says Cindy Eisner, coordinator of PROSYD and Senior Architect for Verification Technologies at the IBM Haifa Research Laboratory. "Now the IEEE has adopted PSL as a standard specification language. So, we now have an industry standard for microprocessor design."

PROSYD's mission was, first, to create tools to deploy PSL for chip design, fabrication and verification. The project then used these tools to demonstrate PSL's benefits. Finally, it sought to foster a revolution in chip design by promoting PSL as a new industry standard.

Mission accomplished, with aplomb. The EU project sought to reduce design errors by 50% but also increase design efficiency. At the end of the two-year €7 million project, PROSYD demonstrated a staggering reduction in design errors of up to 100%, at the same time increasing design efficiency by 16 to 22%.

After designers become more familiar with the new toolset and language, an even more impressive gain in efficiency can be expected, suggests Eisner.

It seems obvious now. If one stage of microchip development needs a precise description language, then should we not describe every stage the same way?

Or perhaps not so obvious…

Not quite. PSL grew out of IBM's verification language SUGAR created in 1994 to standardise just the verification stage. Before SUGAR, there was no standard way to verify a chip. Developers made up their own languages and passed them down, like grandma's prized soup recipes.

But once SUGAR arrived, microprocessor design hit upon a Eureka moment: why not describe every stage of chip creation the same way! Then the IEEE, the professional association for electronic engineers, took up the task and PSL/SUGAR became the standard.

PROSYD's key contribution is the large suite of tools that link PSL across the microchip production process. There are over 16 tools in the set, which make PSL easy to deploy.

This is not the only achievement by PROSYD, though. The project's case studies offer firm proof of the benefits of PSL and the PROSYD tools.

The project also led to unexpected benefits. PROSYD developed a very cool tool that will take a list of desired properties and actually design a microprocessor sub-circuit with those functions – something like machines creating themselves.

"It's a very early version of the tool," remarks Eisner, "you couldn't use it to design a whole chip, but it could be useful to design a simple sub-circuit. It would be very useful for circuits that are fairly simple, but time-consuming to do."

PROSYD's long-term goal, not envisioned for the lifetime of the original project, was nothing less than a revolution in the microchip industry. That seems to be happening already. Actors outside the project are taking PROSYD and running with it, setting up conferences and producing materials to disseminate PSL and PROSYD tools. So now, finally, microchip design gets a unified, mathematically precise description language.

Adapted from materials provided by ICT Results.

http://www.sciencedaily.com:80/releases/2008/01/080130195211.htm

Wired For Sound: Implant Sends Signals Direct To Brain

ScienceDaily (Jan. 31, 2008) — A delicate surgery that involves placement of tiny electrodes onto the brainstem is helping some people avoid total hearing loss.

The electrodes, connected to a device known as an auditory brain implant, are being placed in patients who require surgery to remove noncancerous tumors associated with a disorder called neurofibromastosis type II. The tumors are often entwined around the nerves that facilitate hearing. Over time the tumors – or the surgical intervention to remove them, can result in fractional or total hearing loss.

Only about 500 people have received the implants around the world, but the benefit is substantial, according to Dr. Bradley Welling, chair of otolaryngology at Ohio State University Medical Center and one of the handful of surgeons in the United States trained to implant the devices.

"The primary advantage of the auditory brain implant is that it helps patients lip read and receive environmental sounds, whether it is traffic, warning signals or other alerts," said Welling. "It also helps them to modulate their speaking and improve their own voice since it's very difficult to modulate speech when you are without hearing."

The implants bypass the damaged nerves and form a direct pathway to the brainstem. The electrodes are positioned against the brainstem and receive signals from a pager-sized processor carried on the belt. A tiny microphone on the ear sends the sounds to the processor, which converts them to frequencies that are picked up by the brainstem.

Sounds from the implant may not replicate exactly the actual sounds and voices the patient was once accustomed to hearing, but they're close enough, says Phyllis Lee, who lost her hearing in 1986 due to neurofibromastosis.

"It has helped me step back into life," says Lee, who had the device implanted last year. "I can hear my cat and many things that others take for granted, like running water. It's funny, just the little things you get so excited over, these little sounds," she added.

Because the tumors often envelope the auditory nerves or push against other vital nerves around the face, surgeons require a microscope to make the tedious manipulations necessary to remove the tumors and implant the device.

Many people are seeking the implants after years of not being able to hear. For others, like Lee, the auditory brain implants are positioned at the same time the tumors are removed.

Adapted from materials provided by Ohio State University Medical Center.

http://www.sciencedaily.com/releases/2008/01/080130175721.htm

Computer Scientist Makes Splash With Academy Award For Fluid Simulation

A computer-generated scene shows off the fluid simulation technology developed by computer science Associate Professor Ron Fedkiw, former students, and collaborators at Industrial Light and Magic. (Credit: Frank Losasso, Jerry Talton, Nipun Kwatra, Ron Fedkiw / courtesy of Stanford University)

ScienceDaily (Jan. 31, 2008) — The rushing floodwaters in Evan Almighty, the heaving seas of the latter two Pirates of the Caribbean movies and the dragon's flaming breath in Harry Potter and the Goblet of Fire all featured computer-generated fluids in spectacular action. The science behind those splashy thrills will be recognized Feb. 9 with an Academy Award for Ron Fedkiw, associate professor of computer science at Stanford, and two collaborators at the special effects firm Industrial Light and Magic (ILM).

"The primary work started a few years ago when we developed a system designed for the female liquid terminator in Terminator 3," Fedkiw said. "Almost immediately after that it was used in the first Pirates of the Caribbean movie to simulate the wine that the pirate skeleton was drinking out of the bottle in the moonlight. Things like the sinking ship in Poseidon and the large water whirlpool in Pirates of the Caribbean 3 are good examples of the system in action."

The system, co-developed with ILM scientists Nick Rasmussen and Frank Losasso Petterson (a former doctoral student of Fedkiw's), uses a method of simulating low-viscosity fluids such as water and fire, as in the explosions in Star Wars: Revenge of the Sith.

Contributing to a Star Wars movie was a particular honor for Fedkiw.

"George Lucas made Star Wars and, well, that changed the world for a lot of us," he said. "It's amazing what a movie can do to a civilization. I can only be grateful that he made three more of them and that I started working with ILM just in time to get a screen credit on the last one."

Lifelike liquids

Computer graphics experts typically have used particles and complex blobs to represent water, but these can give rise to unrealistically lumpy or grainy surfaces. Alternatively, they have used a technique called "the level set method" that gives a smooth surface representation, but some water is

"under-resolved" and simply disappears when it breaks down into small volumes, as in a crashing wave.

The key innovation behind Fedkiw and former doctoral student Douglas Enright's novel "particle level set method" was to mix the use of particles and level sets so that studios could maintain smooth surfaces wherever possible and still keep all the fluid via the particle representation.

"As an added bonus, the method automatically generates spray particles and bubbles in under-resolved regions where the level set [method] loses mass and volume," Fedkiw said.

Fedkiw gives a lot of the credit to his colleagues for the system used to make the movies: "Nick made the system and Frank made it rock."

The effect's power is clearly evident in a movie on Fedkiw's website. There, gigantic waves crash against a lighthouse and produce huge sprays. In addition to incorporating the particle level set method, the rendering also uses an additional method to simulate how the spray interacts with itself and the surrounding water.

Such integrations are indicative of a future direction of Fedkiw's computer graphics research.

"This year we built a system that allows two-way coupling between rigid and deformable bodies, so we can fully physically simulate bones moving around under flesh—interacting with the environment," he said. "Another main result is a two-way, solid-fluid coupling method that can be used with it, so the environment can be water; that is, we're going to be simulating people swimming."

Of course the more immediate future calls for a trip to the Beverly Wilshire Hotel in Beverly Hills for the Scientific and Technical Academy Awards presentation Feb. 9. Fedkiw says he'll probably go to pick up his plaque.

"After wearing sandals for the last two years—even in the Lake Tahoe snow— it's going to be tough to go black tie," he said.

Adapted from materials provided by Stanford University.

http://www.sciencedaily.com:80/releases/2008/01/080126100827.htm

El Nino At Play As Source Of More Intense Regional US Wintertime Storms

Remnants of a winter storm, characteristic of those sourced from an El Niño weather anomaly, can be seen pushing eastward over the Atlantic Ocean due east of North Carolina in this true-color image captured on Jan. 4, 2002, by the SeaWiFS satellite. (Credit: NASA/Goddard Space Flight Center; ORBIMAGE)

ScienceDaily (Jan. 31, 2008) — The next time you have to raise your umbrella against torrents of cold winter rain, you may have a remote weather phenomenon to thank that many may know by name as El Nino, but may not well understand.

Researchers now believe that some of the most intense winter storm activity over parts of the United States may be set in motion from changes in the surface waters of far-flung parts of the Pacific Ocean. Siegfried Schubert of NASA's Goddard Space Flight Center in Greenbelt, Md., and his colleagues studied the impact that El Niño-Southern Oscillation (ENSO) events have on the most intense U.S. winter storms.

An ENSO episode typically consists of an El Niño phase followed by a La Niña phase. During the El Niño phase, eastern Pacific temperatures near the equator are warmer than normal, while during the La Niña phase the same waters are colder than normal. These fluctuations in Pacific Ocean temperatures are accompanied with fluctuations in air pressure known as the Southern Oscillation.

ENSO is a coupled ocean-atmosphere effect that has a sweeping influence on weather around the world. Scientists found that during El Niño winters, the position of the jet stream is altered from its normal position and, in the U.S., storm activity tends to be more intense in several regions: the West Coast, Gulf States and the Southeast. They estimate, for example, that certain particularly intense Gulf Coast storms that occur, on average, only once every 20 years would occur in half that time under long-lasting El Niño conditions. In contrast, under long-lasting La Nina conditions, the same storms

would occur on average only about once in 30 years. A related study was published this month in the American Meteorological Society's Journal of Climate.

The scientists examined daily records of snow and rainfall events over 49 U.S. winters, from 1949-1997, together with results from computer model simulations. According to Schubert, the distant temperature fluctuations in Pacific Ocean surface waters near the equator are likely responsible for many of the year-to-year changes in the occurrence of the most intense wintertime storms.

"By studying the history of individual storms, we've made connections between changes in precipitation in the U.S. and ENSO events in the Pacific," said Schubert, a meteorologist and lead author of the study. "We can say that there is an increase in the probability that a severe winter storm will affect regions of the U.S. if there is an El Niño event."

"Looking at the link between large-scale changes in climate and severe weather systems is an emerging area in climate research that affects people and resources all over the world," said Schubert. "Researchers in the past have tended to look at changes in local rainfall and snow statistics and not make the connections to related changes in the broader storm systems and the links to far away sources. We found that our models are now able to mimic the changes in the storms that occurred over the last half century. That can help us understand the reasons for those changes, as well as improve our estimates of the likelihood that stronger storms will occur."

El Niño events, which tend to climax during northern hemisphere winters, are a prime example of how the ocean and atmosphere combine to affect climate and weather, according to Schubert. During an El Niño, warm waters from the western Pacific move into the central and eastern equatorial Pacific, spurred by changes in the surface wind and in the ocean currents. The higher sea surface temperatures in the eastern equatorial Pacific increase rainfall there, which alters the positions of the jet streams in both the northern and southern hemispheres. That in turn affects weather in the U.S. and around the world.

Scientists have known about El Niño weather fluctuations over a large portion of the world since the early 1950s. They occur in cycles every three to seven years, changing rain patterns that can trigger flooding as well as drought.

Schubert cautions against directly linking a particular heavy storm event to El Niño with absolute certainty. "This study is really about the causes for the changes in probability that you'll have stronger storms, not about the causes of individual storms," he said. For that matter, Schubert also discourages linking a particularly intense storm to global warming with complete certainty.

"Our study shows that when tropical ocean surface temperature data is factored in, our models now allow us to estimate the likelihood of intense winter storms much better than we can from the limited records of atmospheric observations alone, especially when studying the most intense weather events such as those associated with ENSO," said Schubert. "But, improved predictions of the probability of intense U.S. winter storms will first require that we produce more reliable ENSO forecasts." NASA's Global Modeling and Assimilation Office is, in fact, doing just that by developing both an improved coupled ocean-atmosphere-land model and comprehensive data, combining space-based and in situ measurements of the atmosphere, ocean and land, necessary to improve short term climate predictions.

Adapted from materials provided by NASA/Goddard Space Flight Center.

http://www.sciencedaily.com:80/releases/2008/01/080128113104.htm

Free, Downloadable Training Program Helps Teen Drivers Anticipate And Avoid Crashes

ScienceDaily (Jan. 31, 2008) — A free, downloadable training program developed by researchers at the University of Massachusetts Amherst teaches teen-age drivers how, when and where to anticipate and avoid potentially fatal traffic hazards. It's called a "Risk Awareness and Perception Training (RAPT) Program," and all the training is done on a personal computer.

The program was developed by the Human Performance Laboratory at UMass Amherst by a team headed by Donald Fisher, director of the lab and a professor in the mechanical and industrial engineering department. Fisher and his team are making the program available to the public and are now working with a major insurance company on an updated version.

"Now we know, based on our studies and other studies, that novice drivers are not anticipating hazards, they are not looking at places in the road where there is a potential threat," says Fisher. "And the other thing we see through research is that attention is also a big problem. For instance, we find that newly licensed drivers will spend much longer looking away from the road ahead than experienced drivers. Text messaging and I-Pods are two of the big culprits here."

Fisher says the RAPT program was created based on an analysis of police crash reports that indicate new drivers tend to lack three basic skills necessary for avoiding crashes: hazard anticipation, attention maintenance and hazard avoidance. Hazard anticipation has to do with knowing where to look for dangers; attention maintenance with concentrating on the road ahead; and hazard avoidance with special driving techniques such as skid control. So far, the Human Performance Laboratory has focused its research on the first of these three skills and is just beginning to study the second. The ongoing research is supported by a five-year grant from the National Institutes of Health awarded to Fisher and his co-investigator Alexander Pollatsek of the psychology department."When kids are 16 or 17, they really don't know what to look for in the way of hazards," says Jeff Muttart, a graduate student in the Human Performance Laboratory. "They don't know where to look. In effect, they're playing a brand new video game with a 3,000-pound weapon, and it's scary to realize the consequences."

RAPT is run on a personal computer with no special accessories and was created largely by the efforts of Anuj Pradhan, a doctoral student in the Human Performance Laboratory. The work was sponsored by the National Science Foundation, the Link Foundation for Simulation and Training, the AAA Foundation for Traffic Safety, the National Institutes of Health and a number of others. RAPT was primarily evaluated on specialized equipment in the laboratory, where driving can be recreated with a true-to-life driving simulator, one of 20 similar ones around the world.The vehicle for the simulator is an actual Saturn sedan, which the driver operates as if it's actually on the road. The road ahead is displayed on three screens, one in front of the car and one on each side. As the driver turns the wheel, brakes or accelerates, the roadway visible to the driver changes appropriately. The system also provides realistic road, wind and vehicle noises.

The lab also uses an eye-tracking device that looks like a pair of glasses mounted with two tiny cameras. What the eye-tracker does is provide a real time video record of the driver's whole field of vision and the objects within that field where the driver is focusing."We can bring novice drivers to the point where they are as good at recognizing hazards as experienced drivers by training them in the laboratory on a PC, then evaluating their performance in our simulator," says Fisher. "Not only do we test their performance in the simulator, but then we take them out on the road. The test results confirm that those novice drivers trained on our training program anticipate hazards on the scenarios that were evaluated as well as veteran drivers."The program is available by going to http://www.ecs.umass.edu/hpl and clicking on "younger drivers."

Adapted from materials provided by University of Massachusetts Amherst.

http://www.sciencedaily.com:80/releases/2008/01/080130185654.htm

Traces Of The Martian Past In The Terby Crater

This false-colour image of Terby crater on Mars was derived from three HRSC colour channels and the nadir channel of the High Resolution Stereo Camera (HRSC) on board ESA's Mars Express orbiter. (Credit: ESA/DLR/FU Berlin (G. Neukum))

ScienceDaily (Jan. 31, 2008) — The High Resolution Stereo Camera (HRSC) on board ESA's Mars Express has returned striking scenes of the Terby crater on Mars. The region is of great scientific interest as it holds information on the role of water in the history of the planet.

The image data was obtained on 13 April 2007 during orbit 4199, with a ground resolution of approximately 13 m/pixel. The Sun illuminates the scene from the west (from above in the image).

Terby crater lies at approximately 27° south and 74° east, at the northern edge of the Hellas Planitia impact basin in the southern hemisphere of Mars.

The crater, named after the Belgian astronomer Francois J. Terby (1846 – 1911), has a diameter of approximately 170 km. The scene shows a section of a second impact crater in the north.

Eye-catching finger-shaped plateaux extend in the north-south direction. They rise up to 2000 m above the surrounding terrain. The relatively old crater was filled with sediments in the past, which formed plateaux on erosion.

The flanks of the plateaux clearly exhibit layering of different-coloured material. Differences in colour usually indicate changes in the composition of the material and such layering is called 'bedding'. Bedding structures are typical of sedimentary rock, which has been deposited either by wind or water. Different rock layers erode differently, forming terraces.

The valleys exhibit gullies, or channels cut in the ground by running liquid, mainly in the northern part of the image. These gullies and the rock-bedding structure indicate that the region has been affected by water.

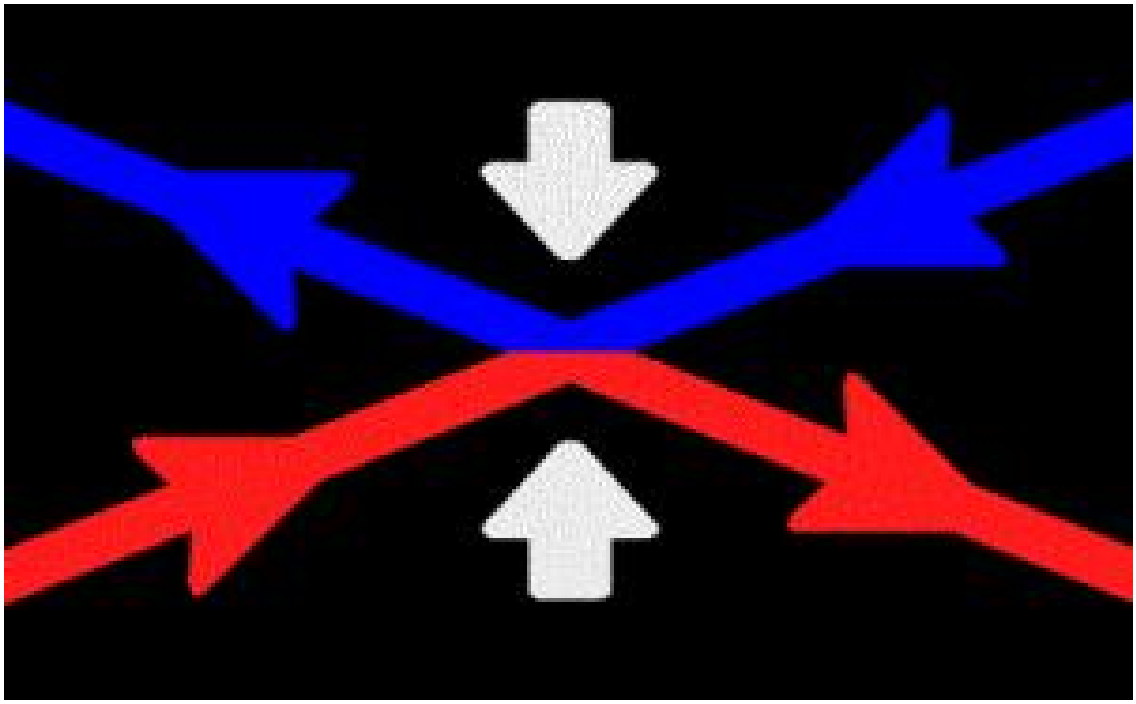
The sediments in this region are interesting to study because they contain information on the role of water in the history of the planet. This is one of the reasons why Terby crater was originally short listed as one of 33 possible landing sites for NASA's Mars Science Laboratory mission, planned for launch in 2009.

The colour scenes have been derived from the three HRSC colour channels and the nadir channel. The perspective views have been calculated from the digital terrain model derived from the HRSC stereo channels. The 3D anaglyph image was calculated from the nadir channel and one stereo channel, stereoscopic glasses are required for viewing.

Adapted from materials provided by European Space Agency.

http://www.sciencedaily.com:80/releases/2008/01/080125223819.htm

New Discovery On Magnetic Reconnection To Impact Future Space Missions



In a plasma (a gas of charged particles), during magnetic reconnection, magnetic field lines of opposite direction break and then reconnect, forming an X-line magnetic topology. The newly reconnected field lines accelerate the plasma away from the X-line. (Credit: Center for Visual computing, Univ. of California Riverside)

ScienceDaily (Jan. 31, 2008) — ESA's Cluster mission has, for the first time, observed the extent of the region that triggers magnetic reconnection, and it is much larger than previously thought. This gives future space missions a much better chance of studying it.

Space is filled with plasma (a gas composed of ions and electrons, globally neutral) and is threaded by magnetic fields. These magnetic fields store energy which can be released explosively, in a process called magnetic reconnection.

This process plays a key role in numerous astrophysical phenomena: star formation, solar flares and intense aurorae, to name a few. On Earth, magnetic reconnection prevents the efficient production of electricity in controlled fusion reactors, potential sources of electricity for the future.

Schematic of magnetic field lines during reconnection

At the heart of magnetic reconnection is the 'electron diffusion region', where reconnection is thought to be triggered. Here, a kink in newly-reconnected magnetic field lines produces large-scale high-velocity jets of plasma.

"Understanding the structure of the diffusion region and its role in controlling the rate at which magnetic energy is converted into particle energy remains a key scientific challenge," says Dr Michael Shay, University of Delaware, USA.

Until recently, theoretical scientists believed that the electron diffusion region was relatively tiny (width about 2 km, length about 10 km). In the vastness of space, the chance of a spacecraft encountering this region would therefore be exceedingly small.

With increased computational power, simulations showed electron diffusion regions that were a lot more elongated than those seen earlier. It was not possible to judge whether the new finding was real because the length of the region increased with more powerful simulations. Nor it was known whether such a layer would be stable in the real, 3D world.

Comparison between observations and simulation

On 14 January 2003, the four Cluster satellites were crossing the magnetosheath, a turbulent plasma region located just outside Earth's magnetosphere, when they encountered an electron diffusion region. The length of the observed region measured 3000 km, 300 times longer than the earlier theoretical expectations and four times longer than seen in recent simulations. Nevertheless, the observations strongly support new simulations.

"These Cluster observations are very significant since they are the first measurements of the length of the electron diffusion region in the space environment. The finding drastically changes the way we understand the physics of reconnection," noted Dr James Drake, University of Maryland, USA.

"This discovery of a large electron diffusion region gives future ESA and NASA missions a much better chance to study it," said Tai Phan at the University of California at Berkeley, USA, lead author of the paper on the findings.

Magnetic reconnection simulation

Cluster was able to detect the region based on its high-resolution magnetic field, electric field and ion measurements. But to understand the fundamental physics of the electron diffusion region responsible for reconnection, higher time resolution measurements are needed to resolve the layer.

The four spacecraft of NASA's Magnetospheric Multi-Scale mission, planned for launch in 2014, are being designed for such measurements. Cross-scale, a mission under study at ESA in collaboration with other space agencies, would use 12 spacecraft to probe the diffusion region, whilst simultaneously measuring the consequences of energy released by reconnection in the surrounding environment.

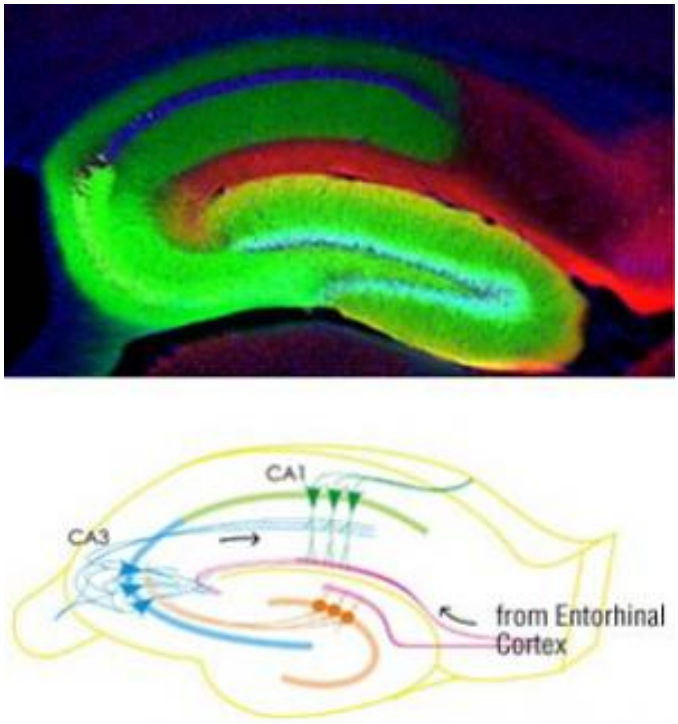
"With the higher probability of encountering the electron diffusion region, we can be confident that future missions will be able to fully understand magnetic reconnection," said Dr Philippe Escoubet, ESA's Cluster and Double Star Project Scientist and Cross-scale Study Scientist.

The findings appear in, 'Evidence for an elongated (> 60 ion skin depths) electron diffusion region during fast magnetic reconnection,' by T. Phan, J. Drake, M. Shay, F. Mozer and J. Eastwood, published in the Physical Review Letters, on 21 December 2007.

Adapted from materials provided by European Space Agency.

http://www.sciencedaily.com:80/releases/2008/01/080125230056.htm

New Tool Probes Brain Circuits: Method Applied To Learning And Memory Pathway



The green-stained section of this mouse hippocampus represents where the new DICE-K technique blocked the neural-signal transmission in one of the hippocampal circuits of the brain. (Credit: Image / Toshi Nakashiba, MIT)

ScienceDaily (Jan. 31, 2008) — Researchers at the Picower Institute for Learning and Memory at MIT report in the Jan. 24 online edition of Science that they have created a way to see, for the first time, the effect of blocking and unblocking a single neural circuit in a living animal.

This revolutionary method allowed Susumu Tonegawa, Picower Professor of Biology and Neuroscience, and colleagues to see how bypassing a major memory-forming circuit in the brain affected learning and memory in mice.

"Our data strongly suggest that the hippocampal neural pathway called the tri-synaptic pathway, or TSP, plays a crucial role in quickly forming memories when encountering new events and episodes in day-to-day life," Tonegawa said. "Our results indicate that the decline of these abilities, such as that which accompanies neurodegenerative diseases and normal aging in humans, is likely to be due, at least in part, to the malfunctioning of this circuit."

Combining several cutting-edge genetic engineering techniques, Tonegawa's laboratory invented a method called doxycycline-inhibited circuit exocytosis-knockdown, or DICE-K-an acronym that also reflects Tonegawa's admiration of ace Boston Red Sox pitcher Daisuke Matsuzaka. DICE-K allows researchers for the first time to induce and reverse a blockade of synaptic transmission in specific neural circuits in the hippocampus.

"The brain is the most complex machine ever assembled on this planet," Tonegawa said. "Our cognitive abilities and behaviors are based on tens of thousands of molecules that compose several billion neurons, as well as how those neurons are connected.

"One effective way to understand how this immensely complex cellular network works in a major form of cognition like memory is to intervene in the specific neural circuit suspected to be involved," he said.

Computing memories

The hippocampus, a seahorse-shaped brain region, plays a part in memory and spatial navigation. In Alzheimer's disease, the hippocampus is one of the first regions to suffer damage; memory problems and disorientation are among the disease's first symptoms.

The hippocampus is made up of several regions--CA1, CA3 and the dentate gyrus--that are wired up with distinct pathways.

The MIT study sought to determine how the interactions between neural pathways and the hippocampal regions affect learning and memory tasks.

Imagine that the three hippocampal regions are computers, and neural pathways are the conduits through which the computers get data from all over the brain. The computers perform different tasks, so the types of data processing will depend on which conduits the data travels through.

The hippocampus has two major, parallel information-carrying routes: the tri-synaptic pathway (TSP) and the shorter monosynaptic pathway (MSP). The TSP includes data processing from all three hippocampal regions, whereas the MSP skips through most of them.

Uisng DICE-K, the researchers were surprised to find that mice in which the major TSP pathway was shut down could still learn to navigate a maze. The shorter MSP pathway was sufficient for the job.

However, the maze is a task that is slowly learned over many repeated trials. When the mice were tested with a different task in a new environment that required rapid learning and memory formation, the researchers found that the mice with TSP shut down could not perform the task. Thus, the TSP pathway is required for animals to quickly acquire memories in a new environment. "This kind of learning results in the most sophisticated form of memory that makes animals more intelligent and is known to decline with age," Tonegawa said.

In addition to Tonegawa, a Howard Hughes Medical Institute investigator, authors include Picower Institute research scientist Toshiaki Nakashiba; postdoctoral associate Jennie Z. Young; research scientist Thomas J. McHugh; and HHMI staff affiliate Derek L. Buhl.

This work is supported by the National Institutes of Health and the RIKEN Brain Science Institute.

Adapted from materials provided by Massachusetts Institute of Technology.

http://www.sciencedaily.com:80/releases/2008/01/080124145020.htm

Poetry's eternal youths

Shirley Dent

January 30, 2008 4:00 PM

http://blogs.guardian.co.uk/books/2008/01/poetrys_eternal_youths.html

Forever young ... Arthur Rimbaud. Photograph: Corbis

"Her trochees are coming on a treat"

"Bless her - and she's only just got her last milk tooth through"

An improbable but not an impossible conversation for a doting mother to have. This week the Liverpool Echo reported that a three-year old is to have her first poem published. Now the volume that young Nicole Rizvi's poem is going to appear in isn't exactly The Golden Treasury and the kid had a few hiccups-scansion wise. But still - it's something to be a published versifier at three.

Liverpool's most precocious author may well be the youngest, but she is not the first startlingly young poet. Sylvia Plath was eight when her first poem was published in the Boston Herald (you beat her by five years Nicole!) Rimbaud was writing verse when he was barely out of short trousers, produced his best known work in his teens and was done with poetry by his early 20s.

Plath and Rimbaud, unmistakably adult poets in their styles and subject matter, point up something incongruous about children writing poetry. We don't actually want kids to be fully-fledged artists, stretching out language with all the weight of experience, often biting down on the bitter gall of that experience to give us something both astounding and unsettling. If a child were to write Lady Lazarus you'd faint.

What we fall for in the verse of poets not yet in double digits is seldom the strength of their work but more often their ingenuous charm. The phenomenon of Marjorie Flemming, posthumously dubbed "Pet Marjorie", is way too sweet for my taste. Any child dying when they are barely eight years old of measles-induced meningitis is a tragedy. Yet Pet Marjorie's early death locked her forever into an

idealised image of childhood. This image is more about our nostalgia than it is about the developing mind of a young poet. Not here do we find "the little savage" revolt and vagabond genius of Rimbaud's Les Poètes de Sept Ans, where "A sept ans, il faisait des romans, sur la vie/ Du grand desert où luit la Liberté ravie" ("At seven, he wrote novels about the trackless desert/ Where exiled freedom shines")

Yet Rimbaud's elegy to his younger self holds a clue to why, as Philip Hensher has argued, poetry - particularly lyric poetry - is something that comes to life, and is often at its best, in the young.

This is not to hurrah a youth-obsessed culture but to note that the delight that Rimbaud takes in bending and moulding language to his imagination is not unique: it is something he shares with young people breaking into life and discovering the power of language.

And this true not just for poets-in-bud. My two eldest nephews, someway off their teens, regularly treat me to Villa chants when I go to Brum (cheers for that, lads). Part of their attraction to the terrace chant, I suspect, is not just the bad language but its exuberance. We may like sugar-coated kids but kids don't care much for sugar-coated language. They want to wrap their tongues and imagination around a bristling, bolshy idiom. It's why Roald Dahl's joyously mean poetry is still a children's classic.

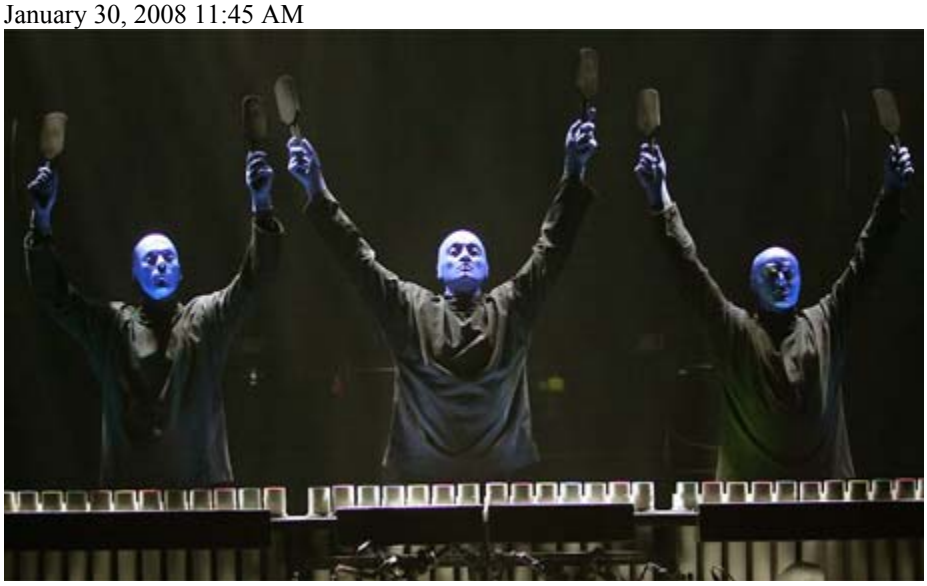
But young people getting their teeth into language is by no means the end of the matter. A lot of poetry's pleasure draws on that youthful excitement on discovering language's flexibility and precision, its bald power and its subtle nuance. And this can last a lifetime. It's a wonderful thing that even for an old git like me, Keats's poetry retains its sense of fresh adventure.

http://blogs.guardian.co.uk/books/2008/01/poetrys_eternal_youths.html

Danger! Theatre can affect your health

With audience participation on the rise, a night at the theatre seems to be getting more hazardous

Lyn Gardner
January 30, 2008 11:45 AM



Blue in the face ... The group performing at New London Theatre in 2005. Photograph: Tristram Kenton

One of my earliest theatre-going memories is of a performance of Toad of Toad Hall which was halted during the final battle for Toad Hall when one of the actors hurtled off the stage and into the orchestra pit and had to be carted off to hospital. Over the years, I've seen actors suffer a number of accidents on the job, most of them minor. But it seems that being a member of the audience is becoming more hazardous too. In Chicago last week, a lawsuit was filed against the Blue Man Group by an audience member who claimed that a camera was forced down his throat - causing damage to his oesophagus - during a piece of audience participation that has been part of the show in performances all over the world.

Of course it used to be that audiences were kept safe from physical harm (although not of course from mental suffering) by the fourth wall. But theatre performances are increasingly blurring the boundaries between performers and audiences, and shows such as the Blue Man Group rely heavily on audience participation to generate laughs. Reviewing the Blue Man Group during their London run back in 2005, I was struck by how members of the audience were coerced into participating. One man was painted blue, suspended upside down and swung into a canvas to create a painting. As I commented at the time: "In some countries they call this torture; the Blue Man Group pass it off as entertainment."

Comics have often used the ritual humiliation of audiences (particularly latecomers and early leavers) to raise a laugh. In promenade shows by companies such as Punchdrunk, audiences have learned to jump out of the way of the performers within their midst, while simultaneously longing to be chosen for one-on-one experiences in closets and broom cupboards.

The increasing hunger among audiences to get involved means that audiences are often volunteering to put themselves into situations where they are entirely in the power of the performers and companies. That includes those who volunteer their lives and experiences in verbatim shows and then find themselves depicted on stage in ways that they don't recognise, or where they become physical participants on stage.

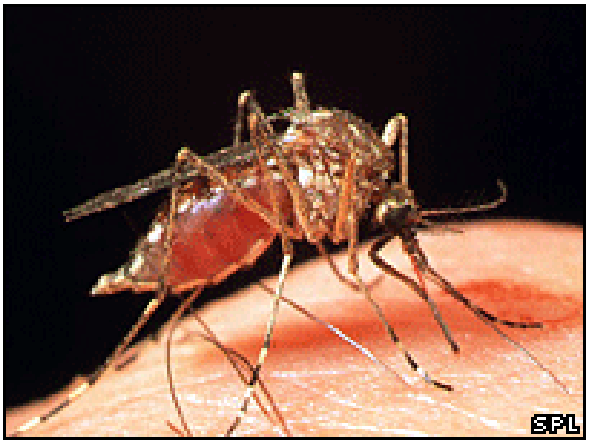
The Smile Off Your Facee in Edinburgh last year involved having your hands tied together and being blindfolded and wheeled around in a wheelchair. People were queuing up for the chance to be rendered helpless, just as a decade ago people blithely signed up to be kidnapped by Blast Theory.

The Smile Off Your Face (which will be at BAC in May this year and is well worth booking in advance) strikes me as benign and interesting and uses its power responsibly, constantly checking that its audience of one is not discombobulated, although you feel you are being stroked to death. I can't say that all the shows I've seen have been as careful and sensitive in their treatment of the volunteer.

At Spielart in Munich last autumn, I saw a performance by the Belgian company Crew called O Rex which used immersive technology to transform one member of the audience into tragic hero Oedipus Rex. Blinded and entirely in thrall to the gods of technology, the audience member has to follow a set of instructions conveyed by others, without knowing why. The rest of the audience interpret those actions accordingly. Would the subject have undertaken those same - sometimes highly suggestive - actions if he or she had understood what they signified to the audience? I suspect not, and although its intention might be very different I wonder whether such a piece is all that different to those hypnotism shows that humiliate some audience members for the entertainment of others?

http://blogs.guardian.co.uk:80/theatre/2008/01/danger_theatre_can_affect_your.html

Malaria jab hope over chimp virus
Scientists believe a chimp virus may hold the clue in the long-running battle to develop a malaria vaccine.



Experts have been trying for the last 20 years to find a jab for the disease, which kills more than 1m people a year.

An Oxford University team are using the chimp virus to provoke an immune response in cells where the parasites responsible for malaria gather.

Trials are just getting under way and, if they prove successful, a vaccine may be available within five years.

The team is using a genetically-modified chimp adenovirus combined with a malaria gene in a bid to kill the parasites once they enter the body.

> **I think we are getting closer with a vaccine and there is more confidence now than there has been for 10 years**
> Colin Sutherland, malaria expert

Previous research had shown that adenoviruses, which cause common problems such as colds and gastroenteritis, are particularly effective at triggering such an immune response.

But as many people will have been exposed to the human adenovirus the team, funded by the Wellcome Trust, turned to the chimp version.

Lead researcher Dr Sarah Gilbert said: "Chimpanzees have their own set of adenoviruses which rarely infect humans, so we have not built up immunity to them.

"This is why we have chosen such a virus to form the backbone of the new vaccine."

Oxford University is just one of several groups reaching the trial stage with potential vaccines.

The disease has proved a particularly tricky challenge as it is so complex.

Malaria pathogens have thousands of genes compared to the scores in many of the diseases which vaccines have already been developed for.

Deaths

And the lack of progress has left doctors relying on drug treatments and bed nets to keep away mosquitoes which carry the malaria parasite.

It means promises made in 2000 to halve the burden of the disease within 10 years are almost certainly going to be missed.

However, experts believe significant steps are now being made.

Colin Sutherland, from the London School of Hygiene and Tropical Medicine, said the Oxford University research showed "promise".

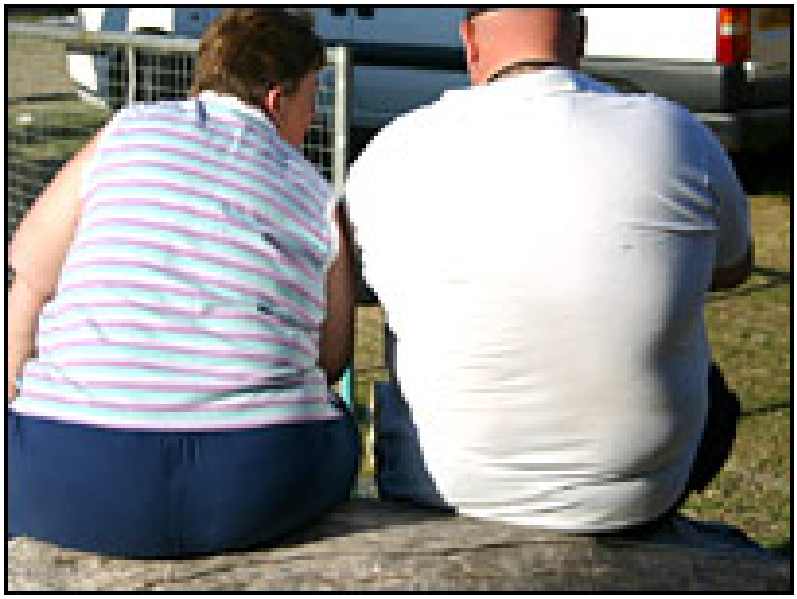
He added: "I think we are getting closer with a vaccine and there is more confidence now than there has been for 10 years.

"The problem is that it is so complex and if we do get there it will be one of the biggest vaccine achievements."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7219371.stm

Published: 2008/02/01 00:14:54 GMT

Obesity drug use rises eight-fold
More than 1m prescriptions are made for obesity drugs a year - eight times the number dispensed seven years ago.



The majority of these were for two treatments - sibutramine and orlistat.

Sibutramine works by altering chemical messages to the brain which control feelings about food, while orlistat prevents some fat absorption.

Just 127,000 obesity pills were prescribed in England in 1999, but that rose to 1.06m in 2006, according to the NHS Information Centre.

It comes as figures show that obesity is rising.

It is too easy to turn to the prescription pad
Professor Alan Maryon-Davis, of the Faculty of Public Health

Nearly a quarter of adults are obese - up 50% in the last 10 years, while one in six children aged two to 15 are classed as obese - up from one in 10.

The increasing use of obesity drugs is partly driven by the fact that more have come on to the market - orlistat was only licensed in the UK in 1998 and sibutramine in 2001.

But Dr Jim Kennedy, prescribing spokesman for the Royal College of GPs, said the condition was also now being taken more seriously.

"Government, patients and doctors are all more aware of the risks and therefore more willing to discuss obesity.

"This means there is more of a willingness to consider treatment options."

Dr Kennedy said patients would only be prescribed obesity drugs alongside a programme to encourage a healthier lifestyle by altering diet and increasing physical activity.

"Patients would have to demonstrate they are genuinely committed to losing weight and doctors would then only prescribe these drugs if there was a high risk from things such as stroke, diabetes or heart disease."

Food consumption

He also pointed out that the 1m prescriptions a year should be seen in context as there were 13m GP consultations each week.

But Professor Alan Maryon-Davis, president of the Faculty of Public Health, said: "Doctors and other health professionals do not have the time to spend on the in-depth diet and exercise advice that is really needed.

"So my fear is that these drugs of last resort are actually used quite early on. It is too easy to turn to the prescription pad.

The NHS Information Centre also revealed the results of its annual health survey.

More than 21,000 adults and children were quizzed about the food consumption and activity levels.

It showed that the gradual rise in the numbers eating healthily and doing regular exercise was continuing.

But despite the increases less than a third of adults and one in five children eat the recommended five daily portions of fruit and vegetables.

And just 40% of men and 28% of women were taking part in 30 minutes of physical activity each week.

And the survey concluded from the lifestyle habits and the height, weight and waist circumference measurements taken that over one in five people were at risk of cardiovascular disease.

Professor Maryon-Davis said: "These findings are worrying, especially when you consider that it is people from poorer backgrounds are the ones who are struggling most to adopt the healthier lifestyles."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7219315.stm

Published: 2008/01/31 10:27:11 GMT

Test confusion 'risk to patients'
Many junior doctors do not understand common hospital laboratory tests and are putting patients at risk as a result, biochemists have claimed.

The Annals of Clinical Biochemistry reports that 18% of more than 80 junior doctors surveyed were happy to order a test they could not fully interpret.

The Association for Clinical Biochemistry blamed poor teaching of the subject at medical schools.

The General Medical Council is planning to review its curriculum guidance.

> **It's something that scares me - these are the doctors who are going to be looking after me when I'm older**
> Dr Danielle Freedman
> Association of Clinical Biochemistry

The majority of hospital pathology tests are ordered by junior doctors, but in recent years many medical schools have reduced the amount of time they devote to pathology teaching.

Dr Trevor Gray, from the Northern General Hospital in Sheffield, carried out a survey of more than 80 juniors, asking them how they felt about the clinical biochemistry tests they were expected to order on a day-to-day basis.

In 10 out of the 12 common tests listed, some of the juniors questioned said they were not entirely confident about interpreting the results.

In three tests, more than a third of those questioned said they were not confident - and 18% of the doctors said they were happy to order a test which they did not fully understand how to interpret.

Seven out of 10 said they would like more teaching in clinical biochemistry.

Dangerous decisions

Dr Danielle Freedman, from the Association of Clinical Biochemistry, said the results revealed "a national problem".

"It's something that scares me - these are the doctors who are going to be looking after me when I'm older."

She said that errors could be highly dangerous to patients: "If you have someone who has a test which shows they have a low sodium level, further tests need to be done to establish the cause.

"Some junior doctors can order the sodium test, but don't know what to do with the result, and the patient doesn't get the right treatment."

She said that she knew of patients who had been discharged from hospital only to suffer a major heart attack because a key test had not been carried out properly.

The General Medical Council (GMC) is currently preparing to review its guidance on the content of medical education.

"It is essential that the GMC, universities and medical school take note to protect both patients and doctors," Dr Freedman said.

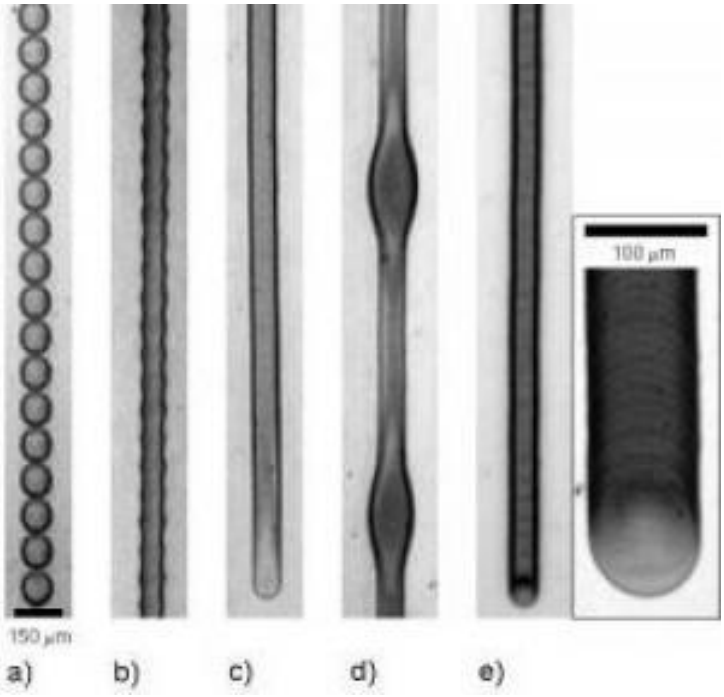
Among those responsible for pathology teaching in UK medical schools is the Royal College of Pathologists, and a spokesman said that it was currently examining what medical students were taught.

"The college has set up a group to review and appraise the new curriculum."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7223227.stm

Published: 2008/02/02 01:02:04 GMT

Wiping Out The Coffee-ring Effect Advances Inkjet Printing Of Electronic Circuits



Examples of printed line behaviors from inkjet printers: (a) individual drops, (b) scalloped, (c) uniform, (d) bulging, and (e) stacked coins. (Credit: Courtesy of the American Chemical Society)

ScienceDaily (Feb. 1, 2008) — Researchers in California report a key advance in efforts to use inkjet printing technology in the manufacture of a new generation of low cost, high-performance electronic circuits for flexible video displays and other products. Their study* describes development of a new method for producing straighter, uniform circuits using inkjet-printing.

In the report, Dan Soltman and Vivek Subramanian note that inkjet-printed circuits must be extremely smooth and straight. That difficult feat has been elusive because the drop-by-drop nature of inkjet-printing often leaves uneven printed features on surfaces, especially a circular pattern known as the "coffee ring" effect, they note.

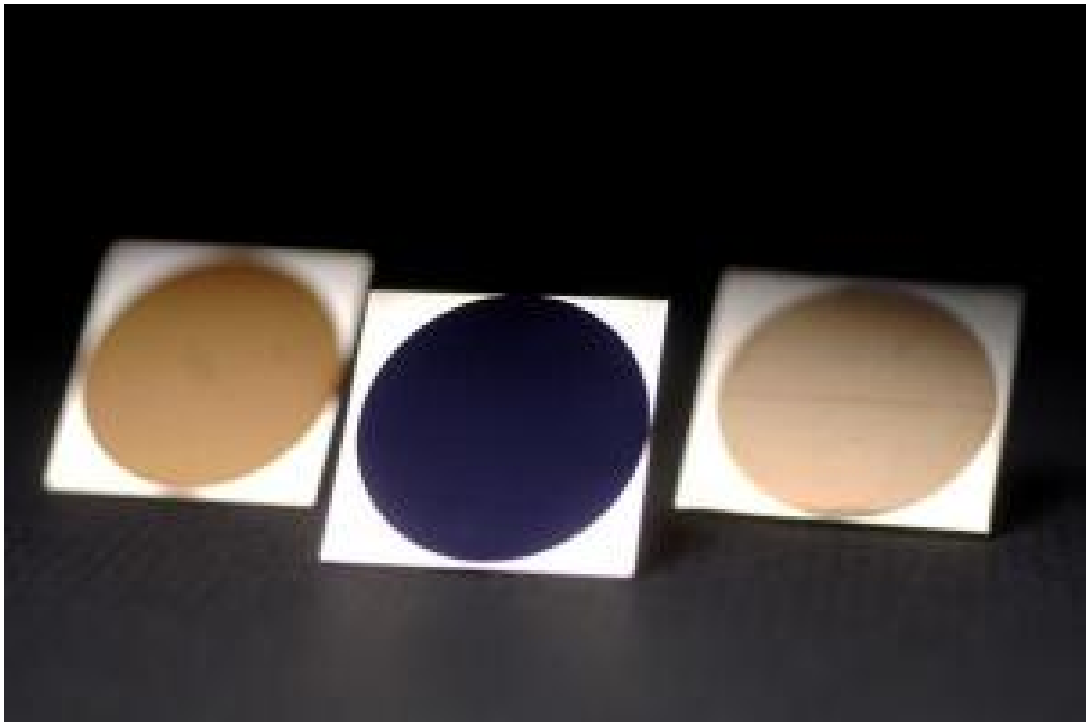
The scientists describe a new way to optimize printing conditions to eliminate the coffee-ring effect and produce smooth, narrow lines with an even edge. The development demonstrates the feasibility of tuning and optimizing inkjet technology for microelectronic applications, they say.

*The article "Inkjet-Printed Line Morphologies and Temperature Control of the Coffee Ring Effect" is scheduled for the March 4 issue of ACS' Langmuir.

Adapted from materials provided by American Chemical Society, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com:80/releases/2008/01/080128113836.htm

Researchers Create Gold Aluminum, Black Platinum, Blue Silver Using Tabletop Laser



Gold Aluminum, Blue Titanium, Gold Platinum. (Credit: Richard Baker, University of Rochester)

ScienceDaily (Feb. 1, 2008) — Using a tabletop laser, University of Rochester optical scientists have turned pure aluminum, gold. And blue. And gray. And many other colors. And it works for every metal tested, including platinum, titanium, tungsten, silver, and gold.

Chunlei Guo, the researcher who a year ago used intense laser light to alter the properties of a variety of metals to render them pitch black, has pushed the same process further in a paper in today's Applied Physics Letters. He now believes it's possible to alter the properties of any metal to turn it any color—even multi-colored iridescence like a butterfly's wings.

Since the process changes the intrinsic surface properties of the metal itself and is not just a coating, the color won't fade or peel, says Guo, associate professor of optics at the Institute of Optics at the University of Rochester. He suggests the possibilities are endless—a cycle factory using a single laser to produce bicycles of different colors; etching a full-color photograph of a family into the refrigerator door; or proposing with a gold engagement ring that matches your fiancée's blue eyes.

"Since the discovery of the black metal we've been determined to get full control on getting metals to reflect only a certain color and absorb the rest, and now we finally can make a metal reflect almost any color we wish," says Guo. "When we first found the process that produced a gold color, we couldn't believe it. We worked in the lab until midnight trying to figure out what other colors we could make."

Guo and his assistant, Anatoliy Vorobeyv, use an incredibly brief but incredibly intense laser burst that changes the surface of a metal, forming nanoscale and microscale structures that selectively reflect a certain color to give the appearance of a specific color or combinations of colors.

The metal-coloring research follows up on Guo's breakthrough "black metal" discovery in late 2006, when his research team was able to create nanostructures on metal surfaces that absorbed virtually all light, making something as simple as regular aluminum into one of the darkest materials ever created.

Guo's black metal, with its very high absorption properties, is ideal for any application where capturing light is desirable. The potential applications range from making better solar energy collectors, to more advanced stealth technology, he says. The ultra-brief/ultra-intense light Guo uses is produced by a femtosecond laser, which produces pulses lasting only a few quadrillionths of a second. A femtosecond is to a second what a second is to about 32 million years. During its brief burst, Guo's laser unleashes as much power as the entire electric grid of North America does, all focused onto a spot the size of a needlepoint.

The intense blast forces the surface of the metal to form nanostructures—pits, globules, and strands that response incoming light in different ways depending on the way the laser pulse sculpted the structures. Since the structures are smaller than the wavelength of light, the way they reflect light is highly dependent upon their specific size and shape, says Guo. Varying the laser intensity, pulse length, and number of pulses, allows Guo to control the configuration of the nanostructures, and hence control what color the metal reflects.

Guo and Vorobyev also achieve the iridescent coloring by creating microscale lines covered with nanostructures. The lines, arranged in regular rows, cause reflected light of different wavelengths to interfere differently in different directions. The result is a piece of metal that can appear solid purple from one direction, and gray from another, or multiple colors all at once.

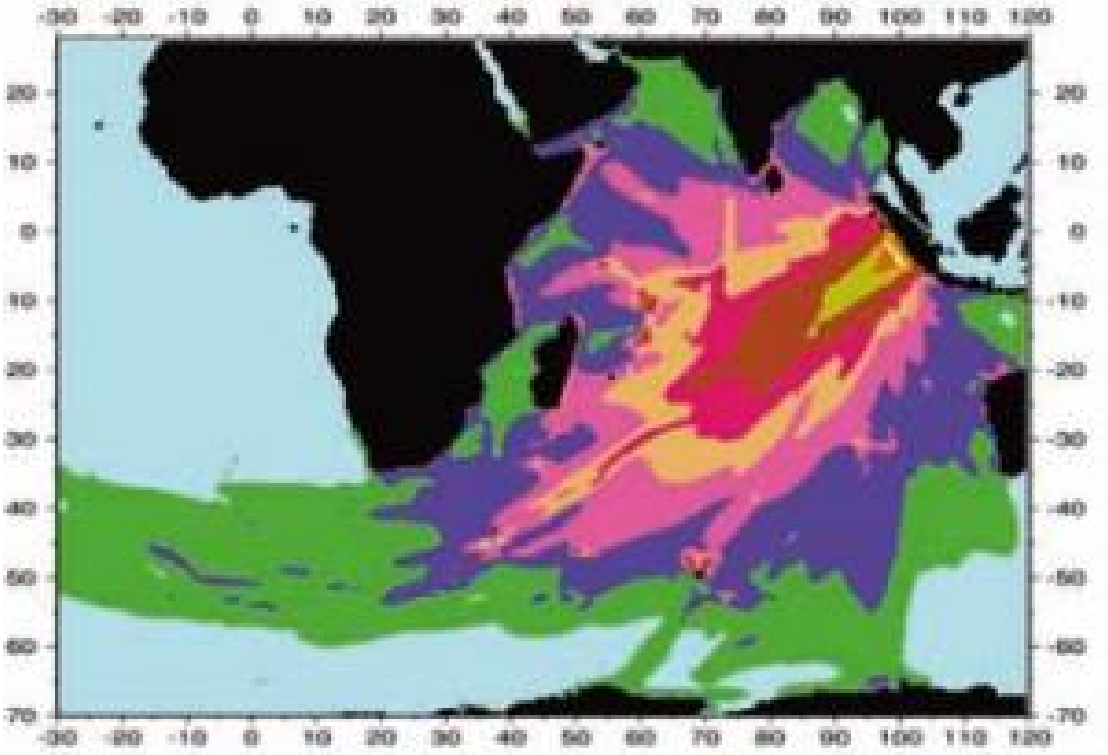
To alter an area of metal the size of a dime currently takes 30 minutes or more, but the researchers are working on refining the technique. Fortunately, despite the incredible intensity involved, the femtosecond laser can be powered by a simple wall outlet, meaning that when the process is refined, implementing it should be relatively simple.

The new process has worked on every metal Guo has tried, and the results are so consistent that he believes it will work for every metal known. His team is currently working to find the right tuning to create the rest of the rainbow for the solid-colored metal, including red and green.

Adapted from materials provided by University of Rochester.

http://www.sciencedaily.com:80/releases/2008/02/080201090845.htm

Making Accurate Predictions Of Tsunami Risks



Wave patterns generated by an earthquake just west of the Indonesian island of Sumatra. (Credit: Image courtesy of University of Southern California)

ScienceDaily (Feb. 1, 2008) — A new review of tsunami hazards concludes that the 2004 catastrophe was far from the worst possible in many Indian Ocean borderlands - and notes that warning systems to guard at-risk populations are still lagging.

Costas Synolakis, director of the University of Southern California Tsunami Research Centeris co-author of "Far-Field Tsunami Hazard From Mega-Thrust Earthquakes in the Indian Ocean," just published in the Geophysical Journal International.

Synolakis and co-author Emile Okal of Northwestern University evaluated all known potential tsunami-generating sources in the vast area between Africa, Asia, Australia and Antarctica, and then calculated the impact of the tsunamis they can generate, should they rupture. Their paper presents the geographical distribution of risk.

The pair examined eight scenarios, two along Southern Sumatra (in Indonesia), two in the North Andaman segment of the Sumatra Subduction Zone, two sources along the Makran Subduction Zone (south of western Pakistan) and two sources south of Java. (Indonesia)

According to Synolakis, a professor in the USC Viterbi School of Engineering's Sonny Astani Department of Civil and Environmental Engineering, "the most important lesson from the scenarios we investigated is that the patterns of far-field maximum amplitudes predicted by our simulations will not be a repeat of those observed in 2004." The differences result from differences in the directions in which the disturbances propagate, "and in many instances the results are counterintuitive."

Synolakis expressed high confidence in the reliability of the projections. "Even if the earthquakes, as they materialize in the future, have geometric characteristics that are slightly different from our hypothetical scenarios, the far field impact projections are robust to small initial perturbations arising from uncertainty in the rupture characteristics."

Among the paper's conclusions:

- The impact in the mid-ocean Maldive Islands from all scenarios appears to be similar or less than what was observed in 2004 - however the low-lying structure of the islands makes them more difficult to evacuate than other risk sites..
- The impact in Madagascar and the Mascarene Islands (Mauritius, Rodrigues and Réunion) and the Seychelles could be far greater than in 2004, particularly from earthquakes in Southern Sumatra and in South Java. Madagascar is found particularly vulnerable from South Sumatran tsunamis.
- Africa suffered in excess of 300 deaths in 2004, 300 of them in Somalia. Its east coast is vulnerable from south Sumatran tsunamis and in particular, Somalia remains at high risk due to the focusing effect of the Maldives ridge. The Comoro islands located between Tanzania and Madagascar would probably be affected more severely than in 2004.
- Large earthquakes in south Java would generate substantial levels of destruction in Northern Australia, despite the sparse level of development there.
- The Strait of Malacca area appears more vulnerable than in 2004, from earthquakes in the North Andaman. Bali and Lombok and could be severely affected by large events in south Java. In fact Bali was affected by the 1994 tsunami, whose trigger was smaller than the ones envisioned here.
- The Kerguelen Islands (49.5◦S; 69.5◦E), part of the French Southern and Antarctic Territories, are highly vulnerable. Other than the North Andaman scenarios, practically all other events affect the Kerguelens, where apparently the 2004 tsunami did not cause damage. The much larger offshore heights the simulations predict would put the scientific base there (60-100 persons) at risk

Many of these scenarios have never been examined before. Synolakis' USC colleague Jose Borrero and others examined the local impact from south Sumatran scenarios in a 2006 paper in the Proceedings of the National Academy of Sciences. Synolakis and Okal concentrated on basin-wide impacts not studied earlier.

The impact to the eastern coast of India and in Myanmar and Bangladesh from the North Andaman scenarios was examined in a paper recently published in Nature by Phil Cummins (2007) of Geoscience Australia. The impact the new paper predicts is slightly different, Synolakis says, but only in the geographical distribution of the carnage.

According to that paper, the Makran Coast of Baluchistan constitutes a subduction zone along which the Arabian plate sinks under the Eurasian one. This was the site of a major earthquake on 1945 November 27, which was accompanied by a significant regional tsunami, with run-up in the five to ten meter range.

Synolakis and Okal, who is a professor in Northwestern's Department of Earth and Planetary Science, examined different rupture scenarios and their affect on the Makran coast, Oman and the west coast of India. "They are substantial and need more detailed study," Synolakis said, making reference to a documented catastrophe that occurred 24 centuries ago: "While the tsunami impact could be inferred from Pliny's reports of the adventure sof the fleet of Alexander the Great returning from India at the Straits of Hormuz in 434 AD, it has not yet been examined to the extent it deserves given the commercial and military value of the Straits.

Synolakis and Okal agree with Cummins about a critical need for the area: a warning net.

"It is quite clear that a tested and true tsunami early warning system as now works in the Pacific by the Pacific Tsunami Warning Center needs to be urgently implemented in the Indian Ocean," said Synolakis. "This system should include hundreds of pre-computed detailed scenarios of inundation for all Indian Ocean nations to facilitate emergency planning for evacuation should any of these scenarios materialize. Public education is a must and local people and visitors should be made aware of tsunami hazards, no matter how unlikely they may be, just us Hawaii and Oregon are already doing."

Synolakis and Okal began work on the project almost in the immediate aftermath of Sumatra 2004 and was completed last year.

"Our work was triggered from three different two week classes we taught for UNESCO in 2006/2007 on tsunami hazard mitigations in the Indian Ocean," said Synolakis. "More than eighty professionals attended having been nominated by their governments and we tried to show them how to assess with us the local impact from adjacent sources. We tried to guide them towards understanding and evaluating transoceanic impact, but the computational tools they had then were just not optimal.

"The work we present here extends the synthesis of hundreds of inundation projections done by our students in these classes, with varying degrees of success. However, all the specific scenarios we used are the synthesis of extensive literature and archive review, a synthesis of the preliminary material we developed in the UNESCO classes and of course all the computations are new."

The National Science Foundation and the European Union - via a Transfer Grant - supported the research.

Adapted from materials provided by University of Southern California.

http://www.sciencedaily.com:80/releases/2008/01/080128113331.htm