Infoteca's E-Journal

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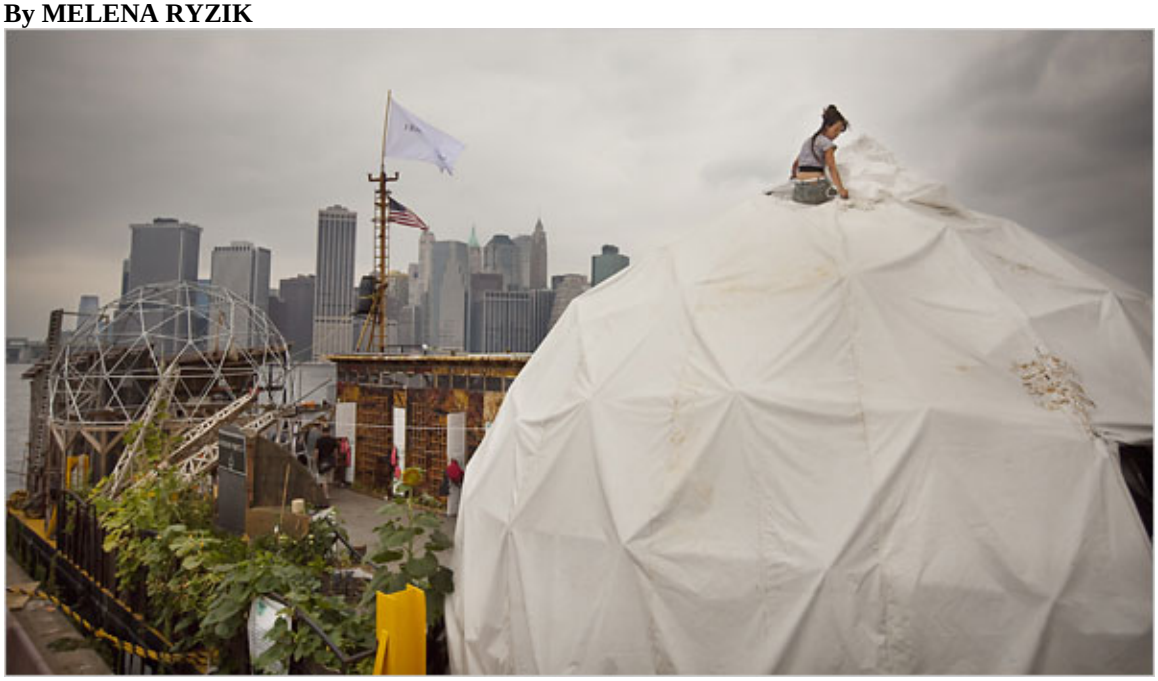
Life, Art and Chickens, Afloat in the Harbor

By MELENA RYZIK



ABOARD THE WATERPOD, in New York Harbor — "One, two, three: Heave! One, two, three: Heave!" Perched nearly 20 feet high at the top of a metal dome on this listing barge, Alison Ward, an artist, was acting as a foreman, supervising as a half-dozen volunteers struggled to pull a heavy vinyl cover over the structure. It was just past 10 a.m. on a blazing Sunday in July, and the public was due to start coming aboard soon — too soon, Ms. Ward felt.

"How long until we're descended upon?" she called to her crew. For a draining hour she and the others had worked the tarp, stitched together from discarded billboards, up and over the structure, which for the moment resembled a Buckminster Fuller-designed jungle gym.
For the last two months artists have been floating around New York City on the Waterpod, a 3,000-square-foot experiment in community living and artistry. Founded by Mary Mattingly, whose medium is mainly photography, it was envisioned as a self-sustaining living space, an eco- and art-friendly sphere that could be recreated in the future, when land resources might be scarce. Preparing for the project, Ms. Mattingly thought about hardship and utopia. And so the Waterpod — at least that part of it that is not a commercial shipping barge, whose rental was backed by dozens of public and private groups — was built from donations and recyclables. Its systems run on solar power; its crew grows its own greens, collects its own rainwater. These things cared for each day, the notion was that the crew could work on more creative pursuits.

In practice, however, the Waterpod has turned out to be more an experiment in sociability and isolation, aesthetic vision and mass utility, organization and freedom, and, mostly, endurance.
"Frankly, I don't think any of us, when we started, knew how much work it would be," Ms. Ward, 37, said. "Building it was hard, but I thought once we got it up and running, we would be able to, you know, make art." This was an assessment that Ms. Mattingly, 30, echoed and one that has not yet come to pass.
"It has challenged everyone," Ms. Ward said, "on all levels — levels of comfort, levels of intellect."
Both Ms. Ward and Ms. Mattingly gave up their apartments and have been living aboard the Waterpod full time since it was launched on June 12, the only two people to do so. Otherwise the crew has included a rotating cast of artists and hangers-on, some with relevant experience in gardening or carpentry or maritime life, experience that both women said they did not have before starting the project.

Over two live-in visits a month apart, this reporter became one of the crew, pitching in on the dome cover-raising and daily tasks like feeding the chickens — four hens produce breakfast, lunch and dinner — and tending the vegetable gardens that line the boat's rails. Though it remains docked in one location for two weeks at a time — the Pod, as its residents call it, is currently tied up at Pier 5 in the East River, below Brooklyn Heights — its mooring lines and gangplanks need frequent attention, as do the systems that make it livable. (The less said about maintaining the dry-composting toilet, the better.) "There's a never-ending list of things to do: It's a ship. It's a farm. It's an art residence. It's an installation," Ms. Ward said.

"It's not a Burning Man camp," said John McGarvey, 43, the Waterpod's executive director and a veteran of that annual Nevada festival. Perhaps not, but it does attract some of the same spirit: people like Dallas Pesola, who gave his age as "ageless" and arrived that July morning to help put up the dome cover wearing a captain's hat, a sarong and no shirt, brandishing a bunch of plastic swords taken from the party where he'd just stayed up all night.

Mr. Pesola and a friend, Elisa Blynn, 37, an artist and performer from the East Village, did much of the heavy lifting on the day's projects. But then Ms. Blynn decided to spray paint a wavy silver border around one of the garden beds. Cool? Debatable. Common? You bet.

"People get on board, and they just start painting," said Ian Daniel, the Waterpod's residency curator, responsible for scheduling official artist visits and coordinating events. "I can't even pinpoint how it happens." He added: "Mary's aesthetic is this futuristic, apocalyptic what-if, but people come on board and want to be a part of it. It seems like free living, like on a commune." (Mr. Daniel, 27, should know; he lived on one, in Oregon, where he learned how to practice sustainable agriculture.)

Eve K. Tremblay, a Canadian-born artist who was based in Berlin until she came to work and live on the Pod this year, was not happy with the result of all this go-with-the-flowness. "It's looking a bit too hippy right now," she said, adding: "I'm a bit of a critical voice on this project. There is very little time to read or do art. It takes a lot of work to do sustainability. And sometimes it feels like Frankenstein, like we've created this organism that has a life of its own."

A few weeks later Ms. Tremblay moved out. Mr. Daniel cut down on his day job as a waiter at the boutique Standard Hotel and took her place on the barge. Though he had trouble sleeping on board and shared the disdain for the Burning Man vibe — he had gently suggested to some of the group that perhaps they should, you know, wear shirts — he was excited about the prospect of organizing and promoting shows. Soon the silver paint Ms. Blynn had applied was gone.

Public enthusiasm for the project has been voracious. Situated at the intersection of recession escapism, do-it-yourself culture and ecomania, the Pod neatly sums up many current lifestyle trends — the compost container gets a lot of "this is how we should do it at home" comments from visitors.
"It's navigating our relationship with the environment in a capacity that doesn't occur when you live in the city," said Matthew Aaron Goodman, 34, a novelist from Brooklyn who visited the Waterpod when it was docked at Governors Island in July. "The advancement of technology has limited our ability to know what we can do with our own capacity. Something like this reminds us."

He turned to his wife, Nadia Murray Goodman, 34, a teacher. "We need to reassess what we're doing with our lives," he said. "We should be taking junk boats around the world."

That kind of support helps balance the constant stream of nosy poking around — what several Pod livers called "the zoo animal aspect." The lack of onboard privacy, coupled with the isolation from the outside world (only Ms. Mattingly has an Internet connection) has been one of the greatest challenges, residents said.

"You're cut off from most media, and you're focused on survival aspects," said Ms. Mattingly, who has left the Pod only three times since it was launched. (Ms. Ward still goes to her studio in Lower Manhattan

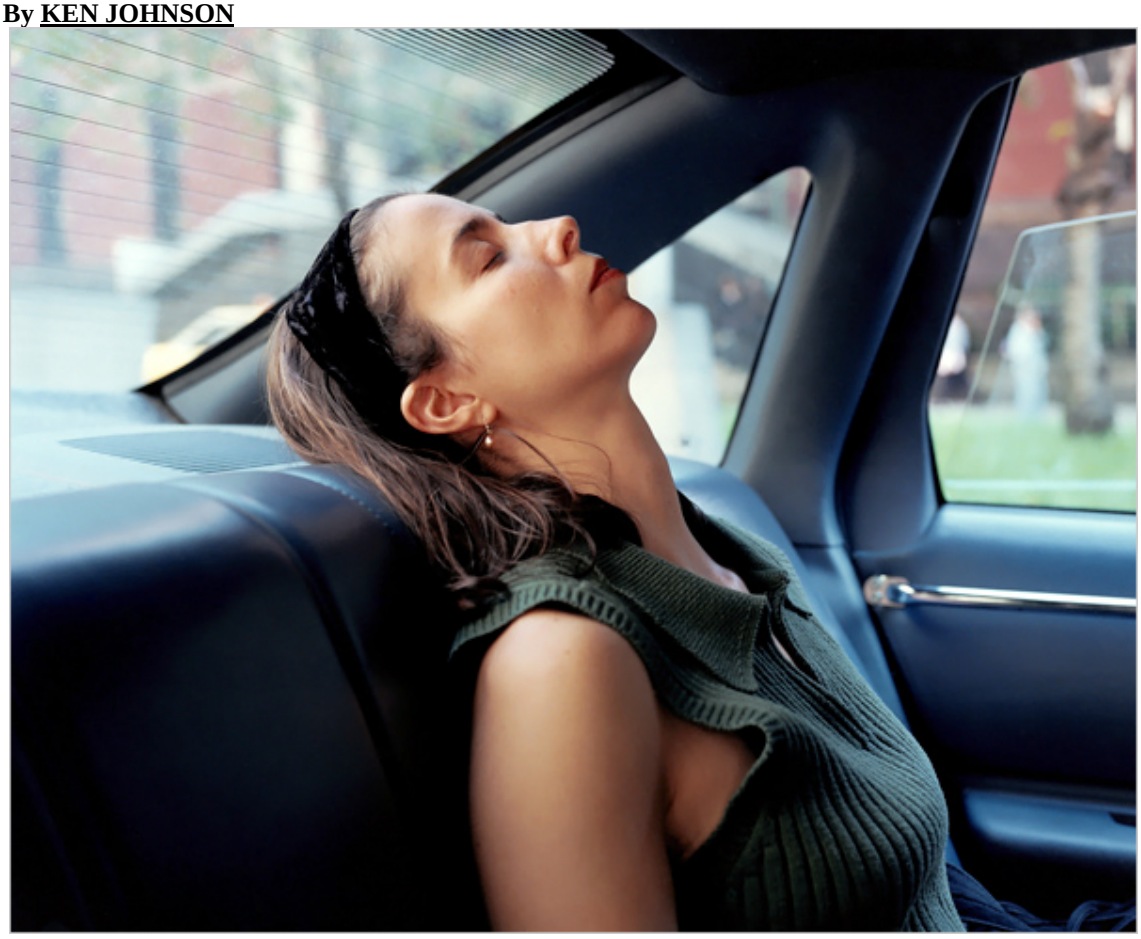
four times a week.) “We want to have those two hours a day where no one is coming into your room asking silly questions.”
Two months in, the residents of the Waterpod are finally making those kind of allowances for themselves. They have begun to understand how to manage the onboard systems and structure their days, and the curatorial program has gone from didactic (lectures about local oysters) to hip, with a performance by the electro duo Yacht. The rewards of life on board have also slowly become evident: diving off the raft and into the cool waters of the harbor; picking fresh lettuces, nasturtium flowers and herbs off the bow for a lunchtime salad; showing off the stunning skyline views to visiting friends.

And every night, after the public leaves, can feel like a covert but elegant dinner party, with candles and thoughtfully prepared food, conversation flowing under the dome as urban life zooms by, the coda to an exhausting but fulfilling day.

“That’s what I like about living on the Pod,” Ms. Ward said, “every moment is accounted for, every action.” She added, “It’s a constantly shifting thing, and that’s what art always is.”
For her part Ms. Mattingly, who said she felt they’d reached a turning point, added that she planned to extend the project through October and hoped someone would take it over after that.
In the meantime there are some moments of peace. Just off the coast of Brooklyn on Sunday the sky was overcast and the barge quiet, with no public events scheduled and few visitors aboard. Mayra Cimet, an eager 22-year-old student, worked on a rope installation with no purpose beyond the aesthetic. David Smith, a visiting artist, discussed his work with Ms. Mattingly. Mr. Daniel showed a new volunteer the gray-water system. Ms. Ward cooked. The chickens clucked, the boat rocked. The Waterpod was, for better or worse, its own little universe.

http://www.nytimes.com/2009/08/13/arts/design/13barge.html?_r=2&hp=&pagewanted=all

'NEW YORK PHOTOGRAPHS'
A Chronicle of New York's Darks and Lights, Captured by Savvy Street Photographers
By KEN JOHNSON



Last winter, when the art economy was looking especially dark, a group of Manhattan photography dealers got together and decided to put on a spirit-lifting show: "New York Photographs," a summertime tribute to the greatest city on earth. Thirteen galleries agreed to mount exhibitions — some dedicated to individual artists, some to subjects like sex or music — of which six are currently up. Together they offer a tantalizing series of glimpses, a dreamy tour of the town from the Statue of Liberty to the streets of Spanish Harlem and from the hurly-burly of Times Square to the furtive sexual encounters of the old West Side piers. They are a reminder, for anyone who needs it, of the endless churn of dark and light, innocence and experience that surrounds all of us in the city at every moment.

A good place to start is with "Glitz & Grime: Photographs of Times Square" at Yancey Richardson. Twenty-four pictures, dating from 1945 to 2009, chronicle the highs and lows of a place that embodies the spirit of American commercial culture at its most seamy and manically exuberant.
In black-and-white pictures from the 1940s and '50s by Louis Stettner and Rudy Burckhardt shadowy, walking men in hats and overcoats seem like lost souls in a crepuscular purgatory. That mood is revived in a photograph from as recently as 1997 — well into Mayor Rudolph W. Giuliani's campaign to clean up the Times Square area — by Philip-Lorca diCorcia in which pedestrians seem like extras in a neo-noir or zombie movie.
A big color picture by Andrew Moore registers the nearly psychedelic impact of the signage that's there now, and Lynn Saville's partly blurred image of automobile traffic has a lush, cinematic beauty. But if there is joy to be found in Times Square, you wouldn't know it from this show.
Considering the once tawdry reputation of this crossroads of the world, and the aggressive eroticism of its contemporary advertising, it is odd that there is hardly any sex in the Richardson show. For that you have

to go to "Sexy and the City" at Yossi Milo, in which the main attraction is a single-wall, salon-style hanging of 29 mostly black-and-white pictures.
As at Richardson the feeling here is more noirish than celebratory, and there is little romance in this sex. The show is leavened by Charles H. Traub's funny picture of an elderly woman at the Metropolitan Museum of Art reading a label at the feet of a giant, marmoreal nude man. But Merry Alpern's grainy, voyeuristic view of a woman in her underwear from a series called "Dirty Windows" and Alvin Baltrop's distant shots of anonymous men having sex on the West Side piers in the late '70s and early '80s are more typical.
The photographers at Yossi Milo are more like underground journalists or sociologists than interested parties. Ryan Weideman's erotically costumed people in the back of his taxi cab, Diane Arbus's awkward young couple on a park bench, Nan Goldin's drag queen out on the street in a huge, rococo wig with nipples exposed: all these images seem possessed of a world-weary remoteness. Hanging on a wall opposite the 29-picture display, Mitch Epstein's big color picture of a pretty young woman in a taxi with her head back in an apparent state of exhausted ennui seems to sum it up.
If the jadedness of the Richardson and Milo shows brings you down, there's a good antidote in a selection of photographs, many never seen in public before, by the great Helen Levitt at Laurence Miller. "First Proofs" presents almost 30 trial prints, ranging from matchbook to playing-card size, that Levitt made between 1939 and 1942. It is a fascinating, heartening exhibition.
In Levitt's images of children at play in Spanish Harlem and the Lower East Side there is not a trace of cynicism. Nor is there anything mean-spirited in her pictures of comically rotund ladies talking on a doorstep or a group of four men who seem clownish archetypes of masculinity, watched over from an apartment window by a little girl with a thoughtful expression. Levitt, who died this year at 95, had a Whitmanesque generosity. Her pictures are loaded with unqualified love, which is something you don't see a lot of in modern photography.
Thanks to artists like Cindy Sherman and Richard Prince, a more prevalent attitude these days is wised-up skepticism: doubt about the truth-telling capabilities of photography itself and suspicion of its engagement with the machinery of mass culture. Three large-scale pictures by Bill Jacobson at Julie Saul Gallery participate in that postmodern trend with depictions of crowded New York streets that are so out of focus it's almost impossible to make out their scenes. They could be viewed as works of Neo-Pictorialist poetry, but mainly they call attention to the technology and conventions of photography.
Most people still want to see through photographs to the people, place and things they represent, and that is the appeal at the Bonni Benrubi Gallery of "Live From New York ...," which rounds up pictures of famous musicians performing or hanging out in the city. Here it's all about the subject: Billie Holiday, Frank Sinatra, Sonny and Cher in hippie-cowboy outfits, Marilyn Monroe singing "Happy Birthday" to President John F. Kennedy, Bob Dylan and George Harrison in a duet onstage, the Ramones outside CBGB. Except for Arnold Newman's starkly formal portrait of Igor Stravinsky, in which the black, uplifted piano top occupies most of the picture, few of the photographs are interesting for formal or stylistic reasons.
One has achieved iconic status: Bob Gruen's 1974 portrait of John Lennon in a sleeveless New York T-shirt, against a backdrop of New York buildings. Lennon once caused a stir by declaring that the Beatles had become more popular than Jesus; for people of a certain age, anyway, Mr. Gruen's image, resonating with Lennon's fate on an Upper West Side street six years later, has an uncanny, Christlike mien.
But no photographic subject symbolizes New York like the Statue of Liberty, which is viewed from near, far, above and below in a small exhibition at Hasted Hunt. In one picture by Lou Stoumen from 1939, a man and a woman gaze worshipfully up at the towering torch bearer. In another, made in 1940 by the same photographer, we look down from above her crown and notice someone sticking an arm out the window, the little human hand comically rhyming with the giantess's fingers curled around her tablet. Bruce Davidson's 1959 photograph of the faraway lady of the harbor, just visible through a forest of rooftop television aerials, is a rueful meditation on humanist values that modernity makes more and more difficult to sustain. Some may view the statue as a colossal piece of kitsch, but who wants to imagine New York without it?

http://www.nytimes.com/2009/08/14/arts/design/14photos.html?ref=design

'AMERICA'S ROME'
With Palettes in Hand, Confronting an Italy of Glory and Decay

By HOLLAND COTTER

COOPERSTOWN, N.Y. — "I was bound to see the Colosseum by moonlight," says Daisy Miller of Schenectady, N.Y., the insistently upbeat but unlucky heroine for whom Henry James named his famous novella. "I shouldn't have wanted to go home without that."

By the time James's story was published in 1878 countless Yankees had already toured Rome, must-do checklists in hand, with countless more to follow as the Gilded Age continued. This summer their 21st-century successors can follow in their footsteps by driving an hour or so west of Daisy's hometown to this village, where an exhibition called "America's Rome: Artists in the Eternal City, 1800-1900" is installed at the Fenimore Art Museum.

With around 140 paintings the show is substantial but small enough for attentive perusal. And while its artists-abroad theme has been addressed before, the recent reopening of the American Wing at the Metropolitan Museum is an encouragement to revisit it. The classicized American 19th-century sculptures that now fill the Engelhard Court at the Met find an ideal complement in the made-in-Italy paintings at Cooperstown.

There's a big difference, though, between the two displays. Where the Met lets its sculptures just stand around looking pretty, or goofy, or ghastly, the Fenimore show takes a serious, investigative look at the pictures it has brought together. And with work as ideologically loaded and anxious as 19th-century American art, serious study makes sense.

For many Americans in those years, travel abroad was itself a serious matter. Vacation was hardly the word for it. Even putting aside the physical rigors — three weeks rocked and tossed midocean, followed by days and nights on lumpy continental roads — the trip was a mental and spiritual workout, as much an experience in moral edification as in aesthetic pleasure, and potentially confusing on both counts.

Rome, for example, carried many positive associations. It was the surviving repository of the Classical ideal that formed a bedrock of Western culture. It was a cradle of republicanism and of imperialism, political systems of equal interest to 19th-century Americans watching the United States develop into a world power.

At the same time the city that visitors actually saw was a wreck, a jumble of antique remains and modern slums, an undemocratic mix of old money and no money. The most renowned ancient monuments changed character depending on who was looking: they were evidence of glory or of end-of-empire decay. They were exotic counterparts to the words cut on Yankee tombstones: "As I am now, so you will be."

American art produced in Rome collectively captured all of this. Most of the artists had come to the city to immerse themselves in Old World cultural traditions available only secondhand at home. Many settled in for a long stay, charmed by the piquant surroundings, cheap living and abundant compatriot company. Some of the more ambitious artists worked hard, and apart, quickly moving beyond warmed-over classicism or exoticism as they attempted to understand and express the ambivalent feelings the city evoked in them.

Thomas Cole did so in an 1832 painting of the Colosseum. He didn't depict the monument in a familiar, distant picture-postcard view, but from inside close to the center, where Daisy Miller would later imagine her moonlight walk. From this vantage the structure looked like the architectural wonder it was, but also intimate, like a great walled garden alive with wild vegetation and worn away by time.

The image that resulted was already a Romantic cliché: the bittersweet ruin. But to it Cole added new things, specific histories. In the middle of the arena stands a large crucifix, its presence turning the Colosseum's arched tiers into a giant altar screen. Cole had a thing for religious props; he slipped them in everywhere. But this one was real. It had been erected in the 18th century to commemorate Christian martyrs and remained in place until the 1870s.

So he makes the Colosseum a sacred place, a Christian place. But he also makes it something else: a reminder of the state of savagery into which a once-great civilization could descend, when the "course of empire" — Cole's term — reached its end.

Cole's vision was so complex and didactic that few other artists matched it, or seemed to want to, though many did variations on it. Some went with its devotional ardor. George Inness painted the empty lands surrounding Rome — the Campagna — as a kind of field of heaven, all blue and bottle green. Sanford Robinson Gifford turned the same terrain into a sheet of beaten gold.

Other artists had tougher eyes. In an 1854 picture John Gadsby Chapman showed the Campagna as wasteland of shattered tombs with an archaeological dig in progress. The excavators seem to be working under supervision, but as they pull classical sculptures and vessels willy-nilly from the earth, the distinction between salvaging and looting feels hazy.

Chapman probably painted this picture, or careful studies for it, on the spot. And the Fenimore Museum curator, Paul D'Ambrosio, backed by the scholars William Vance and John and Mary McGuigan in the catalog, makes much of the American vogue for plein air painting in Italy, a subject overlooked in earlier shows. He also offers some fine examples of the phenomenon, the most delightful being Chapman's deft portrait, painted directly on his wooden palette, of an artist dabbing away near sunset under the shade of an umbrella.

The show has a good amount of figurative work, and too much of certain kinds. Lots of space is given to documenting the artists' use of Roman peasants, preferably in "native dress," as paid-for models. Everyone seems to have given this studio practice a whirl. Interesting artists like Albert Bierstadt and Martin Johnson Heade made interesting use of it — Heade's "Roman Newsboys," one of his very few genre scenes, is a gem — but too many others did not.

More intriguing is what such work suggests about the uneasy relationship of American artists to the cultural milieu of Rome. Chapman seems barely to engage it at all: his peasant models are rosy-cheeked fantasies, tourist-trade dolls, without lives or personalities. Beside them we might put a condescending report by the amateur Philadelphia artist Henry Perry Leland, quoted in the catalog, on the same for-hire sitters:

"They do want a new model for the Madonna badly in Rome, for Giacinta is growing old and fat, and Stella, since she married that cobbler, has lost her angelic expression. The small boy who used to pose for angels has smoked himself too yellow, and the man who stood for Charity has gone out of business."

Again, it seems that everywhere we look in "America's Rome" we find ambivalence and conflict, though Daisy Miller might have wondered what we were thinking. She had no conflicts; she knew exactly what she wanted from her Roman trip: a romantic thrill of the past in the form of a nocturnal Colosseum visit, after which she could return to Schenectady content.

She gets what she wants — "Well, I HAVE seen the Coliseum by moonlight!" — and more. James, expatriate but American to his fingertips, was as uneasy with imperialist American innocence as he was with decadent European pleasure. At the end of "Daisy Miller" someone warns the young woman that the Colosseum at night is a dangerous place of fogs and miasmas. But she goes anyway, catches "Roman fever" — malaria — there, and dies, far from home, a few days later.

"America's Rome: Artists in the Eternal City, 1800-1900" remains through Dec. 31 at the Fenimore Art Museum, 5798 State Highway 80, Lake Road, Cooperstown, N.Y.; (607) 547-1400, (888) 547-1450, fenimoreartmuseum.org.

http://www.nytimes.com/2009/08/14/arts/design/14cotter.html?ref=design

'THE SEEN AND THE HIDDEN'
Multilayered and Multicultural, Creative Views of the Muslim Head Scarf

By KAREN ROSENBERG

The hijab, or Muslim head scarf, is supposed to deflect attention. So what should we make of the model wearing a leopard-print version and an eye patch? She's the creation of Princess Hijab, an anonymous Parisian street artist, who adorns women in advertisements with impromptu black-marker "veils" and papers public spaces with her own hipsterish "Hijab Ads."

The princess is the Shepard Fairey of the French Muslim world or maybe the Naomi Klein. Is she a "hijabist"? Or even a Muslim? We don't know. But you can see some of her work in "The Seen and the Hidden: [Dis]covering the Veil," at the Austrian Cultural Forum in Midtown Manhattan. The exhibition, which includes artists from Europe and the Middle East as well as American artists of diverse backgrounds, reminds New Yorkers that debates about the veil are heating up in many communities overseas.

It is hardly the first show on this subject, but the humor in many of the works is refreshing. The artists are overwhelmingly young and Internet-savvy. They speak in the acerbic and autobiographical tone perfected by Marjane Satrapi, the Iranian expatriate who has recounted her experiences with the veil in "Persepolis," her graphic-novel series, now an animated movie.

A selection of prints from "Persepolis" (Volumes I and II) opens the exhibition. In an early sequence a young Ms. Satrapi, attending school in the wake of the Iranian revolution, chafes at the enforced wearing of the chador. Later in the story she learns that her veiled classmates can still send subtle cues to their personalities and styles.

"With practice, even though they were covered from head to foot, you got to the point where you could guess their shape, the way they wore their hair and even their political opinions," Ms. Satrapi writes in a text above a drawing that illustrates her thought process.

Another Iranian-born artist, Sara Rahbar, expresses a similarly complex attitude toward the veil. Her color photographs show a beautiful woman in Qajar dynasty costume peering through glittering curtains and examining her reflection in ornate, mirror-tiled walls. There's a sense that Ms. Rahbar, who fled Iran during the war with Iraq but has since returned there to live, doesn't feel at home in either the idealized past or the uncertain present.

Using the veil as a physical object rather than a symbol in short video performances proves to be a winning strategy. One standout is "Undressing/Soyunma" (2006), by the Turkish-Austrian artist Nilbar Güres. In the six-minute piece Ms. Güres emerges from beneath many suffocating layers of colorful scarves, unwrapping them one at a time as she recites the names of the friends and family members who provided them. Her act is suspenseful and more than a little seductive, with a dramatic pause before the final piece of fabric is shed.

In Fahreen HaQ's "Endless Tether" (2005), a three-channel video, this South Asian Muslim artist and a mysterious white male play a mesmerizing game of tug of war with a length of billowy red fabric. Ms. HaQ rotates her torso in one direction and then the other, wrapping and revealing, or being swaddled and stripped, depending on who is in control.

Not everything in the show is as tasteful as these works would suggest. Katrina Daschner's sprawling video installation "Cartographies of Sex" manages to be both puerile and preachy. Ms. Daschner, a German-born, Vienna-based artist, performs a gender-bending burlesque routine inspired by the 1940s Egyptian belly dancer Naima Akef, but her awkward gyrations bring to mind "Brüno," the fictional fashion-crazed Austrian.

Marlene Haring, another Austrian, fares only slightly better. Her works hinge on "veils" made of long blond hair. In the photograph "Because every Hair is different" (2007) a seated woman is completely covered, like a Sasquatch. The sculpture "False Friend (Long Chair)" (2009) turns a Corbusier chaise longue into an exaggerated version of Meret Oppenheim's fur-lined teacup.

The curators David Harper, Martha Kirszenbaum and Karin Meisel have clearly made an effort to include artists, like Ms. Daschner and Ms. Haring, who don't have Muslim or Middle Eastern backgrounds. That's admirable, but the most compelling art about the veil comes from women who have some personal experience with it. (Ayad Alkadhi, an Iraqi painter, is the token male in the exhibition.)

And for all its sensitivities, the show doesn't distinguish between the different kinds of veils in the Muslim world: the head scarf, the chador and the burka, to name a few. The wall texts treat these garments more or less interchangeably, as most Westerners see them. To his credit, the Austrian Cultural Forum's director, Andreas Stadler, acknowledges this issue and others in an essay titled "It's Not About the Veil, It's About Us."

In more than a few places you can sense artists grappling with the veil's place in contemporary Western life. It happens in a work by Asma Ahmed Shikoh, a New Yorker of Pakistani descent, who collected hijabs from 100 Muslim-American women. Her sculptural installation takes the form of a honeycomb and refers to Chapter 16 of the Koran, which praises bees as a model for human healing, sustenance and spirituality.

The collaborative format of Ms. Shikoh's sculpture hews closely to classic feminist art like Judy Chicago's "Dinner Party." Each hijab is nestled in its own hexagonal cell and accompanied by the wearer's name, occupation and place of residence. It's a straightforward celebration of diversity and plurality.

At the same time, Western attitudes about clothing (conformity versus self-expression) come face to face with the Islamic world's sartorial proscriptions. Among the many different colored and patterned veils in the honeycomb is a striking red-and-black zebra print. You can picture it on one of Princess Hijab's poster girls.

"The Seen and the Hidden: [Dis]-covering the Veil" continues through Aug. 29 at the Austrian Cultural Forum, 11 East 52nd Street, Manhattan; (212) 319-5300, acfny.org.

http://www.nytimes.com/2009/08/14/arts/design/14hidden.html?ref=design

'DOVE/O'KEEFFE'
Partners in Abstraction, Viewed in Tandem

By ROBERTA SMITH

WILLIAMSTOWN, Mass. — Arthur Dove is a well-known early American modernist, but Georgia O'Keeffe is box-office gold, and the Sterling and Francine Clark Art Institute here makes no bones about it. Billboards for "Dove/O'Keeffe: Circles of Influence," the institute's lively summer exhibition, simply announce "Georgia O'Keeffe at the Clark." Dove is not mentioned. In times like these, such calculated advertising passes for responsible fiscal stewardship: don't confuse people with the facts, just get them through the door.

The show itself corrects this imbalance in different ways. First of all, with nearly 70 works by these artists, including 16 oils by Dove and 19 by O'Keeffe, it demonstrates that without Dove's art there might have been no O'Keeffe. She always credited his work with being crucial in helping her "to find something of my own."

The exhibition also indicates that the shy, retiring Dove was the stronger painter, while the iron-willed O'Keeffe had the stronger personality, which infused her work with distinctive qualities of its own. Organized by the independent curator Debra Bricker Balken, this show is the story of a personal friendship based on mutual artistic respect; it includes works by each painter that the other owned. And it traces a public partnership fomented by art critics and dealers into a catchphrase, one that became synonymous with new, daring art much as "Pollock and de Kooning" and "Johns and Rauschenberg" would in later periods.

The particular meanings associated with the phrase "Dove and O'Keeffe," especially in the 1920s and '30s, reflected the new popularity of Freudian thought. During these years the two artists were often portrayed as yang and yin, the feminine and masculine exemplars of a new nature-based American abstraction that was more than a little sexualized, especially in the case of O'Keeffe. As the critic Paul Rosenfeld wrote in 1924, "Dove is very directly the man in painting, precisely as Georgia O'Keeffe is the female; neither type has been known in quite the degree of purity before."

This point of view was also shaped by Alfred Stieglitz, the photographer, art dealer and visionary. His gallery, 291, gave many American artists their first glimpse of European modernism before the 1913 Armory Show and was in many ways the starting point of the current New York art scene. Stieglitz gave Dove his first solo show in 1912 and O'Keeffe hers in 1917; he represented both artists until his death in 1946. And of course he fell in love with O'Keeffe, leaving his wife for her in 1918 and marrying her six years later. In 1921 Stieglitz exhibited his now classic photographs of O'Keeffe's face, hands and nude body, which did as much as anything to make her the first 20th-century American art star and to link many of her images to the female form.

Dove was born in 1880 in upstate New York, the son of a successful brick manufacturer who opposed his son's art career and ultimately disinherited him. This meant that Dove had to support himself working as an illustrator, a farmer and a caretaker, and toward the end of his life he sometimes teetered on the edge of poverty. Early on, however, in 1908 and 1909, Dove the father helped Dove the son spend 18 months in Europe, mostly in Paris, where he joined a circle of American artists that included Alfred Maurer, Max Weber and Patrick Henry Bruce.

By 1910 or 1911 Dove had become the first American painter, it is widely held, to work abstractly. Like Mondrian and later Klee he merged the latest ideas from Paris, especially Cubism, with a highly personal

reaction to his native environment. Carefully studying natural forms around his family home in Geneva, N.Y., and using deliberate, fanning brushwork or pastel marks that gave his shapes a radiant quality, he devised flattened compositions that merged the geometric and the organic. This fusion, basic to 20th-century American abstraction, is evident in the earliest works in this exhibition, among them the velvety interlocking gray and blue forms of Dove's pastel "Movement No. 1" from around 1911 and his small, even more compactly composed painting "Abstraction No. 3" of 1910-11, which seems based on trees beside a creek.

Like Dove, O'Keeffe, born in 1887, was determined to be an artist from an early age. Studying at the Art Students League, she first visited Stieglitz's gallery in 1908, but it took nearly a decade — and Dove's example — for her to find herself artistically. In 1914 she saw a work by Dove for the first time: "Based on Leaf Forms and Spaces," a pastel reproduced in the first book on avant-garde art written by an American, the Chicago collector Arthur Jerome Eddy's "Cubists and Post-Impressionism."

While Dove lived most of his life either in Geneva or on Long Island, where he died a few months after Stieglitz in 1946, O'Keeffe struck out for the Southwest, whose environment she came to find essential to her work. After 1929 she lived primarily near Santa Fe, N.M., in the village of Abiquiu, until her death in 1986.

The artistic dialogue that transpires in this exhibition is one of agreements and disagreements, primarily about nature, color, surface and space. The constant back and forth enables you to sharpen your appreciation of both artists.

At first you watch O'Keeffe catch up with Dove, alternately pulling it off and stumbling. Two watercolors in saturated primary colors, one of a sunrise from 1916 and one of night stars from 1917, are incredibly deft. A larger all-blue watercolor of a coiled form is vague and inept, as are two oil paintings from 1919 that resemble nothing so much as the top of a very large tooth in front of a very green cabbage. But the centered composition of these paintings nonetheless finds echoes in later, more accomplished works by both artists. We see it especially in Dove's "Penetration" of 1924 and O'Keeffe's small, silvery 1919 "Abstraction," which Dove owned and which might almost be a distillation of his "Abstraction No. 3."

In this show, at least, Dove's forms tend to be close up and immediate, almost regardless of subject. Even when he paints something as grand as "Sunrise" of 1924, his carefully textured surfaces pull us in; his mysterious colors and pulsing forms demand intimacy.

O'Keeffe, in contrast, is more aloof. She favored a smooth, fastidious surface that gives her art an otherworldly perfection; and her compositions can be severe enough to evoke Barnett Newman's stripped-down Abstract Expressionism of 30 years later. The forms in her best images here feel immense and impersonal, whether near or far, and are further dramatized by emphatic distortions of space.

In the dark depths of the 1928 "Wave, Night," three white elements — a curve, an edge-to-edge horizontal line and a pea-size dot — suffice for shoreline, distant whitecaps and a moon so tiny you can almost miss it. In "Dark Abstraction," from 1924, two immense organic shoulderlike shapes press together, nearly filling the canvas and towering over the viewer. The angle of sight in "The Lawrence Tree" of 1929 is steep to the point of deliriousness: straight up the trunk of a pine tree that looms into the picture from the upper left corner, to a canopy of branches dipping toward lower right and, beyond, to stars blanketing a deep blue sky.

The work of Dove and O'Keeffe diverged in the late 1920s, but they remained in touch. In an attempt to head off the sexual readings of her images, O'Keeffe turned to increasingly realistic images. (This didn't always work, as suggested by the overly detailed but nonetheless sexual "Black Iris" of 1930.) In the mid-'20s Dove's feeling for materials led him to make assemblagelike pictures from all kinds of scraps. "Rain," in which he used thin twigs and bits of glass affixed to a metal sheet to suggest inclement weather, belonged to O'Keeffe, who installed it in the New York apartment she shared with Stieglitz and, later, her house in Abiquiu.

In some ways the discrepancy between Dove's and O'Keeffe's reputations, so evident in the billboards for the show, remains one of its more telling aspects. When all is balanced, Dove emerges as the weightier painter. The best artists aren't necessarily those with the big-name recognition.

"Dove/O'Keeffe: Circles of Influence" continues through Sept. 7 at the Sterling and Francine Clark Art Institute, 225 South Street, Williamstown, Mass.; (413) 458-2303, clarkart.edu.

http://www.nytimes.com/2009/08/14/arts/design/14dove.html?ref=design

After the Deluge
By TIMOTHY EGAN

ZEITOUN

By Dave Eggers

Illustrated. 351 pp. McSweeney's Books. $24

Imagine Charles Dickens, his sentimentality in check but his journalistic eyes wide open, roaming New Orleans after it was buried by Hurricane Katrina. He would find anger and pathos. A dark fable, perhaps. His villains would be evil and incompetent, even without Heckuva-Job-Brownie. In the end, though, he would not be able to constrain himself; his outrage might overwhelm the tale.

In "Zeitoun," what Dave Eggers has found in the Katrina mud is the full-fleshed story of a single family, and in telling that story he hits larger targets with more punch than those who have already attacked the thematic and historic giants of this disaster. It's the stuff of great narrative nonfiction. Eggers, the boy wonder of good intentions, has given us 21st-century Dickensian storytelling — which is to say, a character-driven potboiler with a point. But here's the real trick: He does it without any writerly triple-lutzes or winks of postmodern irony. There are no rants against President Bush, no cheap shots at the authorities who let this city drown. He does it the old-fashioned way: with show-not-tell prose, in the most restrained of voices.

In that sense, "Zeitoun" has less in common with Eggers's breakthrough memoir, "A Heartbreaking Work of Staggering Genius" (which met with mostly deserved trumpet-blaring in 2000), than it does with his 2006 novel "What Is the What," the so-called fictionalized memoir of a real-life refugee of the Sudanese civil war. In that book, Eggers's voice took a back seat to his protagonist's outsize story. But it was an odd hybrid.

"Zeitoun" is named for the family at the center of the storm. Abdulrahman Zeitoun is a middle-aged Syrian-American father of four, owner of a successful painting and contracting firm. He works hard and takes good care of his loved ones, in America and in Syria. He is also the kind of neighbor you wish you could find at Home Depot.

His wife, Kathy, has Southern Baptist big-family roots, but drifts after a failed early marriage until she finds a home in Islam and a doting husband in Abdul. Her hijab is a problem for her family, and for many citizens in post-9/11 America. Yet her charms and his smarts make for a good pairing at home and at the office — which is often the same place, an old house in the Uptown neighborhood of New Orleans.

Eggers starts things out at a slow simmer, two days before the storm arrives, with tension in the air, people fleeing, anxiety as heavy as the humidity. It's Hitchcock before the birds attack. Once he starts to turn up the gas, he never lets up. Kathy flees with the children, first to a crowded, anxious house of relatives in Baton Rouge and then west to Phoenix. She begs Zeitoun to join them. But he's been through storms before, he says, and besides, somebody needs to stay behind and watch the fort.

Katrina hits on Sunday, Aug. 28, 2005, the same day as the mandatory evacuation ordered by the mayor. It's a Category 5 storm, with winds over 150 miles an hour. Zeitoun expects his house to leak, maybe some windows to shatter, but he'll be fine. As a precaution, he fetches a 16-foot aluminum canoe that he had purchased secondhand for $75.

Day 1, post-storm, no problem: about a foot of storm sludge in the streets.

Day 2, the world changes. Zeitoun wakes to a sea of water, after the levees have been overtopped. He's neck-deep in a city of a thousand acts of desperation.
"He knew it would keep coming, would likely rise eight feet or more in his neighborhood, and more elsewhere," Eggers writes. At that point, Zeitoun reaches into his aquarium, knowing his fish won't survive there. "He dropped them in the water that filled the house. It was the best chance they had."
Kids: that's the kind of reporting detail that makes a book like this come alive.
Thereafter it's an odyssey with the quality of an unpleasant dream, at times surreal, in which Zeitoun paddles around New Orleans in his canoe for a week, an angel of mercy. This section, which takes up the middle third of the book, reminded me of Cormac McCarthy's postapocalyptic fiction, with the added bonus of proper punctuation.
Zeitoun saves elderly and dehydrated residents trapped in rotting, collapsing homes: "Help me," comes the voice of an old woman. "Her patterned dress was spread out on the surface of the water like a great floating flower. Her legs dangled below. She was holding on to a bookshelf." In his first day in the canoe, Zeitoun assists in the rescue of five residents. "He had never felt such urgency and purpose," Eggers writes. "He was needed."
At night, Zeitoun sleeps in a tent on the flat part of his roof. By day, he's out among the killing waters that buried New Orleans, polluted with garbage, oil, debris, the scraps of people's lives. "It smelled dirtier every day, a wretched mélange of fish and mud and chemicals."
But within a week, the sense of menace and edgy despair becomes overwhelming. Now Zeitoun's days are like a watery version of Dante's "Inferno," with flood and disease and tough moral choices around every bend: rescue or paddle on?
The book takes a sudden turn when six armed officers show up at Zeitoun's house. He thinks they are there to help him, and he's happy to point them to people in need of assistance. Wrong assumption: Zeitoun is taken away at gunpoint.
After that he goes missing, with no contact with the outside world. His wife assumes, after six days without communication, that he's dead. This is perhaps the most haunting part of the book, and Eggers's tone is pitch-perfect — suspense blended with just enough information to stoke reader outrage and what is likely to be a typical response: How could this happen in America?
Only a spoiler would reveal anything beyond this point. Suffice it to say that Zeitoun is mistaken for a terrorist and subjected to a series of humiliations, locked in a cage, then a prison, all the while without being charged with anything or even being allowed to make a phone call to his wife.
The Bush war on terror had come home. FEMA, once a model of government disaster response, is in this account a band of paramilitary thugs, seeing everything through the dark lens of counterterrorism.
Zeitoun was Syrian-American and loose in New Orleans. That's all the authorities needed to know.
In the end, as mentioned, "Zeitoun" is a more powerful indictment of America's dystopia in the Bush era than any number of well-written polemics. That is in large part because Eggers has gotten so close to his subjects, going back and forth between Syria and America, crosscutting to flesh out the family and their story.
"This book does not attempt to be an all-encompassing book about New Orleans or Hurricane Katrina," Eggers writes in his author's note. Of course not. But my guess is, 50 years from now, when people want to know what happened to this once-great city during a shameful episode of our history, they will still be talking about a family named Zeitoun.
Timothy Egan's latest book, "The Big Burn: Teddy Roosevelt and the Fire That Saved America," will be published in October. He writes the Outposts column for NYTimes.com.

http://www.nytimes.com/2009/08/16/books/review/Egan-t.html?ref=books

Hot Ice
By JEFF VANDERMEER

FAR NORTH

By Marcel Theroux

314 pp. Farrar, Straus & Giroux. $25

In Marcel Theroux's postcollapse novel, "Far North," global warming has reduced civilization to largely preindustrial levels of technology and made sparsely populated areas like the Siberian tundra safer than lawless cities. There's a satisfying sadness and finality to Theroux's vision, but the story's true power comes from the hard-won victories of its remarkable narrator, Makepeace. "A person is always better than a book," Makepeace claims, and the novel's enduring achievement is to give us a protagonist who lives up to that claim.

Face scarred by violence, Makepeace patrols the streets of deserted Evangeline, a Siberian town founded by Quakers. After mistakenly shooting a Chinese boy named Ping and then nursing him back to health, Makepeace learns that Ping has a secret — and it's the same secret harbored by Makepeace herself. Ping is a woman, disguised as a man to fool a violent world. In Ping's case, she's also trying to disguise her pregnancy.

Theroux is never shy about subverting expectations. Soon after Ping recovers, Makepeace says with typical yet heartbreaking understatement, "I can't dwell on what happened next, . . . but in June, Ping died and the baby died with her." Ping's death serves as a kind of turning point for Makepeace: it will kill her or force her to engage the world.

Then she witnesses a plane crash, and her despair turns to curiosity: Is the plane a sign of returning civilization? During Makepeace's quest for the answer, members of a strange cult take her prisoner and sell her to slavers. The detail that destroys her is the same one that destroys the reader: "Sometimes, when you've suffered a lot, it turns out to be the small thing that breaks you. That chain almost finished me." The harrowing account of Makepeace's journey to the work camp has the full weight and context of 20th-century history behind it. But when she reaches the camp, personal revelations again dominate. Transferred from hard labor to garden work, Makepeace is unable to bear "the ghost of what might have been" and is "mired in the shame of what I'd become." If shackles can break you when you've suffered,

then small pleasures, like gardening, can also break you — by making you foolishly believe you have a chance at normal life.

Next to such moments, even desperate scenes in a contaminated city (where workers must search for technological marvels) seem oddly unimportant. In this wider context, Theroux can do little more than echo dozens of predecessors, from J. G. Ballard to Cormac McCarthy.

But echoes have their own integrity and resonance. The true flaws in "Far North" are the coincidences that artificially tie Makepeace's past to the novel's present. Without the author's prodding, would Makepeace really return to the same settlement where she'd already escaped from religious fanatics? Is it believable that the person responsible for Makepeace's disfigurement runs the work camp? The reader doesn't need banal explanations, and Makepeace doesn't need the closure.
Makepeace also doesn't need the sentimental, far-fetched rebirth motif that closes "Far North." It's easy to forgive Theroux, though, for succumbing to the temptation. So much has been taken from Makepeace that she's earned some form of kindness.

Deep into this unbearably sad yet often sublime novel, Makepeace says: "Everyone expects to be at the end of something. What no one expects is to be at the end of everything." There's nothing left to say after that — yet Makepeace keeps going, and the reader follows her, if not hopefully then in the hope that she will win out and that her life will have meaning to someone, somewhere.

Jeff VanderMeer's new novel, "Finch," will be published in November.

http://www.nytimes.com/2009/08/16/books/review/VanderMeer-t.html?ref=books

Reaping the Whirlwind
By BRIAN LADD

GERMANY 1945

From War to Peace

By Richard Bessel

Illustrated. 522 pp. Harper/HarperCollins Publishers. $28.99

We have rarely felt sorry for what the Germans suffered at the end of World War II, in part because the Germans have done a superb job of feeling sorry for themselves. Most Germans in 1945 (and long afterward) believed that their own suffering freed them from any obligation to ponder what Germans had done unto others. Historians, therefore, have hesitated to exploit this material, for fear of seeming to endorse the repellent spectacle of German self-pity. The distinguished British historian Richard Bessel, however, understands the difference between suffering and atonement, and with "Germany 1945" he has produced a sober yet powerful account of the terrible year he calls the "hinge" of the 20th century in Europe.

The decisive blow came in January, when a Red Army invasion force, nearly four million strong, poured into eastern provinces that would soon cease forever to be German. (The Anglo-American invasion from the west paled by comparison.) They killed with dreadful efficiency. German military deaths that month exceeded the total wartime losses of either the United States or Britain. Millions of civilians fled in terror from what they had long been told were savage Slavic hordes. Hitler's government, deep in denial, did little to ease the refugees' distress. Nor did it permit the orderly surrender of lost territories. While some soldiers and civilians enthusiastically embraced orders to fight to the death, the rest were kept in line by roving SS death squads that hanged deserters from lampposts. But the formidable Wehrmacht was hopelessly outnumbered and outgunned.

Bessel leaves no doubt about who was to blame for the suffering: Hitler, who chose to destroy his country rather than surrender and face defeat. For the German people — many bombed or chased out of their

homes, all at the mercy of the occupying armies — this was the legacy of the Third Reich: not conquest and glory, nor genocide and guilt, but betrayal and ruin, rubble and grief.

Although the Allies faced a tough job in imposing order, one thing they needlessly feared, as it turned out, was resistance from dead-enders. Rumors of a "Werewolf" underground proved groundless (contrary to the claims of those who argued a few years ago that postwar Germany was just as bad as postwar Iraq). The occupiers were surprised to find a docile people, preoccupied with finding shelter, food and missing family members.

With death all around, the invaders sought vengeance. Soviet soldiers pillaged and raped the most, but the French were not much better. The British and Americans, with fewer grievances, committed fewer atrocities. While Germans resented the inevitable injustices of Allied denazification programs, when the most prominent surviving Nazis went on trial in Nuremberg in November 1945, few could summon any sympathy for these pathetic men who had led their nation into the abyss.

Bessel's account of the second half of 1945 is less gripping but more instructive. The profound insecurity felt by millions of Germans — reduced to camping out in ruined train stations, chasing black-market food and using cigarettes as currency — led to a craving for order: not the Nazis' kind, with its promises of glory and adventure, but something that would give them a home once again. This yearning, Bessel argues, coupled with "the iron tutelage of the Allies," became "the unlikely base for a remarkable recovery."

Bessel, who prefers understatement to pathos, doesn't claim that the suffering was somehow worth it. He merely suggests that misery can sometimes beget hope.

Brian Ladd is the author of "The Ghosts of Berlin" and "Autophobia."

http://www.nytimes.com/2009/08/16/books/review/Ladd-t.html?ref=books

Rebel Rebel
By DAVID S. REYNOLDS

THE STATE OF JONES The Small Southern County That Seceded From the Confederacy

By Sally Jenkins and John Stauffer Illustrated. 400 pp. Doubleday. $27.50

The Civil War was not a simple collision of opposites. There was internal dissent on each side: Northerners who wanted to placate the South, Southerners loyal to the Union, and thousands of deserters from both armies.

In "The State of Jones," Sally Jenkins, a Washington Post reporter, and John Stauffer, a Harvard historian, recreate the life and times of the bold Southern dissenter Newton Knight. An indigent farmer in Jones County, Miss., the flinty, blue-eyed Knight was conscripted into the Southern army in 1862 and soon deserted. He organized a small band of neighbors that used guerilla tactics and swamp hideouts to fend off pursuing Confederate troops. Knight's vastly outnumbered group became a thorn in the side of the South, which was preoccupied with the invasions of Grant and Sherman.

Knight and other Jones County residents aided the North during Reconstruction. Although Knight was married to a white woman and had several children by her, he simultaneously had a long-term liaison with a former slave of his grandfather, named Rachel. At a time when most Mississippi blacks did not own land, he deeded farmland to Rachel, with whom he had a number of children who worked side by side in the fields with their white siblings.

Jenkins and Stauffer suggest that Knight was a religiously inspired antislavery warrior who "fought for racial equality during the war and after" and "forged bonds of alliance with blacks that were unmatched even by Northern abolitionists." But Knight poses special challenges for biographers. He comes down to us mainly through second-hand accounts, such as his white son Tom's sometimes-unreliable 1934 biography.

There's the rub. Jenkins and Stauffer create a lively narrative, but is it factual — or fictionalized, like the movie script about Knight by the screenwriter Gary Ross, which, the authors report, inspired them to write the book?

These issues are the subject of an Internet debate that began when Victoria Bynum, a Texas State history professor and author of the well-researched 2001 book "The Free State of Jones," wrote a review on her blog, Renegade South, in which she characterized Jenkins and Stauffer's book as a good read but inaccurate and unjustifiably politicized. Jenkins and Stauffer responded with counterevidence and claimed that Bynum had launched "turf warfare" to promote her own book. Others joined the exchange, pointing out small factual errors made by Jenkins and Stauffer, as well as the larger one that Jones County did not officially secede from the Confederacy, invalidating their book's subtitle.

The dearth of dependable primary evidence about Knight forces Jenkins and Stauffer to rely often on conjecture. Their book fills lacunas with words like "perhaps," "it is possible," "likely," "could have," and so on. More than 50 pages is devoted to Knight's war experiences, hard information about which is scant. One battle described, Vicksburg, may have little bearing on his biography, since, as an endnote says, "there is no absolute proof that Newton was at Vicksburg, and a case can be made that he was not." (Bynum gives evidence that he was not.)

It's impossible to gauge Knight's alleged early antislavery views, as Jenkins seems to concede in a blog comment: "We don't say categorically he was antislavery before the war." Jenkins and Stauffer describe the ex-slave Rachel as a caring soulmate who symbolized Knight's forward-looking capacity to reach across the racial divide. But we can't be sure, since, as the authors write, "there is precious little direct evidence of their relationship." Jenkins and Stauffer bring historical contexts to life and offer provocative interpretations, but they pile hunch upon hunch about Knight himself. Unless a new cache of sources about his life turns up, he'll remain as elusive to biographers as he was to the Confederate troops that chased him through the wooded marshes of Jones County.

David S. Reynolds is a distinguished professor at the CUNY Graduate Center. His most recent book is "Waking Giant: America in the Age of Jackson."

http://www.nytimes.com/2009/08/16/books/review/Reynolds-t.html?ref=books

Writer's Myth Looms as Large as the Many Novels She Wrote
By DWIGHT GARNER

WHY THIS WORLD

A Biography of Clarice Lispector

By Benjamin Moser

Illustrated. 479 pages. Oxford University Press. $29.95.

The avant-garde Brazilian writer Clarice Lispector (1920-77) is little known in America, where only a handful of her many books have been issued in translation, but back home she is literary royalty — she burns in the collective memory like a slightly sinister eternal flame.

Lispector's face stares from Brazilian postage stamps, and her name adorns luxury condominiums. Countless books have been written about her there, and dozens of theatrical performances have been based on her work. You can buy her books in subway vending machines.

"Her first name is enough to identify her to educated Brazilians," Benjamin Moser writes in "Why This World: A Biography of Clarice Lispector."

Lispector's myth looms as large as anything she has written. Her unusual name made her sound like a spy. Her green almond eyes and high cheekbones led people to liken her to a she-wolf or a panther. To the translator Gregory Rabassa, Lispector "looked like Marlene Dietrich and wrote like Virginia Woolf."

Because Lispector shunned the spotlight, and because she married a diplomat at 22 and spent nearly two decades outside of Brazil, rumors about her sprang up to fill the void.

Some thought she was a man writing under a pseudonym. Her interest in the occult (she had a lifelong habit of consulting astrologers and card readers) led people to refer to her as "the great witch of Brazilian literature." She was also called a monstre sacré. Later in life she burned her right hand in an apartment fire, and it came to resemble a black claw.

Lispector's writing was as unconventional as she was. Her novels and stories lack easily discernible plots, and are related in simmering, impressionistic language. They have a haunted, interior quality that cut against the grain of contemporary Brazilian literature. The poet Elizabeth Bishop, who translated a few of Lispector's stories, wrote to friends: "I think she is better than J. L. Borges — who is good, but not all that good!"

This is rich biographical material that gets only richer as Mr. Moser, a translator and a book critic for Harper's Magazine, begins to unpeel the layers of her complicated life. "Why This World" sucks you — for long stretches, anyway — into its subject's strange vortex.

Clarice Lispector was actually born in Ukraine to Jewish parents. Her birth name was Chaya Pinkhasovna Lispector. Her family fled Russia's pogroms in the wake of World War I, when Clarice was a baby. They were lucky to escape, but they hardly emerged unscathed. Lispector's mother was raped by Russian soldiers and contracted syphilis.

The family immigrated to Recife, a town in northeastern Brazil. When Lispector was 9, her mother died from syphilis. Lispector and her two sisters were raised by their father, who eventually moved the family to Rio de Janeiro. He was a kind and intelligent man with zero talent for making a living. He earned money by peddling cheap goods on the street, and by making and selling soap.

At 13, after reading Hermann Hesse's novel "Steppenwolf," Lispector decided that she wanted to be a writer. After graduating from a prestigious Brazilian law school, she worked as a journalist and began to publish short stories in small magazines.

Her first novel, "Near to the Wild Heart," was issued in 1943 and became a critical sensation. One critic called it "the greatest novel a woman has ever written in the Portuguese language." The novel's stream-of-consciousness style led critics to compare Lispector to Joyce and Woolf, writers she had yet to read.

"Near to the Wild Heart" was, in part, a fractured complaint against marriage. After your wedding, one of its female characters says, "all you can do is wait for death." But by the time the novel came out, Lispector herself had married Maury Gurgel Valente, a young Brazilian diplomat. His postings over the next two decades would take them, and later their two sons, across the world, to Naples, Bern and Washington.

For Lispector, being away from Brazil was a kind of death. The role of the diplomat's wife never came easily to her; she considered it a type of forcible domestication. Her letters are full of acid complaints. "This Switzerland is a cemetery of sensations," she wrote. "The people too are silent and laugh little. I'm the only one laughing." In Washington she rebelled by decorating her Christmas tree with odd black, brown and gray ornaments.

In 1959 she separated from her husband and moved with her two sons back to Rio, where she would live for the rest of her life. She continued writing fiction — at the time of her death she had written some 20 books, including novels, volumes of stories and a few children's books — and began a popular series of columns for Jornal do Brasil, a major daily newspaper.

She needed money, and also took odd jobs to survive. Under a pseudonym she wrote an advice column that was secretly underwritten by the Pond's face cream company, and she sometimes used the company's news materials verbatim. She translated many books, sometimes sloppily.

Her looks fading, the vain Lispector became increasingly reclusive and demanding. Addicted to cigarettes and sleeping pills, she exhibited erratic and sometimes imperious behavior. She would call friends in the middle of the night and flee dinner parties for little apparent reason. She had a reputation for being a liar. About being friends with her, one woman said, "Nobody can stand it for long."

In interviews and in her writing, she fanned the coals of her own legend in ways that made her sound ludicrous. "I am all of yourselves," she said. Also: "Not having been born an animal is one of my secret nostalgias. Maybe it's because I'm a Sagittarian, half beast." About a visit to see the Sphinx, she said, "I'll see who devours whom."

Mr. Moser, at times, also lays it on a little thick. He writes that Lispector's oeuvre is "perhaps the greatest spiritual autobiography of the 20th century." He suggests that she had "one of the most extraordinary careers in 20th-century literature." He calls her novel "The Passion According to G. H." "one of the great novels of the 20th century" and, a few pages later, "among the century's greatest novels."

But a biographer needs his enthusiasms the way a hot motor needs grease. Mr. Moser, for the most part, is a lucid and very learned tour guide, and his book is a fascinating and welcome introduction to a writer whose best work should be better known in this country.

If Clarice Lispector, who died of ovarian cancer in 1977, remains tantalizingly out of reach at the end of "Why This World," it's not through any fault of the industrious Mr. Moser. As Lispector once wrote, "I am so mysterious that even I don't understand myself."

http://www.nytimes.com/2009/08/12/books/12garner.html?ref=books

Patterns: Do Real Men Go to the Doctor?

By RONI CARYN RABIN

Real men don't ask for directions, and now researchers are saying the reluctance to ask for help may not just mean they get lost. It may also take a toll on their health.

Men who strongly endorsed old-school notions of masculinity — believing the ideal man is the strong, silent type who doesn't complain about pain — were only half as likely as other men to seek preventive health care services, like an annual physical or a flu shot, the study found.

Even men with a high level of education, a factor that is strongly associated with better health and usually a predictor of longer life, were less likely to seek out preventive health care if they strongly adhered to the ideal of the macho man, said Kristen W. Springer, the study's primary investigator and an assistant professor of sociology at Rutgers, The State University of New Jersey.

"It's ironic that the belief in the John Wayne, Sylvester Stallone archetype of masculinity — and the idea that real men don't get sick and don't need to see the doctor, and that real men aren't vulnerable — is actually causing men to get sick," Dr. Springer said. "These stereotypes and ideas are actually a reason why men do get sick."

Interestingly, the men who held strong beliefs in old-fashioned masculinity but who worked in blue-collar, stereotypically male jobs — like truck drivers or construction workers — were more likely to seek preventive care. One reason may be because the possibility of not being able to work was a greater threat to their masculinity than seeking help, she said.

The study may help explain why there is still a gender longevity gap, with women outliving men by about five years on average, Dr. Springer said. She added that the real surprise was that the health benefits usually associated with higher education were completely undermined by strongly held macho ideals.

The findings, from a large longitudinal study of about 1,000 middle-aged men who graduated from Wisconsin high schools in 1957, were presented at a meeting of the American Sociological Association in San Francisco.

The men's masculinity beliefs were assessed by their answers to a series of questions, including whether they believed men should be the main breadwinners in the family, show pain or display confidence even when they did not feel it, and whether husbands should have the final say in purchases for the home.

The analysis is believed to be the first population-based study of men's masculinity beliefs and preventive health behaviors.

http://www.nytimes.com/2009/08/18/health/research/18patt.html?ref=health

Increased Ocean Acidification In Alaska Waters, New Findings Show

The pteropod (also known as a sea butterfly or swimming sea snail) may be one of the first marine organisms affected by ocean acidification. Pteropods make up nearly half of the pink salmon diet. This particular pteropod is the Limacina helicina helicina. (Credit: Photo by Russ Hopcroft, UAF School of Fisheries and Ocean Sciences)

ScienceDaily (Aug. 14, 2009) — The same things that make Alaska's marine waters among the most productive in the world may also make them the most vulnerable to ocean acidification. According to new findings by a University of Alaska Fairbanks scientist, Alaska's oceans are becoming increasingly acidic, which could damage Alaska's king crab and salmon fisheries.

This spring, chemical oceanographer Jeremy Mathis returned from a cruise armed with seawater samples collected from the depths of the Gulf of Alaska. When he tested the samples' acidity in his lab, the results were higher than expected. They show that ocean acidification is likely more severe and is happening more rapidly in Alaska than in tropical waters. The results also matched his recent findings in the Chukchi and Bering Seas.

"It seems like everywhere we look in Alaska's coastal oceans, we see signs of increased ocean acidification," said Mathis.

Often referred to as the "sister problem to climate change," ocean acidification is a term to describe increasing acidity in the world's oceans. The ocean absorbs carbon dioxide from the air. As the ocean absorbs more carbon dioxide, seawater becomes more acidic. Scientists estimate that the ocean is 25 percent more acidic today than it was 300 years ago.

"The increasing acidification of Alaska waters could have a destructive effect on all of our commercial fisheries. This is a problem that we have to think about in terms of the next decade instead of the next century," said Mathis.

The ocean contains minerals that organisms like oysters and crabs use to build their shells. Ocean acidification makes it more difficult to build shells, and in some cases the water can become acidic enough to break down existing shells. Mathis' recent research in the Gulf of Alaska uncovered multiple sites where the concentrations of shell-building minerals were so low that shellfish and other organisms in the region would be unable to build strong shells.

"We're not saying that crab shells are going to start dissolving, but these organisms have adapted their physiology to a certain range of acidity. Early results have shown that when some species of crabs and fish are exposed to more acidic water, certain stress hormones increase and their metabolism slows down. If they are spending energy responding to acidity changes, then that energy is diverted away from growth, foraging and reproduction," said Mathis.

Another organism that could be affected by ocean acidification is the tiny pteropod, also known as a sea butterfly or swimming sea snail. The pteropod is at the base of the food chain and makes up nearly half of the pink salmon's diet. A 10 percent decrease in the population of pteropods could mean a 20 percent decrease in an adult salmon's body weight.

"This is a case where we see ocean acidification having an indirect effect on a commercially viable species by reducing its food supply," said Mathis.

The cold waters and broad, shallow continental shelves around Alaska's coast could be accelerating the process of ocean acidification in the North, Mathis said. Cold water can hold more gas than warmer water, which means that the frigid waters off Alaska's coasts can absorb more carbon dioxide. The shallow waters of Alaska's continental shelves also retain more carbon dioxide because there is less mixing of seawater from deeper ocean waters.

Ask any coastal Alaskan and they will tell you that Alaska's waters are teeming with biological life, from tiny plankton to humpback whales. All of these animals use oxygen and emit carbon dioxide. Mathis and other scientists call this the "biological pump."

"We are blessed with highly productive coastal areas that support vast commercial fisheries, but this productivity acts like a pump, absorbing more and more carbon dioxide from the atmosphere," said Mathis. "Because of this, the acidity of Alaska's coastal seas will continue to increase, and likely accelerate, over the next decade."

Mathis said that it is still unclear what the full range of effects of ocean acidification will be, but that it is a clear threat to Alaska's commercial fisheries and subsistence communities.

"We need to give our policy makers and industry managers information and forecasts on ocean acidification in Alaska so they can make decisions that will keep our fisheries viable," said Mathis. "Ecosystems in Alaska are going to take a hit from ocean acidification. Right now, we don't know how they are going to respond."

Adapted from materials provided by University of Alaska Fairbanks.

http://www.sciencedaily.com/releases/2009/08/090813163158.htm

New Life Histories Emerge For Invasive Wasps, Magnify Ecological Harm

Invasive yellowjacket wasp sips on a native Hawaiian ohia blossom. (Credit: Erin Wilson)

ScienceDaily (Aug. 14, 2009) — A switch from annual to multiyear colonies and a willingness to feed just about any prey to their young have allowed invasive yellowjacket wasps to disrupt native populations of insects and spiders on two Hawaiian islands, a new study has found.

By analyzing the DNA from bits of prey snatched from foragers returning to nests, ecologists from the University of California, San Diego, found that introduced yellowjacket wasps kill or scavenge prey from 14 different taxonomic orders of animals, even reptiles and birds.

"They're consuming anything from geckos to shearwater to tree lice to more juicy items that you would expect them to eat, like caterpillars. They're just like little vacuum cleaners," said Erin Wilson, who recently completed her doctorate at UC San Diego and is the lead author of the study reported in the *Proceedings of the National Academy of Sciences* this week.

Wilson and her colleagues found that nearby populations of caterpillars and spiders rebounded when rangers removed wasp nests.

Existing traits, like a flexible diet, can explain why some transplanted species become invasive, but the way a new environment might alter the invader's behavior is seldom considered, the authors say.

In their native range, Western yellowjackets (Vespula pensylvanica) nearly always form nests in the spring that become dormant before winter. In Hawaii's mild climate, however, up to 20 percent of colonies persist for years, grow to enormous sizes and have become major pests. One colony on Maui had as many as 600,000 individuals, compared to the usual size of a few thousand wasps.

"Rather than having a nest the size of a football, you'll have a nest the size of a '57 Buick," Wilson said. "Our largest colony had four nest entrances that were just like fire hoses of wasps coming in and out." More than three times as many foragers return to perennial nests each minute compared to annual nests, the researchers found, most of them bringing food.

The sheer numbers are changing the ecology of Hawaii's endangered ohia woodlands and subalpine shrublands.

"It's not just what they're killing," Wilson said. "They're also collecting great amounts of nectar, drawing down the resources for anything else that might want to feed on it whether it's native insects or birds like the Hawaiian honeycreepers."

In the fall of 2006 and 2007 Wilson traveled to Hawaii Volcanoes National Park on the island of Hawaii and Haleakala National Park on Maui to study the wasps.

Adult wasps mostly consume nectar, but collect protein-rich food for their developing larvae and carry it back to the nest. Wilson and her field assistants plucked bits of food from the mandibles of 500 foragers returning to 10 different nests, five in each park, then sequenced the DNA.

"We were able to identify, using genetics, very small prey items," Wilson said. They compared the sequences to a public database and to sequences they obtained from whole, identifiable specimens collected near the nests to create a comprehensive catalogue of the wasps' diet.

Although wasps will scavenge food from carcasses, more than two-thirds of the confiscated food bits were from freshly killed prey, they found, including native spiders, flies, crickets, bark lice, and Hylaeus bees.

The wasps also eat other introduced insects, which are abundant in Hawaii, such as European honeybees. These fellow invaders may help to sustain larger populations of wasps than the native fauna could, the authors say.

When park officials removed colonies, nearby populations of native spiders and caterpillars rebounded. With the yellowjackets gone, spiders increased by 36% and caterpillars increased by 86% they found.

"We were not only seeing what the yellowjackets consumed, we were actually able to tie that directly to predation," Wilson said. "We were able to say these things in the diet are actually being depressed at the population level."

Co-authors include biology professor David Holway and Lynne Mullen, a former graduate student at UC San Diego, who now studies at Harvard University. The National Science foundation and the Environmental Protection agency funded the work.

Adapted from materials provided by University of California - San Diego.

http://www.sciencedaily.com/releases/2009/07/090720190609.htm

Middle Miocene Oxygen Minimum Zone Expansion Offshore West Africa: Evidence For Global Cooling Precursor Events

ScienceDaily (Aug. 14, 2009) — The Middle Miocene Climatic Optimum (16 to 14 million years ago), considered generally to be the warmest period in Earth's history within the past 25 million years, saw a major shift in climate from global warming to cooling.

This reversal of climatic warming has proven difficult to understand because of the limited range of available records. The first records of this time interval from the Congo Fan, West Africa, may shed light on the events preceding the major cooling at 14 million years ago. The results of Kender et al. reveal two acidification events in the deep sea off West Africa about 16 and 15.5 million years ago, coincident with massive flood basalt release in the Columbia River basin, USA. The Columbia River Flood Basalts represent the largest group of eruptions to occur on Earth since the Paleogene, over 50 million years ago, and Kender et al. now suggest that they had a significant effect on the climate at this time.

The acidification events, which dissolved carbonate organisms on the seafloor, probably resulted from the accumulation of dead organic matter on the seafloor. Stronger offshore winds and increased primary productivity in the surface ocean off the west coast of Africa is likely to account for the accumulation and burial of this organic matter, which ultimately removed CO_2 from the atmosphere, leading to long-term cooling.

The implications of this study are that Columbia River volcanism likely triggered climatic cooling by sulphuric acid-induced volcanic winters, which would have increased the tradewinds off West Africa and, in turn, fertilized the ocean by transporting more nutrients such as sulphates to the ocean.

Large extinctions in deep-sea organisms (benthic foraminifera) associated with this time interval imply that increasing ocean productivity may have dramatic consequences for ocean ecology.

This reseach by S. Kender et al. of the British Geological Survey is published in the August issue of Geology on pages 699-702.

Adapted from materials provided by The Geological Society of America, via AlphaGalileo.

http://www.sciencedaily.com/releases/2009/08/090801095806.htm

Unexpected Relationship Between Climate Warming And Advancing Treelines

New research reveals that treelines are not universally responding to climate warming by advancing, as expected. (Credit: iStockphoto/Alexander Potapov)

ScienceDaily (Aug. 14, 2009) — A new study reveals that treelines are not responding to climate warming as expected. The research, the first global quantitative assessment of the relationship between climate warming and treeline advance, is published in *Ecology Letters* and tests the premise that treelines are globally advancing in response to climate warming since 1900.

Treelines are the elevation or latitudinal limits where trees are capable of growth or survival and are considered to be early indicators of climate warming because they are constrained primarily by cold temperatures. Summer temperature is widely considered to be the primary control of treeline formation and maintenance, whereas winter temperatures have previously been considered less critical because of the insulative effects of snow. This study reveals how winter warming has overturned this prevailing view.

"Average temperatures have risen over the last century, with a more pronounced and rapid change at high altitudes and latitudes", said Ms. Melanie Harsch from the Bio-Protection Research Centre in New Zealand. "Within these zones, treelines are thought to be more temperature sensitive and so the rise in summer temperatures should result in an advance of treeline position."

Harsch and her co-authors conducted a multivariate meta-analysis, using a global dataset of 166 treeline sites with temperature data taken from the closest climate station to each site. The team used this data to analyse treeline advance throughout the 20th century and consider the contributing factors to that advance.

The team found that only 87 of the 166 sites (52%) had advanced while simultaneously the mean annual local temperatures had increased at 111 of the 166 sites at an average rate of 0.013˚C a year (or 1˚C in 77 years). Of the remaining sites, 77 (47%) remained stable and only two (1%) had treelines that receded. Both of the receding sites showed evidence of disturbance, indicating that regardless of form, location or

degree of temperature change experienced over the last century, treeline positions have either advanced or remained static.

"Surprisingly these results reveal that treelines are not universally responding to climate warming by advancing, as expected," said Harsch, "However they demonstrate the importance of temperature on treeline advance over other factors such as disturbance, latitude, scale, elevation and distance to the ocean; none of which demonstrated strong relationships with the probability of treeline advance."

Another surprising result of this study was the association with winter, rather than summer, warming. These results provide no evidence of the prevailing view that high altitude and latitude treelines are controlled only by summer temperatures. Instead they show that treelines are more likely to advance at sites that had warmed during the winter months. It is known, at least in northern latitudes that climate-associated changes in winter conditions are on average more extreme than changes in summer conditions.

"These results show that treelines are responding to warming, but are not consistent in that only half of the sites showed signs of advance despite most sites experiencing warming. Several studies on plant species' responses to climate warming have shown mixed results and this study provides a possible explanation – both winter and summer conditions control treeline position," concluded Harsch. "Our expectations of response depend upon which factors are limiting the current treeline distribution. Where summer temperature is the primary limiting factor we can expect to continue seeing advance, but at other sites treeline advance is unlikely to occur until other limiting factors are first lessened."

Journal reference:

1. Harsch M, Hulme P, McGlone M, Duncan R. **Are Treelines Advancing? A global meta-analysis of treeline response to climate warming**. *Ecology Letters*, 2009; DOI: 10.1111/j.1461-0248.2009.01355.x

Adapted from materials provided by Wiley-Blackwell, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/08/090812202047.htm

Novel, Orally Inhaled Migraine Therapy Is Effective, Study Shows

ScienceDaily (Aug. 14, 2009) — A new study conducted at the Jefferson Headache Center at Thomas Jefferson University Hospital in Philadelphia, Pennsylvania shows an investigational, orally-inhaled therapy is effective in treating migraines. The multi-center, phase three FREEDOM-301 trial for the orally-inhaled migraine therapy, LEVADEX™, shows study participants had significant relief from symptoms such as pain, nausea and light and sound sensitivity when compared to placebo treatment.

According to trial results, this therapy provided pain relief in 30 minutes and sustained relief for 48 hours after dosing in patients with moderate or severe migraine attacks. The drug was generally very well tolerated and there were no drug-related, serious adverse events reported.

According to the American Headache Society (AHS), migraine is a common, debilitating neurological disorder that affects approximately 30 million people in the United States. The AHS also states that most migraines last between four and 24 hours, but some may last as long as three days. Common associated symptoms of migraine include nausea, vomiting, photophobia (sensitivity to light) and phonophobia (sensitivity to sound).

"The major advantage of LEVADEX is that it has the efficacy of intravenous DHE (dihydroergotamine) with a side-effect profile similar to placebo and better than oral triptans," said Stephen Silberstein, M.D., F.A.C.P, a clinical study investigator, director of the Jefferson Headache Center, and professor in the Department of Neurology at Jefferson Medical College of Thomas Jefferson University.

About the FREEDOM-301 Study

FREEDOM-301 is a multi-center, randomized, double-blind, placebo-controlled Phase 3 trial designed to evaluate the safety and efficacy of LEVADEX as a potential treatment for acute migraine. Primary efficacy measures include pain relief, and being free from phonophobia, photophobia and nausea at two hours after dosing. Patients enrolled in the trial were evaluated for the treatment of a single moderate or severe migraine attack and then were given the option to continue in an open label, long-term safety study. This safety study is targeting 300 patients for six months and 150 patients for 12 months, and over 500 patients are continuing in this arm of the trial. FREEDOM-301, the first Phase 3 study of LEVADEX therapy, was conducted pursuant to a Special Protocol Assessment with the U.S. Food and Drug Administration. The FREEDOM-301 trial is sponsored by MAP Pharmaceuticals, Inc.

About LEVADEX™

LEVADEX orally inhaled migraine therapy is a novel migraine therapy in Phase 3 development. Patients administer LEVADEX themselves using MAP Pharmaceuticals' proprietary TEMPO® inhaler. LEVADEX has been designed to be differentiated from existing migraine treatments. It is a novel formulation of dihydroergotamine (DHE), a drug used intravenously in clinical settings for many years to effectively and safely treat migraines. Based on clinical results, MAP Pharmaceuticals believes that LEVADEX has the potential to provide both fast onset of action and sustained pain relief and other migraine symptom relief in an easy-to-use and non-invasive at-home therapy.

Based on research to date, including the FREEDOM-301 trial, MAP Pharmaceuticals believes the unique pharmacokinetic profile of LEVADEX has the potential to effectively treat migraines, while minimizing the side effects commonly seen with DHE and other currently available medicines.

About the Jefferson Headache Center

The Jefferson Headache Center is one of a very few academic headache centers in the country. The Center, founded in 1982, specializes in the treatment of patients with all types of headache pain. In addition to treating patients, the Jefferson Headache Center is a teaching facility that gives trainees the

highest quality of preparation so that they can make contributions to patient care and advance the level of knowledge of headache medicine. The Fellowship program prepares Fellows for a career in clinical headache practice or academic headache medicine and/or research. The Jefferson Headache Center is also deeply involved in research. The Clinical Research team is made up of the Clinical Research Manager, several Research Coordinators, and a Clinical Trials Assistant. For more information, visit http://www.jefferson.edu/headache.

Editor's Note: LEVADEX and TEMPO are trademarks of MAP Pharmaceuticals, Inc. Dr. Silberstein serves on the Advisory Board for MAP Pharmaceuticals.

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

http://www.sciencedaily.com/releases/2009/08/090811143546.htm

Scientists Warn Restoration-based Environmental Markets May Not Improve Ecosystem Health

ScienceDaily (Aug. 14, 2009) — While policymakers across of the globe are relying on environmental restoration projects to fuel emerging market-based environmental programs, an article in the July 31 edition of *Science* by two noted ecologists warns that these programs still lack the scientific certainty needed to ensure that restoration projects deliver the environmental improvements being marketed.

Markets identify the benefits humans derive from ecosystems, called ecosystem services, and associate them with economic values which can be bought, sold or traded. The scientists, Dr. Margaret Palmer and Dr. Solange Filoso of the University of Maryland Center for Environmental Science Chesapeake Biological Laboratory, raise concerns that there is insufficient scientific understanding of the restoration process, namely, how to alter a landscape or coastal habitat to achieve the environmental benefits that are marketed.

"Both locally and nationally, policymakers are considering market-based environmental restoration programs where the science does not yet conclusively show that environment health will improve once the 'restoration' is completed," said Dr. Palmer. "These programs may very well make economic sense, but the jury is still out whether or not the local environment will ultimately benefit."

At present, the demand in ecosystem service markets is driven by regulations that require those who harm the environment to mitigate or provide offsets for their environmental impacts. But in the regions throughout the world, including the Chesapeake Bay, many people hope that voluntary markets will expand outside of a regulatory context and result in a net gain of ecosystem services rather than just offsets for lost ecosystem services.

Examples include markets for flood protection created by restoring floodplains or wetlands and markets for improving water quality by restoring streams or rivers. The scientists outline what should be done before markets expand further: recognize that restoration projects generally only restore a subset of the services that natural ecosystem provide, complete a limited number of projects in which direct measurements are made of the response of biophysical processes to restoration actions, and identify easily measured ecosystem features that have been shown to reflect the biophysical processes that support the desired ecosystem service.

"There is an inherent danger of marketing ecosystem services through ecological restoration without properly verifying if the restoration actions actually lead to the delivery of services," said Dr. Filoso. "If this happens, these markets may unintentionally cause an increase in environmental degradation."

This work is supported in part by a Collaborative Network for Sustainability grant from the U.S. Environmental Protection Agency.

Journal reference:

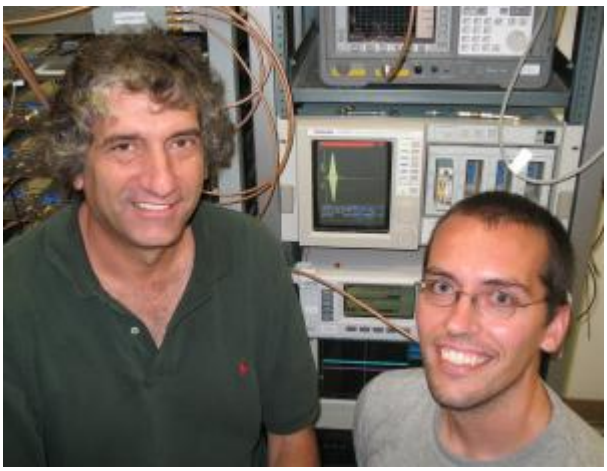
1. . **Restoration of Ecosystem Services for Environmental Markets**. *Science*, July 31, 2009

Adapted from materials provided by University of Maryland Center for Environmental Science, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/07/090730141600.htm

Experiments Push Quantum Mechanics To Higher Levels

John Martinis and Matthew Neeley are researchers at University of California - Santa Barbara. (Credit: George Foulsham, Office of Public Affairs, UCSB)



ScienceDaily (Aug. 13, 2009) — Scientists at UC Santa Barbara have devised a new type of superconducting circuit that behaves quantum mechanically – but has up to five levels of energy instead of the usual two. The findings are published in the August 7 issue of *Science*.

These circuits act like artificial atoms in that they can only gain or lose energy in packets, or quanta, by jumping between discrete energy levels. "In our previous work, we focused on systems with just two energy levels, 'qubits,' because they are the quantum analog of 'bits,' which have two states, on and off," said Matthew Neeley, first author and a graduate student at UCSB.

He explained that in this work they operated a quantum circuit as a more complicated artificial atom with up to five energy levels. The generic term for such a system is "qudit," where 'd' refers to the number of energy levels — in this case, 'd' equals five.

"This is the quantum analog of a switch that has several allowed positions, rather than just two," said Neeley. "Because it has more energy levels, the physics of a qudit is richer than for just a single qubit. This allows us to explore certain aspects of quantum mechanics that go beyond what can be observed with a qubit."

Just as bits are used as the fundamental building blocks of computers, qubits could one day be used as building blocks of a quantum computer, a device that exploits the laws of quantum mechanics to perform certain computations faster than can be done with classical bits alone. "Qudits can be used in quantum computers as well, and there are even cases where qudits could be used to speed up certain operations with a quantum computer," said Neeley. "Most research to date has focused on qubit systems, but we hope our experimental demonstration will motivate more effort on qudits, as an addition to the quantum information processing toolbox."

The senior co-author of the paper is John M. Martinis, professor of physics at UCSB. Other co-authors from UCSB are: Markus Ansmann, Radoslaw C. Bialczak, Max Hofheinz, Erik Lucero, Aaron D. O'Connell, Daniel Sank, Haohua Wang, James Wenner, and Andrew N. Cleland. Another co-author, Michael R. Geller, is from the University of Georgia.

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

http://www.sciencedaily.com/releases/2009/08/090811143844.htm

Black Tea May Fight Diabetes

Long known for its antioxidants, immune boosting and, most recently, antihypertensive properties, black tea could have another health benefit. Black tea may be used to control diabetes. (Credit: iStockphoto/Dmitry Galanternik)

ScienceDaily (Aug. 13, 2009) — Long known for its antioxidants, immune boosting and, most recently, antihypertensive properties, black tea could have another health benefit. Black tea may be used to control diabetes, according to a study in the *Journal of Food Science*, published by the Institute of Food Technologists.

Next to water, tea is the second most consumed beverage in the world. Researchers from the Tianjin Key Laboratory in China studied the polysaccharide levels of green, oolong and black teas and whether they could be used to treat diabetes. Polysaccharides, a type of carbohydrate that includes starch and cellulose, may benefit people with diabetes because they help retard absorption of glucose.

The researchers found that of the three teas, the polysaccharides in black tea had the most glucose-inhibiting properties. The black tea polysaccharides also showed the highest scavenging effect on free radicals, which are involved in the onset of diseases such as cancer and rheumatoid arthritis.

"Many efforts have been made to search for effective glucose inhibitors from natural materials," says lead researcher Haixia Chen. "There is a potential for exploitation of black tea polysaccharide in managing diabetes."

Adapted from materials provided by Institute of Food Technologists.

http://www.sciencedaily.com/releases/2009/07/090728172604.htm

Scientists Open Doors To Diagnosis Of Emphysema

ScienceDaily (Aug. 13, 2009) — hronic inflammatory lung diseases like chronic bronchitis and emphysema are a major global health problem, and the fourth leading cause of death and disability in developed countries, with smoking accounting for 90% of the risk for developing them. Work by scientists at the European Molecular Biology Laboratory (EMBL) and its Molecular Medicine Partnership Unit (MMPU) with the University of Heidelberg, Germany, has shed new light on the underlying disease process of emphysema using a technique which could in future be adapted for use in diagnosis.

The researchers present a new strategy for testing the activity of MMP12, an enzyme known to be involved in the development of emphysema. Emphysema is characterised by the damage and destruction of the alveoli, the tiny air-sacs of the lungs that are crucial for respiration and uptake of oxygen from the air.

Cigarette smoke and other irritants activate immune cells, like macrophages, in the lungs to destroy the foreign material, and chronic exposure causes inflammation. MMP12 is an enzyme secreted by macrophages which usually helps them to break down the extracellular matrix (the complex network of proteins and fibers that surround and support the cells of the body), a process important for normal wound healing. However, over-stimulation of macrophages by irritants leads to build up of excess MMP12, which starts to damage the delicate structure of the small airspaces of the lungs, eventually leading to emphysema.

“We developed a tool which, for the first time, allows us to study MMP12 activity in specific cells, as if we were actually looking inside the lungs,” says Carsten Schultz, whose group carried out the research at EMBL. The researchers designed a special fluorescent probe that essentially allows MMP12 activity in macrophages to be quantified by the amount of fluorescence they take up. Applying this test to samples of lung cells from a mouse model of acute lung inflammation showed that MMP12 activity in macrophages was indeed increased.

Although the study was performed in mice, the researchers hope that in future it will be possible to adapt the test for use in patients. “It would allow us to use MMP12 as a biomarker to monitor disease evolution and the risk of emphysema formation. It could also serve to examine the response to therapeutic interventions in patients with inflammatory lung diseases,” says Marcus Mall, group leader at the Children's Hospital at the University of Heidelberg.

The EMBL and University researchers hope that the new testing strategy can be extended to other enzymes involved in lung inflammation and that, with a better picture of the processes underlying these diseases, future treatments could be more specific, reducing the side-effects often caused by broad spectrum treatments.

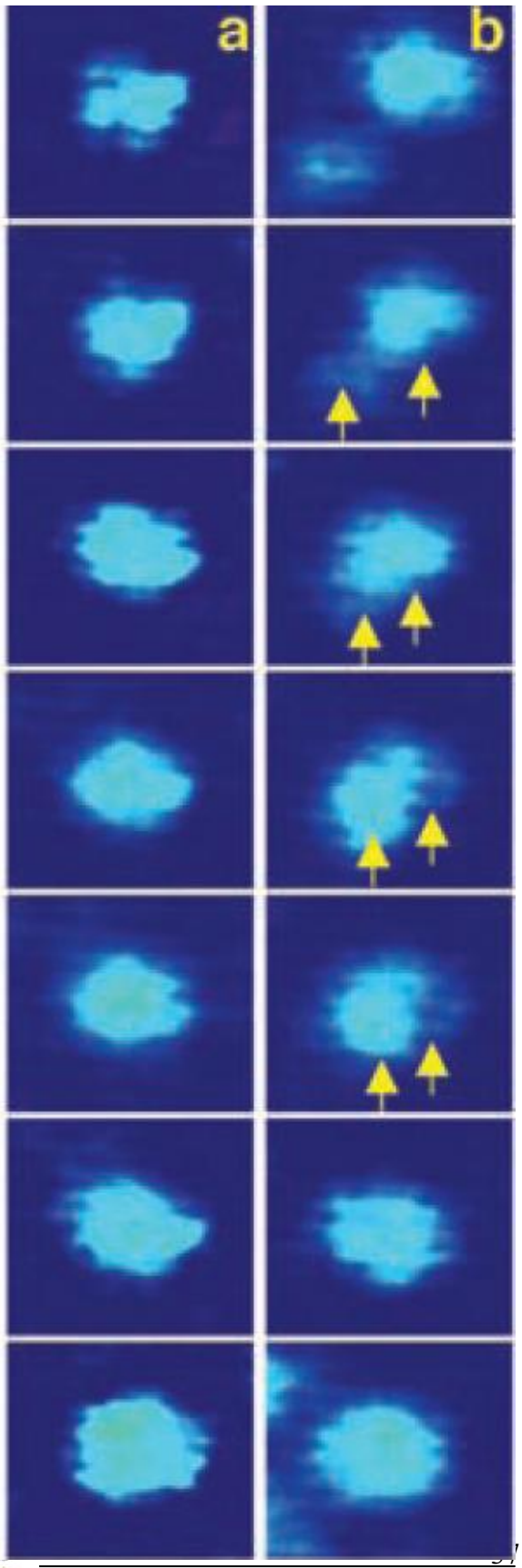
Journal reference:

1. A. Cobos-Correa, J. Trojanek, S. Diemer, M.A. Mall & C. Schultz. **MMP12 activity in pulmonary inflammation visualized by a membrane-targeted fluorescent reporter**. *Nature Chemical Biology*, 3 August 2009

Adapted from materials provided by European Molecular Biology Laboratory (EMBL).

http://www.sciencedaily.com/releases/2009/08/090803083910.htm

Nanocrystal Growth Spurts: First Real-Time Direct Observations Of Nanocrystal Growth In Solution



These TEM images show comparisons between the nanocrystal growth trajectories of monomer attachments (a) and coalescence events (b). (Credit: Image courtesy of DOE/Lawrence Berkeley National Laboratory)

ScienceDaily (Aug. 13, 2009) — The veil is being lifted from the once unseen world of molecular activity. Not so long ago only the final products were visible and scientists were forced to gauge the processes behind those products by ensemble averages of many molecules. The limitations of that approach have become clear with the advent of technologies that allow for the observation and manipulation of single molecules.

A prime example is the recent first ever direct observations in real-time of the growth of single nanocrystals in solution, which revealed that much of what we thought we knew is wrong.

Interim Berkeley Lab Director Paul Alivisatos and Ulrich Dahmen, director of Berkeley Lab's National Center for Electron Microscopy (NCEM), led a team of experts in nanocrystal growth and electron microscopy who combined their skills to observe the dynamic growth of colloidal platinum nanocrystals in solution with subnanometer resolution. Their results showed that while some crystals in solution grow steadily in size via classical nucleation and aggregation - meaning molecules collide and join together - others grow in fits and spurts, driven by "coalescence events," in which small crystals randomly collide and fuse together into larger crystals. Despite their distinctly different growth trajectories, these two processes ultimately yield a nearly monodisperse distribution of nanocrystals, meaning the crystals are all approximately the same size and shape.

"Coalescence events have been previously observed in flask synthesis of colloidal nanocrystals and has been considered detrimental for achieving monodisperse colloidal nanocrystals," says Haimei Zheng, a chemist in Alivisatos' research group, who was the lead author on a paper that reported these results in the journal Science. "In our study, we found that coalescence events are frequently involved in the

early stage of nanocrystal growth and yet monodisperse nanocrystals are still formed."

Says Alivisatos, a chemist who holds joint appointments with Berkeley Lab and the University of California at Berkeley where he is the Larry and Diane Bock professor of Nanotechnology, "This direct observation of nanocrystal growth trajectories revealed a set of pathways more complex than those previously envisioned and enables us to re-think the nanocrystal growth mechanism with an eye towards more controlled synthesis."

Nanocrystals are projected to play important roles in a wide-ranging number of technologies including solar and fuel cell, catalysis, electronics and photonics, medicine, and imaging and sensing. The key to success will be the ability to synthesis nanocrystals with desired physical properties. This will require a much better understanding of colloidal nanocrystal growth mechanisms. While the past two decades have seen tremendous advances in the synthesis of semiconductor, metal and dielectric nanocrystals, these advances have generally been realized through trial and error chemistry. A much more directed and controlled approach to nanocrystal synthesis is needed.

A new technique known as "liquid cell in situ transmission electron microscopy," in which the powerful resolution capabilities of a transmission electron microscope (TEM) are brought to bear on a liquid cell that allows liquids to be observed inside a vacuum, enables the visualization of single nanoparticles in solution. The Berkeley researchers deployed this technique on NCEM's JEOL 3010 In-Situ microscope. Utilizing an electron beam operating at 300 kilovolts of energy, the JEOL 3010 provides outstanding specimen penetration and spatial resolution of about 8 angstroms through the thick liquid cell sample.

"The JEOL 3010 In-Situ Microscope is our best machine for imaging dynamic events, and at 300kV the electron beam has enough penetrating power to maintain high resolution, even when looking through a liquid confined between two thin solid windows," says NCEM director Dahmen. "Our resolution is significantly higher than any previous studies of this nature, which made it possible for us to measure the movement and growth of individual colloidal particles only a few nanometers in size."

Zheng, Dahmen, Alivisatos and their colleagues used the JEOL 3010 and liquid cells microfabricated from a pair of 100-micron-thick silicon wafers with 20 nanometer thick silicon nitride membrane windows to image the growth trajectories of platinum nanocrystals in solution. Platinum nanocrystals are an ideal system for such studies because their high electron contrast allows liquid-cell TEM imaging of individual particles. The JEOL 3010's electron beam was used to both trigger nucleation and drive crystal growth through reduction of the platinum cations.

"Video-rate acquisition allowed us to track nanocrystal growth trajectories from frame-to-frame," says Zheng. "This allowed us to observe that each nanocrystal can either grow steadily through the addition of monomers from solution or by merging with another nanocrystal in random coalescence events."

Zheng says it has been assumed that coalescence events would result in some crystals being much larger than others, a bad thing in that the physical properties of nanocrystals are so dependent upon size and shape that for many applications it is critical that monodispersed nanocrystals be produced during synthesis. Consequently, strategies such as the use of surfactants to coat nanocrystal surfaces have been adopted to avoid coalescence events.

"Our observations provide invaluable direct information on how nanocrystals grow and indicate how we might directly control nanocrystal synthesis for tailored properties," says Zheng. "Also, our in situ liquid cell TEM technique can be applied to other areas of research such as soft matter imaging and nanoparticle catalysis, and offers great potential for addressing many fundamental issues in materials science, chemistry and other fields of science."

Says Dahmen, "From a microscopist's point of view, the ability to observe nanoparticles in liquid solution opens new opportunities in an area that has traditionally been off-limits because electron

microscopes require vacuum conditions. We can now see directly what before could only be surmised from the statistical behavior of the ensemble. It's like understanding traffic by watching individual cars instead of listening to the traffic report."

Co-authoring this paper with Zheng, Alivisatos and Dahmen were Rachel Smith, Young-wook Jun and Christian Kisielowski.

Journal reference:

1. Zheng et al. **Observation of Single Colloidal Platinum Nanocrystal Growth Trajectories**. *Science*, August 7, 2009

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

http://www.sciencedaily.com/releases/2009/08/090807135056.htm

Substance Abuse, Schizophrenia And Risk Of Violence

ScienceDaily (Aug. 13, 2009) — A study published this week in the open access journal *PLoS Medicine* demonstrates that there is an association between schizophrenia and violence, but shows that this association is greatly increased by drug and alcohol abuse. Importantly, the study also finds that the risk of violence from patients with psychoses who also have substance use disorder is no greater than those who have a substance use disorder but who do not have a psychotic illness – in other words, schizophrenia and other psychotic illnesses do not appear to be responsible for any additional risk of violence above the increased risk associated with substance abuse. Potentially this finding has implications for attempts to reduce violence in society, suggesting that strategies aimed at reducing drug and alcohol abuse would be more successful than focusing on mental illness.

Whether or not there is a link between psychotic illnesses and violence has been disputed in the medical literature as well as being a controversial issue with far-reaching social and policy implications. Seena Fazel, of the Department of Psychiatry at the University of Oxford, and colleagues conducted a systematic review of all previous studies examining psychotic illness and the risk of violence to try and resolve their varied conclusions – some of the previous studies concluded that there is no increased risk of violence from patients with schizophrenia, whilst others have reported that there is a marked increase in the risk of violence in individuals with schizophrenia. The opinion emerging in the last couple of decades that there is a modest association between schizophrenia and violence is thought to have influenced policy and legal developments, with the number of patients in secure hospitals increasing in Western countries. Many mental health charities and clinicians specializing in mental health contest this opinion – arguing that the perception that people with mental illness are more violent is a myth reinforced by the media, contributing to a social stigma around mental illness that damages many people and prevents understanding. In their systematic review, the researchers identified 20 studies that compared the risk of violence among people with psychotic illness with those in the general population. Using statistical tools to allow for the differences between the studies, the researchers found that the risk of violent outcomes did increase for individuals with schizophrenia or other psychoses. Men with schizophrenia or other psychoses were typically four to five times as likely to commit a violent act as a man in the general population; for women with schizophrenia or other psychoses there was an eight times greater risk of violence than women in the general population – although the researchers suggest this might be explained by the lower prevalence of alcohol and drug use in the general female population. When analysing the characteristics that differed between the studies, including study location and whether the diagnosis was for schizophrenia or another psychotic disorder, the researchers found that substance abuse was the only factor causing variation between the studies. Substance abuse greatly increased the risk of violence for those with a psychotic illness, but this increased risk of violence was similar to those in the general population with substance abuse but no psychotic illness – suggesting that most of the excess risk of violence in psychotic patients appears to be mediated by the abuse of drugs and alcohol. The authors acknowledge that further research is needed to clarify the relationship between schizophrenia and other psychoses, substance abuse, medication adherence and violence. However, the authors suggest that their findings could help redress the stigmatization of patients with schizophrenia and other psychoses. They conclude: "As substance use disorders are three to four times more common than the psychoses, public health strategies to reduce violence could focus on the prevention and treatment of substance abuse at an individual, community and societal level."

Journal reference:

1. Fazel et al. **Schizophrenia and Violence: Systematic Review and Meta-Analysis**. *PLoS Medicine*, 2009; 6 (8): e1000120 DOI: 10.1371/journal.pmed.1000120

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

http://www.sciencedaily.com/releases/2009/08/090810221407.htm

Harbingers Of Increased Atlantic Hurricane Activity Identified

This is a bird's eye view of hurricane Katrina approaching the Gulf coast. (Credit: NASA)

ScienceDaily (Aug. 13, 2009) — Reconstructions of past hurricane activity in the Atlantic Ocean indicate that the most active hurricane period in the past was during the "Medieval Climate Anomaly" about a thousand years ago when climate conditions created a "perfect storm" of La Niña-like conditions combined with warm tropical Atlantic waters.

"La Niña conditions are favorable for hurricanes because they lead to less wind shear in the tropical Atlantic," said Michael E. Mann, professor of meteorology, Penn State. When combined with warm tropical Atlantic ocean temperatures, a requirement for hurricanes to form, conditions become ideal for high levels of activity."

During an El Niño, the more familiar half of the El Niño Southern Oscillation (ENSO), there is more wind shear in the Caribbean and fewer hurricanes. The low Atlantic hurricane activity so far during this current season is likely related to the mitigating effects of an emerging El Niño event.

"Hurricane activity since the mid-1990s is the highest in the historical record, but that only goes back a little more than a century and is most accurate since the advent of air travel and satellites in recent decades," said Mann. "It is therefore difficult to assess if the recent increase in hurricane activity is in fact unusual."

Mann, working with Jonathan D. Woodruff, assistant professor of geosciences, University of Massachusetts; Jeffrey P. Donnelly, associate scientist, Woods Hole Oceanographic Institution, and Zhihua Zhang, postdoctoral assistant, Penn State, reconstructed the past 1,500 years of hurricanes using two independent methods. They report their results in the Aug. 13 issue of *Nature*.

One estimate of hurricane numbers is based on sediment deposited during landfall hurricanes. The researchers looked for coastal areas where water breached the normal boundaries of the beaches and

overwashed into protected basins. Samples from Puerto Rico, the U.S. Gulf coast, the Southern U.S. coast, the mid-Atlantic coast and the southeastern New England coast were radiocarbon dated and combined to form a history of landfall hurricanes.

The other method used a previously developed statistical model for predicting hurricane activity based on climate variables. They applied the model to paleoclimate reconstructions of tropical Atlantic sea surface temperature, the history of ENSO and another climate pattern called the North Atlantic Oscillation (NAO), which is related to the year-to-year fluctuations of the jet stream. Warm waters are necessary for hurricane development, ENSO influences the wind shear and the NAO controls the path of storms, determining whether or not they encounter favorable conditions for development.

The researchers compared the results of both hurricane estimates, taking into account that the sediment measurements only record landfall hurricanes, but that the relationship between landfall hurricanes and storms that form and dissipate without ever hitting land can be estimated.

Both hurricane reconstructions indicate similar overall patterns and both indicate a high period of hurricane activity during the Medieval Climate Anomaly around AD 900 to 1100.

"We are at levels now that are about as high as anything we have seen in the past 1,000 years," said Mann.

The two estimates of hurricane numbers do not match identically. The researchers note that they do not know the exact force of a storm that will breach the beach area and deposit sediments. They are also aware that the relationship between landfalling hurricanes and those that remain at sea is not uniform through all time periods. However, they believe that key features like the medieval peak and subsequent lull are real and help to validate our current understanding of the factors governing long-term changes in Atlantic hurricane activity.

One thing the estimates show is that long periods of warm Atlantic ocean conditions produce greater Atlantic hurricane activity.

"It seems that the paleodata support the contention that greenhouse warming may increase the frequency of Atlantic tropical storms," said Mann. "It may not be just that the storms are stronger, but that there are there may be more of them as well."

The National Science Foundation and the Bermuda Institute for Ocean Sciences supported this work.

Adapted from materials provided by Penn State.

http://www.sciencedaily.com/releases/2009/08/090812143936.htm

Synthetic Derivative Of Kudzu Vine Can Reduce Drinking And Prevent Relapse

Kudzu bloom. (Credit: iStockphoto)

ScienceDaily (Aug. 13, 2009) — Kudzu and its extracts and flowers have been used in traditional Chinese folk medicine to treat alcoholism for about 1,000 years. Kudzu contains daidzin, an anti-drinking substance. Daidzin inhibits human aldehyde dehydrogenase 2 (ALDH-2), which metabolizes alcohol into acetaldehyde. Inhibiting ALDH-2 promotes the accumulation of acetaldehyde, which has aversive effects. A recent test of a synthetic ALDH-2 inhibitor (CVT-10216) on rodents shows that it reduces drinking and prevents relapse by increasing acetaldehyde while drinking and later decreasing dopamine in the brain region that controls relapse during abstinence.

Results will be published in the November issue of *Alcoholism: Clinical & Experimental Research* and are currently available at Early View.

"I think the over-arching issue here is medical treatment," said Ivan Diamond, vice president of neuroscience at Gilead Science, Professor Emeritus of neurology, cellular and molecular pharmacology and neuroscience at the University of California, San Francisco, and corresponding author for the study.

"Alcoholism is a medical disorder, not just a problem of will power," he said. "Physicians treat medical disorders in order to prevent harm, while not necessarily curing the disease being treated – for example, drug treatment of hypertension, statins for high cholesterol, insulin for diabetes – and the same will become true for treating alcoholism. Heavy drinking causes harm. We need to prevent heavy drinking in order to prevent harm."

Diamond added that relapse may be the biggest problem facing physicians today. "We are talking about a patient who has the motivation to undergo a very unpleasant detoxification to try to stop drinking, and then gets into trouble afterward," he said. "Nearly 80 percent of abstinent alcoholics or addicts relapse within a year. Current therapies for alcoholism help, but we can do much better."

"Extracts of various parts of the kudzu vine have been used in many Chinese herbal medicine formulas and are said to be helpful in treating a variety of maladies, including alcoholism and intoxication," said Ting-Kai Li, a professor in the department of psychiatry at Duke University Medical Center, and former director of the National Institute on Alcohol Abuse and Alcoholism. "Recent research has found that several compounds of the isoflavone family – puerarin, daidzin, daidzein – in the kudzu extract decrease alcohol intake in experimental animals."

"Drs. Wing Ming Keung and Bert Vallee at Harvard were the first to confirm kudzu's effects and isolate daidzin as the most potent of the isoflavones in kudzu," added Diamond. "They went further by searching for the basis of daidzin's anti-drinking properties, discovering that daidzin was a selective inhibitor of

ALDH-2. Based on x-ray crystallographic studies of daidzin binding to ALDH-2, our team set out to design a compound that would interact more efficiently with ALDH-2, finally choosing CVT-10216 as our best candidate to date."

Diamond and his colleagues administered CVT-10216 to groups of rats bred for moderate and high levels of drinking, after having exposed them to various scenarios of alcohol administration: two-bottle choice, deprivation-induced drinking, operant self-administration, and cue-induced reinstatement. The researchers then tested for blood acetaldehyde levels, alcohol-induced dopamine release in the nucleus accumbens, and effects of the inhibitor on drinking behavior and relapse.

"We had several key findings," said Diamond. "We found that, one, CVT-10216 is a highly selective reversible inhibitor of ALDH2 without apparent toxicity. This means that it does not cause serious damage to other proteins and functions. Two, treatment with our ALDH-2 inhibitor increases acetaldehyde in the test tube and in living animals." Acetaldehyde's aversive effects can include a flushing reaction and feeling ill, which tend to reduce drinking. "And three, we found that our ALDH-2 inhibitor suppresses drinking in a variety of rodent drinking models." But that's not the whole story, Diamond added. "Most importantly, we also found that CVT-10216 prevents the usual increase in drinking (binge drinking) that occurs after five days of abstinence, and also prevents relapse to drink, even when alcohol is not present. This means that something else besides acetaldehyde helps to suppress craving for, and prevent relapse to, drinking alcohol. We believe that 'something else' is dopamine." He said that current concepts suggest that increased dopamine in the nucleus accumbens drives craving and relapse into drinking.

"Alcohol-induced increases in dopamine in the nucleus accumbens are prevented by CVT-10216 in a dose-dependent manner," said Diamond. "This means the drug has a therapeutic effect in the brain, probably on the desire to drink. Importantly, CVT-10216 does not reduce basal dopamine levels when there is no stimulation to increase dopamine levels. This is consistent with our findings that CVT-10216 does not appear to affect moderate drinking, and does not have adverse side effects at the therapeutic doses used." "The findings show promise that CVT-10216 might be better tolerated than Antabuse™," said Li. "How this happens is yet unknown, but suggests that the compound may be useful in treating alcohol relapse and perhaps for other psychoactive, potentially addictive compounds."

Diamond agreed: "Disulfiram or Antabuse™ has been around for 50 years," he explained. "It is called an ALDH-2 inhibitor, but it actually inhibits far more than that. Most believe that disulfiram would not be approved today as a new drug for alcoholism because of its many toxicities. Instead, we have developed CVT-10216, a reversible inhibitor with a very favorable profile, so far." Diamond hopes this novel compound will become an effective therapeutic agent for alcoholism.

"The goal of medicine is harm reduction," emphasized Diamond. "Excessive drinking causes harm while moderate drinking appears to be safe. Increasing numbers of doctors believe abstinence is an unrealistic goal. It sounds like heresy, but it isn't. Therefore, an ideal drug might be able to prevent uncontrolled relapse, convert heavy drinkers into moderate drinkers, and avoid the harmful consequences of excessive alcohol intake. If our compound works and is safe to use, then I think most physicians would not hesitate to prescribe a new drug to prevent relapse and reduce heavy drinking. My goal is to make this happen."

Adapted from materials provided by Alcoholism: Clinical & Experimental Research, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/08/090811161255.htm

Dysport Deemed Safe, Effective Anti-wrinkle Treatment, Plastic Surgeons Say

ScienceDaily (Aug. 13, 2009) — The new anti-wrinkle facial filler Dysport, which could be used as an alternative to Botox, noticeably reduced frown lines between the eyes, according to users and independent reviewers in a study involving plastic surgeons at UT Southwestern Medical Center.

"Our study confirmed that Dysport (abobotulinumtoxinA) is a safe and effective tool in fighting wrinkles," said Dr. Rod Rohrich, chairman of plastic surgery at UT Southwestern and one of the study's authors. "It also confirmed that the dosage should be tailored to one's facial muscle mass to be most effective. So it's important to visit with a certified plastic surgeon to ensure the dosage is correct."

The study's findings showed that Dysport was:

- Most effective in women;
- More effective for African-American patients;
- Longer-lasting for African-American patients;
- Less effective for people 65 and older; and
- As effective for those who had previously been injected with a form of botulinum neurotoxin type A (such as Botox).

The Food and Drug Administration-approved study involved 816 participants with moderate to severe frown lines (called glabellar lines) at 27 centers in the U.S. The study is available online and will appear in *Plastic and Reconstructive Surgery*.

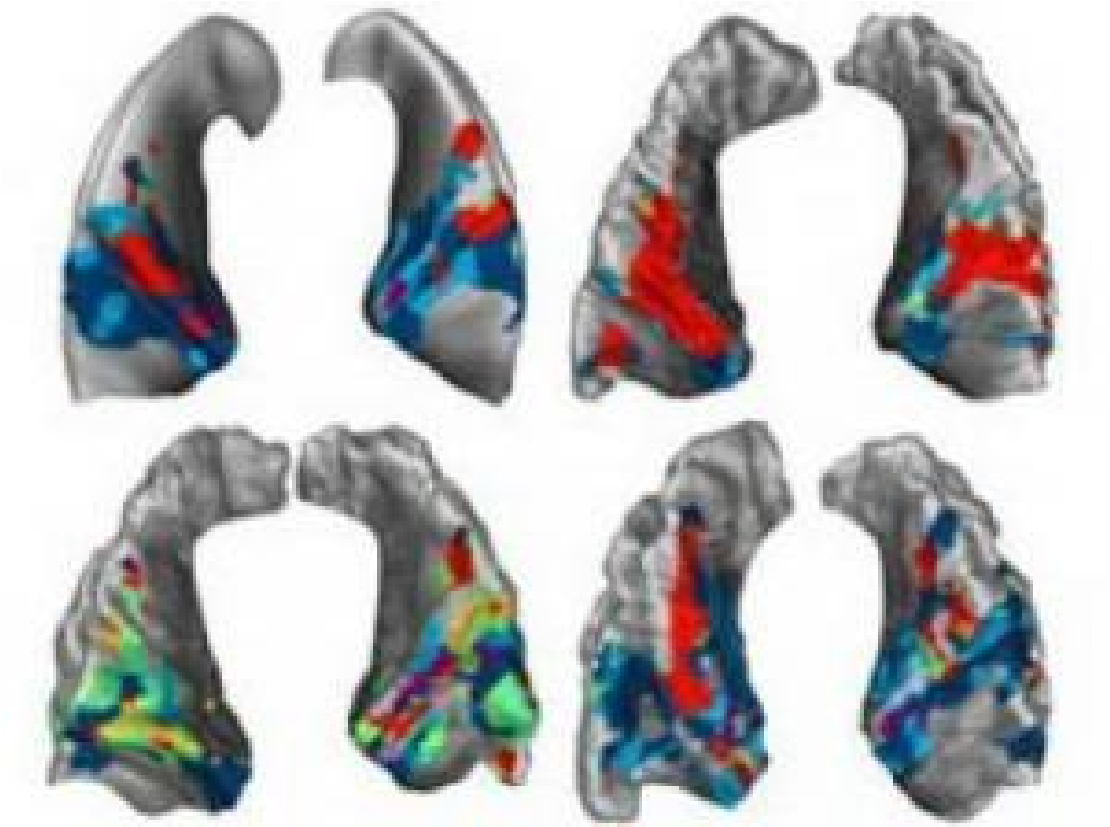
Study participants, who kept diaries for the first 14 days after being injected, were given the Dysport facial filler or a placebo. Surgeons injected Dysport in various levels, dependent on sex and facial mass, at five facial points. Self-assessments and assessments by independent reviewers were performed six times over a five-month follow-up period.Eighty-seven percent of people given Dysport reported a reduction in wrinkles, compared with 5 percent of patients taking placebos who reported an improvement. An independent assessment showed improvement among 85 percent of patients receiving Dysport, compared with 3 percent of patients receiving the placebo. It was found that Dysport took effect as quickly as 24 hours, with the median time about four days. The facial filler lasted 7 percent longer in African-Americans (median of 117 days, compared with 109 days in the overall population) in blinded assessments, and 20 percent longer in African-Americans (129 compared with 107) according to self-assessments by study participants.The study also confirmed that dosing should be adjusted according to a person's facial muscle mass. Participants with the smallest muscle mass had the largest response (96 percent) by 30 days. That rate dropped as low as 80 percent in people with the highest facial muscle masses. The study is the first to examine effects from varying dose levels, which is more common in clinical practice, rather than the standardized dosing used for FDA approval tests."Most studies have evaluated Dysport with a standard dosage," Dr. Rohrich said. "This study evaluated the safety and effectiveness of different doses based on a person's specific muscle mass, which better mirrors what occurs in clinical practice. The size and use of the muscles that produce frown lines varies among individuals, so you want to customize treatment to the patient's face."

Dysport is a type of botulinum neurotoxin type A, similar to Botox. Both work by blocking nerve impulses to the facial muscles that create wrinkles. Dysport is produced by Scottsdale, Ariz.-based Medicis Aesthetics. Dr. Rohrich is a member of the Reloxin Investigational Group.

Adapted from materials provided by UT Southwestern Medical Center, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/08/090803083638.htm

Human Mind: Sound And Vision Wired Through Same 'Black Box'



Participants were recruited to undergo functional magnetic resonance imaging, a non-invasive form of brain mapping used to determine how the brain recognizes different characteristics in musical instruments. (Credit: Marc Schönwiesner, Université de Montréal)

ScienceDaily (Aug. 13, 2009) — Sounds and images share a similar neural code in the human brain, according to a new Canadian study. In the online edition of the *Proceedings of the National Academy of Sciences* (PNAS), scientists from the Université de Montréal and the Montreal Neurological Institute at McGill University explain how the same neural code in the brain allows people to distinguish between different types of sounds, such as speech and music, or different images.

Participants were recruited to undergo functional magnetic resonance imaging (FMRI), a non-invasive form of brain mapping used to determine how the brain recognizes different characteristics in musical instruments, words from conversations or environmental sounds. Subjects underwent an exhaustive three hours of FMRI exams to provide precise information about how the brain reacts when different sounds are played.

"It turns out that the brain uses the same strategy to encode sounds than it uses to encode different images," explains lead author Marc Schönwiesner, a Université de Montréal psychology professor. "This may make it easier for people to combine sounds and images that belong to the same object, such as the dribbling of a basketball."

The next step for the researchers is to determine exactly how the brain distinguishes between rock drum beats to the strings of a symphony or from a French conversation to an English one. "Our goal is to disentangle exactly how the brain extracts these different types of sounds. This is a step may eventually let us reconstruct a song that a person has heard from according to the activity pattern in their brain," explains Dr. Schönwiesner, who is also a member of the International Laboratory for Brain, Music and

Sound Research (BRAMS), a joint Université de Montréal and McGill University think-tank on music and the mind.

As scientists advance in decoding brain activation patterns, says Dr. Schönwiesner, mind-boggling applications can be envisaged. "If researchers can reconstruct a song a person has heard according to an fMRI reading, we're not far off to being able to record brain patterns during sleep and reconstruct dreams," he predicts. "That would be really cool, although this possibility is decades of research away."

This study was funded by the Canadian Institutes of Health Research and the German Academy of Sciences.

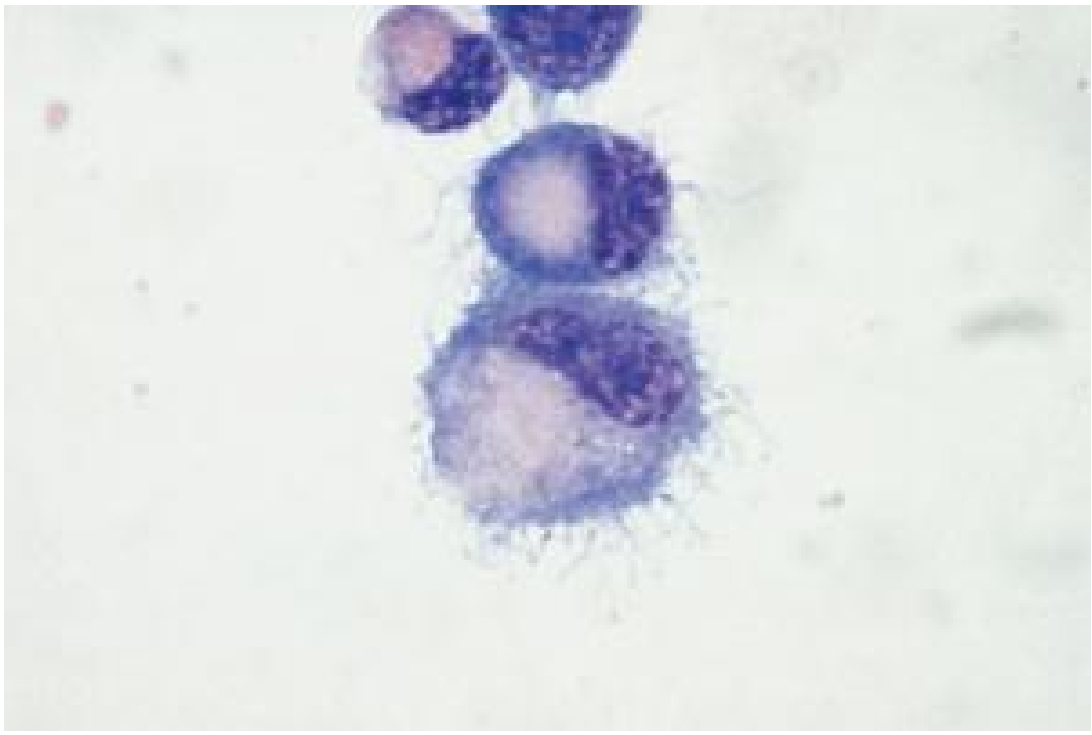
Journal reference:

1. Marc Schönwiesner, Robert Zatorre. **Spectro-temporal modulation transfer function of single voxels in the human auditory cortex measured with high-resolution fMRI**. *Proceedings of the National Academy of Sciences*, 2009; DOI: 10.1073/pnas.0907682106

Adapted from materials provided by University of Montreal.

http://www.sciencedaily.com/releases/2009/08/090812111445.htm

Multiple Types Of White Blood Cells Made Directly From Embryonic And Adult Stem Cells



Starting from two types of stem cells, researchers in the Igor Slukvin lab at the University of Wisconsin-Madison produced Langerhans cells, which help direct immune functions in the skin. Slukvin's new technique could advance the safety screening of candidate drugs and perhaps lead to a replacement for bone-marrow transplants. (Credit: Photo courtesy Igor Slukvin, University of Wisconsin-Madison)

ScienceDaily (Aug. 13, 2009) — In an advance that could help transform embryonic stem cells into a multipurpose medical tool, scientists at the University of Wisconsin-Madison have transformed these versatile cells into progenitors of white blood cells and into six types of mature white blood and immune cells.

While clinical use is some years away, the new technique could produce cells with enormous potential for studying the development and treatment of disease. The technique works equally well with stem cells grown from an embryo and with adult pluripotent stem cells, which are derived from adult cells that have been converted until they resemble embryonic stem cells.

If the adult cells came from people with certain bone marrow diseases, the new technique could produce blood cells with specific defects. It could also be used to grow specific varieties of immune cells that could target specific infections or tumors.

The likely most immediate benefit is cells that can be used for safety screening of new drugs, says study leader Igor Slukvin, an assistant professor in the university's Department of Pathology and Laboratory Medicine.

"Toxicity to the blood-forming system is a key limit on drug development, so these cells could be used for safety testing in any drug development," says Slukvin, who performs research at the National Primate Research Center in Madison.

Bone marrow stem cells are already used to screen drugs, but the new technique promises to produce large quantities of cells in a dish that can be more exactly tailored to the task at hand, without requiring a constant supply of bone marrow cells from donors.

The development of stem cells into mature, specialized cells is governed by trace amounts of biological signaling molecules, so Slukvin and colleagues Kyung-Dal Choi and Maxim Vodyanik exposed two types of highly versatile stem cells to various compounds.

Eventually they found a recipe that would cause the cells to move through a process of progressive specialization into a variety of adult cells. Slukvin's study was published in the *Journal of Clinical Investigation*.

The result included osteoclasts, cells that play a role in osteoporosis, and eosinophils, which are involved in allergy and asthma. Other adult cells included dendritic and Langerhans cells, which direct other immune cells to attack infections, and neutrophils, the most common type of white blood cell.

"While we now can make almost all types of blood cells from embryonic and adult pluripotent stem cells, the next major challenge is to produce blood stem cells (called hematopoetic stem cells) that might be used in a bone marrow transplant," Slukvin says.

This life-saving procedure can replace the entire blood-forming system in a patient with blood cancer, but more than one-third of patients cannot find a well-matched bone marrow donor and thus risk graft-versus-host disease, a sometimes-fatal attack on the patient by the transferred immune system.

Compatibility problems should disappear if the blood-forming stem cells are based on the patient's own cells, Slukvin says. "Eventually, we want to make therapeutic cells that could be used instead of bone marrow transplants."

In the interim, Slukvin expects the new technique to produce cells that model a variety of medical conditions.

"We can take cells from patients with a disease of the blood system and explore the cause and treatment of that specific disease. We can generate blood cells which are normal or abnormal, and study the mechanisms and treatments of blood cancers," he says.

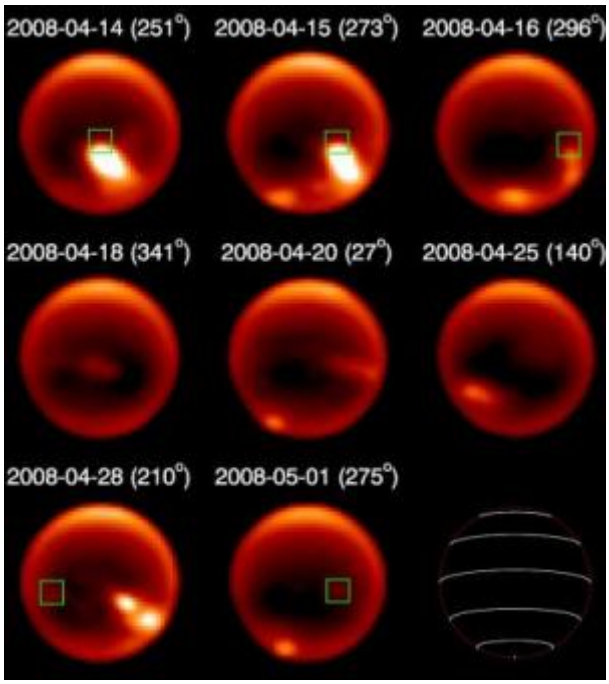
Scientists now suspect that many cancers have their own stem cells, a long-lived malefactor that spawns cells that form the bulk of the tumor.

"Cancer has these stem cells, and we need to target them for treatment. But when patients come to the clinic, they already have cancer, so the malignant transformation already started," says Slukvin. "By reprogramming blood cancer cells to pluripotent stem cells and differentiating these cells back to blood, we hope to generate cancer stem cells in a dish; that would be a good model for studying how these cells formed, to figure out what external factors make them go bad. This could be a crucial step in treating or preventing cancer."

Adapted from materials provided by University of Wisconsin-Madison, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/08/090810174223.htm

Storms In The Tropics Of Saturn's Moon Titan Discovered



A major storm erupts in the desert tropics of Titan. (Credit: Emily Schaller et al./Gemini Observatory)

ScienceDaily (Aug. 13, 2009) — For all its similarities to Earth—clouds that pour rain (albeit liquid methane not liquid water) onto the surface producing lakes and rivers, vast dune fields in desert-like regions, plus a smoggy orange atmosphere that looks like Los Angeles's during fire season—Saturn's largest moon, Titan, is generally "a very bland place, weatherwise," says Mike Brown of the California Institute of Technology (Caltech).

"We can watch for years and see almost nothing happen. This is bad news for people trying to understand Titan's meteorological cycle, as not only do things happen infrequently, but we tend to miss them when they DO happen, because nobody wants to waste time on big telescopes—which you need to study where the clouds are and what is happening to them—looking at things that don't happen," explains Brown, the Richard and Barbara Rosenberg Professor of Planetary Astronomy.

However, just because weather occurs "infrequently" doesn't mean it never occurs, nor does it mean that astronomers, in the right place at the right time, can't catch it in the act.

That's just what Emily Schaller—then a graduate student of Brown's—and colleagues accomplished when they observed, in April 2008, a large system of storm clouds appear in the apparently dry mid-latitudes and then spread in a southeastward direction across the moon. Eventually, the storm generated a number of bright but transient clouds over Titan's tropical latitudes, a region where clouds had never been seen—and, indeed, where it was thought they were extremely unlikely to form.

Schaller, now a Hubble Postdoctoral Fellow at the University of Arizona, Brown, and their colleages; Henry Roe, a former Caltech postdoctoral scholar in Brown's group, now at the Lowell Observatory in Flagstaff; and Tapio Schneider, a professor of environmental science and engineering at Caltech, describe their work, and its implications for climate on Titan, in the August 13 issue of Nature.

"A couple of years ago, we set up a highly efficient system on a smaller telescope to figure out when to use the biggest telescopes," Brown says. The first telescope, NASA's Infrared Telescope Facility, on

Mauna Kea, takes a spectrum of Titan almost every single night. "From that we can't tell much, but we can say 'no clouds,' 'a few clouds,' or, if we get lucky 'monster clouds,'" he explains.

Schaller explains, "The period during which I was collecting data for my thesis, sadly, corresponded entirely to an extended period of essentially no clouds, so we never really got to show the full power of the combined telescopes. But then, after finishing and turning in my thesis, I walked back across campus to my office to look at the data from the previous night to find that Titan suddenly had the biggest clouds ever. I like to think it was Titan's graduation gift to me. Or perhaps a bad joke."

The day after the telescope's big find (and Schaller's thesis submission), Schaller, Brown, and Roe began tracking the clouds with the large Gemini telescope on Mauna Kea and watched this system evolve for a month. "And what a cool show it was," Brown says.

"The first cloud was seen near the tropics and was caused by a still-mysterious process, but it behaved almost like an explosion in the atmosphere, setting off waves that traveled around the planet, triggering their own clouds. Within days a huge cloud system had covered the south pole, and sporadic clouds were seen all the way up to the equator."

Schneider, an expert on atmospheric circulations, was instrumental in helping to sort out the complicated chain of events that followed the initial outburst of cloud activity.

"The monthlong event has many important implications for understanding the hydrological cycle on Titan," says Brown, "but one of the reasons I am most excited about it is that it shows clouds near the equator—where the [European Space Agency's] Huygens probe landed—for the first time. For a while now, people have speculated that the equatorial regions are simply too dry to ever have significant clouds."

And yet, the images snapped by the Huygens probe in January 2005, as it descended through Titan's soupy atmosphere and toward the surface, revealed small-scale channels and streams, which looked just like features created by fluids—by water, here on Earth, and on Titan, probably by liquid methane.

Experts had speculated for years on how there could be streams and channels in a region with no rain. The new results suggest those speculations may prove unneccessary. "No one considered how storms in one location can trigger them in many other locations," says Brown.

The paper, "Storms in the tropics of Titan," appears in the August 13 issue of *Nature*. The research was supported by a Hubble Postdoctoral Fellowship (to Schaller), the NASA Planetary Astronomy Program, and a Planetary Astronomy Grant from the National Science Foundation.

Adapted from materials provided by California Institute of Technology, via EurekAlert!, a service of AAAS.

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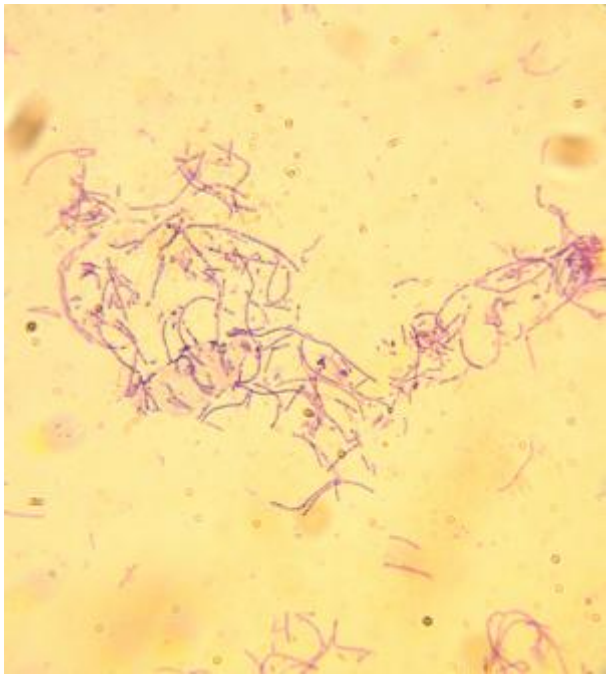
Anthrax Bacteria Conspire With Viruses To Stay Alive



Photomicrograph of anthrax (Bacillus anthracis) at 45x. (Credit: iStockphoto/Carolina K. Smith, M.D.)

ScienceDaily (Aug. 13, 2009) — The brute force of *Bacillus anthracis*, the ancient scourge that causes anthrax, can sweep through and overpower a two-ton animal in under 72 hours. But when it isn't busy claiming livestock and humans throughout the world -- up to 100,000 annually -- it resides ominously in the soil as a spore waiting for its next victim.

Researchers at Rockefeller University now reveal that this deadly bacterium isn't the only master of its fate. Its survival is directed and shaped by the DNA of bacteria-infecting viruses in what appears to be an evolutionary contract written to benefit both parties.

The research, led by Vincent A. Fischetti, head of the Laboratory of Bacterial Pathogenesis and Immunology, and Raymond Schuch, a research assistant professor in the lab, revamps the way scientists think about how pathogens exist in the environment in between outbreaks, focusing on the role viruses play during this dormant stage in the life cycle. The implications reach far and wide, from the sequencing of genomes to the recurrent and cyclical nature of disease.

"*B. anthracis* leads a much more complicated life than we had ever known," says Schuch, whose work will appear in the August issue of *PLoS One*. "Small, infecting viruses dramatically alter the survival capabilities of *B. anthracis*. It is more or less a symbiotic relationship in which the interests of both the bacterium and virus are kept in balance."

The secret life of anthrax-causing bacteria emerged from a seemingly innocuous observation made by Louis Pasteur more than 100 years ago. The famous bacteriologist found that earthworms were associated with anthrax-infected animal carcasses in the ground and hypothesized that the earthworm could play an important role in the life cycle of the deadly pest. For the first time, Shuch and Fischetti have now confirmed Pasteur's early hunch. They found that in the gut of the earthworm, *B. anthracis* infected with a type of virus, known as a bacteriophage, live longer than virus-free bacteria. The gut of the earthworm, they surmised, provides the infected bacteria with a safe niche in which to exist.

The researchers further show that in both the gut of the earthworm and the stark confines of a Petri dish, viruses can alter the lifestyle of *B. anthracis* in two principal ways. One is associated with the ability to build communities, the state in which bacteria prefer to live in the environment; the other affects the bacterium's ability to produce spores: round, dormant cells with a thick cell wall that enables them to endure harsh environmental conditions that the rod-shaped bacteria cannot. What's more, they found that depending on the conditions of the environment, the virus's DNA manipulates the bacterium's genome to toggle between spore production and community building.

The relationship appears to result from some sort of evolutionary contract that keeps the interests of bacterium and virus in balance. Since viruses cannot infect and grow in spores, they have an interest in silencing genes that ramp up spore production and in activating genes that help build *B. anthracis* communities. But when soil conditions threaten the survival of anthrax-causing bacteria, spawning a tougher line of defense to weather the soil's extreme conditions benefits both parties. The unveiling of the bacterium's life cycle opens up completely new strategies to combat anthrax infection, says Fischetti.

This isn't the first time that Fischetti and Schuch have seen that bacteriophages can affect the survival of *B. anthracis*. In 2006 they showed that infected anthrax-causing bacteria become more resistant to a natural antibiotic found in the soil. The new studies now go further, showing how these survival capabilities are not just affected by bacteriophages but actually depend on them.

Bacteriophages, the researchers found, exert their control via molecules known as sigma factors, which delegate proteins to turn specific host genes on or off. Different viruses encode different sigma factors, so the appearance of different traits depends on which virus infects the bacterium. While the DNA of some bacteriophages gets incorporated into the bacterium's single chromosome, the DNA of others exists as separate circular entities called episomes. These episomes can either stay inside one bacterium or flit in and out, infecting several bacteria in a matter of hours.

The finding has implications for the sequencing of genomes. "What that means is that sequencing the genome may not be enough," says Fischetti. "There are more than 1,000 known isolates of anthrax and there is little genetic variation between one isolate and the next. So at face value, it is a really boring genome. But what we see here is that the phage DNA, which works together with the anthrax genome, has always been overlooked."

If bacteriophages can govern the fate of bacteria and bacteria affect human health, the transformation of these bacteria may be able to explain the recurrent and cyclical nature of certain diseases. Humans have 10 times more bacteria on them or in them than the number of human cells, explains Fischetti. And there are 10 times more bacteriophages than there are bacteria. "Bacteriophages play a major role in us and what goes on around us in nature," he says. "I am convinced of that."

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

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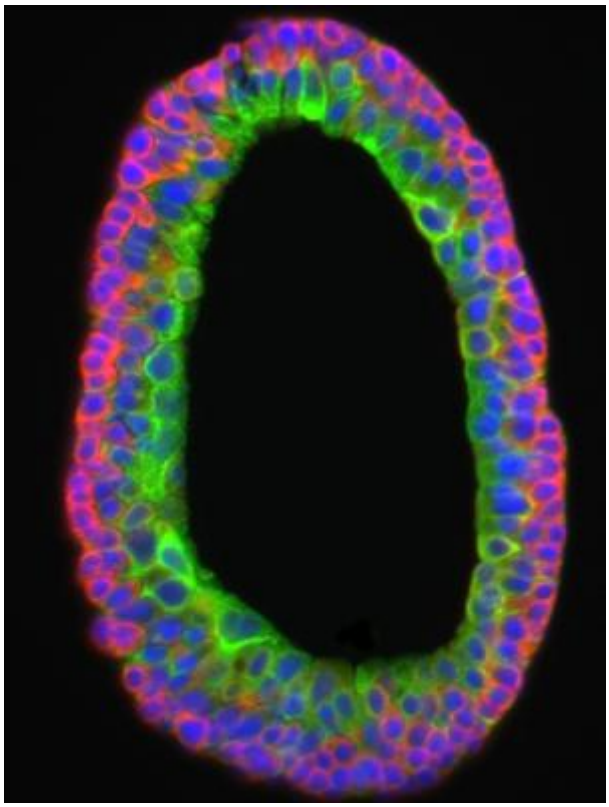
Scientists Create Airway Spheres To Study Lung Diseases



A section of a mouse tracheosphere shows future ciliary and secretory cells (green) have arisen on the inside of the structure while the basal stem cells (red) remain aligned on the outside of the structure. The whole structure developed from a single basal cell. (Credit: Image courtesy of Duke University Medical Center)

ScienceDaily (Aug. 13, 2009) — Using both animal and human cells, Duke University Medical Center scientists have demonstrated that a single lung cell can become one of two very different types of airway cells, which could lead to a better understanding of lung diseases.

From this single "basal" cell, a small, squat stem cell that divides to replenish the lung lining layer, scientists created 3-D hollow spheres that were lined inside with both ciliary and secretory cells. This 3-D model can be used to study dynamic processes underlying lung diseases, including cancer, said Brigid Hogan, Ph.D., chair of the Duke Department of Cell Biology and senior researcher of the study, which was published in *PNAS* Early Edition.

"Now that we have this 3-D model and information about the gene expression 'signature' of basal cells, we are in a strong position to see what happens when lung-cell behavior goes awry," Hogan said. "We might, for example, be able to activate an oncogene (a cancer-causing gene) or other factors to see how lung cancer might develop in the airways. Amazingly, almost nothing is known about lung basal cells, which are so important to health and make up nearly a third of the cells in the human airways."

Normally, basal stem cells maintain the airways by turning over slowly into new ciliated cells and secretory cells. Ciliated cells resemble waving brooms that sweep along particles and distribute secretions that are needed in the airways, and secretory cells provide the antibacterial and lubricating secretions. These two types of cells are neatly arranged in equal proportions in healthy lung airways. However, when lungs are affected by maladies like cancer, chemical damage, cystic fibrosis or asthma, the balance of these cells can be thrown off.

By learning the role these basal cells play in maintaining the airway tissue, the scientists were able to create an entirely new way to study them.

"We put a lot of effort into developing this model, so that we and other groups can test the ability of individual airway progenitor cells to divide and differentiate under defined conditions," said lead author Jason Rock, Ph.D., a postdoctoral associate in the Duke Department of Cell Biology. "Now we can change the culture conditions to investigate mechanisms that underlie pathological conditions, including chronic asthma and cancer."

The work was a collaboration of cell biologists, Mark Onaitis, M.D., of the Department of Surgery at Duke University Medical Center, and Scott H. Randell, PhD., of the Cystic Fibrosis/Pulmonary Research and Treatment Center at the University of North Carolina in Chapel Hill.

The scientists isolated basal cells, set each separately in a gel suspension, and observed the cells growing into a hollow sphere as they divided. Analysis shows that the basal cells remain on the outside of the sphere, while inside the hollow was lined in an equal arrangement of cilial and secretory cells, as in nature.

"This basal cell is making daughters, which are polarized and retain their orientation so that they will form a structure with luminal (airway lining) cells on the inside," Hogan said. "Only about 5 percent of the basal cells we isolated and put into gel formed these spheres; perhaps these are the ones that are normally ready to leap into action when they are challenged."

After painstakingly sorting individual green fluorescent mouse basal cells from the other lung tissue cells, the scientists studied the genes expressed in these mouse cells using microarray technology. They found more than 600 genes preferentially expressed in the basal cells compared with the other cells.

"We found that many of these genes are similar to genes expressed in stem cells in other tissues," Hogan said. "We think these genes are helping these cells to stay 'quiet' and keep them from dividing until they get the right signal."

The researchers also found that one gene expressed in the basal cells encodes a surface receptor, also found on human lung basal cells. "This meant we were able to use a labeled antibody against this receptor to efficiently extract human lung basal cells to create the human bronchospheres for study," Hogan said.

Other authors included Emma Rawlins, Yun Lu, Cheryl P. Clark, and Yan Xue of the Duke Department of Cell Biology. This research is supported by grants from the National Institutes of Health, a Howard Hughes Medical Institute Early Career Grant and a Parker B. Francis Fellowship.

Adapted from materials provided by Duke University Medical Center, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/07/090728170956.htm

Mars, Methane And Mysteries: Red Planet May Not Be As Dormant As Once Thought

Artist's impression of Mars Express. (Credit: Alex Lutkus)

ScienceDaily (Aug. 13, 2009) — Mars may not be as dormant as scientists once thought. The 2004 discovery of methane means that either there is life on Mars, or that volcanic activity continues to generate heat below the martian surface. ESA plans to find out which it is. Either outcome is big news for a planet once thought to be biologically and geologically inactive.

The methane mystery started soon after December 2003, when ESA's Mars Express arrived in orbit around the red planet. As the Planetary Fourier Spectrometer (PFS) began taking data, Vittorio Formisano, Istituto di Fisica dello Spazio Interplanetario CNR, Rome, and the rest of the instrument team saw a puzzling signal. As well as the atmospheric gases they were anticipating, such as carbon monoxide and water vapour, they also saw methane.

"Methane was a surprise, we were not expecting that," says Agustin Chicarro, ESA Mars Lead Scientist. The reason is that on Earth much of the methane in our atmosphere is released by evolved life forms, such as cattle digesting food. While there are ways to produce methane without life, such as by volcanic activity, it is the possible biological route that has focused attention on the discovery.

The Mars Express detection of methane is not an isolated case. While the spacecraft was en route, two independent teams of astronomers using ground-based telescopes started to see traces of methane. After five years of intensive study, the suite of observations all confirmed the discovery and presented planetary scientists with a big puzzle.

Methane is thought to be stable in the martian atmosphere for around 300 years. So, whatever is generating the methane up there, it is a recent occurrence. In January 2009, a team led by Michael Mumma of NASA's Goddard Space Flight Center published results that the methane they saw in 2003 was concentrated in three regions of the planet. This showed that the methane was being released at the present time and was being observed before it had time to distribute itself around the planet.

Things then took a strange turn. Instead of taking 300 years to disappear, the methane had almost entirely vanished by early 2006. Clearly something unusual is going on at Mars. "We thought we understood how methane behaved on Mars but if the measurements are correct then we must be missing something big," says Franck Lefèvre, Université Pierre et Marie Curie, CNRS, Paris and a member of Mars Express's SPICAM instrument team.

Together with his colleague François Forget, Mars Express Interdisciplinary Scientist in charge of atmospheric studies and also of Université Pierre et Marie Curie, CNRS, Paris, Lefèvre has investigated the disappearance using a computer model of Mars' climate. "We have tackled the problem as atmospheric physicists, without worrying about the nature of the source of the methane," he says.

In results published last week they found that, while their computer model can reproduce atmospheric species such as carbon monoxide and ozone, it is unable to reproduce the behaviour of the methane. "Something is removing the methane from the atmosphere 600 times faster than the models can account for," says Lefèvre. "Consequently, the source must be 600 times more intense than originally assumed, which is considerable even by Earth's geological standards."

To remove methane at such a rate, suspicion falls on the surface of the planet. Either the methane is being trapped in the dust there or highly reactive chemicals such as hydrogen peroxide are destroying it, as was hinted by the Viking missions in the 1970s. If the latter, then the surface is much more hostile to organic molecules (those containing carbon) than previously thought. This will make searching for traces of past or present life much tougher and future rovers will have to drill below the martian surface to look for signs of life.

To help get to the bottom of the methane mystery, ESA and the Italian space agency (ASI) are to hold a three-day international workshop in November. The assembled scientists will discuss the results and plan strategies for the future study of methane. At the workshop, the Mars Express PFS team hopes to present a global map of martian methane. "We have made the PFS mapping a priority over the last few months," says Olivier Witasse, ESA Project Scientist for Mars Express.

In July, ESA agreed with NASA to launch joint missions to Mars. The topic of methane is of such importance that it will be most likely addressed in these future missions. "Understanding the methane on Mars is one of our top priorities," says Witasse.

However the methane is eventually explained, it makes Mars a more fascinating place than even planetary scientists dreamed.

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Adapted from materials provided by European Space Agency.

http://www.sciencedaily.com/releases/2009/08/090810085308.htm

New No-needle Approach To Prevent Blood Clots

ScienceDaily (Aug. 13, 2009) — A team of scientists worldwide have found a better way to prevent deadly blood clots after joint replacement surgery – a major problem that results in thousands of unnecessary deaths each year.

The research appears this week in the *New England Journal of Medicine*.

The research team, which includes scientists from Oklahoma, Denmark, Australia and Canada, set out to find a better way to prevent blood clots without increasing the risk of bleeding. Blood clots, known as deep-vein thrombosis (DVT), affect the large veins in the lower leg and thigh. If the clot breaks free and moves through the bloodstream, it can lodge in the lungs, a condition known as pulmonary embolism (PE), which is often fatal. Pulmonary embolism is the most common preventable cause of sudden death after surgery.

Current preventive treatments include uncomfortable injections and one oral anti-clotting medicine that is difficult for patients and physicians to manage. Researchers wanted to find something better.

In a double-blind study of more than 3,000 patients, researchers tested a new type of anti-clotting drug called Apixaban, which is an oral medication. The medicine proved just as effective at preventing blood clots and reduced the risk of bleeding by half. Most importantly for patient convenience, it was much easier to use.

"This is a major step in our fight to prevent DVT and the many unnecessary deaths each year caused by blood clots after joint replacement surgery. We now have a better treatment that reduces the risk of bleeding, and a patient no longer has to endure injections by needle," said Gary Raskob, Ph.D., a lead researcher on the project and dean of the OU College of Public Health.

Raskob, who is a renowned expert in the field, said as our population ages, the number of hip and knee replacements will skyrocket in the coming years, so an easier to use and safe preventive medicine is essential. According to the American Academy of Orthopaedic Surgeons, more than 700,000 primary total hip and knee replacements are performed each year in the United States, and that number is expected to grow to more than 3.5 million by 2030.

On average, 1 percent to 3 percent of people undergoing total joint replacement will end up with a symptomatic deep-vein thrombosis (blood clot in the legs) or a pulmonary embolism (a blood clot in the lungs).

Apixaban is now being studied in Phase III clinical trials and, if approved by the U.S. Food and Drug Administration, will be an important option for patients having joint replacement surgery.

Adapted from materials provided by University of Oklahoma.

http://www.sciencedaily.com/releases/2009/08/090811191705.htm

Jet-propelled Imaging For An Ultrafast Light Source

The liquid flows through a narrow capillary, issuing some distance from the opening in the outer tube through which the gas flows. Approaching the narrow opening, gas pressure and speed increase, focusing the thin stream of liquid until it is so small only a single protein or virus can fit into each droplet. The liquid flows through a capillary, issuing some distance from the opening in the outer tube through which the gas flows. Approaching the narrow opening, gas pressure and speed increase, focusing the thin stream of liquid until it is so small only a single protein or virus can fit into each droplet. (Credit: Image courtesy of DOE/Lawrence Berkeley National Laboratory)

ScienceDaily (Aug. 13, 2009) — John Spence, a physicist at Arizona State University, is a longtime user of the Advanced Light Source at Lawrence Berkeley National Laboratory, where he has contributed to major advances in lensless imaging. It's a particularly apt propensity for someone who works with x-rays, since they can't be focused with ordinary lenses.

As new light sources evolve to produce brighter x-rays in faster pulses, lensless imaging becomes ever more critical for science. Among the promises of superbright, ultrafast x-ray pulses is the ability to solve the structure of the complicated molecules from which our bodies are made. All living things are made of proteins and nucleic acids, but relatively few of the atomic structures of the thousands, perhaps millions, of varieties of proteins are known.

The Linac Coherent Light Source (LCLS) will soon begin operation at the SLAC National Accelerator Laboratory in Palo Alto, California, using energetic electrons from a linear accelerator to produce coherent x-rays with an instrument called a free electron laser (FEL). The x-rays will be delivered 120 times a second in pulses only a tenth of a trillionth of a second long – about the time it takes light to travel the width of a human hair. These brief, bright pulses offer a novel approach to the problem of protein structure.

Unfolding the origami

Proteins begin as strings of amino acids that fold themselves into an amazing variety of origami-like structures, whose bumps and crannies and distribution of electrical charges determine how they act individually or fit together to form complex molecular machines. Simple organisms like viruses often consist of a few proteins fitted together to enclose a thread of DNA or RNA.

Proteins are usually large molecules containing many thousands of atoms. Drug molecules are much smaller, and do their work by attaching themselves to the larger protein molecules. A knowledge of the arrangement of a protein's atoms is therefore a great help to drug designers, who like to understand how a drug molecule will dock with a protein to promote or inhibit its activity, or cripple the organism of which it is a part.

Until now, the best way to solve the structure of a protein or virus has been with x ray crystallography. The crystal consists of many copies of the protein or virus arranged in regular order. As the crystal rotates in the x-ray beam, x-rays scatter off the atoms and reveal – once these complex diffraction patterns have been converted into a 3-D image by computers – how the electrons, and thus the atoms, are arranged.

But many proteins can't be crystallized at all, and others are so difficult to crystallize it's virtually impossible to obtain crystals large enough to use in today's light sources.

Ultrafast, ultrabright x-rays offer a way past this dilemma. The idea is that a quick pulse of tightly focused x-rays can be diffracted from a microcrystal or even a single protein or virus in solution. The pulse is so brief that it comes and goes before any of the atoms can move, freezing their orientation like a strobe light. Just as important, a sufficiently brief pulse may terminate before radiation damage effects can start. In this way it can outrun radiation damage, always one of the fundamental limitations to imaging in biology.

Another quick pulse could be diffracted from another copy of the protein in a different orientation. As the process is repeated, diffractions from different angles give the overlapping views needed for the computer to construct a 3-D image of the structure.

It's a great idea, but as Spence notes, there are a few problems. "So as not to scatter, the x-ray beam has to be in a high vacuum, but a protein or virus in its natural state is usually wet. As in T. S. Eliot's Wasteland, water is life. How do we maintain the protein or virus in an aqueous environment inside the vacuum?"

Shot from a microcannon

The answer was what Spence calls a "particle gun, like an ink-jet printer," designed to inject a beam of water droplets across the tightly focused x-ray beam in single file, each droplet so small it contains only a single protein or virus. He and colleagues Bruce Doak and Uwe Weierstall of ASU designed a nozzle that can fire liquid droplets, each less than a millionth of a meter in diameter (one micrometer), faster than hundreds of thousands of times a second. The sample jet is designed to shoot droplets right through a pulsed beam of x-rays a billion times brighter than any ever created in a light source before.

It wasn't easy. Nozzles made of solid material like glass invariably clog up, limiting droplets to at best 20 micrometers across. What Spence and his colleagues wanted was a jet of particles less than a micrometer in size. ASU postdoc Dan DePonte has done most of the recent hard work needed to make it all function.

Back in 1878 Lord Rayleigh, a professor of experimental physics at Cambridge University, discovered that a smooth, cylindrical jet of liquid emerging from an orifice spontaneously breaks up to form a train of spherical droplets. In the late 1990s, physicist Alfonso Gañán-Calvo of the University of Seville found a way to surround the streaming liquid with pressurized gas to make a co-flowing liquid sheath. By adjusting gas and liquid pressure and other parameters, he was able to create a "virtual nozzle" that could shrink the diameter of the liquid jet to a thread so small it would not clog the physical aperture of the tube. In effect, the gas sheath acts to focus the liquid stream.

Spence and his colleagues needed a true microthread of liquid, however, one that produced droplets sized a millionth of a meter or less. In their nozzle, liquid flows through a narrow capillary inside the tube through which the gas flows; the liquid issues from the capillary some distance from the opening in the outer tube, so the gas surrounds it, then increases speed and pressure as it approaches the opening, squeezing and accelerating the thin stream of liquid until it is so small that the proteins or viruses dissolved in the liquid can only fit into the droplets one at a time.

And the nozzle won't clog, because even a particle bigger than the sample protein or virus – bigger than the stream of liquid itself – can still fly through the glass nozzle without hitting the walls and getting stuck.

The frequency at which the droplets emerge can be controlled by an oscillator the researchers call an "acoustic trigger." Tuning the acoustic trigger adjusts the frequency so that each droplet containing a protein or virus meets an incoming pulse of x-rays.

The entire device – which the researchers call a gas dynamic virtual nozzle (GDVN) – is only about a millimeter in diameter (not counting feed lines and cables) and fits to the side of the beamline's vacuum chamber. After passing through the beam, the liquid droplets and the gas (typically carbon dioxide) freeze in a trap opposite the injection point, without significantly reducing the vacuum.

In 2008 Spence and his colleagues, including Berkeley Lab's David Shapiro, successfully tested the GDVN on the Advanced Light Source beamline 9.0.1, managed by Berkeley Lab's Stefano Marchesini. The test was done with protein microcrystals extracted from the fluid in which researchers were attempting to grow larger crystals. These are the smallest protein nanocrystals from which diffraction patterns have ever been obtained, and the first from membrane protein nanocrystals – among the most resistant to crystallization.

Although the microcrystals weren't individual protein specimens, and while the 9.0.1's x-ray beams aren't as bright or as rapidly pulsed as SLAC's LCLS will be, the experiment demonstrated the jet technique's high potential for speeds and exposures that won't subject the samples to radiation damage. Some of the patterns the researchers obtained come from nanocrystals just a few molecules on a side, with a width of about 100 billionths of a meter (100 nanometers). At SLAC, the researchers plan to steadily reduce the nanocrystal size down to single molecules.

The corresponding reduction in scattered intensity will hasten and improve lensless imaging. The first step in lensless imaging is scattering the beam from the sample; the second step is constructing the image by interpreting and combining the data from the diffracted x-rays.

In order to merge the different views (projections) of an object, which is subsequently vaporized in this "diffract-and-destroy" mode, it is important that they all be identical. In biology, that leaves only molecules like proteins and viruses. DNA or RNA inside a virus is often packed differently in each virus, and cells are not identical at the molecular level, so cannot be studied in 3-D by this method.

Besides identical particles, successful data-merging also depends partly on knowing how the sample was oriented in the beam – easy to do with a large crystal, not so easy to do with a sample inside a drop of liquid whizzing across the beam. It may be possible to orient flying droplets by optical methods such as polarized laser beams or with specially shaped nozzles.

Perhaps simpler is to use the ever-increasing power of the computer – which for a lensless imaging system is where most of the functions of a lens reside. Computer systems have been developed that infer the orientation of the sample from the diffraction pattern itself, even when as few as four percent of the pixels in the detector light up. It does take a lot of diffraction patterns to derive an image this way – as many as 10 million – which will take the LCLS a few hours until better ways of orienting the droplets can be devised.

Nevertheless, Spence's group recently obtained excellent diffraction patterns of MS2 virus capsids at the ALS by subtracting the diffraction "noise" of the liquid jet itself. These capsids, made in Mat Francis's lab at the University of California at Berkeley, are the shells of the virus lacking its RNA genome and have the regular shape of buckyballs. Eventually the LCLS will be able to get a good diffraction pattern from a target like this with a single ultrabright pulse. In this case, however, computer processing was able to derive an excellent pattern by averaging diffraction from a series of samples.

DePonte will soon install Spence and Doak's ultrafine, ultrafast "inkjet printer," tested at the ALS, on the powerful new SLAC machine. It will be the first step into a bold new future for investigating the biological universe, one big molecule at a time.

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

http://www.sciencedaily.com/releases/2009/07/090729132111.htm

45-nanometer Chips For Ultra-fast WiFi

ScienceDaily (Aug. 13, 2009) — Powerful new radio technologies that promise blisteringly fast WiFi have been given a boost by a team of European researchers' cutting-edge work on miniscule microchips.

The work, led by Belgian-based nanotechnology research group IMEC, has proven the potential for 45 nanometre-scale chips to be used for radio frequency (RF) applications that require high speed and low power consumption.

The Complementary Metal Oxide Semiconductor (CMOS) chips, made using a 45nm circuit etching process, are the newest and smallest generation of integrated circuits to be produced commercially and are already found in some ultra-high performance computer processors.

"However, the evaluation of successive generations of CMOS chips for analogue and RF applications typically tends to lag behind their use for digital processing, despite the important applications for them," says Stefaan Decoutere, an electrical engineer at IMEC.

That is where a team of researchers from IMEC, Infineon Technologies, Philips Electronics, Sweden's Chalmers University and Belgium's KUL (Catholic University Leuven) stepped in. Led by Decoutere, they carried out groundbreaking validation, modelling and optimisation work on 45nm CMOS for RF and analogue applications, creating some of the world's first functioning sub-circuits using the technology and proving its potential for ultra-wide band wireless communications at frequencies above 60 gigahertz. Their research was partially funded by the European Union in the NANO-RF project.

"When we started our research three years ago we did not know what the technology would look like, not least because there were many challenges to overcome when it came to improving upon the performance of the 90nm generation of CMOS," Decoutere explains.

However, scaling down CMOS chips remains crucial to ongoing improvements in RF and analogue technologies. That echoes chip scaling in the digital domain where Moore's Law predicts that the number of transistors that can be placed inexpensively on an integrated circuit will lead to a doubling of computer processing power approximately every two years.

For example, different wireless technologies, from WiFi and Bluetooth to the UMTS and CDMA mobile standards, mean that smart phones have to have a variety of radios in them to pick up the different signals in different frequency ranges.

Smaller, faster and less power-hungry chips mean that more radios can be packed into the same sized device, increasing functionality and performance while extending battery life.

In Decoutere's view, mobile phones and similar communications devices are likely to gain most from work on 45nm CMOS. However, the NANO-RF team also proved the potential for 45nm CMOS to be an enabling technology for the next generation of wireless communications in its own right.

Streaming HD video

One of the team's key breakthroughs was the validation of 45nm CMOS for radio communications at the 60GHz frequency, a form of ultra-wide band WiFi that will enable high-definition video to be streamed at speeds of several gigabits per second over short distances.

"We showed that, in the long run, 45nm CMOS is the technology of choice for 60GHz radio, compared to the silicon germanium (SiGe) transistor technology that was demonstrated by IBM a few years ago. The key difference with our approach is the CMOS is the high-speed device, whereas with SiGe the high-

speed device must be added to the CMOS – that adds to the complexity and increases the cost," Decoutere notes.

IMEC presented some of the results of the 45nm CMOS research at the International Solid State Circuits Conference in San Francisco in February, unveiling a 60GHz front-end receive chain, phase-locked loop and power amplifier, among other devices. The Belgian group envisions those building blocks leading to commercial 60GHz radios by 2010 that rely solely on CMOS.

At higher frequencies, project partner Infineon investigated whether 45nm CMOS could be used for emerging 77GHz in-car radar and collision-avoidance systems that promise to dramatically improve road safety. That application – as well as others, such as medical imaging, air traffic control and industrial process control – is being explored by Infineon and IMEC as part of the EU-funded DOTFIVE project.

From 45nm to 22...

As new applications emerge and performance demands increase, further CMOS scaling will be required. That, in turn, is likely to necessitate the adoption of different chip production techniques from the planar, or layer-by-layer, manufacturing process used to make most CMOS chips today.

With that in mind, Decoutere's team carried out groundbreaking research on 45nm CMOS built using FinFETs, a type of multigate field effect transistor in which the conducting channel is wrapped around a thin silicon fin.

"To our knowledge, the consortium has created the first complex sub-circuits in FinFET CMOS technology, proving that it is a viable contender [to planar CMOS] for RF applications beyond 45nm," Decoutere explains. "The findings are very important to our industrial partners in preparing for future scaling demands," he adds.

Having optimised 45nm CMOS for RF applications, the team behind the NANO-RF project are now turning their sights to successive generations of chips.

"We are now looking to 22nm, skipping the 32nm scale which is just a scaling down of the work we have already done. 22nm offers new challenges. For us it has to be disruptive, it has to be significantly different," Decoutere says.

The NANO-RF project received funding from the ICT strand of the EU's Sixth Framework Programme for research.

Adapted from materials provided by ICT Results.

http://www.sciencedaily.com/releases/2009/07/090729140243.htm

AIRBIA: Awesome Suburban Airships Take Flight

by Mike Chino

What's lighter than air, soars through the sky, and stands to save our suburbs by breaking the shackles of car culture? The answer is Airbia, an incredible fleet of high-flying airships that aims to create an efficient and eco-friendly alternative to smog-choked suburban commutes. Designed by Alexandros Tsolakis and Irene Shamma, the airship infrastructure system ferries passengers quickly and easily from their suburban homes to urban city centers, and we imagine that gliding through the clouds at the break of dawn each day would make for a heck of a morning commute. Today most suburban commutes involve long hours spent sitting in smog-choked traffic behind endless miles of idling cars. Add to that the costs of maintaining road infrastructure amid the ever increasing sprawl of suburbia and you've got a murky environmental quandary on your hands.

Tsolakis and Shamma's Airbia stands to change all that by offering commuters the opportunity to sail through their morning commute aboard a system of high-flying eco-friendly airships. The sleek fleet of dirigibles use helium to hover and require only a limited amount of infrastructure (just overhead loading platforms). Each one is capable of carrying 400 people and travels at an average speed of 93 mph at heights between 100 to 1,640 feet above the earth. The Airbia system will cover a set of nodes scattered throughout the suburbs, creating connections to the edge of the city on all sides. Tsolakis and Shamma say that "This network would potentially replace the use of cars and trains as transportation between the suburbs and the city centers." Each node consists of just staircases, lifts, and ticket spaces, which makes the system is extremely flexible - pick up an drop off locations can be easily placed almost anywhere in the city.

Airbia is one of 20 incredible finalists in our ReBurbia competition to redesign our suburbs - be sure to check out the other inspired finalists and vote for your favorite!

http://www.inhabitat.com/2009/08/10/airbia-suburban-airships-take-flight/

August 10, 2009

Herzog + de Meuron's Gorgeous Green-Roofed Plaza de Espana
by Bridgette Meinhold

This gorgeous plaza near the wharf of Santa Cruz de Tenerife represents the connection between the nearby ocean and the various ecosystems of the Canary islands. Designed by Herzog + de Meuron, Plaza de España introduces a beautiful green space that builds upon the past of the site and the future of the city. Many years ago the plaza was the site of a "Castillo," and the graphic motif in the basin of water represents the foundation of the old castle. Around the basin, many architectural landscape elements — including the two structures with green roofs — represent the Islands' diverse ecosystems and topography.

Spanning almost 9 1/2 acres of open public space, Plaza de España consists of a large shallow basin that serves as a wading pool and has a geyser-like fountain in the center. Surrounding the basin are various forms of landscape design elements - sparse islands of trees, four pavilions containing tourist information, retail space, a café, and access to below-ground parking. Each structure was designed to resemble natural forms from the Canary Islands, but not replicate them exactly.

Two of the pavilions feature sloping, lush green roofs bursting with vegetation. These structures seem almost volcanic in their texture and color and are complimented well by the bright vegetation. The Plaza is well-suited as a public gathering space and event venue. And when the basin is full of water, it is surely a favorite among neighboring children as a place to splash around in. Herzog + de Meuron, who are responsible for many impressive sustainably designed structures, finished Plaza de España in 2008.

http://www.inhabitat.com/2009/08/10/herzog-de-meurons-gorgeous-green-roofed-plaza-de-espana/

August 11, 2009

Living Growing Root Bridges Are 100% Natural Architecture

by Trey Farmer

In the forests of Meghalaya, India, the War-Khasis people have discovered a patient way of crossing the many rivers of their wet region. By guiding the roots of an abundant species of rubber tree, they were able to create a living system of bridges that are in some cases over one hundred feet long and can support the weight of 50 people!

This graceful solution came from a people who saw a problem and solved it using their surrounding environment. The roots are woven and guided in hollowed out betel nut trunks until they reach and grab onto the opposite banks. Over time these root systems become strong enough to support the daily movement of people across the rivers.

The bridges are alive and grow stronger with time, repairing themselves and solidifying their users' relationships with the earth. We hope you enjoy this inspiring glimpse at a solution that is truly in harmony with nature.

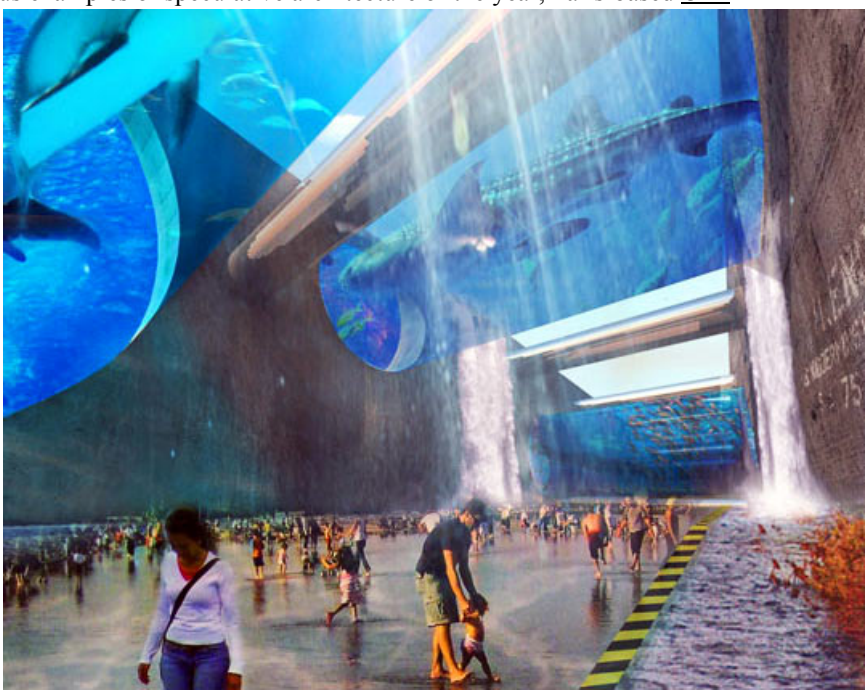
http://www.inhabitat.com/2009/08/11/living-growing-root-bridges-are-100-natural-architecture/

August 11, 2009

OFF Architecture's Visionary Eco-Bridge Spans the Bering Strait

by Daniel Flahiff

In one of the most ambitious examples of speculative architecture of the year, Paris-based OFF Architecture recently unveiled an incredible eco-bridge spanning the Bering Strait from Russia to the United States that would facilitate international trade, protect wildlife, mitigate global warming, and promote peace. Every bit as beautiful and eco-conscious as it is quixotic, the project stole the show at the Bering Strait International Ideas Competition. OFF Architecture's proposal for a structure spanning the Bering Strait includes the obligatory bridge and park, but also adds a self-contained ecosystem powered by geothermal technology and ocean current turbines. The design also features a stunning, Utopian village of tomorrow and speculates that the separation of the Arctic Ocean from the Pacific could stabilize salinity levels and the Arctic ice sheet, protecting the ice cap from melting thereby reducing global climate change.Launched last February by the Foundation for Peace and Unification, the Bering Strait International Ideas Competition invited architects and students to submit plans for an international peace park linking the Diomede Islands and uniting the Eurasian and American continents through a "pertinent architectural symbol." The Bering Strait Competition was intended to promote "…the elimination of all the barriers like spatial disconnection of national borders and chronological disconnection of today and tomorrow, and thus, stepping forward to peace and prosperity for all earth and mankind," according to the jury. 135 projects (71 from professionals and 64 from students) were submitted to the international jury, but we particularly appreciated OFF Architecture's holistic, green approach and ambitious thinking, which is what this kind of competition is about.



Feasibility aside, we think this vision of the future — one in which the human-industrial-political world protects and celebrates the natural world — is worth pursuing. There is no doubt that we are creating our generation's legacy today, and ideas and projects like the OFF Bering Strait proposal are valuable ways of envisioning a sustainable tomorrow. Congratulations to the entire OFF Architecture Bering Strait proposal team: Manal Rachdi, Tanguy Vermet, Mathieu Michel, Takanao Todo, and Lily Nourmansouri. Keep up the great work!

http://www.inhabitat.com/2009/08/11/off-architectures-visionary-eco-bridge-spans-the-bering-strait/

August 11, 2009

PuRE Turns Swimming Pools into Water Treatment Plants

by Yuka Yoneda

Once a status symbol of wealth and affluence, the iconic topaz swimming pool has, in more recent times, been tainted as a wasteful pit of water and energy. But it doesn't have to be that way. Designed by Craig England, the ingenious puRE water filtration system (not to be mistaken for that other system with no "E") rehabilitates resource-greedy pools into productive designs for society by giving them new jobs as mini wastewater treatment plants! The forward-thinking design is one of 20 finalists in our ReBurbia competition to redesign our suburbs.

Using the same principles employed in constructed wetlands, puRE treats wastewater through six stages. Wastewater first flows into closed treatment tanks during the first two stages before reaching four separate purification cells in stages 3-6. These purification cells contain several species of aquatic plants and animals which remove pollutants naturally and even allow for small-scale food production as a by-product. The solids from the wastewater stream are filtered and directed to a communal methane digester, generating another bounty for its users - power.

PuRE stands for peri-urban Revitalization Element, and the system lives up to its name because it performs so many functions that bring new life the areas around them while allowing neighborhoods to drastically reduce their dependence on bottled water and store-bought food. Although each system only needs one pool to hook up to, each unit can service up to five homes, meaning that not everyone has to have a pool to enjoy the energy, food and clean drinking water that this clever system facilitates.

The puRE water filtration system is one of 20 finalists in our ReBurbia competition to redesign our suburbs - be sure to check out the other incredible finalists and vote for your favorite!

http://www.inhabitat.com/2009/08/11/pure-turns-swimming-pools-into-seafood-growing-wastewater-filters/

Eye drops 'may reverse glaucoma'

A new type of medicated eye drop may be able to reverse symptoms of glaucoma, an Italian study has suggested.

Glaucoma, the world's leading cause of blindness, is caused by pressure inside the eye - intraocular pressure - which damages cells in the optic nerve.

The study of rats and human patients found drops containing a nerve growth factor may stop these cells dying, and actually improve vision.

It is reported in Proceedings of the National Academy of Sciences.

It is estimated that 77m people have glaucoma around the world.

The build up of intraocular pressure can sometimes be controlled through other techniques.

But once pressure has started to damage optic nerve cells, called retinal ganglion cells (RGCs), it has proved impossible to recover that lost function.

And often people with glaucoma do not seek expert help until the condition is already relatively advanced.

" **This research would seem to indicate both effectiveness and acceptability as to the means of drug delivery** "
David Wright International Glaucoma Association

The researchers, from the University of Rome, treated rats with symptoms of glaucoma with eye drops containing nerve growth factor.

The animals who were given the eye drops showed decreased levels of RGC death compared with those who did not receive the treatment.

The researchers went on to test the drops in three human patients whose intraocular pressure had started to be controlled, but who still showed signs of progressive deterioration in their vision.

In two of the patients vision improved, while in the other it was stabilised.

The improvements lasted up to 18 months after the eye drops were applied.

Nerve growth factor appears to trigger chemical changes within cells that prevent them from dying in response to damage.

It might also enable cells whose function had begun to be damaged to bounce back.

And it might boost the capacity of healthy RGCs to form new connections within the optic nerve, to compensate for any damage that had already taken place.

However, nerve growth factor cannot rescue RGCs that have already died - in common with brain tissue, the optic nerve cannot regenerate.

Encouraging results

Lead researcher Dr Stefano Bonini said: "Although neuroprotection in glaucoma has already been attempted with several compounds, this is the first time that an improvement in visual function is observed in patients with advanced optic nerve damage."

David Wright, chief executive of the International Glaucoma Association, warned against drawing firm conclusions from such a small study - but said the results were encouraging.

He said: "There have been many false dawns in the search for neuro-protective agents for the treatment of glaucoma and it is a feature of research on other compounds that early promise does not always translate into clinical effectiveness when larger studies are undertaken.

"However, this research would seem to indicate both effectiveness and acceptability as to the means of drug delivery.

"If these early indications are carried through to wider trials and there are no other problems, then this has the potential to open a completely new method of treating glaucoma and of preventing unnecessary visual loss in the future."

Professor Peng Khaw is director of the National Institute of Health Research Biomedical Research Centre at Moorfields Eye Hospital and UCL Institute of Ophthalmology.

He said many other substances had achieved good results in animals, only to fail in humans.

However, he said, if the researchers could perfect an easy-to-use eye drop formulation that would represent a huge step forward.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8180992.stm

Published: 2009/08/05 22:59:30 GMT

Autism 'hits body language skill'

Problems processing visual information may stop those with autism interpreting body language, harming their ability to gauge others' emotions, a study says.

Researchers say people with autism have problems recognising physical displays of emotion, but also general difficulty perceiving certain sorts of motion. They suggest in Neuropsychologia this may contribute to problems with social interaction, characteristic of autism. The National Autistic Society said the UK study was an interesting one.

A team from the University of Durham studied 13 adults with autism and found the patients had difficulty identifying emotions such as anger or happiness when shown short animated video clips.

Silent movies

The characters had no faces, nor did they speak, so the participants were asked to judge the emotion based on the body language of the figure alone. Along with 16 adults with no autism diagnosis, they were also shown a number of dots on a computer screen and asked which way they were moving. A proportion of dots moved noticeably to the left or right, while the others moved randomly.

" **The way people move their bodies tells us a lot about their feelings or intentions, and we use this information on a daily basis to communicate with each other** "
Anthony Atkinson Lead author

The performance of the autism group was significantly below that of the others in both tests, leading researchers to speculate that there may be serious differences between the ability to process visual information. They point to an area of the brain needed for the perception of motion called the superior temporal sulcus, and cite previous research which has found that this area responds differently in people with autism.

"The way people move their bodies tells us a lot about their feelings or intentions, and we use this information on a daily basis to communicate with each other. "We use others' body movements and postures, as well as people's faces and voices, to gauge their feelings," said Anthony Atkinson, who led the research. "People with autism are less able to use these cues to make accurate judgements about how others are feeling.

"We now need to look further to see how exactly this happens and how this may combine with potential difficulties in attention." It is thought as many as half a million people in the UK have a form of autism, a lifelong developmental disability which can severely affect how a person makes sense of the world around them.

Gina Gomez De La Cuesta, of the National Autistic Society, said the study was an interesting one. "It certainly takes us on. We know of these problems with emotion recognition but to start to unpick the reasons why is helpful. There appear to be difficulties at the very basic processing level.

"But we really need to see this repeated in more people and then we can start thinking about how we act on it."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8183447.stm

Published: 2009/08/04 23:02:57 GMT

Orangutan ruse misleads predators
By Griet Scheldeman
Science reporter, BBC News

Wild orangutans in Borneo hold leaves to their mouths to make their voices sound deeper than they actually are, a new study shows.

The apes employ the leaf trick when they are threatened by predators, according to scientists observing them.

By holding leaves to their mouths, the orangutans lower the frequency of the sounds they produce.

This is used to ward off predators, giving them the impression the apes are a bigger target.

The international team made the discovery while observing distress calls made by the orangutans.

The apes make the sounds in response to approaches by snakes, clouded leopards, tigers or humans.

These distress calls are known as "kiss squeaks" because they involve a sharp intake of breath through pursed lips, producing a sound similar to that made during a kiss.

But by using the leaves to modify the sound that comes out, orangutans deceive predators into thinking the calls are being made by a bigger animal.

Co-author Madeleine Hardus, from the University of Utrecht in the Netherlands, told BBC News: "This study clearly indicates that the abilities of great ape communication have been traditionally undervalued and that there may be traces of language precursors in our closest relatives, the great apes."

She added that the findings suggest that primate calling behaviour is not purely based on instinct, but instead is socially learned.

Primates have often been observed using tools to obtain food. But cases where tools are used to modify sound are not well documented.

Jungle trek

Madeleine Hardus explained how she and her colleagues followed the apes through the swamps of Kalimantan in the Indonesian part of Borneo.

Pointing a microphone to the canopy to record the sounds they made, the researchers also observed how the apes used their calls in their ecological environment.

Kiss-squeaks can be given in three different forms, the authors wrote: using only the lips, or with either a hand or leaves in front of the lips.

Using a sound studio, the team analysed the recorded calls and found that these three forms were acoustically different from each other.

"The maximum frequency (Hz) of the kiss-squeak using leaves was the lowest of the three," Ms Hardus explained.

"As kiss-squeaks in orangutans are related to body size, this showed that the ones using leaves exaggerated orangutans' size by lowering the sound frequency.

Concealed from view

"Because it is very rare and difficult to get a full view of an orangutan in its rainforest habitat, this could be very advantageous, since a potential predator will have to rely more on sounds than sight in these conditions," the Dutch primatologist continued.

Evolutionary psychologist and chimpanzee expert Professor Andrew Whiten of St Andrews University told BBC News called the study exciting. He said it explained the use of leaves to perform the kiss-squeak as a local, socially learned tradition. Apes can learn much about how to use leaves and other tools by watching others, he said. Dr Whiten pointed out some parallels with the behaviour of chimpanzees. They also modify their calls, so that they are similar to members of their own community and different from those of other groups.

Different communities of chimpanzees "clip" leaves noisily with their mouths in different contexts, such as courtship, the professor explained.

"Apes appeared to have much more voluntary control over their hands than their voices and facial expressions," Professor Whiten continued. He cited a widely known example of a chimp which used its hand to hide its involuntary grin from a rival.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8184015.stm

Published: 2009/08/05 10:26:14 GMT

Child headache burden uncovered

One in five young teenagers suffer headaches at least once a week, say researchers.

Of 1,000 12-15 year olds in Exeter questioned for the study, 10% had more than two headaches a week.

That group had a poorer quality of life than children with asthma, diabetes or cancer, the British Journal of General Practice reported.

The researchers said many children were suffering unnecessarily with headaches at home and at school.

Study leader Dr David Kernick said headache was the most common type of pain in children but estimates on the prevalence of headache in teenagers and children vary widely.

" **The needs of many adult headache sufferers are unmet, and this study shows that in children the need is even more significant** "
Dr David Kernick Study leader

Also there is little known about the impact of headache in children, he said.

The study participants - half boys and half girls - completed a questionnaire to find out not only how often they had headaches but also what effect that had on their quality of life.

For 20% of students, headaches affected their ability to function at home or school on more than 12 days in a three-month period.

Those worse affected struggled with their normal lives for 17 days over three months, the researchers found.

It means headache is more common than diseases that receive considerably more attention, such as diabetes and asthma, they said.

Services lacking

It is known that many adults who suffer headaches do not go to the GP and correct diagnosis and treatment is lacking.

This problem is likely to be even worse for children who may not be able to articulate how they feel.

Dr Kernick said GPs needed to do more to help children who suffer from headaches.

He said the underlying cause was complex and linked with factors such as anxiety and depression.

"The needs of many adult headache sufferers are unmet, and this study shows that in children the need is even more significant.

"Many children are suffering unnecessarily at home and at school.

"We need to do more to recognise and treat this problem, and the Royal College of GPs is working hard towards this."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8197696.stm

Published: 2009/08/12 23:42:41 GMT

'Many hurricanes' in modern times

By Richard Black
Environment correspondent, BBC News

Hurricanes in the Atlantic are more frequent than at any time in the last 1,000 years, according to research just published in the journal Nature.

Scientists examined sediments left by hurricanes that crossed the coast in North America and the Caribbean.

The record suggests modern hurricane activity is unusual - though it might have been even higher 1,000 years ago.

The possible influence of climate change on hurricanes has been a controversial topic for several years.

Study leader Michael Mann from Penn State University believes that while not providing a definitive answer, this work does add a useful piece to the puzzle.

" **The levels we're seeing at the moment are within the bounds of uncertainty.** "
Julian Heming, UK Met Office

"It's been hotly debated, and various teams using different computer models have come up with different answers," he told BBC News.

"I would argue that this study presents some useful palaeoclimatic data points."

Washing over

Hurricanes strike land with winds blowing at up to 300km per hour - strong enough to pick up sand and earth from the shore and carry it inland.

In places where there is a lagoon behind the shoreline, this leads to "overwash" - material from the shore being deposited in the lagoon, where it forms a layer in the sediment.

Researchers have studied eight such lagoons on shores where Atlantic hurricanes regularly make landfall - seven around the US mainland and one in Puerto Rico.

Over time, Dr Mann's team believes, the number of hurricanes making landfall on these sites will be approximately proportional to the total number of hurricanes formed - so these zones provide a long-term record of how hurricane frequency has changed over the centuries.

The last decade has seen an average of 17 hurricanes and tropical storms in the Atlantic - earlier in the century, half that number were recorded.

But current levels were matched and perhaps exceeded during the Mediaeval Climate Anomaly (also known as the Mediaeval Warm Period) about 1,000 years ago.

"I think if there's one standout result (from this study), it's that the high storm counts we've seen in the last 10 to 15 years could have been matched or even exceeded in past periods," commented Julian Heming, a tropical storm specialist from the UK Met Office who was not involved in the new research.

"So it's worth feeding into the debate about whether what we're seeing now is exceptional or something related to multi-decadal or even multi-centennial variability; and it does tell us that the levels we're seeing at the moment are within the bounds of uncertainty."

Different strokes

Dr Mann's team also used a pre-existing computer model of hurricane generation to estimate activity over the same 1,500-year period.

The model includes three factors known to be important in determining hurricane formation: sea surface temperature in the tropical Atlantic Ocean, the El Nino/La Nina cycle in the eastern Pacific, and another natural climatic cycle, the North Atlantic Oscillation.

This analysis suggests, Dr Mann argues, that the hurricane peak 1,000 years ago and the current high activity are not produced by identical sets of circumstances.

Then, he says, an extended period of La Nina conditions in the Pacific - which aid hurricane formation - co-incided with relatively warm conditions in the Atlantic.

Now, the high number is simply driven by warming waters in the Atlantic - which is projected to increase in the coming decades.

"Even though the levels of activity are similar (between 1,000 years ago and now), the factors behind that are different," said Dr Mann.

"The implication is that if everything else is equal - and we don't know that about El Nino - then warming of the tropical Atlantic should lead to increasing levels of Atlantic tropical cyclone activity."

Richard.Black-INTERNET@bbc.co.uk

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8197191.stm

Published: 2009/08/13 10:51:35 GMT

Early toolmakers were 'engineers'

By Griet Scheldeman
Science reporter, BBC News

Early modern humans in South Africa were using "heat treatment" to improve their stone tools about 72,000 years ago, according to new research.

This technique may bridge a gap between the use of fire to cook food 800,000 years ago and the production of ceramics 10,000 years ago.

Evidence for this innovation was found at Pinnacle Point, a Middle Stone Age site on the South African coast.

The researchers have published details in the journal Science.

"We found that as early as 165,000 years ago, but definitely 72,000 years ago, people are doing more than just using fires for cooking, heat, light or protection," lead researcher Kyle Brown, from Arizona State University, US, told BBC News.

" **These early modern humans seem to have been able to make a big mental jump** "
Kyle Brown, ASU

"I think heating stones is the dawn of human engineering.

"One of the things that makes us uniquely human is that we can take the things in our landscape and adapt them. We can engineer them to fit our needs."

Evidence suggests that about 800,000 years ago, people were able to control fire to cook their food.

By about 10,000 years ago, humans were using fire to make ceramics and to extract iron and copper from their ores.

Until now, there was nothing to link these two different uses of fire, the researchers explained.

"These early modern humans seem to have been able to make a big mental jump," Kyle Brown commented.

Cutting edge

The heat treatment makes the stones more brittle, making it easier to chop off clean flakes. This produces a fine cutting edge - like a modern day razor blade - good for cutting animal skins or making clothing.

However, the breakable edge is not very strong, making it unsuitable for use as a chopping tool in wood working, digging or stone shaping.

The stone tools found at the Pinnacle Point site were made of silcrete, a hard and resistant material that looks like another mineral called quartzite - but is not as coarse.

When the archaeologists searched a 50km radius around the site, they could not find the right type of stone required to recreate the ancient tools.

The stones had a different colour and texture; they were a deeper red, with a high gloss and were more brittle.

Mr Brown explained: "What we had spent six years looking for had always been right under our noses.

"Taking that step of putting the stone in the fire and pulling it out… I could imagine what the first people must have thought when they did that and realised that what they just did was going to change their lives."

Mr Brown, who is an experimental archaeologist, tried to recreate the "heat treatment technology" for himself.

Planning ahead

"The fire requires a significant amount of fuel, which you need to gather in advance, together with the stones," he explained.

"Then you bury the stone in sand two centimetres below the fire, and, gradually, over 12 hours, build up the fire. You keep it at about 300 degrees for roughly five hours. Then you gradually let it cool down on its own so the stone does not crack.

"This can take 10 or even 20 hours. So you need to schedule your time, knowing that you need to be around the fire for 40 hours."

Establishing this sequence is crucial, Kyle Brown explained.

"As you can imagine, there are several ways in which materials can be unintentionally burnt on an archaeological site."

At around the same time as the tools were being fired in South Africa, humans had begun harvesting shellfish, making pigments and grinding ochre.

"These are highly sophisticated people who spread from Africa to eventually colonise the rest of the world," Mr Brown explained.

Heat treatment technology appears to have been known about 165,000 years ago, but it was not used routinely until about 70,000 years ago. It is unclear why the technology suddenly took off.

"Perhaps," the archaeologist speculated, "heat treatment could have become popular because good silcrete stones were scarce. Or it could have been a way to produce high quality material to be traded for other goods".

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8195664.stm

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The Guggenheim At 50: A Legacy Spirals On Fifth

by Edward Lifson

August 5, 2009

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Stan Honda/AFP/Getty Images

A contemporary view of the interior walkways at the Guggenheim Museum. The New York landmark marks its 50th anniversary with an exhibition titled "Frank Lloyd Wright: From Within Outward."

Stan Honda/AFP/Getty ImagesAugust 5, 2009
Fifty years ago, an object landed on Fifth Avenue in New York City. It looked like it had dropped from outer space, and was treated as such.
Writer Norman Mailer said it "shattered the mood of the neighborhood" — "wantonly" and "barbarically."
Prominent avant-garde artists signed a petition against it, even though it was meant to hold contemporary art.
When it opened, the Solomon R. Guggenheim Museum broke a lot of centuries-old architecture rules. Its design not only shattered the squared-off line of the apartment buildings it was set against, but it also crushed the notion that buildings should have a ground floor, a first floor and so on.
Designed by Frank Lloyd Wright, the Guggenheim earned many a dubious description upon its opening. Critics called it "inverted oatmeal dish," or a "hot cross bun." And in the face of such hostility, Wright defended his work.
"Somebody said the museum out here on Fifth Avenue looked like a washing machine," Wright said. "Well, I've heard a lot of that type of reaction, and I've always discounted it as worthless, and I think it is."

Today, tourists come from around the world to see the museum.
The spiral rings and ribbon walkways of New York's Guggenheim Museum have made it an international icon.

Architecture That Doesn't 'Lie Down And Play Dead'
"I think the legacy of this building is in the message that architecture does not have to lie down and play dead in front of art," says Paul Goldberger, architecture critic for The New Yorker. "That there are other ways to show art than in a neutral space. That an architect can do something that's powerful in itself and that enhances the experience of looking at art."
Inside the building, a ramp spirals upward, with the museum's collection displayed along the ramp as it coils toward the museum's glass ceiling. Some say if you stand on a slight slant and can't get close enough to a piece — or far enough away — it can be hard to fully appreciate some of the art.
Martin Pedersen, editor of Metropolis magazine, admires the building but isn't so sure about the ramping concourse.
"I've never once felt comfortable underfoot, viewing art, and I've been to many, many, many exhibitions," Pedersen says. "You feel always slightly off-kilter watching art there."
But Frank Lloyd Wright scholar and Harvard professor Neil Levine says that was the intent, and the resulting space can help many types of art put you into "a daydream."
"In other words, it's a space that's — I don't want to say 'surreal,' but it's outside the boundaries of reality," Levine says. "It's a space of walking through and being relieved from the normal conditions of the world, because there's no horizon line, there is no straight path, there's no verticals, there's no horizontals. So everything is different from 'the real world.' "
A New Kind Of Space For A New Kind Of Art
The building isn't the only thing that was different. So were the paintings that Solomon Guggenheim collected: radical new abstract art for a new world, a world suffering from the effects of World War II. It was specifically to showcase that collection that Guggenheim and his curator asked Wright for what they called a "Temple of Spirit."
Wright's vision wasn't fully realized; he wanted visitors to take a glass-tube elevator to the top of the building, relax under a glass sphere with a telescope and garden, and then — primed for the experience — stroll down the ramps to the art.
"Which would be a very gentle way of perceiving the works of art in the building," says Neil Levine, before swiping a line from Wright himself: "Let the elevator do the lifting so the visitor could do the drifting."
Bruce Brooks Pfeiffer, director of the Frank Lloyd Wright Archives, says now that curators understand the unique nature of the Guggenheim space, the exhibitions work better.
"What's amazing, when you're in the building, when you're on the ramp, you can see where you are, naturally, but you can see where you've been and you can see where you're going," Pfeiffer says. "It's as though you are in control of the time-space continuum."
An Icon Of 'Spirit, Passion And Feeling'
Wright also designed the Guggenheim as a place to see other people and to be seen. It helped usher in the era of museum branding and spawned every freestyled sculptural museum of the past half-century. The most famous of them might be another Guggenheim: the one in Bilbao, Spain, by architect Frank Gehry.
Gehry's next project — the Guggenheim for Abu Dhabi — is moving forward, but in the current economic climate, the architect says, it's getting harder to build works with "spirit, passion and feeling."
"I think that throwing architecture under the bus is being touted by the people who can't do the other," Gehry says. "And this is a great excuse to trash those who can, and say we're through with those guys, and now we're going back to straight simple, minimalist, idiocy again. Cold simple sterility. It's got to be green, though! As long as it's green, you're OK."
That's today's way to save the world. Fifty years ago, Solomon Guggenheim and his curator thought experiencing their new kind of art — in Wright's new kind of space — was "the only solid way to peace."
Did we get there, or, as in the Guggenheim, are we going around in circles?
Edward Lifson writes about architecture at www.EdwardLifson.com.

http://www.npr.org/templates/story/story.php?storyId=111434035

'You Must Change Your Life'

On John Heliker's portraits of Merce Cunningham and an astounding artistic community.

Jed Perl, The New Republic Published: August 6, 2009

Courtesy of the Heliker-LaHotan Foundation

With the news of Merce Cunningham's death has come a blizzard of wonderful photographic portraits of the dancer in action. He was a great camera subject, often caught in mid-flight, lyrical yet hyperbolic, arrestingly individualistic. To this extraordinary photographic record--and to Jennifer Homans's obituary salute here a few days ago--I would like to add a small trove of images of Cunningham from around 1946, which unlike so much of what we have been seeing are not products of the photographer's eye. These include a painting and some sketchbook drawings and a print, all done by an old friend of the dancer, the painter John Heliker. I was friends with Heliker for many years, and although he would occasionally mention the time he had spent with Merce Cunningham and John Cage, especially their weeks together in Italy and France in the summer of 1949, it was only some years after Heliker's death in 2000 that I became aware that he had drawn and painted his friend Merce. The glimpses of Cunningham that we discover here have a delicacy and a dreaminess about them; these are very much portraits of the artist as a young man. And particularly in Heliker's painting of Cunningham, with its echoes of Picasso's saltimbanques, we see the most striking illustration imaginable of Alastair Macaulay's observation, in his obituary in *The New York Times*, that in the early years Cunningham's "long neck and sloping shoulders reminded people of a Picasso acrobat."

While John Heliker was alive, I had known of his involvement with the world of modern dance and music in New York in the 1940s, but only up to a point. I had been vaguely aware that his lover during much of the 1940s had been an avant-garde composer, Merton Brown, who was beginning to establish a name for himself. And I'd known that Heliker had been close to the composer Lou Harrison, although only later did I discover that Heliker had been involved in the publication of Harrison's little book about Carl Ruggles. Like most artists, Heliker was more interested in the present than the past. When I was getting to know

him in the 1970s, a few years after he had had a retrospective at the Whitney Museum, he knew he was reaching his prime, painting casually yet powerfully ordered landscapes and interiors, and he had little desire to look back. But the back story is pretty terrific, and I'm glad to be able to fill in some of the details now. (I should explain that I've had the opportunity to do so because I'm involved with the Heliker-LaHotan Foundation, which was set up by Heliker and his life partner, the painter Robert LaHotan, who died in 2002, and maintains their archives and runs an artist residency program in Maine.)

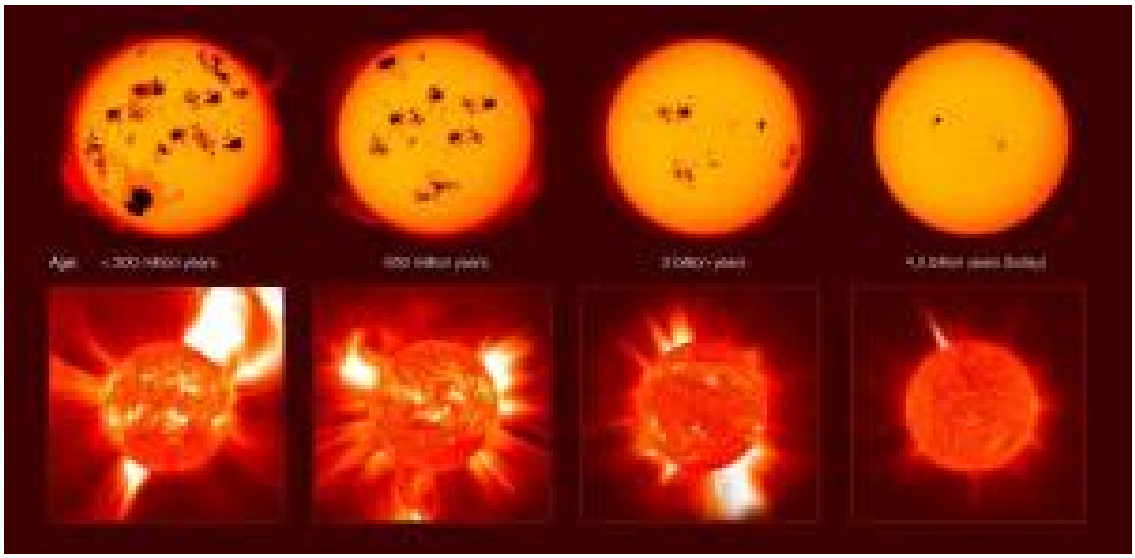
In the summer of 1949, Heliker was living in Rome, and went with Cage and Cunningham to a music festival in Palermo. Later, they spent time together in Paris, where they went to visit Alice B. Toklas and the great collection of Picassos in the apartment she had shared on the Rue Christine with Gertrude Stein, who had died three years earlier. There was always a catch in Heliker's voice when he spoke about seeing those paintings in that place, as if for a moment he had stepped back to the beginning of the century, when Picasso was a young man and the Rose Period was climaxing and Cubism had not yet been born. There was also that summer, if I remember correctly, a dance performance in the Montparnasse studio of the painter Jean Helion, with Toklas sitting in the front row. I am holding in my hands right now a letter from Cunningham to Heliker, written from Amsterdam on April 4, 1949, in which he is making plans for them to meet up in Italy. Cunningham regrets that Heliker isn't "here to see the landscape, you would love it so." He and Cage "are madly, and at this point, vainly, trying to arrange a concert or concerts here, but I am afraid it is hopeless. The Dutch are slow & ponderous like the boats on the canals. ... Amsterdam is canals & whores in shop windows across a canal from a cathedral and aristocratic buildings and new buildings with Mondrians for windows. Everything is altogether too neat & tidy." But the "ocean crossing was a delight--John says I will have to be billed as America's fattest dancer."

That joke about all Cunningham had eaten during the crossing brings us back to Heliker's sketchbook pages of a few years earlier, in which we see Cunningham in the dance studio, with the tapered torso, the long neck, and the open, unconventional, utterly American face. If we have the sketchbook dated correctly, he was 27 at the time. Heliker's beautiful drypoint print of Cunningham, probably from the following year, in which the dancer is surrounded by a series of emblematic images, like fragments of the choreographer's dreams, is related to a mask of a bird's head that Heliker designed for Cunningham to wear in one of his early dances. Heliker, so far as I know, never drew or painted a dancer again after these encounters with Cunningham back in the 1940s. But he always loved Rilke's poetry, and he must have seen in Cunningham's physique the image of the "Archaic Torso," with its extraordinarily expressive chest. The theme of the artistic youth would be woven all through Heliker's work. In his later years he did a remarkable series of paintings of younger and older men, gathered together around a piano or in the studio of a painter or a printmaker. Here there is a distinctly erotic atmosphere, but muffled, sublimated, transformed into an age-old search for the secret of artistic power. These paintings, so I believe, are suffused with memories of the days in the 1940s when Heliker and his music-and-dance friends--Lou Harrison, Merton Brown, Merce Cunningham, and John Cage--had been living the great injunction with which Rilke's poem concludes: "You must change your life." And so they did, none more dramatically than Cunningham, who changed the face of American dance.

Jed Perl is The New Republic's *art critic.*

http://www.tnr.com/booksarts/story.html?id=906afc6c-57d7-4f03-9a80-409592723e74

Violent Youth Of Solar Proxies Steers Course Of Genesis Of Life



Stars similar to our Sun -- "solar proxies" -- enable scientists to look through a window in time to see the harsh conditions prevailing in the early or future Solar System, as well as in planetary systems around other stars. These studies could lead to profound insights into the origin of life on Earth and reveal how likely (or unlikely) the rise of life is elsewhere in the cosmos. This work has revealed that the Sun rotated more than ten times faster in its youth (over four billion years ago) than today generating a stronger magnetic field and stronger activity. This also meant that the young Sun emitted X-rays and ultraviolet radiation up to several hundred times stronger than the Sun does today. (Credit: IAU/E. Guinan)

ScienceDaily (Aug. 13, 2009) — One of the hottest topics at this year's XXVIIth General Assembly of the International Astronomical Union (IAU) in Rio de Janeiro, Brazil involves the study of the astrophysical conditions favourable for the development and survival of primordial life. New research shows that compared to middle-aged stars like the Sun, newly formed stars spin faster generating strong magnetic fields that result in emission of more intense levels of X-rays, ultraviolet rays and charged particles — all of which could wreak havoc on budding atmospheres and have a dramatic effect on the development of emerging life forms.

Just how rare life is in the Universe is one of the key questions in the natural sciences today. By pulling in multidisciplinary expertise from biology, geology, physics and astronomy, astrobiologists are addressing different facets of this very profound question, and notably how the conditions around different types of stars in an early stage of development might help or hinder the emergence of life in a solar system. Several scientists at the forefront of this research have just concluded IAU Symposium 264 on "Solar and Stellar Variability — impact on Earth and Planets".

The Sun is awe-inspiring and fearsome — a superheated ball about 300,000 times as heavy as the Earth, radiating immense amounts of energy and hurling great globs of hot plasma millions of kilometres out into space. The intense radiation from this giant powerhouse would be fatal close to the Sun, but for a planet like Earth, orbiting at a safe distance from these violent outbursts, and bathed by a gentler radiation, the Sun can provide the steady energy supply needed to sustain life. Now sedate and middle-aged, at around 4.5 billion years old, the Sun's wild youth is behind it.

Edward Guinan, a professor of astronomy and astrophysics at Villanova University in the USA, and his "Sun-in-Time" project team have studied stars that are analogues of the Sun at both early and late stages of its lifecycle. These "solar proxies" enable scientists to look through a window in time to see the harsh conditions prevailing in the early or future Solar System, as well as in planetary systems around other stars. These studies could lead to profound insights into the origin of life on Earth and reveal how likely

(or unlikely) the rise of life is elsewhere in the cosmos. This work has revealed that the Sun rotated more than ten times faster in its youth (over four billion years ago) than today. The faster a star rotates, the harder the magnetic dynamo at its core works, generating a stronger magnetic field, so the young Sun emitted X-rays and ultraviolet radiation up to several hundred times stronger than the Sun today. A team led by Jean-Mathias Grießmeier from ASTRON in the Netherlands looked at another type of magnetic fields — that around planets. They found that the presence of planetary magnetic fields plays a major role in determining the potential for life on other planets as they can protect against the effects of both short-lived intense particle storms when the star ejects mass from its corona and the persistent onslaught of particles from the stellar wind. Grießmeier says: "Planetary magnetic fields are important for two reasons: they protect the planet against the incoming charged particles, thus preventing the planetary atmosphere from being blown away, and also act as a shield against high energy cosmic rays. The lack of an intrinsic magnetic field may be the reason why today Mars does not have an atmosphere".

Guinan explains a surprising realisation that emerged from their work: "The Sun does not seem like the perfect star for a system where life might arise. Although it is hard to argue with the Sun's 'success' as it so far is the only star known to host a planet with life, our studies indicate that the ideal stars to support planets suitable for life for tens of billions of years may be a smaller slower burning 'orange dwarf' with a longer lifetime than the Sun — about 20-40 billion years. These stars, also called K stars, are stable stars with a habitable zone that remains in the same place for tens of billions of years. They are 10 times more numerous than the Sun, and may provide the best potential habitat for life in the long run". He continues: "On the more speculative side we have also found indications that planets like Earth are also not necessarily the best suited for life to thrive. Planets two to three times more massive than the Earth, with a higher gravity, can retain the atmosphere better. They may have a larger liquid iron core giving a stronger magnetic field that protects against the early onslaught of cosmic rays. Furthermore, a larger planet cools more slowly and maintains its magnetic protection. This kind of planet may be more likely to harbour life. I would not trade though — you can't argue with success".

Manfred Cuntz, an associate professor of physics at the University of Texas at Arlington, USA, and his collaborators have examined both the damaging and the favourable effects of ultraviolet radiation from stars on DNA molecules. This allows them to study the effect on other potential carbon-based extraterrestrial life forms in the habitable zones around other stars. Cuntz says: "The most significant damage associated with ultraviolet light occurs from UV-C, which is produced in enormous quantities in the photosphere of hotter F-type stars and further out, in the chromospheres, of cooler orange K-type and red M-type stars. Our Sun is an intermediate, yellow G-type star. The ultraviolet and cosmic ray environment around a star may very well have 'chosen' what type of life could arise around it".

Rocco Mancinelli, an astrobiologist with the Search for Extraterrestrial Life (SETI) Institute in the USA, observes that as life arose on Earth at least 3.5 billion years ago, it must have withstood a barrage of intense solar ultraviolet radiation for a billion years before the oxygen released by these life forms formed the protective ozone layer. Mancinelli studies DNA to delve into some of the ultraviolet protection strategies that evolved in early life forms and still persist in a recognisable form today. As any life in other planetary systems must also contend with radiation from their host stars, these methods for repairing and protecting organisms from ultraviolet damage serve as models for life beyond Earth. Mancinelli says "We also see ultraviolet radiation as a kind of selection mechanism. All three domains of life that exist today have common ultraviolet protection strategies such as a DNA repair mechanism and sheltering in water or in rocks. Those that did not were likely wiped out early on".

The scientists agree that we do yet know how ubiquitous or how fragile life is, but as Guinan concludes: "The Earth's period of habitability is nearly over — on a cosmological timescale. In a half to one billion years the Sun will start to be too luminous and warm for water to exist in liquid form on Earth, leading to a runaway greenhouse effect in less than 2 billion years".

Adapted from materials provided by International Astronomical Union.

http://www.sciencedaily.com/releases/2009/08/090810162109.htm

Surveying Ships Sunk Off North Carolina In World War II

World War II shipwrecks sunk in 1942 off the coast of North Carolina during the Battle of the Atlantic. (Credit: NOAA)

ScienceDaily (Aug. 13, 2009) — NOAA will lead a three-week research expedition in August to study World War II shipwrecks sunk in 1942 off the coast of North Carolina during the Battle of the Atlantic. The shipwrecks are located in an area known as the "Graveyard of the Atlantic," which includes sunken vessels from U.S. and British naval fleets, merchant ships, and German U-boats.

"The information collected during this expedition will help us better understand and document this often lost chapter of America's maritime history and its significance to the nation," said David W. Alberg, expedition leader and superintendent of the USS Monitor National Marine Sanctuary. "It continues the work conducted by NOAA's Office of National Marine Sanctuaries last summer to research and document historically significant shipwrecks tragically lost during World War II."

Alberg said the expedition, which happens August 4-24, will also help document the condition of these vessels some 67 years after they were lost. Understanding the wrecks' current condition is a crucial first step in establishing efforts to preserve these historic sites, which serve as "time capsules from one of the darkest times in the nation's history," he said.

This year's project will be divided into two phases. Phase one of the expedition will be conducted aboard the NOAA Ship Nancy Foster. Using advanced remote sensing technologies, including sidescan and multibeam sonar systems, researchers will attempt to locate several previously undiscovered WWII shipwrecks. NOAA and its expedition partners from the University of North Carolina will also deploy an advanced remotely operated vehicle to take high-definition imagery of these shipwrecks.

During the second phase, NOAA divers and partners will survey and photograph visible sections of a British armed trawler, HMT Bedfordshire, using non-invasive methods. Bedfordshire was sunk by a torpedo fired from the German submarine U-558 on May 12, 1942, resulting in the loss of the entire crew. The survey team will also study marine life found at the site which now serves as a vibrant artificial reef. Consistent with U.S. and international policy, the shipwreck site is considered a war grave and will not be disturbed during the expedition.

Many of the WWII wrecks off North Carolina, some lying as shallow as 130 feet, serve as popular recreational dive sites and are visited by thousands of divers each year. Unfortunately, some of these wrecks have been severely impacted over the years by human activity. Both NOAA and the recreational diving community promote open access to the shipwrecks and encourage responsible dive behavior and preservation of underwater resources.

Through this expedition, NOAA hopes to highlight our shared maritime history and demonstrate the importance of preserving these shipwrecks for the study and enjoyment of future generations of divers and for all Americans.

In consultation with the British and German governments, NOAA is conducting this expedition survey with technical expertise and logistical support from the Minerals Management Service, the National Park Service, the State of North Carolina, and East Carolina University. The University of North Carolina Coastal Studies Institute, the University of North Carolina at Wilmington, the Georgia Aquarium, and The Mariners' Museum are also providing support.

Adapted from materials provided by National Oceanic And Atmospheric Administration.

http://www.sciencedaily.com/releases/2009/08/090807154406.htm

Police Woman Fights Quantum Hacking And Cracking

ScienceDaily (Aug. 13, 2009) — The first desktop computers changed the way we managed data forever. Three decades after their introduction, we rely on them to manage our time, social life and finances — and to keep this information safe from prying eyes and online predators.

So far, so good, despite an occasional breach. But our security and our data could be compromised overnight when the first quantum computer is built, says Dr. Julia Kempe of Tel Aviv University's Blavatnik School of Computer Science. These new computers, still in the theoretical stage, will be many times more powerful than the computers that protect our data now.

Laying the groundwork to keep governments, companies and individuals safe, Dr. Kempe is working to understand the power of quantum computers by designing algorithms that fit them. At the same time, she is figuring out the limits of quantum computers, something especially important so we can build safety systems against quantum hackers.

"If a very rich person worked secretly to fund the building of a quantum computer, there is no reason in principle that it couldn't be used for malevolent power within the next decade," she says. "Governments, large corporations, entrepreneurs and common everyday people will have no ability to protect themselves. So we have to plan ahead."

What quanta can't do

"If we know what quantum computers will not be able to do, we can find 'windows' of protection for data," says Dr. Kempe, who is working on future programs that could keep data in quantum computers safe. Dr. Kempe recently published papers in Computational Complexity, the *SIAM Journal on Computing and Communications in Mathematical Physics.*

Quantum mechanics allows a computer built on these principles, a so-called quantum computer, to perform tasks that are currently thought impossible to do efficiently on a normal computer, such as breaking current encryption standards.

Adding it all up

Although the most powerful quantum computer today barely has the computational capacity of a 4-bit calculator, it's just a matter of time until they are as powerful as physicists and mathematicians suspect they can be, Dr. Kempe says.

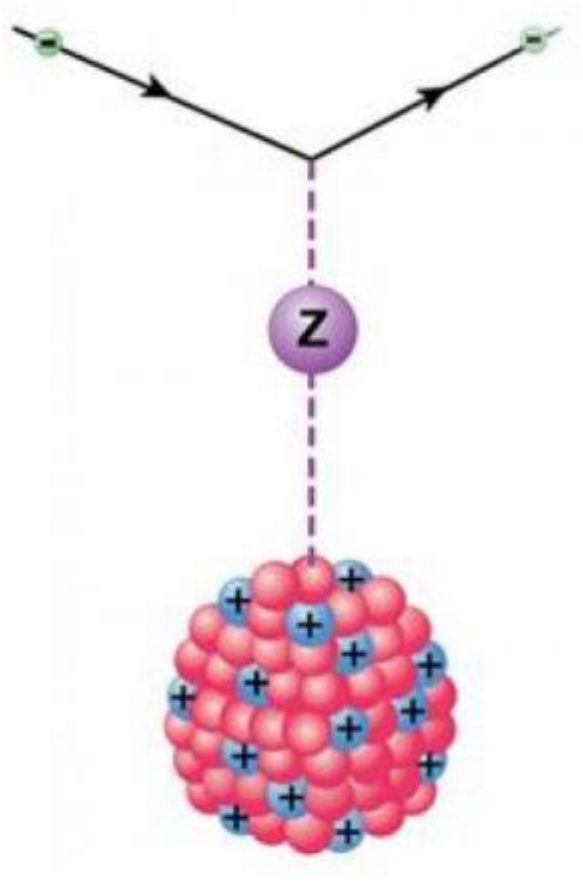
Today's computer operates by manipulating 0s and 1s — that is, a piece of data can be in one state or the other, but cannot be in both states simultaneously. In quantum computing, however, photons can be in the states 0 and 1 at the same time. This will give people and institutions phenomenally more computing power, but at the same time leave their data held in binary computers vulnerable to attack.

"Today if you use a credit card it's encrypted. No matter who intercepts the data it would take forever to decode the numbers — even if all the computers we have today were wired together for the job," Dr. Kempe explains. A quantum computer, however, could crack the code quickly and efficiently.

Adapted from materials provided by Tel Aviv University.

http://www.sciencedaily.com/releases/2009/07/090730121212.htm

Strong Effect Of The Weak Interaction: Exploring The Standard Model Of Physics Without The High-energy Collider



Scientists have measured the largest effect of the "weak interaction" -- one of the four fundamental forces of nature -- ever observed in an atom. (Credit: Image copyright American Physical Society [Illustration: Carin Cain])

ScienceDaily (Aug. 13, 2009) — Scientists at the University of California, Berkeley, and Lawrence Berkeley National Laboratory in the US, have performed sophisticated laser measurements to detect the subtle effects of one of nature's most elusive forces - the "weak interaction". Their work, which reveals the largest effect of the weak interaction ever observed in an atom, is reported in *Physical Review Letters* and highlighted in the August 10th issue of APS's on-line journal *Physics* (physics.aps.org).

Along with gravity, electromagnetism and the strong interaction that holds protons and neutrons together in the nucleus, the weak interaction is one of the four known fundamental forces. It is the force that allows the radioactive decay of a neutron into a proton - the basis of carbon dating – to occur. However, because it acts over such a short range – about a tenth of a percent the diameter of the proton – it is almost impossible to study its effect without large, high-energy particle accelerators.

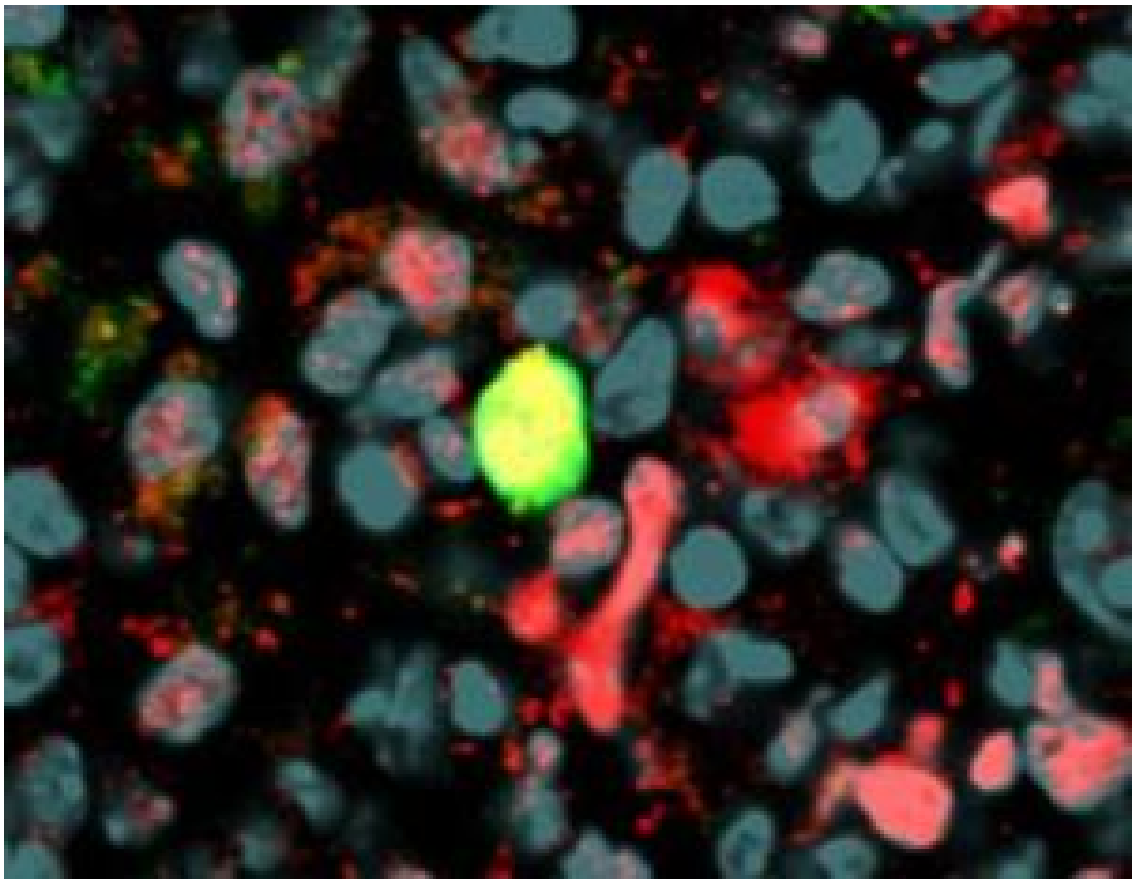
Theorists had predicted that the weak interaction between an atom's electrons and its nucleus could be quite large in Ytterbium (element 70 in the periodic table). To actually see this interaction, though, Dmitry Budker and his group at UC Berkeley had to carefully perform delicate measurements based on fundamental quantum mechanical effects and systematically eliminate other spurious signals.

The effect Budker and his colleagues see in Ytterbium is about 100 times bigger than what has been seen in Cesium, the atom in which most experiments in this field have been performed so far. The finding of such a large effect in Ytterbium poses an exciting opportunity to use tabletop atomic physics techniques as part of sensitive searches for new physics that complement ongoing efforts at the world's high-energy colliders.

Adapted from materials provided by American Physical Society, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/08/090810122137.htm

Discovery Of A Mechanism Controlling The Fate Of Hematopoietic Stem Cells



Microscopy image of a hematopoietic stem cell (in yellow) surrounded by other cells, in a spleen section. (Credit: Copyright Frédéric Mourcin)

ScienceDaily (Aug. 13, 2009) — Hematopoietic stem cells are capable of manufacturing all types of blood cells. But which factors influence the production of a specific type of cell? Until now, it was thought that this was a random process. At the Centre d'Immunologie de Marseille-Luminy (1), a team of CNRS and Inserm researchers led by Michael Sieweke has discovered the factors that determine the type of cells produced. The mechanism they have demonstrated in the mouse involves one factor intrinsic to the cell and one extrinsic factor.

These results were published in the journal *Cell* on July 24, 2009.

Stem cells are a source of much hope, thanks to their extraordinary ability to produce all types of cell in the body or an organ, depending on their origin.Scientists are now trying to understand the mechanisms that commit stem cells to a particular specialization.

At the Centre d'Immunologie de Marseille-Luminy, CNRS and INSERM researchers have been working on mouse hematopoietic stem cells. They studied the development of myeloid cells, a lineage of white blood cells that combats microorganisms by "eating" them, by releasing toxins or by alerting other specialized immune cells. Until now, it was thought that the production of different specialized cells from a hematopoietic stem cell was a random process. Sieweke's team has discovered that in the case of myeloid cells, it is the combined action of two proteins which is relevant; one protein that is situated inside the cell (transcription factor) and the other outside (a cytokine).

Transcription factors are capable of switching genes on or off. The identity of a cell is the combination of active genes it possesses. Because of this, scientists already suspected that transcription factors played an important role in the orientation of differentiation. They also knew that blood cells can only prosper in an environment containing a particular cytokine, a type of hormone specific to each cell type. But until now, they thought that cytokines assisted the survival and renewal of cells without affecting their "fate". The team in Marseille has now shown that a specific cytokine (M-CSF) places stem cells on a "myeloid pathway", but that these stem cells can only follow this path if levels of a certain transcription factor (MafB) within the cells is low.

These findings help to solve a mystery that has fascinated specialists during the past fifty years. In the longer term, these results may throw new light on the mechanisms of leukemia, where abnormal stem cells remain "undecided" and are still able to escape therapy.

Until now, studies on hematopoietic stem cells had opened the way to research on stem cells in other tissues. In this context, the results achieved and published by Michael Sieweke and his colleagues may provide more general information on how stem cells function (in the brain, muscle or intestine).

Journal reference:

1. Sandrine Sarrazin, Noushine Mossadegh-Keller, Taro Fukao, Athar Aziz, Frederic Mourcin, Laurent Vanhille, Louise M. Kelly-Modis, Philippe Kastner, Susan Chan, Estelle Duprez, Claas Otto and Michael H. Sieweke. **MAFB Restricts M-CSF Dependent Myeloid Commitment Divisions of Hematopoietic Stem Cells**. *Cell*, 24 July 2009

Adapted from materials provided by CNRS.

http://www.sciencedaily.com/releases/2009/07/090730233126.htm

Female Supervisors More Susceptible To Workplace Sexual Harassment

ScienceDaily (Aug. 13, 2009) — Women who hold supervisory positions are more likely to be sexually harassed at work, according to the first-ever, large-scale longitudinal study to examine workplace power, gender and sexual harassment.

The study, which will be presented at the 104th annual meeting of the American Sociological Association, reveals that nearly fifty percent of women supervisors, but only one-third of women who do not supervise others, reported sexual harassment in the workplace. In more conservative models with stringent statistical controls, women supervisors were 137 percent more likely to be sexually harassed than women who did not hold managerial roles. While supervisory status increased the likelihood of harassment among women, it did not significantly impact the likelihood for men.

"This study provides the strongest evidence to date supporting the theory that sexual harassment is less about sexual desire than about control and domination," said Heather McLaughlin, a sociologist at the University of Minnesota and the study's primary investigator. "Male co-workers, clients and supervisors seem to be using harassment as an equalizer against women in power."

McLaughlin and her co-authors examined data from the 2003 and 2004 waves of the Youth Development Study (YDS), a prospective study of adolescents that began in 1988 with a sample of 1,010 ninth graders in the St. Paul, Minnesota, public school district and has continued near annually since. Respondents were approximately 29 and 30 years old during the 2003 and 2004 waves. The analysis was supplemented with in-depth interviews with a subset of the YDS survey respondents.

The sociologists found that, in addition to workplace power, gender expression was a strong predictor of workplace harassment. Men who reported higher levels of femininity were more likely to have experienced harassment than less feminine men. More feminine men were at a greater risk of experiencing more severe or multiple forms of sexual harassment (as were female supervisors).

In a separate analysis examining perceived and self-reported sexual orientation, study respondents who reported being labeled as non-heterosexual by others or who self-identified as non-heterosexual (gay, lesbian, bisexual, unsure, other) were nearly twice as likely to experience harassment.

Researchers also found that those who reported harassment in the first year (2003) were 6.5 times more likely to experience harassment in the following year. The most common scenario reported by survey respondents involved male harassers and female targets, while males harassing other males was the second most frequent situation.

McLaughlin co-authored the study with sociologists Christopher Uggen, chair of the University of Minnesota's sociology department and a distinguished McKnight professor of sociology, and Amy Blackstone, associate professor of sociology at the University of Maine. The multi-method research was supported by grants from the National Institutes of Mental Health and the National Institute of Child Health and Human Development.

The paper, "A Longitudinal Analysis of Gender, Power and Sexual Harassment in Young Adulthood," will be presented on Saturday, Aug. 8, at the American Sociological Association's 104th annual meeting.

Adapted from materials provided by American Sociological Association, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/08/090810025247.htm

New Drug-resistant TB Strains Could Become Widespread, Says New Study

Chest X-ray image. One in three humans already carries the TB bacterium. (Credit: Image courtesy of University of New South Wales)

ScienceDaily (Aug. 12, 2009) — The emergence of new forms of tuberculosis could swell the proportion of drug-resistant cases globally, a new study has found. The finding raises concern that although TB incidence is falling in many regions, the emergence of antibiotic resistance could see virtually untreatable strains of the disease become widespread.

Australian researchers from the University of New South Wales and the University of Western Sydney have published the new finding in the latest issue of the *Proceedings of the National Academy of Sciences*.

Laboratory-based studies have suggested that antibiotic-resistant TB strains cause longer-lasting infections but with a lower transmission rate. Therefore, scientists have questioned whether drug-resistant TB strains are more likely than drug-sensitive strains to persist and spread – an important question for predicting the future impact of the disease.

One in three humans already carries the TB bacterium. Although it remains latent in most cases, the World Health Organisation (WHO) has estimated there were 9.27 million new cases of TB in 2007. There were 1.6 million TB-related deaths in 2005. Drug-resistant TB is caused by inconsistent or partial treatment, when patients do not take all their medicines regularly for the required period or because the drug supply is unreliable.

A research team led by UNSW's Dr Mark Tanaka used epidemiological and molecular data from Mycobacterium tuberculosis strains isolated from Cuba, Estonia and Venezuela to estimate the rate of evolution of drug resistance and to compare the relative "reproductive fitness" of resistant and drug-sensitive strains.

"We found that the overall fitness of drug-resistant strains is comparable to drug-sensitive strains," says Dr Tanaka of the Evolution and Ecology Research Centre. "This was especially so in Cuba and Estonia, where the there is a high prevalence of drug-resistant cases."

The finding may reflect an inconsistency in drug treatment programs in these countries. Indeed, Estonia now has one of the highest rates of multi-drug resistance in the world. The intermittent presence of drugs and the resulting transmission of resistant strains would have let drug-resistant strains collectively spend more time within untreated hosts, allowing them to evolve ways to become more infectious and out-compete the drug-sensitive strains.

The study also reveals that the contribution of transmission to the spread of drug resistance is very high – up to 99 per cent – compared with acquired resistance due to treatment failure. "Our results imply that drug resistant strains of TB are likely to become highly prevalent in the next few decades," says UNSW's Dr Fabio Luciani, the study's lead author. "They also suggest that limiting further transmission of TB might be an effective approach to reducing the impact of drug resistance."

"Mathematical and statistical methods can add a lot of value to empirical data by allowing us to account for the processes behind them," says research co-author, Dr Andrew Francis from the University of Western Sydney. "In this case, we use samples of TB genotypes, together with information about drug resistance, to make inferences and predictions that wouldn't have been possible just a few years ago."

About tuberculosis

Tuberculosis is a contagious disease. Like the common cold, it spreads through the air. Only people who are sick with TB in their lungs are infectious. When infectious people cough, sneeze, talk or spit, they propel TB germs, known as bacilli, into the air. A person needs only to inhale a small number of these to be infected.

Left untreated, each person with active TB disease will infect on average between ten and 15 people every year. However, people infected with TB bacilli will not necessarily become sick with the disease. The immune system "walls off" the TB bacilli and it can lie dormant for years. When someone's immune system is weakened, the chances of becoming sick are greater.

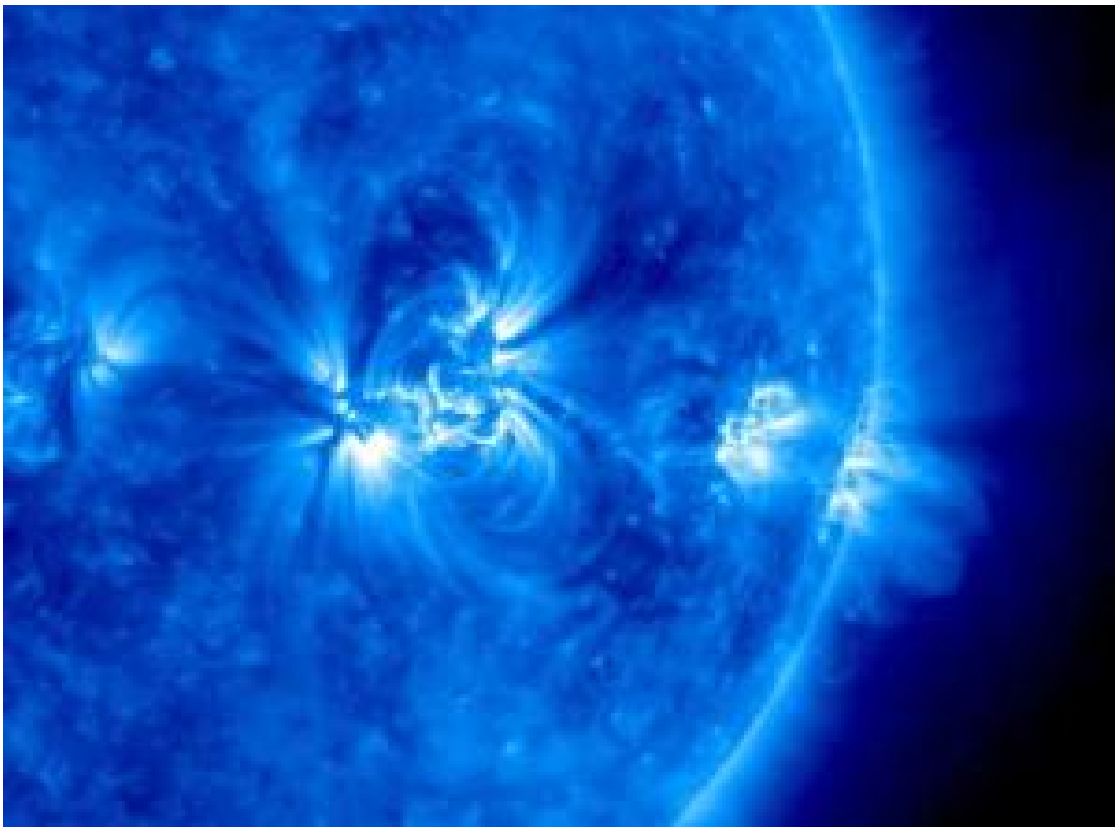
Until 50 years ago, there were no medicines to cure TB. Now, strains that are resistant to antibiotics have emerged and about 1.7 per cent of cases worldwide have multi-drug resistant (MDR-TB) disease. In 2006, extensively drug-resistant tuberculosis (XDR-TB) emerged. XDR-TB is defined as MDR-TB plus resistance to any fluoroquinolone and at least one injectable agent: kanamycin, amikacin or capreomycin. The spread of XDR-TB globally has been fuelled by the HIV epidemic, inadequate public health systems, limited access to high-quality laboratory resources, and a neglect of infection control measures.

"The epidemiological fitness cost of drug resistance in Mycobacterium tuberculosis," Fabio Luciania, Scott A. Sisson, Honglin Jiangb, Andrew R. Francis, and Mark M. Tanaka, *PNAS*. Public release date 10-Aug-2009

Adapted from materials provided by University of New South Wales. Original article written by Dan Gaffney.

http://www.sciencedaily.com/releases/2009/08/090810161957.htm

Avalanche! The Incredible Data Stream Of Solar Dynamics Observatory



This is the sun photographed by an ultraviolet camera onboard NASA's STEREO spacecraft. Solar Dynamics Observatory will expand scenes like this one to IMAX resolution. (Credit: NASA/STEREO)

ScienceDaily (Aug. 12, 2009) — When NASA's Solar Dynamics Observatory (SDO) leaves Earth in November 2009 onboard an Atlas V rocket, the thunderous launch will trigger an avalanche.

Mission planners are bracing themselves -- not for rocks or snow, but an avalanche of data.

"SDO will beam back 150 million bits of data per second, 24 hours a day, 7 days a week," says Dean Pesnell of the Goddard Space Flight Center in Greenbelt, Md. That's almost 50 times more science data than any other mission in NASA history. "It's like downloading 500,000 iTunes a day."

SDO is on a mission to study the sun in unprecedented detail. Onboard telescopes will scrutinize sunspots and solar flares using more pixels and colors than any other observatory in the history of solar physics. And SDO will reveal the sun's hidden secrets in a prodigious rush of pictures.

"SDO is going to send us images ten times better than high definition television," says Pesnell, the project scientist for the new mission. A typical HDTV screen has 720 by 1280 pixels; SDO's images will have almost four times that number in the horizontal direction and five times in the vertical. "The pixel count is comparable to an IMAX movie -- an IMAX filled with the raging sun, 24 hours a day."

Spatial resolution is only half the story, though. Previous missions have photographed the sun no faster than once every few minutes. SDO will shatter that record.

"We'll be getting IMAX-quality images every 10 seconds," says Pesnell. "We'll see every nuance of solar activity." Because these fast cadences have never been attempted before by an orbiting observatory, the potential for discovery is great.

To illustrate the effect this might have on solar physics, Pesnell recalls the 18th century photographer Eadweard Muybridge, who won a famous bet with racehorse owner Leland Stanford. In those days, horses were widely thought to keep at least one hoof on the ground even in full gallop. That's how it appeared to the human eye.

"But when Muybridge photographed horses using a new high-speed camera system, he discovered something surprising," says Pesnell. "Galloping horses spend part of the race completely airborne—all four feet are off the ground."

Pesnell anticipates similar surprises from high-speed photography of the sun. The images could upend mainstream ideas about sunspot genesis, what triggers solar flares, and how explosions ripple through the sun's atmosphere en route to Earth.

The Solar Dynamics Observatory has three main instruments. The Atmospheric Imaging Assembly (AIA) is a battery of four telescopes designed to photograph the sun's surface and atmosphere. AIA filters cover 10 different wavelength bands, or colors, selected to reveal key aspects of solar activity. The bulk of SDO's data stream will come from these telescopes.

The Helioseismic and Magnetic Imager (HMI) will map solar magnetic fields and peer beneath the sun's opaque surface using a technique called helioseismology. A key goal of this experiment is to decipher the physics of the sun's magnetic dynamo.

The Extreme Ultraviolet Variability Experiment (EVE) will measure fluctuations in the sun's ultraviolet output. EUV radiation sun has a direct and powerful effect on Earth's upper atmosphere, heating it, puffing it up, and breaking apart atoms and molecules. "We really don't know how fast the sun varies at these wavelengths," notes Pesnell. "We're guaranteed to learn something new."

To gather data from all three instruments, NASA has set up a pair of dedicated radio antennas near Las Cruces, New Mexico. SDO's geosynchronous orbit will keep the observatory in constant view of the two 18-meter dishes around the clock for the duration of the observatory's five-year mission. Not a single bit should be lost.

"We're ready," says Pesnell. "Let the avalanche begin!"

Adapted from materials provided by NASA. Original article written by Dr. Tony Phillips, NASA Heliophysics News Team.

http://www.sciencedaily.com/releases/2009/08/090811081637.htm

Doctors' Opinions Not Always Welcome In Life Support Decisions

ScienceDaily (Aug. 12, 2009) — Some caregivers of critical care patients prefer doctors to keep their opinions on life support decisions to themselves, according to new research that challenges long-held beliefs in the critical care community.

The research, an article to be published in the August 15 issue of the *American Journal of Respiratory and Critical Care Medicine*, found that surrogates are virtually split when it comes to how much guidance they want to receive from physicians in making end-of-life medical choices on behalf of critically ill patients, according to lead author of the paper, Douglas B. White, of the University of Pittsburgh Medical Center.

"In fact, what we found was that, while a slight majority did prefer doctors to help them make those difficult decisions, many felt that it was a decision they wanted to make without guiding input from doctors other than an explanation of the options," said Dr. White.

At the end of life, critically ill patients frequently require surrogates to make their medical decisions for them, who, in the absence of advance directives from the patient, must rely on what they believe would have been the patients' desires. "This puts an enormous emotional burden on surrogates; not only are they losing a loved one, they also may feel burdened by guilt about allowing the patient to die." said Dr. White. "It was therefore assumed by some in the medical community that a doctor's dispassionate advice could reduce some of that burden and help surrogates make a good decision with less second-guessing themselves. However, there was little or no research to support this assumption."

Dr. White and colleagues set out to test that assumption, recently formalized as a recommendation by a number of critical care societies, by asking surrogates of critical care patients to watch and respond to two videos. The videos depicted a hypothetical ICU "family conference" in which surrogates must decide whether to continue or withdraw life support from a loved one who has a small chance of survival with continued intervention, but a high likelihood of severe functional impairment in the long-term, including dependence on a ventilator. Both videos were identical in all ways except one: in one version, the doctor says that the most important thing is for the surrogate to "make the choice that's consistent with [the patient's] values," but states that only the surrogate could make that decision; in the alternate version, the doctor offers his opinion that the patient would likely not have wanted to continue aggressive treatment given the likely outcome.

A total of 169 surrogates who were recruited from four ICUs at the University of California San Francisco Medical Center to watch the films in randomized order and respond to it. The researchers used a multi-method analysis to code the responses and validated their analyses with the surrogates themselves to ensure an accurate and complete qualitative assessment of the data.

To their surprise, Dr. White and colleagues found that only a slight majority, 56 percent, of surrogates expressed a preference for the version in which the physician offered an opinion to limit life support. A slight minority, 42 percent, preferred no recommendation, and the final two percent had no preference.

"This is an important article that has changed my clinical practice," said J. Randall Curtis, M.PH., M.D., president of the American Thoracic Society and Professor of Medicine Pulmonary and Critical Care Medicine Section Head, Harborview Medical Center in Seattle, WA"I had previously assumed that almost all families would want physicians' recommendations, but these findings indicate that there is no such consensus among surrogates. I suspect that physicians can do more harm by withholding a recommendation that is desired than by providing a recommendation that is not desired, but this study suggests we should ask rather than assume."

Just over half (51 percent) of the surrogates expressing a preference for receiving their doctors' advice believed that it was the doctor's role to provide that opinion, whereas nearly four of five (79 percent) who preferred not to receive the advice saw it as overstepping.

"A very important part of American bioethics is respecting patient's choices," said Dr. White. "The family's most important job when acting as a surrogate decision maker is to give voice to the patient's values. I think our research highlights that the physician's job is to be flexible enough and insightful enough to respond to the surrogate's individual needs for guidance.

"It is rare that a research paper changes clinical practice, and I think this one will," said Dr. Curtis.

Adapted from materials provided by American Thoracic Society, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/08/090810104927.htm

What Science Says About Beach Sand And Stomach Aches

Hands playing with sand. New research shows that by washing your hands after digging in beach sand, you could greatly reduce your risk of ingesting bacteria that could make you sick. (Credit: iStockphoto)

ScienceDaily (Aug. 12, 2009) — By washing your hands after digging in beach sand, you could greatly reduce your risk of ingesting bacteria that could make you sick. In new research, published in the *Journal of Water and Health*, scientists have determined that, although beach sand is a potential source of bacteria and viruses, hand rinsing may effectively reduce exposure to microbes that cause gastrointestinal illnesses.

"Our mothers were right! Cleaning our hands before eating really works, especially after handling sand at the beach," said Dr. Richard Whitman, the lead author of the U.S. Geological Survey (USGS) study. "Simply rinsing hands may help reduce risk, but a good scrubbing is the best way to avoid illness."

For this study, scientists measured how many *E. coli* bacteria could be transferred to people's hands when they dug in sand. They analyzed sand from the shores of Lake Michigan in Chicago. Using past findings on illness rates, scientists found that if individuals were to ingest all of the sand and the associated biological community retained on their fingertip, 11 individuals in 1000 would develop symptoms of gastrointestinal illness. Ingestion of all material on the entire hand would result in 33 of 1000 individuals developing gastrointestinal illness.

In a further laboratory experiment, USGS scientists determined that submerging one's hands four times in clean water removed more than 99% of the *E. coli* and associated viruses from the hands.

In recent years, USGS scientists have discovered that concentrations of *E. coli* bacteria in beach sand are often much higher than those in beach water. Follow-up research at beaches around the nation by many scientists has resulted in similar findings, although the amount of bacteria in sand varies depending on the beach. Although beach water is monitored for *E. coli* as mandated in the Beaches Environmental Assessment and Coastal Health Act (BEACH Act 2000), beach sand is not currently monitored for contamination.

Recent analysis of seven beaches across the nation by the University of North Carolina -Chapel Hill and the U.S. Environmental Protection Agency showed that beachgoers digging in sand were more likely to develop gastrointestinal illness after a day at the beach compared to those not digging in sand. The association with these illnesses was even stronger for individuals who reported being partially covered up in sand. Because children played in the sand more frequently and were more likely to get sand in their mouths, they were more likely to develop gastrointestinal illness after a day at the beach.

"The excess illnesses we observed among those exposed to sand generally consisted of mild gastrointestinal symptoms, but it is a good idea to be sure to wash your hands or use hand sanitizer after digging or playing in the sand," said Chris Heaney, lead author of the UNC study.

E. coli is an indicator of recent sewage contamination and if it is present, pathogens harmful to human health are also likely present. The origin of these bacteria is often unknown. They can persist throughout the swimming season, remaining a potential contamination source to beach visitors.

Results of these studies highlight the need to intensify efforts to determine sources of microbial contamination to beaches and associated risk of playing in beach sand.

Journal reference:

1. Whitman et al. **Hand-mouth transfer and potential for exposure to E. coli and F^+ coliphage in beach sand, Chicago, Illinois**. *Journal of Water and Health*, 2009; 7 (4): 623 DOI: 10.2166/wh.2009.115

Adapted from materials provided by United States Geological Survey.

http://www.sciencedaily.com/releases/2009/08/090811091836.htm

Ugly Truth About One Night Stands: Men Less Choosy Than Women

ScienceDaily (Aug. 12, 2009) — Men are far more interested in casual sex than women. While men need to be exceptionally attractive to tempt women to consider casual sex, men are far less choosy. These findings1 by Dr Achim Schützwohl, from the Department of Psychology at Brunel University in the UK, and his team are published online in Springer's journal *Human Nature*.

The research shows that men are more likely than women to report having had casual sex and they express a greater desire for it than do women. It is also thought that women but not men raise their standards of attractiveness for a casual sex partner.

Dr Schützwohl and his colleagues looked at the influence of an imagined requestor's physical attractiveness on men's and women's willingness to accept three distinct offers: go out, go to their apartment and go to bed with them. A total of 427 male and 433 female students from the US, Germany and Italy answered a questionnaire. They were asked to imagine being approached by a member of the opposite sex, described as either "slightly unattractive", "moderately attractive" or "exceptionally attractive". They then rated how likely they would be to accept each of the three offers.

The authors found that the requestor's looks affected men and women differently. Across all three levels of requestor attractiveness, men were more likely to go out, go to their apartment and go to bed with them than were women. German men were less likely to go out with the requestor and go to their apartment than American and Italian men. Italian men were more likely to go to bed with the requestor than were American men. German men were even less likely than American men to go to bed with the requestor. These differences highlight cultural differences in sexual morals and preferences.

For each of the three offers, men were more likely to accept when the hypothetical woman was moderately or exceptionally attractive than when she was slightly unattractive, but whether she was moderately or exceptionally attractive made no difference. Women however placed more importance on the requestor's good looks. They were more likely to accept the apartment and bed requests from an exceptionally attractive man than from either a moderately attractive or slightly unattractive man.

The authors conclude: "While men are not entirely insensitive to their requestor's attractiveness, women have higher standards and are more likely to engage in casual sex with an exceptionally attractive man than with a less attractive man."

Journal reference:

1. Schützwohl et al. **How Willing Are You to Accept Sexual Requests from Slightly Unattractive to Exceptionally Attractive Imagined Requestors?** *Human Nature*, 2009; DOI: 10.1007/s12110-009-9067-3

Adapted from materials provided by Springer Science+Business Media.

http://www.sciencedaily.com/releases/2009/08/090811080749.htm

Aspirin Use After Colorectal Cancer Diagnosis Associated With Improved Survival

ScienceDaily (Aug. 12, 2009) — Men and women who were diagnosed with colorectal cancer and began regular use of aspirin had a lower risk of overall and colorectal cancer death compared to patients not using aspirin, according to a study in the August 12 issue of *JAMA*.

Numerous prospective, observational studies demonstrate that regular aspirin use is associated with a lower risk of colorectal adenoma (a benign tumor) or cancer. Aspirin is likely, at least in part, to prevent colorectal neoplasia (tumor growth) through inhibition of cyclooxygenase-2 (COX-2; an enzyme), which promotes inflammation and cell proliferation, and is overexpressed in the majority of human colorectal cancers, according to background information in the article. However, the influence of aspirin on survival after diagnosis of colorectal cancer has been unknown.

Andrew T. Chan, M.D., M.P.H., of Massachusetts General Hospital and Harvard Medical School, Boston, and colleagues studied the association between aspirin use and survival among 1,279 men and women with nonmetastatic (stage I, II, and III) colorectal cancer who were participating in 2 large prospective cohort studies (Nurses' Health Study [NHS] and the Health Professionals Follow-up Study [HPFS]) that were initiated (in 1980 and 1986, respectively) prior to cancer diagnosis and followed up through June 1, 2008.

"Within these cohorts, we previously have demonstrated that regular aspirin use was associated with a reduction in the subsequent risk of developing an initial primary colorectal cancer, particularly tumors with COX-2 overexpression. Because these participants have provided biennially updated data on aspirin use, we had a unique opportunity to extend these findings by examining the influence of prediagnosis and postdiagnosis aspirin use on the survival of patients with established colorectal cancer," the authors write.

For participants who were alive through the end of follow-up, the median (midpoint) time of follow-up from date of diagnosis was 11.8 years. There were 193 total deaths (35 percent) and 81 colorectal cancer-specific deaths (15 percent) among 549 participants who regularly used aspirin after colorectal cancer diagnosis, compared with 287 (39 percent) total and 141 (19 percent) colorectal cancer-specific deaths among 730 participants who did not use aspirin. For the entire cohort, the overall 5-year survival was 88 percent for participants who used aspirin compared with 83 percent for those who did not. The corresponding 10-year survival rates were 74 percent and 69 percent.

Regular use of aspirin after diagnosis was associated with a significant reduction in risk of colorectal cancer-specific death and a reduction in overall mortality. Compared with nonusers, regular aspirin use after diagnosis was associated with a 29 percent lower risk for colorectal-specific mortality and a 21 percent lower risk for overall mortality. Because the prognosis among stage I participants is generally favorable, the researchers also examined the influence of aspirin use among those diagnosed with stage II or III disease and observed similar results.

Among the 719 participants who did not use aspirin before diagnosis, initiation of use postdiagnosis was associated with a 47 percent lower risk for colorectal cancer-specific mortality and a 32 percent lower risk of overall mortality. In contrast, among participants who were using aspirin before diagnosis, continuation of aspirin use postdiagnosis was not associated with a significant reduction in colorectal cancer-specific survival or overall survival.

Among participants with COX-2–positive tumors, regular aspirin use after diagnosis was associated with a 61 percent lower risk of colorectal cancer-specific death and 38 percent lower risk of overall mortality, whereas postdiagnosis aspirin use was not associated with lower risk of either colorectal cancer-specific or overall mortality for those with COX-2–negative tumors. "This supports the hypothesis that COX-2–positive tumors may be relatively sensitive to the anticancer effect of aspirin, whereas COX-2–negative tumors may be relatively aspirin-resistant. Moreover, it potentially explains the observation that the

benefit of postdiagnosis aspirin use on patient survival was not apparent among patients who used aspirin prior to cancer diagnosis," the researchers note.

"These results suggest that aspirin may influence the biology of established colorectal tumors in addition to preventing their occurrence. Our data also highlight the potential for using COX-2 or related markers to tailor aspirin use among patients with newly diagnosed colorectal cancer. Nonetheless, because our data are observational, routine use of aspirin or related agents as cancer therapy cannot be recommended, especially in light of concerns over their related toxicities, such as gastrointestinal bleeding. Further studies among patients with colorectal cancer, including placebo-controlled trials of aspirin or related agents as adjuncts to other routine therapies, are required."

Editorial: Aspirin as Adjuvant Therapy for Colorectal Cancer - A Promising New Twist for an Old Drug

Alfred I. Neugut, M.D., Ph.D., of Columbia University, New York, writes in an accompanying editorial that the results of this study are encouraging.

"In the study by Chan et al, the survival benefits of aspirin were similar in patients who received standard adjuvant chemotherapy and those who did not, and in patients with stage I and stage II disease as well as those who had stage III disease at diagnosis. Thus, aspirin may have the potential to be useful as adjuvant therapy not just for locally advanced disease but for early-stage patients as well. Further studies are needed to confirm and extend these findings, and should also investigate the use of aspirin as an agent in individuals with metastatic disease."

Journal references:

1. Andrew T. Chan; Shuji Ogino; Charles S. Fuchs. **Aspirin Use and Survival After Diagnosis of Colorectal Cancer**. *JAMA*, 2009; 302 (6): 649-658 [link]
2. Alfred I. Neugut. **Aspirin as Adjuvant Therapy for Colorectal Cancer: A Promising New Twist for an Old Drug**. *JAMA The Journal of the American Medical Association*, 2009; 302 (6): 688 DOI: 10.1001/jama.2009.1145

Adapted from materials provided by JAMA and Archives Journals.

http://www.sciencedaily.com/releases/2009/08/090811161308.htm

Climbing To New Heights In The Forest Canopy

White clematis growing on a garden wall. (Credit: iStockphoto/Brigitte Smith)

ScienceDaily (Aug. 12, 2009) — With summer in full swing, many plants are at their peak bloom and climbing plants, like clematis, morning glories, and sweet peas, are especially remarkable. Not only are these plants beautiful, but their ability to climb walls and trellises is an impressive feat of biological engineering that has taken millions of years to accomplish.

A recent article by Dr. Sandrine Isnard and Dr. Wendy Silk in the July issue of the *American Journal of Botany* explores the logistics of this incredible ability. Climbing plants have fascinated biologists, including Charles Darwin, who wrote a provocative essay on the subject in 1865; however, many questions remain to be answered.

Climbing plants vary in their mode of attachment to their supporting structures. They have traditionally been classified into five categories based on their mode of attachment: twining plants like morning glories, leaf-climbers like clematis, tendril-bearers like grapevines, root-climbers like English ivy, and hook-climbers like cats claw.

Climbing plants in the first three categories exhibit a type of motion where the plant grows by revolving in large arcs, known as circumnutation, giving them the greatest likelihood of encountering a support. Exactly what allows the plants to circumnutate is still poorly-understood and is a topic of much ongoing research involving biophysics. After contacting a support, the stem of twining plants winds and forms a helix around the supporting structure. In leaf-climbers, the leaves bend and clasp the supporting structure; while in tendril-bearing plants, the tendrils coil around a support, and form a basipetal spring-like structure which draws the stem closer to its source of support.

Root-climbers and other clinging climbers often adhere to a supporting structure through viscous secretions, allowing them to crawl up very large tree trunks. Hook-climbers are rather less sophisticated. They use their hooks to lean on their source of support without firmly attaching to it, a notable difference from the other types of climbers.

Although it is possible to observe the superficial differences among the vines in their climbing methods, it is more difficult to observe structural traits of the stems that play an integral role in the plants' climbing ability. Because climbing plants rely on their other supportive structures as they reach toward the sky, they do not need to invest their energy into building huge tree trunks to support heavy branches. Not only are they able to be flexible, but flexibility is an asset that makes a vine less prone to mechanical stresses while detaching from support or during fall of the support itself. Many anatomical traits of vines, such as the significant development of parenchyma and high frequency of wide water transport vessels, allow them to maintain this flexibility and withstand breakage while still effectively transporting water and nutrients throughout the plant.

Recent research in Amazonian forests has suggested that the abundance of woody vines is increasing relative to tree species, possibly as a result of human-induced climate change, such as increasing carbon dioxide concentration and increasing forest fragmentation. A greater knowledge of these fascinating plants is warranted as we begin to understand the important ecological role they play in forest dynamics, structure, and composition.

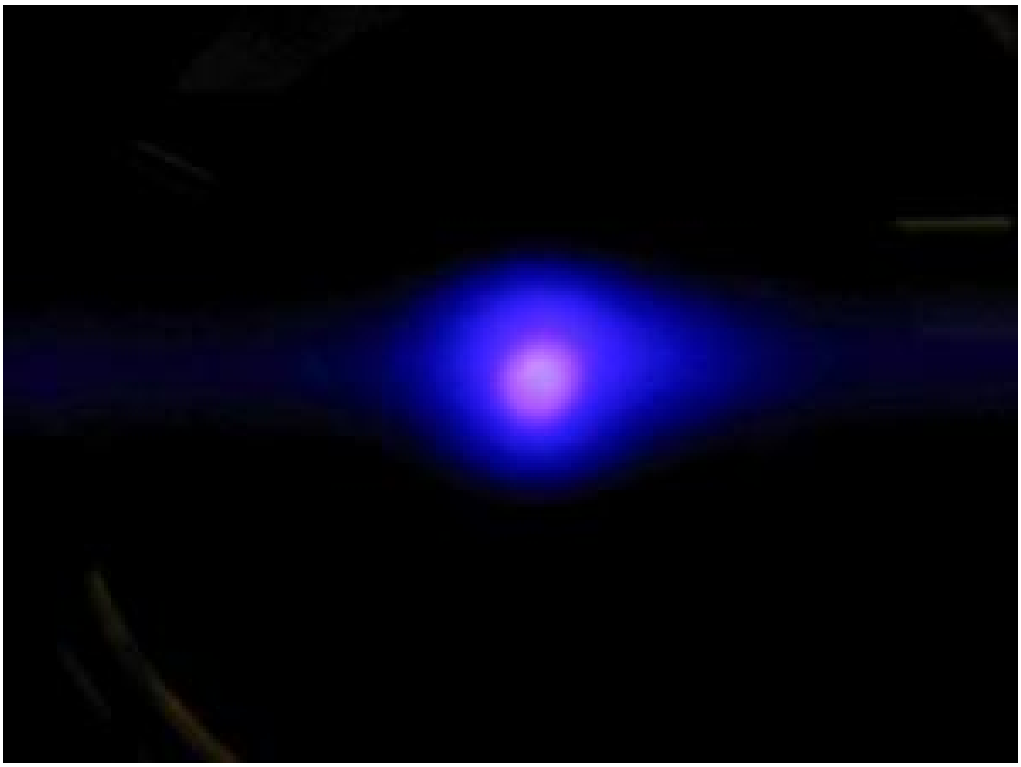
Journal reference:

1. Sandrine Isnard and Wendy K. Silk. **Moving with climbing plants from Charles Darwin's time into the 21st century**. *American Journal of Botany*, July 2009 DOI: 10.3732/ajb.0900045

Adapted from materials provided by American Journal of Botany, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/08/090806112603.htm

Ytterbium Gains Ground In Quest For Next-generation Atomic Clocks



This photo shows about 1 million ytterbium atoms illuminated by a blue laser in an experimental atomic clock that holds the atoms in a lattice made of intersecting laser beams. The photo was taken with a digital camera through the window of a vacuum chamber. NIST is studying the possible use of ytterbium atoms in next-generation atomic clocks based on optical frequencies, which could be more stable and accurate than today's best time standards, which are based on microwave frequencies. (Credit: Barber, NIST)

ScienceDaily (Aug. 12, 2009) — An experimental atomic clock based on ytterbium atoms is about four times more accurate than it was several years ago, giving it a precision comparable to that of the NIST-F1 cesium fountain clock, the nation's civilian time standard, scientists at the National Institute of Standards and Technology (NIST) report in *Physical Review Letters*.

NIST scientists evaluated the clock by measuring the natural frequency of ytterbium, carefully accounting for all possible deviations such as those caused by collisions between the atoms, and by using NIST-F1 as a "ruler" for comparison. The results were good enough to indicate that the ytterbium clock is competitive in some respects with NIST-F1, which has been improving steadily and now keeps time to within 1 second in about 100 million years. (Because the international definition of the second is based on the cesium atom, technically no clock can be more accurate than cesium standards such as NIST-F1.) More importantly, the improved ytterbium clock gives the time standards community more options in the ongoing development and comparisons of next-generation clocks, says NIST physicist Chris Oates, an author of the new paper.

The NIST ytterbium clock is based on about 30,000 heavy metal atoms that are cooled to 15 microkelvins (close to absolute zero) and trapped in a column of several hundred pancake-shaped wells—an "optical lattice"—made of laser light. A laser that "ticks" 518 trillion times per second induces a transition between two energy levels in the atoms. The clock's enhanced performance was made possible by improvements in the apparatus and a switch to a different form of ytterbium whose nucleus is slightly magnetic due its "spin-one half" angular momentum. This atom is less susceptible to key errors than the "spin-zero" form of ytterbium used previously.

NIST scientists are developing five versions of next-generation atomic clocks, each using a different atom and offering different advantages. The experimental clocks all operate at optical (visible light) frequencies, which are higher than the microwave frequencies used in NIST-F1, and thus can divide time into smaller units, thereby yielding more stable clocks. Additionally, optical clocks could one day lead to time standards up to 100 times more accurate than today's microwave clocks.

The best optical clocks are currently based on single ions (electrically charged atoms), such as the NIST "logic clock" using an aluminum ion (see "NIST 'Quantum Logic Clock' Rivals Mercury Ion as World's Most Accurate Clock".) But lattice clocks have the potential for higher stability because they simultaneously average signals from tens of thousands of atoms. Ongoing comparisons of the ytterbium clock to that of the strontium lattice clock located nearby at JILA, a joint institute of NIST and the University of Colorado at Boulder, (see "Collaboration Helps Make JILA Strontium Atomic Clock 'Best in Class'") should help enable worldwide tests of optical clock performance with extremely high precision. JILA is At this point it is far from clear which atom and clock design will be selected by research groups around the world as a future time and frequency standard.

Advances in atomic clock performance support development of technologies such as high data rate telecommunications and the Global Positioning System (GPS). Optical clocks are already providing record measurements of possible changes in the fundamental "constants" of nature, a line of inquiry that has huge implications for cosmology and tests of the laws of physics, such as Einstein's theories of special and general relativity. Next-generation clocks might lead to new types of gravity sensors for exploring underground natural resources and fundamental studies of the Earth. Other possible applications may include ultra-precise autonomous navigation, such as landing planes by GPS.

Journal reference:

1. N. D. Lemke, A. D. Ludlow, Z.W. Barber, T. M. Fortier, S.A. Diddams, Y. Jiang, S. R. Jefferts, T. P. Heavner, T. E. Parker and C.W. Oates. **Spin-1/2 Optical Lattice Clock**. *Physical Review Letters*, 2009; 103 (6): 063001 DOI: 10.1103/PhysRevLett.103.063001

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

http://www.sciencedaily.com/releases/2009/08/090811161349.htm

Scientists Control Living Cells With Light; Advances Could Enhance Stem Cells' Power

Aristide Dogariu of the College of Optics and Photonics at the University of Central Florida. (Credit: Photo by Jacque Brund)

ScienceDaily (Aug. 12, 2009) — University of Central Florida researchers have shown for the first time that light energy can gently guide and change the orientation of living cells within lab cultures. That ability to optically steer cells could be a major step in harnessing the healing power of stem cells and guiding them to areas of the body that need help.

The results, presented at the 2009 Conference on Lasers and Electro-Optics/International Quantum Electronics Conference, were discovered by a research team led by Aristide Dogariu, an optical scientist at the College of Optics and Photonics, and Kiminobu Sugaya, a stem cell researcher at the College of Medicine's Burnett School of Biomedical Sciences.

Long-term implications of the work include stimulating and controlling tissue regeneration for cleaner wound healing and the possibility of altering the shapes of cells and preventing malignant tumors from spreading throughout the body.

While optical techniques such as drilling microscopic holes with light or using the light as tweezers have shown promise in manipulating small pieces of matter, the UCF team explored the use of a gentler light energy. Their work showed for the first time that optically induced torques can affect components within cells that drive their motility -- their ability to move spontaneously -- and change the orientation of cells within cultures.

While earlier studies of cell manipulation have emphasized shielding the cell from the power of the light, Dogariu and Sugaya focused on using that energy to stimulate the cells' natural tendencies.

Living cells use energy to move actively and spontaneously. To influence them without jeopardizing their chemical makeup was a tremendous challenge. Dogariu and Sugaya began exploring the idea of moving

an entire cell by focusing on its inner mechanisms. Inside the cells there are slender rods made up of a protein called actin.

"Actin rods are constantly vibrating, causing the cells to move sporadically" Sugaya said. The researchers demonstrated that low-intensity polarized light can guide the rods' Brownian motion to ever-so-slowly line up and move in the desired direction.

"Stronger light would simply kill them," Dogariu said. "We wanted to gently help the cells do their job the way they know how to do it."

A time-lapse video shows that after more than two hours of exposure to light with specific characteristics, a group of stem cells migrates from a seemingly random mix of shapes, movement and sizes to a uniform lineup.

Adapted from materials provided by University of Central Florida. Original article written by Barb Abney.

http://www.sciencedaily.com/releases/2009/08/090811161347.htm

NASA Goes Inside A Volcano, Monitors Activity

A sensor like this is being placed inside and around the mouth of Mount St. Helens. One day it may be used to respond rapidly to an impending eruption. (Credit: Image courtesy of NASA/Jet Propulsion Laboratory)

ScienceDaily (Aug. 12, 2009) — Scientists have placed high-tech "spiders" inside and around the mouth of Mount St. Helens, one of the most active volcanoes in the United States. Networks such as these could one day be used to respond rapidly to an impending eruption.

On July 14, 2009, these spider pods were lowered by cable from a helicopter hovering about 100 feet up (30 meters) and gently put in hot spots inside and around the volcano crater.

"This project demonstrates that a low-cost sensor network system can support real-time monitoring in extremely challenging environments," said WenZhan Song of Washington State University Vancouver. Song is the principal investigator for this NASA-funded technology research project, which also draws on participation from the U.S. Geological Survey and from NASA's Jet Propulsion Laboratory, Pasadena, Calif.

These robotic emissaries were built to go where no human can and operate in extreme temperatures and treacherous terrain. Fifteen pods form a virtual wireless network, communicating with each other and the Earth Observing-1 (EO-1) satellite, operated by NASA's Goddard Space Flight Center, in Greenbelt, Md.

"Taking data from the ground onsite and from above by satellite gives you a great picture of what is going on inside the volcano," said Steve Chien, principal scientist for autonomous systems at JPL.

Each pod contains a seismometer to detect earthquakes; a GPS receiver to pinpoint the exact location and measure subtle ground deformation; an infrared sounder to sense volcanic explosions; and a lightning detector to search for ash cloud formation. The main instrument box is the size and shape of a microwave oven. It sits on top of a three-legged tripod, which is why scientists call them spiders. The pods are powered by batteries that can last for at least a year.

"With these high-tech instruments, we can rapidly respond during periods of volcanic unrest to supplement our permanent monitoring network or quickly replace damaged stations without excessive

exposure to personnel," said Rick LaHusen, an instrumentation engineer with the U.S. Geological Survey's Cascades Volcano Observatory, Vancouver, Wash.

In 1980, a tremendous eruption at Mount St. Helens caused considerable loss of life and damage. More recently, in 2004, the volcano came back to life and erupted more than 100 million cubic meters (26 billion gallons) of lava, accompanied by a series of explosions that hurled rock and ash far from the vent. If eruptions like these ever occur again, a sensor network could be quickly put in place to provide valuable real-time information to scientists and emergency services.

This work is part of NASA's plan to develop a sensor web to provide timely data and analyses for scientific research, natural hazard mitigation, and the exploration of other planets in this solar system and beyond.

"We hope this network will provide a blueprint for future networks to be installed on many of the world's unmonitored active volcanoes, so educated and reliable estimates can be made when a town or a village needs to be evacuated to reduce the risk to life and property," said Project Manager Sharon Kedar (shah-RONE keh-DARR) of JPL.

Chien said, "Hostile environments like Mount St. Helens are proving grounds for future space missions, such as to Mars, where we may someday have similar sensor networks to track a meteor strike, dust storm or Mars quake, as a virtual scientist on the ground."

Song said, "The design and deployment experiences will help us understand challenging environments and inspire new discoveries."

A team of engineers, students, volcanologists and geologists put the system together. The team includes the U.S. Geological Survey's Cascades Volcano Observatory staff, who designed and built the "spider" hardware; Washington State University in Vancouver, where the sensor network software was written; and NASA, which developed software to make the spiders able to detect events to trigger space observations by the EO-1 satellite.

For more information on Volcano sensor networks see: http://ai.jpl.nasa.gov/public/projects/sensorweb/ .

The work is funded by NASA's Earth Science Technology Office through the Advanced Information System Technology program and also by the USGS Volcano Hazards Program. JPL is managed for NASA by the California Institute of Technology in Pasadena.

Adapted from materials provided by NASA/Jet Propulsion Laboratory.

http://www.sciencedaily.com/releases/2009/08/090810033921.htm

Seizures During Pregnancy Associated With Risk Of Pre-term And Small Babies

ScienceDaily (Aug. 12, 2009) — Women with epilepsy who have seizures during pregnancy appear more likely to give birth to pre-term, small or low-birth-weight babies than women without epilepsy, according to a report in the August issue of *Archives of Neurology*, one of the JAMA/Archives journals.

An estimated 0.2 percent to 0.7 percent of pregnant women have epilepsy, the most common major neurologic complication in pregnancy, according to background information in the article. "While approximately 40 percent of the 18 million women with epilepsy in the world are of childbearing age, managing maternal epilepsy and monitoring the health of the developing fetus remain some of the most perplexing and engaging issues in the fields of neurology and obstetrics," the authors write.

Yi-Hua Chen, Ph.D., of Tai Pei Medical University, Taiwan, and colleagues used data from the Taiwan National Health Insurance Research Data set and analyzed records from 1,016 women with epilepsy who gave birth between 2001 and 2003. Of these, 503 had seizures during pregnancy and 513 did not. A control group of 8,128 women who were the same age and gave birth during the same years but did not have epilepsy or any other chronic disease were selected for comparison.

Compared to women without epilepsy, women who had seizures during pregnancy had a 1.36-fold greater risk of having a low-birth-weight baby (weighing less than 2,500 grams), a 1.63-fold increased risk of giving birth pre-term (before 37 weeks) and a 1.37-fold increased risk of having a baby who was small for gestational age (having a birth weight below the 10th percentile for age). In addition, when compared with women who had epilepsy but did not have seizures, the odds of women who had seizures during pregnancy having a baby who was small for gestational age were 1.34 times greater.

Some previous studies had reported a link between adverse pregnancy outcomes and mothers' epilepsy, but others found no association, the authors note. "Our study further illuminates these conflicting data to suggest that it is the seizures themselves that seem to contribute greatly to the increased risk of infants being delivered preterm, of low birth weight and small for gestational age. For women who remained seizure-free throughout pregnancy, null or mild risk was identified compared with unaffected women."

Several mechanisms might explain the association between seizures and adverse pregnancy outcomes. Trauma caused by a woman's seizures could rupture fetal membranes, increasing risk of infection and early delivery. Tension and acute injury may result from contractions in the uterus that occur during seizures. However, additional research is needed to understand how seizures interfere with fetal development.

"Neonates born pre-term, of low birth weight and small for gestational age may be predisposed to diseases during infancy and later life, highlighting the significance of proper intervention strategies for prevention," the authors write. These could include helping women control seizures for a period of time before pregnancy, assisting them in sleeping better, providing education about the risks of seizures while pregnant and teaching improved strategies for coping with stress.

Journal reference:

1. Yi-Hua Chen; Hung-Yi Chiou; Herng-Ching Lin; Hsiu-Li Lin. **Affect of Seizures During Gestation on Pregnancy Outcomes in Women With Epilepsy**. *Arch Neurol.*, 2009; 66 (8): 979-984 [link]

Adapted from materials provided by JAMA and Archives Journals.

http://www.sciencedaily.com/releases/2009/08/090810161913.htm

When Did Humans Return After Last Ice Age?

Gough's Cave. (Credit: Copyright Natural History Museum)

ScienceDaily (Aug. 12, 2009) — The Cheddar Gorge in Somerset was one of the first sites to be inhabited by humans when they returned to Britain near the end of the last Ice Age. According to new radio carbon dating by Oxford University researchers, outlined in the latest issue of Quaternary Science Review, humans were living in Gough's Cave 14,700 years ago.

A number of stone artefacts as well as human and animal bones from excavations, spread over more than 100 years, shed further light on the nature as well as the timing of people to the cave.

Technological advances have allowed researchers at Oxford University and London's Natural History Museum to date the bones more accurately. Previous radiocarbon dates suggested a wide span of occupation of within 1000-1500 years. The new dates show a much narrower range of dates, corresponding precisely to climate warming, providing evidence that the archaeological material in the cave could have accumulated over perhaps as little as two to three human generations, centred on 14,700 years ago.

Dr Tom Higham, Deputy Director of the Oxford Radiocarbon Accelerator Unit, commented: 'In the past, radiocarbon dates have often been influenced by contamination that modern techniques can remove much more effectively. The new results have transformed our understanding of this site because at last we have a chronology we can rely on and which we can link to climatic events here and in the wider world.'

Dr Roger Jacobi, of the British Museum and the Natural History Museum, who led the research, said: 'This is the biggest advance which we have made in understanding the story of the Palaeolithic use of this remarkable cave, and it is one which has implications for our understanding of many other British archaeological sites.'

Many of the human remains bear patterns of cutmarks, which have been interpreted as evidence of cannibalism. These were previously thought to have belonged to a more recent period of activity than that associated with the hunting of horses and red deer.

Professor Chris Stringer, Natural History Museum Palaeontologist, commented: ' We were puzzled that the human bones we excavated in Gough's Cave about 20 years ago, including those that may have been cannibalised, seemed to be up to a thousand years different in age. The new dating methods show instead that the butchery and consumption of both horses and humans occurred in a very short space of time, about 14,700 years ago. So as Europe rapidly defrosted, family groups probably followed herds of horses into Britain across grasslands where the North Sea is today.'

Further sites will be re-examined using the same approach to test whether humans returned to Britain at the time of climate warming or whether they came back before this period. More accurate dating might be possible through applying isotopic methods directly to the human teeth from the site, as well as to those of the prey animals, because this will allow a better assessment of whether the animals were hunted in a warmer or colder period. At present, the radiocarbon dates are not sufficiently precise enough to answer this key question. The work is part of the Ancient Human Occupation of Britain project, funded by the Leverhulme Trust.

Adapted from materials provided by University of Oxford.

http://www.sciencedaily.com/releases/2009/07/090727130600.htm

Combustion Simulation: Digital Fireworks

Volume rendering of hydroperoxy (HO2) radical concentration during autoignition. The red colouring indicates a high HO2 concentration. The little green "bubble" below is about to auto-ignite. (Credit: Photo: LAV/ETH Zurich)

ScienceDaily (Aug. 12, 2009) — Researchers from ETH Zurich have simulated autoignition in a turbulent flow using a supercomputer with up to 65,000 processors in one of the largest reactive flow simulations to date. The results could help to develop better models and reduce the high cost of real experiments.

A team of researchers from the Laboratory of Aerothermochemistry and Combustion Systems (LAV) headed by Professor Konstantinos Boulouchos recently presented initial results of one of the largest reactive "Direct Numerical Simulations" (DNS) to date. The simulated autoignition of hydrogen in a turbulent hot air coflow is essentially a laboratory experiment performed on the computer. The fuel ignites by itself when its pressure and temperature is high enough.

"The main advantage of such a numerical simulation over a "real" experiment is that data like the flow velocity, temperature, pressure and concentration of the individual chemical components can be measured accurately with a high temporal and spatial resolution. It would simply be impossible to obtain such detailed information in a real experiment", explains Christos Frouzakis, head of the DNS group at LAV.

100 terabytes of data for 11 milliseconds

The software used for the simulation is the result of a long collaboration between the LAV group and the Argonne National Laboratory (ANL) near Chicago, and had already been used successfully in less demanding computations. In order to make the simulation on tens of thousands of processors possible,

Stefan Kerkemeier, a doctoral student at LAV, and Paul Fischer from ANL optimized and further expanded the code over the last two years.

The simulation was performed on the IBM BlueGene/P at ANL, one of the world's largest high-performance supercomputers. It required about 12 days on up to 65,000 processors to calculate 11 milliseconds of real time. According to Kerkemeier, at the time of the computations (December 2008), such a simulation was not possible in Switzerland due to lack of computational resources. Over 100 terabytes of data were collected with a temporal resolution of 3 microseconds and a spatial resolution of 30 micrometers. "The wealth of data is enormous. The next big challenge is to analyze the results of the simulation and understand the processes involved", stresses Kerkemeier.

For more efficient engines and energy from hydrogen

A better understanding of autoignition is necessary for the development of more efficient engines. So far, the simulation used hydrogen as the fuel. "We used hydrogen because the computational time would be too long with petrol or diesel due to their complex chemical composition", explains Konstantinos Boulouchos. However, hydrogen could become increasingly important in the future, according to Boulouchos. For example when coal or natural gas is converted into hydrogen in order to be burnt in a gas turbine, while carbon dioxide is separated before the combustion chamber.

Adapted from materials provided by ETH Zurich.

http://www.sciencedaily.com/releases/2009/07/090725203431.htm

Multiple Sclerosis Successfully Reversed In Mice: New Immune-suppressing Treatment Forces The Disease Into Remission

Dr. Jacques Galipeau of the Jewish General Hospital Lady Davis Institute for Medical Research and McGill University. (Credit: Claudio Calligaris/McGill University)

ScienceDaily (Aug. 12, 2009) — A new experimental treatment for multiple sclerosis (MS) completely reverses the devastating autoimmune disorder in mice, and might work exactly the same way in humans, say researchers at the Jewish General Hospital Lady Davis Institute for Medical Research and McGill University in Montreal.

MS is an autoimmune disease in which the body's own immune response attacks the central nervous system, almost as if the body had become allergic to itself, leading to progressive physical and cognitive disability.

The new treatment, appropriately named GIFT15, puts MS into remission by suppressing the immune response. This means it might also be effective against other autoimmune disorders like Crohn's disease, lupus and arthritis, the researchers said, and could theoretically also control immune responses in organ transplant patients. Moreover, unlike earlier immune-supppressing therapies which rely on chemical pharamaceuticals, this approach is a personalized form of cellular therapy which utilizes the body's own cells to suppress immunity in a much more targeted way.

GIFT15 was discovered by a team led by Dr. Jacques Galipeau of the JGH Lady Davis Institute and McGill's Faculty of Medicine. The results were published August 9 in the prestigious journal *Nature Medicine*.

GIFT15 is composed of two proteins, GSM-CSF and interleukin-15, fused together artificially in the lab. Under normal circumstances, the individual proteins usually act to stimulate the immune system, but in their fused form, the equation reverses itself.

"You know those mythical animals that have the head of an eagle and the body of a lion? They're called chimeras. In a lyrical sense, that's what we've created," said Galipeau, a world-renowned expert in cell regeneration affiliated with the Segal Cancer Centre at the Jewish General and McGill's Centre for

Translational Research. "GIFT15 is a new protein hormone composed of two distinct proteins, and when they're stuck together they lead to a completely unexpected biological effect."

This effect, explained Galipeau, converts B-cells -- a common form of white blood cell normally involved in immune response -- into powerful immune-suppressive cells. Unlike their better-known cousins, T-cells, naturally-occurring immune-suppressing B-cells are almost unknown in nature and the notion of using them to control immunity is very new.

"GIFT15 can take your normal, run-of-the-mill B-cells and convert them -- in a Superman or Jekyll - Hyde sort of way -- into these super-powerful B-regulatory cells," Galipeau explained. "We can do that in a petri dish. We took normal B-cells from mice, and sprinkled GIFT15 on them, which led to this Jekyll and Hyde effect.

"And when we gave them back intravenously to mice ill with multiple sclerosis, the disease went away."

MS must be caught in its earliest stages, Galipeau cautioned, and clinical studies are needed to test the treatment's efficacy and safety in humans. No significant side-effects showed up in the mice, he said, and the treatment was fully effective with a single dose.

"It's easy to collect B-cells from a patient," he added. "It's just like donating blood. We purify them in the lab, treat them with GIFT15 in a petri dish, and give them back to the patient. That's what we did in mice, and that's what we believe we could do in people. It would be very easy to take the next step, it's just a question of finding the financial resources and partnerships to make this a reality."

Journal reference:

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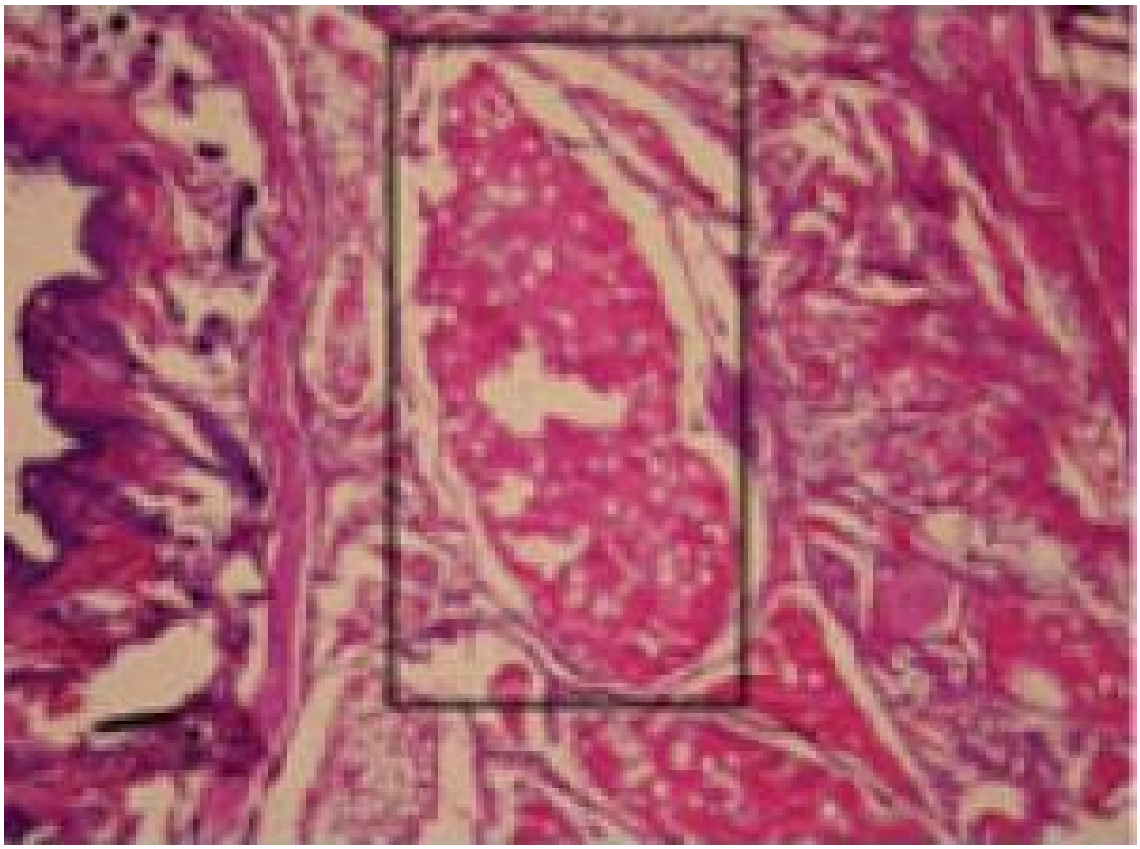
Adapted from materials provided by McGill University.

http://www.sciencedaily.com/releases/2009/08/090811143725.htm

Bone From Blood: Circulating Cells Form Bone Outside The Normal Skeleton



Circulating osteogenic precursor (COP) cells form bone in vivo. COP cells were transplanted into nude mice with histological sections revealing hard tissue containing osteoctyes and bone-lining cells (boxed area) eight weeks later. (Credit: Robert Pignolo, MD, PhD, University of Pennsylvania School of Medicine)

ScienceDaily (Aug. 12, 2009) — The accepted dogma has been that bone-forming cells, derived from the body's connective tissue, are the only cells able to form the skeleton. However, new research shows that specialized cells in the blood share a common origin with white blood cells derived from the bone marrow and that these bloodstream cells are capable of forming bone at sites distant from the original skeleton.

This work, published online this month in the journal *Stem Cells*, represents the first example of how circulating cells may contribute to abnormal bone formation.

The discovery that circulating blood cells can form bone outside the normal skeleton was made while studying a rare genetic disease of misplaced bone growth, fibrodysplasia ossificans progressiva, or FOP.

"Identifying circulating cells with bone-forming potential in humans has important implications for FOP, as well as more common disorders where bone is formed outside the skeleton, such as in end-stage aortic valve disease, following head and spinal cord injury, and after hip and knee replacements," says senior author Robert J. Pignolo, MD, PhD, Assistant Professor of Medicine at the University of Pennsylvania School of Medicine. "This type of aberrant bone growth also occurs after severe trauma, such as blast injuries suffered by Iraqi war veterans, and its study may help us understand how bone forms after the development of the skeleton has ceased, with possible applications in bone diseases where only scarce or poor quality bone forms." Pignolo is also the Director of the Ralston-Penn Clinic for Osteoporosis & Related Bone Disorders.

The researchers analyzed blood samples from patients with FOP and unaffected individuals, isolating cells that could form bone when transplanted subcutaneously into animals. The isolated cells were characterized using surface and other markers, which identified them as being derived from bone marrow. The researchers also examined tissue from FOP patients that had formed new bone, and found that these cells had migrated into the early sites of the lesion.

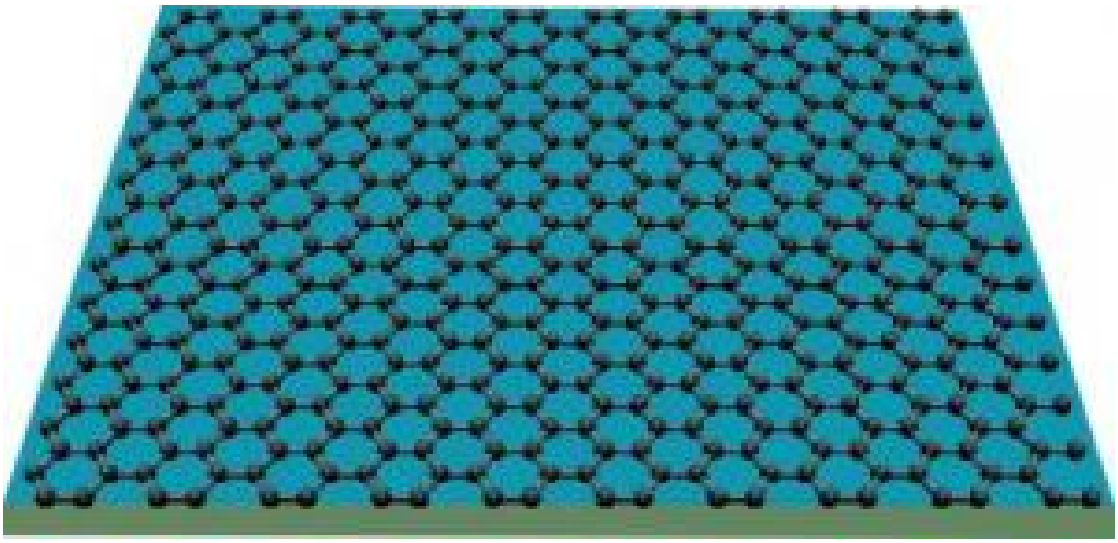
"This study provides an explanation for how bone-forming cells could seed sites of injury and inflammation that subsequently develop ossifications outside the skeleton," says Frederick S. Kaplan, MD, Isaac & Rose Nassau Professor of Orthopedic Molecular Medicine and Director of the Center for FOP & Related Disorders at Penn. "Dr. Pignolo and researchers in his lab demonstrated that these circulating cells are able to home to damaged tissue."

This work was funded by a National Institutes of Health career development award to Dr. Pignolo and the The Ian Cali Developmental Grants fund of the Center for Research in FOP and Related Disorders. Pignolo is also a staff physician at the Veterans Affairs Medical Center in Philadelphia.

Adapted from materials provided by University of Pennsylvania School of Medicine.

http://www.sciencedaily.com/releases/2009/07/090723150828.htm

Scientists Manipulate Ripples In Graphene, Enabling Strain-based Graphene Electronics



Graphene consists of carbon atoms only one atomic layer thick, with the unique characteristic that its electrons behave as if they have zero mass. (Credit: Lau lab, UC Riverside)

ScienceDaily (Aug. 12, 2009) — Graphene is nature's thinnest elastic material and displays exceptional mechanical and electronic properties. Its one-atom thickness, planar geometry, high current-carrying capacity and thermal conductivity make it ideally suited for further miniaturizing electronics through ultra-small devices and components for semiconductor circuits and computers.

But one of graphene's intrinsic features is ripples, similar to those seen on plastic wrap tightly pulled over a clamped edge. Induced by pre-existing strains in graphene, these ripples can strongly affect graphene's electronic properties, and not always favorably.

If the ripples can be controlled, however, they can be used to advantage in nanoscale devices and electronics, opening up a new arena in graphene engineering: strain-based devices.

UC Riverside's Chun Ning (Jeanie) Lau and colleagues now report the first direct observation and controlled creation of one- and two-dimensional ripples in graphene sheets. Using simple thermal manipulation, the researchers produced the ripples, and controlled their orientation, wavelength and amplitude.

"When the graphene sheets are stretched across a pair of parallel trenches, they spontaneously form nearly periodic ripples," Lau explained. "When these sheets are heated up, they actually contract, so the ripples disappear. When they are cooled down to room temperature, the ripples re-appear, with ridges at right angle to the edges of the trenches. This phenomenon is similar to what happens to a piece of thin plastic wrap that covers a container and heated in a microwave oven."

The unusual thermal contraction of graphene had been predicted theoretically, but Lau's lab is the first to demonstrate and quantify the phenomenon experimentally.

Study results appear July 26 in the advance online publication of *Nature Nanotechnology.*

Because graphene is both an excellent conductor and the thinnest elastic membrane, the ripples could have profound implications for graphene-based electronics.

"This is because graphene's ability to conduct electricity is expected to vary with the local shape of the membrane," Lau said. "For instance, the ripples may produce effective magnetic fields that can be used to steer and manipulate electrons in a nanoscale device without an external magnet."

Lau, an associate professor of physics and a member of UCR's Center for Nanoscale Science and Engineering, and her colleagues examined the ripples' morphology using a scanning electron microscope and an atomic force microscope. They found that almost all the graphene membranes underwent dramatic morphological changes when heated, displaying significant alterations in the ripple geometry, a buckling of the graphene membrane, or both.

Their experimental system, which involved a stage inside a scanning electron microscope (SEM) with a built-in heater, thermometer and several electrical feed-throughs, enabled them to image graphene while it was being heated and explore the interplay between graphene's mechanical, thermal and electrical properties.

"Our result has important implications for controlling thermally induced stress in graphene electronics," Lau said. "Our ability to control and manipulate the ripples in graphene sheets represents the first step towards strain-based graphene engineering. We show that suspended graphene is almost invariably rippled, and this may need to be considered in the interpretation of a broad array of existing and future research."

Proposed to supplement or replace silicon as the main electronic material, graphene is a single layer of graphite. Even though graphite has been studied for decades, the single sheet first was isolated experimentally only in 2004. Graphene's structure is a two-dimensional honeycomb lattice of carbon atoms. Structurally, it is related to carbon nanotubes (tiny hollow tubes formed by rolling up sheets of graphene) and buckyballs (hollow carbon molecules that form a closed cage).

Lau, who earlier this month was named one of the recipients of the Presidential Early Career Awards for Scientists and Engineers for the 2008 competition, joined UCR in 2004. She was joined in the 18-month study by UCR's Wenzhong Bao (first author), Feng Miao, Zhen Chen, Hang Zhang, Wanyoung Jang and Chris Dames.

The research was supported in part by grants from the National Science Foundation and the Office of Naval Research.

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

http://www.sciencedaily.com/releases/2009/07/090726151748.htm

Harsh Punishment Backfires: Psychologists Offer Ways To Improve Prison Environment, Reduce Violent Crime

ScienceDaily (Aug. 12, 2009) — U.S. prisons are too punitive and often fail to rehabilitate, but targeting prisoners' behavior, reducing prison populations and offering job skills could reduce prisoner aggression and prevent recidivism, a researcher told the American Psychological Association.

"The current design of prison systems don't work," said criminal justice expert Joel Dvoskin, PhD, of the University of Arizona. "Overly punitive approaches used on violent, angry criminals only provide a breeding ground for more anger and more violence."

Presenting at the American Psychological Association's 117th Annual Convention, Dvoskin discussed his upcoming book, "Applying Social Science to Reduce Violent Offending," which examines why prisons are failing and what needs to change."Prison environments are replete with aggressive behaviors, and people learn from watching others acting aggressively to get what they want," Dvoskin said in an interview.

Applying behavior modification and social learning principles can work in corrections, he said. "For example, systematic reinforcement of pro-social behaviors is a powerful and effective way to change behavior, but it has never been used as a cornerstone of corrections," he said. Also, punishment can be effective in changing behavior, but it only works in the short term and immediately after the unwanted behavior happens, he said. While there is a place for punishment, it should be used in psychologically informed and effective ways. However, punishment should not be one-size-fits-all, Dvoskin said.

"We need to know what may be behind the criminal behavior to know what the best treatment is," he said. "A person who commits crimes when drunk but not when sober is likely suffering from an alcohol problem. Treating the alcohol problem may diminish the criminal behavior." Decreasing prison populations needs to be more of a priority, Dvoskin said. "This can be done by paying more attention to those with the highest risk of violent behavior rather than focusing on lesser crimes, such as minor drug offenses."

Finally, bringing work back into prisons can benefit prisoners by teaching them job skills and filling unmet job needs. With the increase in the criminal population and lack of increase in prison staff, "there is not enough supervision to allow prisoners to work and build skills," Dvoskin said. "This makes it very hard to re-enter into the civilian world and increases the likelihood of going back to prison."

With 7 million American adults in prison and almost 50 percent of them African-American males, many children are growing up without fathers and are at risk for continuing the vicious cycle of criminal behavior, Dvoskin said. "If we don't make the changes now, we will see these numbers go up."

Dvoskin, along with co-editors Jennifer Skeem, Ray Novaco and Kevin Douglas, wanted to find out what social science reveals about preventing and reducing violent crime. "Our intention," said Dvoskin, "is to avoid the extreme partisan bickering about whether to be 'soft' or 'hard' on crime, but to combine social science and common sense so that our correctional systems can more effectively change behavior. After all, isn't that their job?"

Adapted from materials provided by American Psychological Association, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/08/090810025245.htm

Mental Problems

New book *Healing the Broken Mind* by Timothy Kelly demonstrates how to begin fixing America's utterly failed mental health care system.

- By: Ryan Blitstein | August 14, 2009

The U.S. mental health care system has progressed since *One Flew Over the Cuckoo's Nest* won five Oscars, but it's still deeply dysfunctional.Warner Home Video

In 1994, soon after Timothy Kelly became Virginia's mental health commissioner, he took a trip to one of the state's psychiatric facilities. Staffers rolled out the red carpet: impressive presentations, guided tours, meetings with residents. The whole place seemed so functional — too functional, Kelly thought, suspecting they'd built a Potemkin village for his benefit.

A few weeks later, Kelly dropped by unannounced. In a building housing residents with behavioral problems, he detected odors of urine and unwashed clothes. Though such patients require intensive treatment, the commissioner saw them hanging out in rooms in groups as employees lazily chatted in hallways. Kelly, a practicing psychologist and former professor, seethed. In the months to come, during surprise stopovers at the rest of the state's hospitals, he often found overmedicated patients slouched on couches, watching television.

While commissioner of Virginia's Department of Mental Health, Retardation and Substance Abuse Services, Kelly labored to fix facilities and advocate for better mental health care statewide. But he quickly discovered the issues weren't unique to Virginia, and there was only so much an agency head in a single state could do. After stepping down from the post, Kelly began work on an ambitious plan to revamp American mental health care. The result, *Healing the Broken Mind: Transforming America's Failed Mental Health System*, offers a thoughtful introduction to a subject that's often shunted aside in the health care reform debate.

The patchwork system that treats Americans with mental illness is a lot like the U.S. health care system as a whole — only much worse. Psychologists and psychiatrists too often rely on outdated treatment

methods, and insurers frequently refuse to pay for much-needed preventive care. Economic incentives cut against doing right by patients. And many Americans still fear the stigma that comes with merely admitting they're sick. As the latest presidential commission put it in 2003, "America's mental health service delivery system is in shambles." Yet this and other calls for mental health care transformation have resulted in piecemeal changes that fixed very little.

The issue affects vast numbers of Americans: In recent years, one-quarter of U.S. adults met the criteria for diagnosable mental illness, with some 340,000 attempting suicide. In addition to the ethical considerations that militate in favor of helping people with mental illness, there's a financial imperative: America spent $69 billion on mental health services in 1999, and the current number is likely much higher. A more efficient system would be an economic boon, producing benefits that range from increased worker productivity to a smaller prison population.

A recurring theme in Kelly's road map toward change involves measurement. All levels of the mental health care system, he says, need improved assessment so decisions can be made based on data rather than tradition or conjecture. Right now, that rarely happens. When a person shows signs of major depression, a psychiatrist or psychologist might treat the patient using Freudian psychoanalysis — not because of anything that research says about the usefulness of the approach, but because that's what the doctor learned during graduate school in the 1970s. Despite a growing body of literature devoted to the testing of mental health care methods, less than 15 percent of mental health consumers receive care based on evidence.

If Kelly had his way, every consumer (the politically correct term for "mental health patient") entering a therapist's office would fill out a lengthy questionnaire, with follow-up information added on a weekly or monthly basis, depending on care received. Therapists would use that patient feedback — which would range from customer-service responses about treatment received to descriptions of the patient's mental state — to deliver better services. Insurers could make certain the fees they pay are put to more cost-effective use. State mental health agencies might use outcomes reported during the questionnaire updates to decide where to deploy or cut back funding. Experts and professors could aggregate the data and use them to make better recommendations in training providers.

Kelly admits that outcome-oriented mental health care is far from reality: When he became Virginia commissioner, his staff couldn't even estimate the number of patients using the state system, let alone provide him with figures on outcomes. His ideas on data-collection aren't very popular now either: Patient advocates and doctors criticize the increased documentation as a burdensome, expensive administrative headache, and insurers fear consumers will game the system.

Kelly addresses these concerns effectively. For instance, he describes a nuanced approach to link patient outcomes with public funding for agencies — but without penalizing providers that treat challenging populations. He also marshals evidence that, in the long term, outcome measurement will lead to better care and lower costs. For support, he points to Australia, where a system similar to the one he envisions is in place.

Americans remain faithful to the mental health status quo, he argues, partly because of the monopolies each of the states holds. Mental illness has no obvious voting constituency; the current treatment system includes little competition that would foster anything like innovation. In Virginia, bureaucrats were so complacent, they awarded a construction contract for a psychiatric facility to a company that had tried (and failed) to bribe state officials — and then allocated another $20,000 toward surveillance of the contractor.

Though Kelly says he wants to end those state-level monopolies, his proposals are less about trust-busting or privatization than they are about taking advantage of the government's monopoly power to bargain for better deals. He advocates common-sense plans, including the expanded use of competitive bidding and the requests-for-proposal process, rather than the sole-source contracts that inflate construction costs (and mental health service fees) in many states. He believes that greater transparency about mental health

outcomes will cause states to compete with one another for bragging rights, and that experimental pilot projects can foster improved outcomes. In Virginia, for example, his department developed the concept of the "treatment mall," a central location where psychiatric facility residents can access a variety of services daily, such as social-skill training and anger management. It may not sound like a groundbreaking idea, but it's likely more effective than the glorified baby-sitting that sometimes passes for publicly funded, inpatient mental health care.

In Kelly's view, regulators need to seriously rethink how insurance companies provide for mental health care. An insurer might now cover mental health treatment but, in some cases, for as few as seven days per year, and substance abuse treatment often is not covered at all. Recent state and federal laws mandating parity between mental and physical care insurance are still littered with loopholes.

Not all mental illnesses are created equal. When it comes to affecting a patient's quality of life, there's a huge difference between caffeine addiction and major depression. Yet some insurers reimburse for all conditions similarly. Kelly advocates directing the bulk of limited funds, private and public, toward the 6 percent of the U.S. population with serious mental illnesses, particularly schizophrenia.

It's one of many proposed compromises by which the author shows that he's no ivory-tower academic, and that he's well aware of the medical and political challenges involved in mental health care reform.

In the mental health system, as in any other market, change won't arrive without citizen demand. In terms of physical health care, the old dynamic of doctor as expert and patient as passive consumer is fading from the modern scene. The mental health care system, however, still follows outdated patterns. Many Americans are so averse to talking about the subject that when someone in their family faces mental illness, they have little clue what to do. The result, far too often, is time and money wasted on ineffective therapy or unneeded pills.

For all its faults, the U.S. mental health system has progressed a long way over time. Gone are the medieval asylums where patients were at times chained to walls in rooms filled with excrement; early in the 20th century, such facilities were reformed into mental hospitals. After World War II, breakthroughs in anti-psychotic medications and Great Society-funded community mental health centers meant even those suffering from severe mental illness could return to their communities.

Kelly believes America is on the verge of another systemic transformation. He's encouraged by media stories and political speeches highlighting critical issues, including the daunting rate of post-traumatic stress disorder among veterans of wars in Iraq and Afghanistan and the crisis of mental illness among the homeless in major cities. Though mental health care is still nowhere near the top of the national agenda, at least it now has a place on the list of problems needing attention. Perhaps Kelly's book will move it up the list a few notches.

http://www.miller-mccune.com/health/mental-problems-1401

Playing Chicken With Antibiotic Resistance

By: Paul Webster

Murray Opsteen has 18,000 chickens at his feet. He's standing very still, so as not to crush them with his size-12 boots. Although the chickens densely carpet the floor around him — so densely they have little room to move — they aren't making much noise. In fact, the primary sound in Opsteen's vast barn, known in the poultry industry as a raising shed, comes from half a dozen powerful electric fans pushing the shed's fetid air. Still, the air reeks, because the chickens are being raised atop their own excrement, a practice that hugely reduces cleaning costs. "They're birds," says Opsteen, a broad-backed giant who doesn't mince his words after 18 years in the poultry business. "And this is the way birds live."

Here's how the process works: A nearby egg hatchery sends chicks to Opsteen's raising shed just a few days after birth. They're given another 40 days to mature and fatten in the raising shed, and then they're trucked away to a slaughterhouse operated by a grocery chain. After they leave, Opsteen scrapes six weeks' worth of excrement off the shed's concrete floor. Then the next huge flock of chicks arrives.

To help the birds cope with infections — the shed is forever teeming with the many types of bacteria and parasites that thrive in chicken excrement — drugs are mixed into the birds' supplies of food and water. Opsteen's not sure exactly what type of drugs they get; he relies on his feed supplier to get the mix right. But on one specific drug issue, Osteen is extremely clear: Although eggs are routinely injected with antibiotics at many North American poultry hatcheries, this was not done with the chickens on Opsteen's farm, located in Ontario, Canada.

Opsteen's uncertainty about the types of drugs used on his farm seems incongruous with his insistence that drugs were not used at the hatchery. But Opsteen, after all, is no ordinary farmer. He's the farmer assigned to handle reporters looking for farm tours here in Ontario, heartland of the chicken industry in Canada, where exports to the U.S. are booming. And today, Opsteen's been designated by professional chicken-industry media handlers to deliver one major message: On his farm at least, the chickens come from drug-free eggs. "I'm absolutely certain these chicks came from eggs that were not injected with antibiotics," he says. "In fact, I can guarantee it."

It's a long way from Murray Opsteen's raising shed to the gleaming, ultramodern headquarters of the U.S. Food and Drug Administration near Baltimore. But Opsteen's preoccupation with denying the practice of injecting antibiotics into eggs — a procedure widely used to help prevent disease in densely packed chicken raising sheds — follows directly from a directive issued by the FDA last year.

Citing concerns that injecting eggs with antibiotics "presents a risk to the public health," the FDA issued a rule in July 2008 that severely limited antibiotic use in hatcheries. The aim, the FDA said in a carefully reasoned statement backed by government studies from the U.S., Canada and Europe, was to restrict use of a class of antibiotics due to fears that misuse on farms reduced the antibiotics' effectiveness for humans — a concern long voiced by the American Medical Association, the World Health Organization and public health agencies in numerous countries.

Coming from a federal agency with sweeping legal powers and powerful law-enforcement capabilities, the FDA's rule was tough stuff — or so it seemed at first. But that was before the powerful U.S. chicken lobby — sometimes dubbed "Big Chicken" — stepped in. Within weeks of the FDA's antibiotic prohibition, a barn burner of a fight, pitting scientists against farmers and physicians against veterinarians, ignited across the continent. Then, three weeks before the ban was to go into effect, FDA policymakers — mindful of an earlier ban on antibiotic use in poultry that was won only after years of litigation — suddenly abandoned their own ruling.

The target of the FDA's concern was a category of antibiotics known as cephalosporins, which are highly valued because of their ability to knock out a wide range of otherwise hard-to-treat human ailments, including urinary tract infections and pneumonia. Cephalosporins were first marketed decades back, but doctors rely increasingly on newer, more powerful generations of cephalosporin antibiotics as bacterial resistance to other heavily used antibiotics — including penicillin — has grown. Although they were long considered a back-of-the-shelf drug, to be used only in rare situations when other antibiotics failed, third-, fourth- and fifth-generation cephalosporins have now moved to medicine's very forefront.

It was with antibiotic resistance in mind that the FDA announced a ban on certain uses of cephalosporins — most notably their injection into poultry eggs, a practice the FDA had never studied or approved. Unrestricted cephalosporin use "is likely to lead to the emergence of cephalosporin-resistant strains of food-borne bacterial pathogens," the FDA explained. "If these drug-resistant bacterial strains infect humans, it is likely that cephalosporins will no longer be effective for treating disease in those people."

Cephalosporins are popular on poultry, cattle and pork farms, where the FDA has approved their use for numerous veterinary purposes. But farmers have also adopted "extra-label" uses of cephalosporins. In one such use, just before the egg hatches, robots pierce the shells of chicken eggs, injecting doses of a third-generation cephalosporin antibiotic, ceftiofur, to suppress disease.

This practice, known as preventive use, harnesses ceftiofur's remarkable medicinal power not just to treat infection outbreaks but to suppress them. By preventing outbreaks from occurring in crowded raising sheds that hold as many as 50,000 birds, antibiotic egg injections help chickens to grow faster. The injections also allow farmers to send more birds to slaughter, even while they grow up in their own excrement.

Over the past decade, however, resistance to cephalosporin antibiotics has increased dramatically in North America, Europe and Asia, causing experts, including Robert Moellering of Harvard Medical School, to warn that thanks to misuse of antibiotics by veterinarians and physicians alike "we are perilously close" to not having drugs to treat tough-to-beat infections such as gonorrhea. "There are very few situations where we have no therapeutic options," Moellering says, noting that eight patients recently died in New York City when cephalosporins and other antibiotics failed, "but we are getting close."

From the farmer's perspective, using antibiotics as growth promoters — an approach that U.S. Department of Agriculture antibiotics expert Todd Callaway estimates accounts for half of all drug use on

farms — is simply money in the bank. Obviously, widespread agricultural use also greatly benefits ceftiofur's manufacturer, Pfizer Inc.

And money brings popularity: According to a 2004 study of 24 hatcheries in the Canadian province of Quebec, ceftiofur was injected into eggs in every hatchery studied. In the U.S., according to a summary of a 2001 FDA investigation of 27 chicken and turkey hatcheries obtained by a Chicago-based group, the Food Animal Concerns Trust, four hatcheries reported injecting eggs, while four others reported injecting already-hatched birds. The real extent of ceftiofur usage may have been greater; more than a third of the hatcheries "kept poor or no treatment records," the FDA reported.

When it comes to tracking drug use on factory farms, says Toni Poole, a USDA specialist on the use of antibiotics, secrecy is a serious problem. Penetrating that secrecy has become an urgent priority for a small but influential group of scientists. about the global spread of bacteria resistant to up to as many as 10 types of antibiotics, governments in Europe, Canada and the U.S. established national surveillance systems late in the 1990s in an attempt to track human resistance to antibiotics in relation to usage of antibiotics on farms. What they have found — especially regarding links between ceftiofur use in poultry and human resistance to cephalosporins — has not been welcomed by the meat and poultry industries.

The scientists' opening salvo came in 2006, when a group of the most senior antibiotic-resistance experts from the FDA, the Public Health Agency of Canada, France's National Microbiology Laboratory and Belgium's Veterinary and Agricultural Research Centre warned in a comprehensive review of published data that cephalosporin-resistant bacteria "are frequently recovered from animals and food, with poultry as primary food source, suggesting that humans are often infected by these routes."

A subsequent series of studies in Europe and North America has convinced researchers — including Frank Aarestrup, a specialist on antibiotic resistance with the Danish Technical University in Copenhagen who helped introduce a system of comprehensive surveillance of veterinary drug use in Denmark — that the link between veterinary antibiotic use and human resistance has been proven. "Taken in context with all the other knowledge we have," Aarestrup says, "anyone still opposing a link between antibiotic use in food animal production and direct human health impact does so for other reasons than science."

In a recently published review of international studies on the issue, Aarestrup noted that a Canadian study found the adoption of universal use of ceftiofur in hatcheries in Quebec earlier this decade matched a rapid increase in human resistance to the drug. When this problem was brought to the attention of public health authorities, hatcheries voluntarily stopped using ceftiofur — and there was a rapid decrease in resistance to cephalosporins in humans.

The data cannot conclusively link drug use in poultry with human resistance, says James Johnson, an infectious disease specialist with the Veterans Administration Medical Center in Minneapolis. But like Aarestrup, Johnson thinks the data "is as good as it gets" in terms of signals about the dangers of ceftiofur use in hatcheries. Canadian veterinarians agree: Last year, the Canadian Veterinary Medical Association instructed its members not to use ceftiofur for extra-label purposes such as hatchery injections. The Canadian government also acted, last year ordering Pfizer to include a warning against extra-label use on ceftiofur packages.

Rebecca Irwin, who manages the Canadian farm antibiotic surveillance system, says that strong as the data implicating ceftiofur use in hatcheries with human resistance is, it would be even stronger if the poultry industry weren't so secretive about drug use. "People can hide behind whatever," she told a gathering of scientists in early May. "We're still getting the 'hear no evil, see no evil, speak no evil' from numerous sources."

Although chicken farmers seldom discuss their use of drugs — especially high-profile drugs such as cephalosporin — the veterinarians they employ are obliged to be more open, thanks to professional codes requiring at least a degree of scientific transparency. So when it came to mounting a response to the

FDA's prohibition of extra-label use of cephalosporins on farms, the industry turned to the American Veterinary Medical Association. The AVMA represents 78,000 veterinarians working in private and corporate practice, the government, industry, academia and the military.

In a toughly worded, 18-page letter drafted by a panel of veterinarians employed on chicken farms across the U.S., the AVMA broke ranks with its Canadian counterpart veterinarian organization, arguing that the FDA's rule against extra-label cephalosporin use was completely unjustified. The Canadian, American and European studies cited by the FDA fail to directly demonstrate that veterinary use of ceftiofur impairs human medicine, the AVMA insists, and the FDA prohibition would put animals at risk. "Because veterinarians have a relatively limited number of FDA-approved drugs for treatment of the numerous animal species," the American veterinarians' group said, "extra-label cephalosporin use is medically necessary to relieve animal pain and suffering and allow veterinarians discretion to use drugs judiciously."

Just weeks after the group filed its protest, the FDA reversed course. Late in November 2008, amid a crescendo of last-minute regulatory interventions by the outgoing Bush administration, William Flynn, acting director of the FDA's Center for Veterinary Medicine, announced the restrictions on cephalosporin use were being withdrawn to allow the agency to "fully consider" comments, including the AVMA's. "We responded through the AVMA," says the National Chicken Council's Steve Pretanick. "They worked up the argument as to why the FDA should not take this action. As a result, the FDA withdrew it. And that's the last I've heard of it."

In Pretanick's account, the business of getting the FDA to knuckle under sounds like a routine event. But Margaret Mellon, head of the food and environment program for the Washington-based Union of Concerned Scientists, describes a "take no prisoners attitude" on the part of the chicken industry at a time when it knew it could count on the White House.

"The past administration didn't believe in regulation," Mellon says. But she also believes the FDA itself "miscalculated the blowback" from the industry and its powerful rural political allies.

The FDA now refuses to discuss the matter. But speaking to scientists in Kansas in May, Flynn suggested the FDA's retreat may not be permanent. The agency, he said, may try again to reintroduce restrictions sometime soon. Until that happens, however, poultry farmers will remain free to play chicken with some of the most important antibiotics in human medicine.

http://www.miller-mccune.com/health/playing-chicken-with-antibiotic-resistance-1388

Tests Begin on Drugs That May Slow Aging

By NICHOLAS WADE

It may be the ultimate free lunch — how to reap all the advantages of a calorically restricted diet, including freedom from disease and an extended healthy life span, without eating one fewer calorie. Just take a drug that tricks the body into thinking it's on such a diet.

It sounds too good to be true, and maybe it is. Yet such drugs are now in clinical trials. Even if they should fail, as most candidate drugs do, their development represents a new optimism among research biologists that aging is not immutable, that the body has resources that can be mobilized into resisting disease and averting the adversities of old age.

This optimism, however, is not fully shared. Evolutionary biologists, the experts on the theory of aging, have strong reasons to suppose that human life span cannot be altered in any quick and easy way. But they have been confounded by experiments with small laboratory animals, like roundworms, fruit flies and mice. In all these species, the change of single genes has brought noticeable increases in life span.

With theorists' and their gloomy predictions cast in the shade, at least for the time being, experimental biologists are pushing confidently into the tangle of linkages that evolution has woven among food intake, fertility and life span. "My rule of thumb is to ignore the evolutionary biologists — they're constantly telling you what you can't think," Gary Ruvkun of the Massachusetts General Hospital remarked this June after making an unusual discovery about longevity.

Excitement among researchers on aging has picked up in the last few years with the apparent convergence of two lines of inquiry: single gene changes and the diet known as caloric restriction.

In caloric restriction, mice are kept on a diet that is healthy but has 30 percent fewer calories than a normal diet. The mice live 30 or 40 percent longer than usual with the only evident penalty being that they are less fertile.

People find it almost impossible to maintain such a diet, so this recipe for longevity remained a scientific curiosity for many decades. Then came the discovery of the single gene changes, many of which are involved in the body's regulation of growth, energy metabolism and reproduction. The single gene changes thus seem to be pointing to the same biochemical pathways through which caloric restriction extends life span.

If biologists could only identify these pathways, it might be possible to develop drugs that would trigger them. Such drugs could in principle have far-reaching effects. Mice on caloric restriction seem protected from degenerative disease, which may be why they live longer. A single drug that protected against some or all the degenerative diseases of aging would enable people to enjoy more healthy years, a great benefit in itself, even if it did not extend life span.

The leading candidates for such a role are drugs called sirtuin activators, which may well be mimicking caloric restriction, in whole or in part. The chief such drug is resveratrol, a minor ingredient of grapes and red wine. Sirtris Pharmaceuticals, of Cambridge, Mass., is now conducting clinical trials of resveratrol, in a special formulation, and of small-molecule drugs that also activate sirtuin but can be given in much lower doses. The resveratrol formulation and one of the small chemicals have passed safety tests and are now being tested against diabetes and other diseases. The Food and Drug Administration does not approve drugs to delay aging, because aging in its view is not a disease.

The sirtuin activators have a strong scientific pedigree. They emerged as the surprising outcome of a quest begun in 1991 by Leonard P. Guarente of M.I.T. to look for genes that might prolong life span in yeast, a single-cell organism. Working with David A. Sinclair, now at Harvard Medical School, he discovered such a gene, one called sir-2. People and mice turned out to have equivalent genes, called sirt genes, that produce proteins called sirtuins.

Dr. Guarente then found that the sirtuins can detect the energy reserves in a cell and are activated when reserves are low, just what would be needed for a protein that mediates the effects of caloric restriction. Dr. Sinclair and colleagues screened a number of chemicals for their ability to activate sirtuin, and resveratrol landed at the top of the list. The chemical was already known as the suspected cause of the French paradox, the fact that the French eat a high fat diet without penalty to their longevity.

The two researchers and their colleagues thus argued that caloric restriction works by activating sirtuins, and so drugs that activate sirtuins should offer the same health benefits.

In 2004 Dr. Sinclair co-founded Sirtris with Christoph Westphal, a scientific entrepreneur. Helped by growing interest in the sirtuin story, Dr. Westphal was able to sell the company last year to GlaxoSmithKline for $720 million.

Dr. Sinclair says that "the results from the Sirtris compounds are promising and will be submitted for publication in coming months."

But despite the high promise and strong scientific foundation of the sirtuin approach, it has yet to be proved that Sirtris's drugs will work. The first of many questions is that of whether caloric restriction applies at all to people.

Two experts on aging, Jan Vijg of the Albert Einstein College of Medicine and Judith Campisi of the Lawrence Berkeley National Laboratory, argued recently in Nature that the whole phenomenon of caloric restriction may be a misleading result unwittingly produced in laboratory mice. The mice are selected for quick breeding and fed on rich diets. A low-calorie diet could be much closer to the diet that mice are adapted to in the wild, and therefore it could extend life simply because it is much healthier for them.

"Life extension in model organisms may be an artifact to some extent," they wrote. To the extent caloric restriction works at all, it may have a bigger impact in short-lived organisms that do not have to worry

about cancer than in humans. Thus the hope of mimicking caloric restriction with drugs "may be an illusion," they write.

To decide whether life extension by caloric restriction is an artifact of mice in captivity, why not try it on wild mice? Just such an experiment has been done by Steven N. Austad of the University of Texas Health Science Center. Dr. Austad reported that caloric restriction did not extend the average life span of wild mice, suggesting the diet's benefits are indeed an artifact of mice in captivity. But others interpret his results differently. Richard A. Miller of the University of Michigan, says the maximum life span of the wild mice was extended, and so the experiment was a success for caloric restriction.

Laboratory mice are very inbred, and researchers can get different results depending on the breed they use. To put the mouse data on a firmer footing, the National Institute on Aging has set up a program to test substances in three labs simultaneously. Its first round of candidate agents for reversing aging include green tea extract and two doses of resveratrol.

The resveratrol tests are still under way, but last month the results with another substance, the antifungal drug rapamycin, were published. Rapamycin was found to extend mice's lives significantly even though by accident the mice were already the equivalent of 60 years old when the experiment started.

Rapamycin has nothing to do with caloric restriction, so far as is known, but the study provided striking proof that a chemical can extend life span.

Another result, directly related to the caloric restriction approach, emerged last month from a long-awaited study of rhesus monkeys kept on such a diet. The research was led by Richard Weindruch of the University of Wisconsin. As fellow primates, the monkeys are the best possible guide to whether the mouse results will apply in people. And the answer they gave was ambiguous.

The monkeys who had spent 20 years on caloric restriction were in better health than their normally fed counterparts, and suffered less diabetes, cancer and heart disease, apparently confirming that caloric restriction holds off the degenerative diseases of aging in primates as well as rodents.

But as for life span, the diet extended life significantly only if the researchers excluded deaths that were apparently unrelated to aging, such as under the anesthesia necessary to take blood samples. When all deaths were counted, life span was not significantly extended.

Some researchers think it is perfectly valid to ignore such deaths. Others note that in mouse studies one just counts the numbers of dead mice without asking what they died of, and the same procedure should be followed with monkeys, since one cannot be sure if a death under anesthesia might have been age related.

With the rapamycin and rhesus monkey results, Dr. Sinclair said, "We have more weight on the side of people who think it's going to be possible." He stressed the ability of both caloric restriction and sirtuin-activating drugs to postpone the many diseases of aging, at least in mice. To have one drug that postponed many degenerative diseases in people would be a significant advance, he said, even without any increase in longevity.

People may live so long already that no drug could make much of a difference. Probably because of reductions in infant mortality and other types of disease, human life expectancy in developed countries has been on a remarkable, unbroken upward trend for the last 160 years. Female life expectancy at birth rose from 45 years in 1840 to 85 years in 2000.

An important difference among experts on aging is whether there is an intrinsic rate of aging. Supposing there were cures for all diseases, what would one die of, if one died at all? Dr. Vijg and Dr. Campisi believe there is a steady buildup of damage to DNA and to proteins like the collagen and elastin fibers that knit the body together. Damage to DNA means that the regulation of genes gets less precise, and this

regulatory drift disrupts the stem cells that repair each tissue. Even if all disease could be treated, it is not clear that anything could overcome intrinsic aging.

Dr. Miller, on the other hand, believes no clear distinction can be made between disease and other frailties of aging. “Anything a doctor can charge for we call disease, but wrinkled skin, white hair or not feeling good in the morning, these we don’t call disease,” he said.

He thinks that the idea of intrinsic aging is not well defined and that contrary to the theories of the evolutionary biologists, there may be simple ways to intervene in the aging process.

In the view of evolutionary biologists, the life span of each species is adapted to the nature of its environment. Mice live at most a year in the wild because owls, cats and freezing to death are such frequent hazards. Mice with genes that allow longer life can rarely be favored by natural selection. Rather, the mice that leave the most progeny are those that devote resources to breeding at as early an age as possible.

According to this theory, if mice had wings and could escape their usual predators, natural selection ought to favor longer life. And indeed the maximum life span of bats is 3.5 times greater than flightless mammals of the same size, according to research by Gerald S. Wilkinson of the University of Maryland.

In this view, cells are so robust that they do not limit life span. Instead the problem, especially for longer-lived species, is to keep them under control lest they cause cancer. Cells have not blocked the evolution of extremely long life spans, like that of the bristlecone pine, which lives 5,000 years, or certain deep sea corals, whose age has been found to exceed 4,000 years.

Some species seem to be imperishable. A tiny freshwater animal known as a hydra can regenerate itself from almost any part of its body, apparently because it makes no distinction between its germ cells and its ordinary body cells. In people the germ cells, the egg and sperm, do not age; babies are born equally young, whatever the age of their parents. The genesis of aging was the division of labor in the first multicellular animals between the germ cells and the body cells.

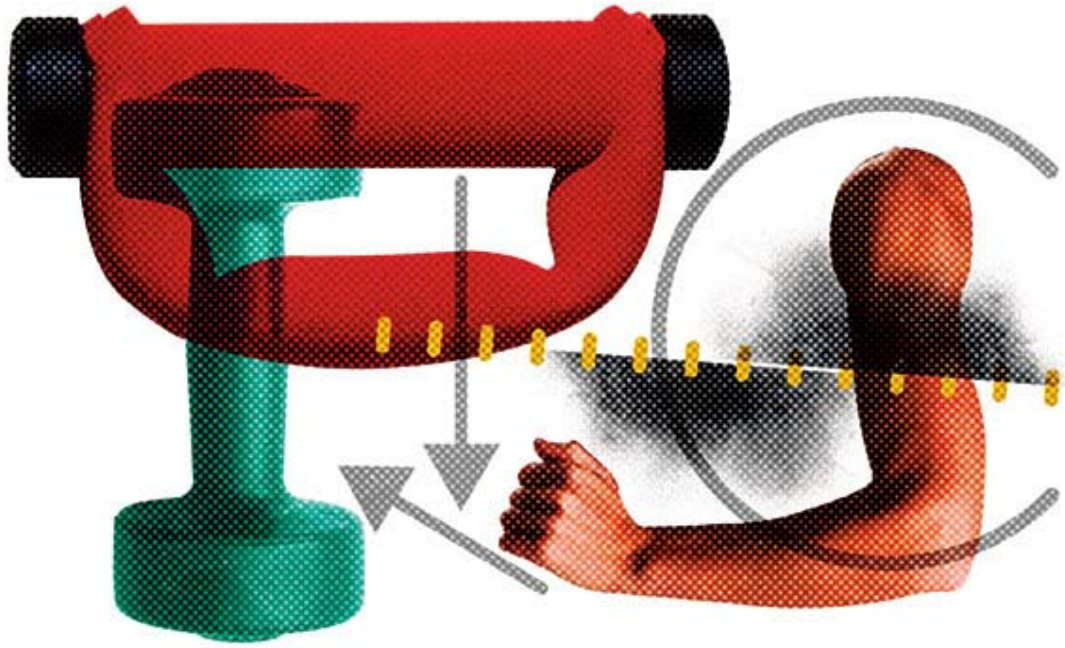
That division put the role of maintaining the species on the germ cells and left the body cells free to become specialized, like neurons or skin cells. But in doing so the body cells made themselves disposable. The reason we die, in the view of Thomas Kirkwood, an expert on the theory of aging, is that constant effort is required to keep the body cells going. “This, in the long run, is unwarranted — in terms of natural selection, there are more important things to do,” he writes.

All that seems clear about life span is that it is not fixed. And if it is not fixed, there may indeed be ways to extend it.

http://www.nytimes.com/2009/08/18/science/18aging.html?nl=health&emc=healthupdateema3

Weight Lifting May Help to Avert Lymph Problem

By TARA PARKER-POPE



After a woman has surgery for breast cancer, she is typically given a long list of don'ts. Don't lift anything heavier than 15 pounds, including your child. Don't carry a heavy purse or grocery bags. Don't scrub, push, pull or hammer.

The goal is to prevent lymphedema, a painful and unsightly swelling of an arm or leg that can occur near the site where lymph nodes have been removed or damaged by radiation. But new research suggests that much of that advice may be too restrictive. To prevent lymphedema after breast cancer, the best strategy may be more exercise, not less.

Last week, The New England Journal of Medicine reported on a study of 141 breast cancer patients who had lymphedema. Half adhered to the traditional restrictions, while the other half embarked on a slow, progressive program of weight lifting. To the researchers' surprise, the weight lifters actually had significantly fewer flare-ups than the women who restricted their activity.

"Lymphedema is a very feared complication, and many women have made major alterations to their lifestyle in an effort to avoid it," said Dr. Monica Morrow, chief of breast surgery at Memorial Sloan-Kettering Cancer Center in Manhattan.

"This is a very welcome study that very clearly shows controlled weight lifting does not make it worse and, in fact, improves symptoms. That should be a reason to re-evaluate a whole lot of things we tell people about lymphedema."

The findings don't mean that patients should disregard everything their doctors tell them about lymphedema, which can also occur with other cancers. Once lymph nodes have been damaged or removed, the lymphatic system is less able to cope with trauma or infection, and the painful swelling, tightness and heaviness of lymphedema can result. While physical therapy can ease the symptoms, some patients never fully recover.

Doctors say some of the standard guidelines are reasonable. Intravenous lines, for example, pose a risk of infection, and they should not be used on an arm affected by lymphedema. But other restrictions, like not carrying children or using a blood pressure cuff on the affected arm, may be too extreme.

An editorial accompanying the weight-lifting study in The New England Journal notes that the current "policy of avoidance" should be replaced by recommendations for rehabilitation, particularly because many women have to ignore the restrictions anyway — they are caring for young children, or their jobs require manual labor.

"Rather than saying, 'Don't ever lift more than 15 pounds, don't carry a suitcase,' instead we should empower women," said Wendy Demark-Wahnefried, a professor of behavioral science at the University of Texas M. D. Anderson Cancer Center, who wrote the editorial. "Give them the rehab and the exercise training they need after their treatment."

Kathryn H. Schmitz, an associate professor at the University of Pennsylvania School of Medicine and the study's lead author, notes that in the past, patients were wrongly advised to avoid activity after a heart attack or a back injury.

"It's the same principle as back rehab and cardiac rehab," she said. "You're slowly and progressively increasing the stress that your system can handle. We're applying that to lymphedema."

Corrie Roberts of Philadelphia developed lymphedema in her left arm in June 2004, about 18 months after a mastectomy. She had taken the usual precautions, but during back surgery the anesthesiologist mistakenly used her left arm to insert the intravenous line.

After taking part in the weight-lifting study, she said the swelling and discomfort were finally under control. She uses an exercise room in her apartment building and lifts weights three to five days a week.

"It sure was an improvement," said Ms. Roberts, 75. "As long as I keep the weight lifting up, I don't have swelling in my arm."

Dr. Schmitz is conducting a separate study to determine whether weight lifting can prevent symptoms in women who have never had lymphedema. Another study will focus on exercise programs for people with lower-limb lymphedema.

Experts warn that women should not embark on an exercise program on their own, but should ask their doctor about finding a rehabilitation center or exercise program for patients at risk for lymphedema. The women in the study began with very light weights and were regularly monitored for swelling or pain. Dr. Schmitz noted that not every woman is a candidate, and that a few women in the study developed swelling almost immediately after exerting the arm.

Centers that offer the weight-lifting program used in the New England Journal study can be found at www.uphs.upenn.edu/news. Patients can look for a personal trainer who has a cancer exercise certification from the American College of Sports Medicine. In addition, many Y's now have exercise programs for cancer patients through a partnership with the Lance Armstrong Foundation.

Women can also order the DVD "Strength and Courage: Exercises for Breast Cancer Survivors," which was developed by Dr. Sharon Cowden, a Pittsburgh pediatrician and golfer who had breast cancer, and Janette Poppenberg, a health fitness specialist certified by the American College of Sports Medicine.

http://www.nytimes.com/2009/08/18/health/18well.html?nl=health&emc=healthupdateema1

Screening Could Lead to More Potent Cancer Drugs

By NICHOLAS WADE

Researchers have discovered a way to identify drugs that can specifically attack and kill cancer stem cells, a finding that could lead to a new generation of anticancer medicines and a new strategy of treatment.

Many researchers believe that tumor growth is driven by cancerous stem cells that, for reasons not understood, are highly resistant to standard treatments. Chemotherapy agents may kill off 99 percent of cells in a tumor, but the stem cells that remain can make the cancer recur, the theory holds, or spread to other tissues to cause new cancers. Stem cells, unlike mature cells, can constantly renew themselves and are thought to be the source of cancers when, through mutations in their DNA, they throw off their natural restraints.

A practical test of this theory has been difficult because cancer stem cells are hard to recognize and have proved elusive targets. But a team at the Broad Institute, a Harvard-M.I.T. collaborative for genomics research, has devised a way of screening for drugs that attack cancer stem cells but leave ordinary cells unharmed.

Cancer stem cells are hard to maintain in sufficient numbers, but the Broad Institute team devised a genetic manipulation to keep breast cancer stem cells trapped in the stem cell state.

The team, led by Piyush B. Gupta, screened 16,000 chemicals, including all known chemotherapeutic agents approved by the Food and Drug Administration. The team reported in the Thursday issue of Cell that 32 of the chemicals selectively went after cancer stem cells. These particular chemicals may or may not make good drugs, but the screening system proves, the researchers say, that it is possible to single out cancer stem cells with drugs that leave ordinary cells alone. Only one of the 32 chemicals is approved as a drug for cancer.

Another approach to concentrating on cancer stem cells, based on the use of antibodies, was reported this month by OncoMed Pharmaceuticals, a company founded by Michael F. Clarke, a Stanford researcher who in 2003 discovered cancer stem cells in breast tumors.

If effective drugs against cancer stem cells can be developed, one obvious strategy would be to use them in combination with standard chemotherapeutic agents, so that all types of cells in a tumor could be attacked. That way, cancer would be attacked as AIDS is now — with a cocktail of chemicals that blocks all escape paths. Both the AIDS virus and cancer cells can change DNA to dodge an effective drug, but are thought to perish if confronted with many drugs at once.

Standard chemotherapy is effective because the chemicals are applied in such large doses that they kill all cells. But this approach is stressful for the patient.

“You could probably lower the doses considerably with a combination of drugs that attacked specific types of cell,” Dr. Gupta said.

Eric S. Lander, director of the Broad Institute, said: “If we make a drug that kills 99.9 percent of the cells in a tumor but fails to kill the 0.1 percent, that is the real problem. It’s a pyrrhic victory.”

Dr. Lander said that given the new screening system and the idea of using combinations of drugs against cancer, there was “a potential for a real renaissance in cancer therapeutics.”

“We have not been able to do that yet with cancer,” he added, “but if we could, it’s a numbers game, and we win.”

The cancer stem cell theory has been thrust into the spotlight in recent years with the discovery of stem cells in many types of solid tumors, including those of the breast, brain, prostate, colon and pancreas. This month, a Stanford team led by Irving Weissman reported finding the stem cells of bladder cancer.

But the theory is not without critics.

"The cancer stem cell hypothesis has in the past year been challenged on many fronts," said Bert Vogelstein, a leading cancer geneticist at Johns Hopkins University. "For example, a paper on melanomas last year showed that 100 percent of melanoma cancer cells were cancer stem cells."

If many of a tumor's cells are stem cells, then existing chemotherapy agents are clearly killing them, Dr. Vogelstein said, and the cancer stem cell theory is not an effective guide to finding new drugs.

The theory has also aroused opposition because, in its extreme, it implies that standard chemotherapy goes after the wrong targets and is ineffective.

"It's the most amazing polarity that I've seen," Dr. Clarke, the Stanford researcher, said of the debate over stem cells among cancer researchers. "It's like two religions fighting."

Some advocates of the idea believe that to dissolve tumors, it would be necessary to go after only cancer stem cells, if such drugs existed. But the Broad Institute team and others take the view that a combination of drugs attacking each of the types of cells in a tumor would be best.

One reason for using a combination of drugs is the suspicion that mature cancer cells may be able to convert themselves back into stem cells, a route that is apparently prohibited to normal mature cells.

"The possibility is that the nonstem cells in a tumor may regenerate de novo new stem cells," said Robert Weinberg, a leading cancer biologist at M.I.T. and, a co-author with Dr. Lander of the Cell report. "If one had ways of treating both the stem cells and the nonstem cells, then the de novo generation of stem cells would be dealt with."

The basic insight of the cancer stem cell theory is that there is a hierarchy of cells in a tumor, with the stem cells at the top generating the mature cells that are the majority. Most researchers accept that this is a good description of leukemias because Gleevec, a highly effective drug for chronic myelogenous leukemia, does not kill stem cells, and the leukemia returns if the treatment is stopped.

But with solid tumors, Dr. Vogelstein said, "the jury is out." If stem cells are common in solid tumors, not just a small resistant reservoir of cells, "then there's no difference between the stem cells and the bulk cancer — so a screen for drugs to kill melanoma cells is by definition also going to kill the melanoma's cancer stem cells."

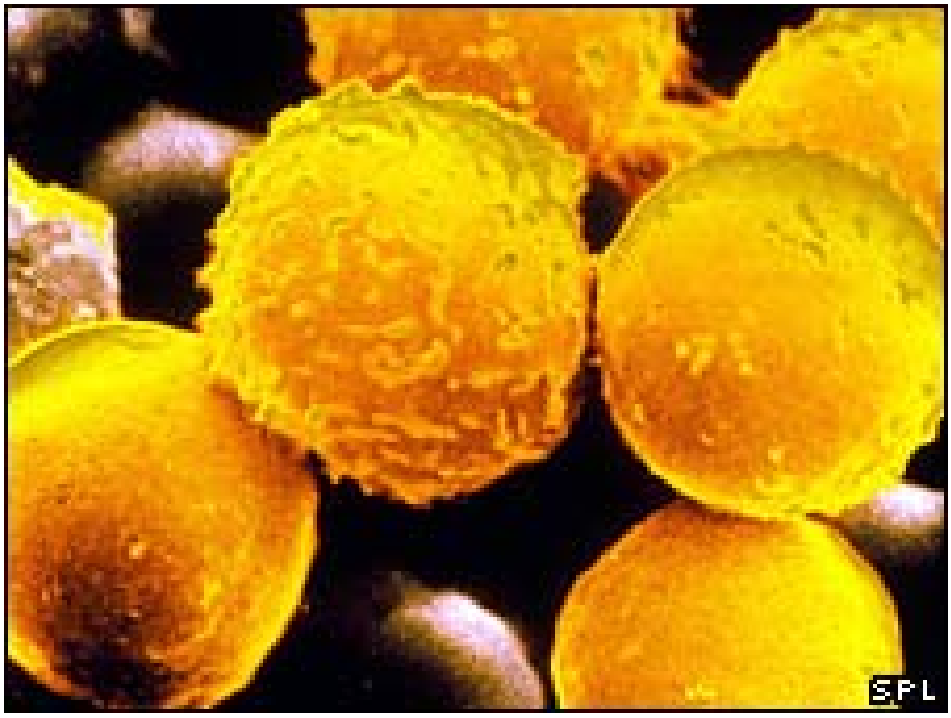
Still, in Dr. Vogelstein's view, the Broad Institute's new screening method is important whether or not the cancer stem cell theory is correct. "Because most of the compounds in use now clearly aren't doing the job we'd all like," he said, "then novel methods for screening could be extremely valuable."

The Broad Institute researchers hope that pharmaceutical companies will use their screening method to begin to develop drugs against cancer stem cells.

http://www.nytimes.com/2009/08/14/health/research/14cancer.html?_r=1&nl=health&emc=healthupdateema1

Child leukaemia 'genes' revealed

Genetic flaws that increase the risk of the most common form of childhood leukaemia have been uncovered by British scientists.



The three variants each raise the risk by between 30% and 60%, said the Institute of Cancer Research team.

But they stressed that other things, such as childhood infections, may also play a role.

Leukaemia Research said the clues offered by the research, in the journal Nature Genetics, may improve care.

Leukaemia is the most common childhood cancer, with approximately 500 new cases each year in the UK, and Acute Lymphoblastic Leukaemia (ALL) accounts for roughly 85% of these.

Scientists believe that there is likely to be no single reason why a child develops the disease, but a combination of factors, perhaps including an inherited genetic ingredient in some cases.

Previous research has suggested that both a blood cell change that happens in the womb and other mutations. possibly triggered by common childhood infections. could be involved.

The latest research used technology which allows the entire DNA of leukaemia patients to be scanned for common features not present in apparently healthy children.

Small risk

The presence of each of the three variants was linked to a rise in the risk of the disease - although even then, the overall risk remained very small.

Professor Richard Houlston, who led the study, said: "These findings provide the first evidence that genetic make-up plays a major role in the risk of Acute Lymphoblastic Leukaemia, and insight into how the disease develops."

His colleague, professor Mel Greaves, said: "The new results should not be taken by parents or the public at large to mean that children develop leukaemia because of an accident of inheritance.

"Genetic risk factors are just one component of cause - finding the triggering exposures still remains a focus of intense effort."

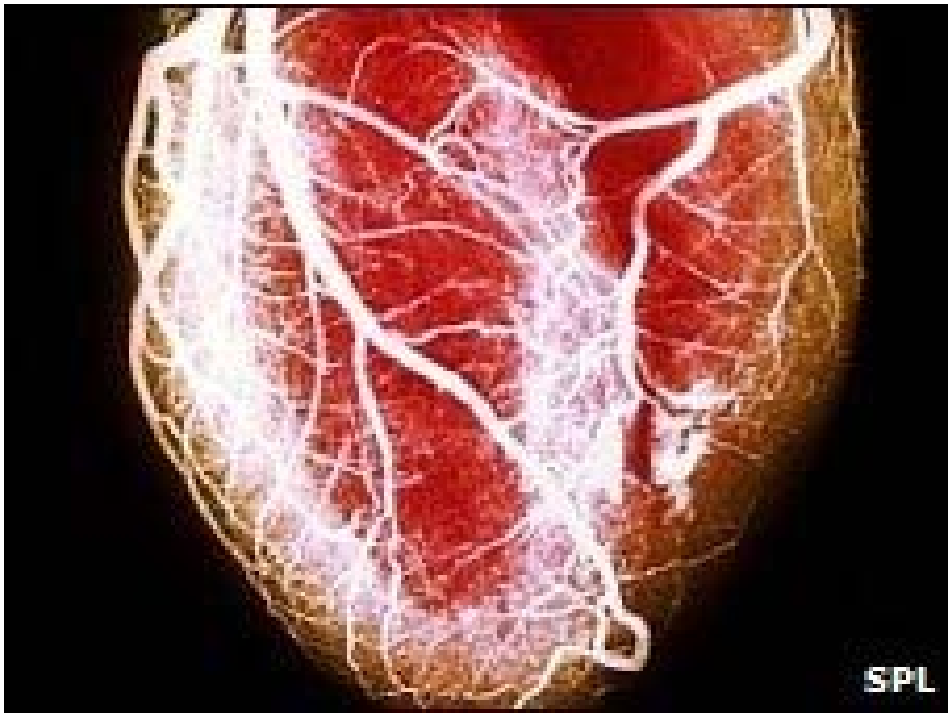
The charity Leukaemia Research which part-funded the project, said that the research had uncovered "important clues" which could lead to "less punishing" treatments for children.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8201969.stm

Published: 2009/08/16 23:14:44 GMT

'Magnetic' stem cells for hearts

Heart attacks and other vascular injuries could eventually be treated using regular injections of magnetised stem cells, experts say.



In animal trials, the cutting-edge treatment delivered the healing cells to the precise site of damage where their help was needed.

Although human tests are needed, a similar magnetic approach has been used to guide cancer therapies.

The expert US journal Cardiovascular Interventions reports the findings.

Targeted treatment

The idea behind the targeted therapy is to get as many of the reparative stem cells as possible to the area of damage.

To achieve this the UK scientists coated the stem cells with minute magnetic particles.

When these stem cells were injected into the blood stream it was then possible to control their movement using a magnet.

In trials, the magnetic targeting led to a five-fold increase in cell localisation at a site of vascular injury in rats.

" **We await further research to find out if, as well as increasing the chances of these cells getting to where they are needed, this strategy can actually speed up the repair process** "
The British Heart Foundation's Professor Peter Weissberg

These same magnetic nanoparticles are already approved in the US where they are routinely used as an agent to make MRI scans clearer to read.

Senior author of the study Dr Mark Lythgoe, of University College London, said this meant human trials could begin within the next few years.

He said: "It's feasible that heart attacks and other vascular injuries could eventually be treated using regular injections of magnetised stem cells.

"The technology could be adapted to localise cells in other organs and provide a useful tool for the systemic injection of all manner of cell therapies.

"And it's not just limited to cells - by focusing tagged antibodies or viruses using this method, cancerous tumours could be much more specifically targeted."

Professor Peter Weissberg of the British Heart Foundation, which co-funded the work, said: "This encouraging research shows that nanomagnets could be used to help therapeutic stem cells reach specific areas of the body, particularly inside blood vessels where the blood is flowing fast and at high pressure.

"It is hoped that this strategy could be used to help these cells home-in to the sites of diseased tissue and improve the chances of repairing it.

"We await further research to find out if, as well as increasing the chances of these cells getting to where they are needed, this strategy can actually speed up the repair process."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8204835.stm

Published: 2009/08/17 23:59:38 GMT

Parents 'ignoring eye sun danger'

Three in four parents are risking their child's eyesight by exposing them to bright sun without appropriate protection, experts warn.

Nearly a third of parents in Britain do not buy their children sunglasses, a poll of 2,000 people for the College of Optometrists revealed. Of those who do, nearly half put price before protection and only a quarter buy sunglasses from a trusted brand.

The College recommends choosing dark glasses with a CE mark for quality.

" **Sunglasses don't need to be expensive to offer good protection but it is important for parents to check that the pair they buy carry a CE Mark** "
Optometrist Dr Susan Blakeney

People with light coloured eyes are most at risk from sun damage and those with blue eyes should always wear sunglasses, the experts advise. UV rays from sunlight can damage the retina and the lens of the eye and can lead to long-term damage.

Too much exposure is linked to conditions like cataracts and age-related macular degeneration.

Wearing cheap sunglasses with no UV filters poses an even greater danger than wearing none at all because the pupils will dilate allowing more harmful rays into the eye.

BUYING TIPS
- Buy good quality dark sunglasses from a reputable seller
- Look for the standard CE mark for quality
- Ensure they are a good fit - children should not be able to peep over the top
- Bands can be worn to keep the sunglasses on - particularly useful for the sporty

And the risk is cumulative, meaning the more UV exposure a person has the higher their risk will be.

Dr Susan Blakeney, optometric adviser at the College of Optometrists, said: "I am shocked to see that so many parents aren't ensuring that their child's eyes are protected in the sun, and am equally astounded to see that of those who do, many are opting for 'cheap and cheerful' over quality.

"Sunglasses don't need to be expensive to offer good protection but it is important for parents to check that the pair they buy carry a CE mark." She said most children would happily wear sunglasses but said a sunhat to shade the eyes would also work, particularly for infants who may pull the glasses off.

However, research has shown mixed results about whether UV causes significant damage. Consultant paediatric ophthalmologist Michael Clarke said the issue was controversial.

The Royal College of Ophthalmologists recommends children wear protective sunglasses if they are likely to be exposed to a lot of UV light, such as during a day at the beach. Very young children should not be exposed to bright sunshine at all, says the college.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8204956.stm

Published: 2009/08/18 00:09:13 GMT

Monkeys booze because of genes
By Sudeep Chand
Science reporter, BBC News

A study has shown that having a particular gene variant causes some macaque monkeys to drink more alcohol in experiments.

The gene, known as the corticotrophin releasing factor (CRF) gene, is an important part of how we respond to everyday stress.

Sometimes it can become overactive and lead to stress-related problems such as anxiety, depression and alcoholism. The findings may eventually lead to new treatments for alcoholism.

Writing in the Proceedings of the National Academy of Sciences (PNAS), the scientists found that some monkeys with the gene variant drank more alcohol, possibly to relieve their anxiety.

In particular the "T" form of the gene was associated with increased voluntary consumption of alcohol in drinks equivalent to the strength of strong beer.

Some were drinking "well over the limit, maybe up to four or five drinks in one hour. They're not drinking it because it's tasty, it smelt like rubbing alcohol".

"And they act much like humans do: some sleep, some are friendly, others are aggressive," said Christina Barr, from the US National Institutes of Health in Bethesda, Maryland, one of the authors of the study.

It is thought that a similar variant of the gene exists in humans but may be rare. There are also other genes that have been associated with alcoholism. This may eventually lead to treatments that reduce the activity of these genes and the risk of alcoholism in those that carry them.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8206151.stm

Published: 2009/08/17 20:40:39 GMT

Water reform is 'needed in Asia'

Asia must reform its water use to feed 1.5 billion extra people by 2050, says a new report.

The authors warn that without big changes to irrigation many nations will have to import food.

The report says that 94% of suitable land in South Asia is already being used for growing food.

According to their computer model the continent could obtain three quarters of the additional food it needs with better irrigation systems.

The report will be presented on Tuesday to the World Water Week conference in Stockholm.

The study was carried out by the International Water Management Institute and the United Nations Food and Agriculture Organization (FAO).

The researchers warn that some developing nations will have to import more than a quarter of the rice, what and maize they will need by 2050 and that this prospect will be politically risky.

They outline three options for meeting the food needs of Asia's population.

The first is to import large quantities of cereals from other regions, the second to improve and expand "rain-fed" agriculture and the third is to focus on irrigated farmlands.

Politically risky

The report warns that the first option is too politically risky and the second is impossible as suitable land is already in use in many areas.

Lead author Aditi Mukherji of the International Water Management Institute said: "Today, the option of expanding irrigated land area in Asia to feed a growing population is becoming increasingly problematic due to land or water constraints."

The scenarios presented in the report do not factor in climate change which is likely to make rainfall more erratic.

The report recommends modernising the region's large scale irrigation systems which rely on surface water but have fallen into disrepair through lack of investment.

Another suggestion is for governments to help individual farmers use cheap pumps to extract ground water for irrigation.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8206230.stm

Published: 2009/08/17 18:41:48 GMT

Herbs 'can be natural pesticides'

Common herbs and spices show promise as an environmentally-friendly alternative to conventional pesticides, scientists have told a major US conference.

They have spent a decade researching the insecticidal properties of rosemary, thyme, clove and mint.

They could become a key weapon against insect pests in organic agriculture, the researchers say, as the industry attempts to satisfy demand.

The "plant essential oils" have a broad range of action against bugs.

Some kill them outright while others repel them.

Details were presented at the Fall Meeting of the American Chemical Society (ACS) in Washington DC.

These new pesticides are generally a mixture of tiny amounts of two to four different herbs diluted in water.

The research was led by Dr Murray Isman, from the University of British Columbia in Vancouver, Canada.

Some spice-based commercial products now being used by farmers have already shown success in protecting organic strawberry, spinach, and tomato crops against destructive aphids and mites, Dr Isman explained.

"These products expand the limited arsenal of organic growers to combat pests," he said.

"They're still only a small piece of the insecticide market, but they're growing and gaining momentum."

Unlike conventional pesticides, these "killer spices" do not require more limited approval from regulatory bodies and are readily available.

An additional advantage is that insects are less likely to evolve resistance - the ability to shrug off once-effective toxins - Isman says. They're also safer for farm workers, who are at high risk for pesticide exposure, he notes.

But the herb-based pesticides also have shortcomings.

Since the essential oils made from these herbs tend to evaporate quickly and degrade rapidly in sunlight, farmers need to apply them to crops more frequently than conventional pesticides.

Some last only a few hours, compared to days or even months for conventional pesticides.

As they are also generally less potent than conventional pesticides, they must be applied in higher concentrations to achieve acceptable levels of pest control, Dr Isman said.

Researchers are now seeking ways of making the novel pesticides longer-lasting and more potent, he added.

"They're not a panacea for pest control," Dr Isman explained.

Conventional pesticides are still the most effective way to control caterpillars, grasshoppers, beetles and other large insects on commercial food crops, he added.

"It comes down to what's good for the environment and what's good for human health."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8206045.stm

Published: 2009/08/17 17:33:50 GMT

Needle-free, Inhalant Powder Measles Vaccine Could Save Thousands Of Lives

Scientists have developed the first dry powder inhalable vaccine for measles. The inhaler is easy to use. (Credit: Aktiv-Dry, LLC)

ScienceDaily (Aug. 18, 2009) — The first dry powder inhalable vaccine for measles is moving toward clinical trials next year in India, where the disease still sickens millions of infants and children and kills almost 200,000 annually, according to a report presented at the 238th National Meeting of the American Chemical Society (ACS).

Robert Sievers, Ph.D., who leads the team that developed the dry-powder vaccine, said it's a perfect fit for use in back-roads areas of developing countries. Those areas often lack the electricity for refrigeration, clean water and sterile needles needed to administer traditional liquid vaccines.

"Childhood vaccines that can be inhaled and delivered directly to mucosal surfaces have the potential to offer significant advantages over injection," Sievers said. "Not only might they reduce the risk of infection from HIV, hepatitis, and other serious diseases due to unsterilized needles, they may prove more effective against disease."

"Many serious infections, such as the measles virus, can enter the body through inhalation. Measles vaccine dry powders have the potential to effectively vaccinate infants, children and adults by inhalation, avoiding the problems associated with liquid vaccines delivered by injection," he added.

Although made for developing countries, the technology eventually could become the basis for a new generation of inhalable — and ouchless vaccines — in the United States and elsewhere. So far, an inhalable vaccine is available for only one disease. It is a wet mist vaccine for influenza.

Sievers, once an atmospheric scientist and who now is with Department of Chemistry and Biochemistry and Center for Pharmaceutical Biotechnology, University of Colorado, Boulder, took inspiration for the new vaccine from research on how people inhale tiny airborne droplets of air pollutants.

To create an inhalable vaccine, Sievers and his team of students and researchers developed a patented process known as the "Carbon Dioxide-Assisted Nebulization with a Bubble Dryer," called CAN-BD. The weakened measles virus is mixed with "supercritical" carbon dioxide — part gas, part liquid — to produce microscopic bubbles and droplets, which then are dried to make an inhalable powder.

The powder is puffed into a small, cylindrical, plastic sack, with an opening like the neck of a plastic water bottle, and administered. "By taking one deep breath from the sack, a child could be effectively vaccinated," Sievers said.

In animal tests, the inhaler has been just as effective in delivering measles vaccine as the traditional injection, the researchers say. They now are working on an inexpensive dry powder inhaler that would deliver measles or influenza vaccines to developing nations and could be used elsewhere. In replacing injections, the new method also would help reach those who refuse inoculations because of their fear of needles. The researchers say that the vaccine could be produced for about 26 cents a dose.

If the inhaler passes final safety and effectiveness tests, the Serum Institute of India Ltd. expects a demand growing to 400 million doses of measles vaccine a year, according to Sievers.

"Human clinical trials are expected to begin next year in India, after animal safety studies are completed this year," Sievers said. "About two-thirds of the world's deaths due to measles occur in that nation. Worldwide, several hundred people die every day from measles-related disease," he added.

In earlier research in the 1980s in Mexico during a measles outbreak, 3 million children received a measles vaccine by inhaling a wet mist aerosol and those who took part in the test had a lower rate of developing measles than those who received a vaccine by injection, according to Sievers. "The problem with that method," he said, "was that the wet mists required power or batteries to generate the aerosol and the liquid vaccines had to be freshly made up and kept on ice and the nebulizer that delivers the dose had to be cleaned. The new, inexpensive dry aerosol dispenser doesn't need to be cleaned and doesn't require power," he said.

The study has been conducted with a grant from the Foundation for the National Institutes of Health as part of the Grand Challenges in Global Health Initiative of the Bill and Melinda Gates Foundation.

Adapted from materials provided by American Chemical Society, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/08/090816170913.htm

Cardiovascular Diseases: Researchers Have Found A Way To Treat Ischemic Pathologies

ScienceDaily (Aug. 18, 2009) — A team of researchers from CIC bioGUNE from the Cellular Biology and Stem Cell Unit, alongside a team from Paris' Cardiovascular Research Centre (INSERM U970) have developed a new area of research which looks extremely promising regarding the development of new therapeutic responses to ischemic pathologies and cardiovascular diseases in general.

The results of this research project, which was initiated in 2005 and is supported by Bizkaia:Xede and the Basque Government's Etortek programme, were published in the journal *Circulation*.

By activating a protein called HIF, the strategy is to stimulate revascularisation and the repair of the damaged organ following ischemia caused by the obstruction of a blood vessel preventing normal blood flow. These obstructions occur, for example, in the event of thrombosis in a limb, myocardial infarction or a stroke. In this sense, it is important to highlight the fact that cardiovascular diseases are the principal cause of death throughout the world (in the European Union, they account for 40% of all deaths, a figure equivalent to 2 million deaths per year).

In general, cells tend to respond to the lack of oxygen caused by poor blood flow by activating HIF. However, in the case of an ischemic pathology, HIF is not sufficiently activated.

Dr Berra, Cellular Biology and Stem Cell Unit's leader, stated that they decided to over-produce HIF following ischemia as an attractive therapeutic alternative. For their research purposes, they used an ischemic model provoked in a mouse leg through ligation of the femoral artery. In other words, they closed off the femoral artery and stopped the blood flow to the limb. When this happens, the leg develops necrosis and after a time, the mouse dies.

The aim was to artificially help stimulate the production of HIF after the femoral artery had been closed off. And they saw that when they did this, the mouse's leg revascularised and no longer entered into a degenerative process.

How is this high level of HIF production achieved? HIF is a protein which, when not required, degrades constitutively and this degradation is regulated by enzymes called PHDs.

These enzymes hydroxylate HIF and, as a result of this hydroxylation, the protein degrades. Therefore, when these enzymes are inhibited, HIF cannot degrade and so accumulates. To inhibit PHDs, they use siRNAs, explains Dr Berra.

Adapted from materials provided by Basque Research.

http://www.sciencedaily.com/releases/2009/08/090805075753.htm

Agricultural Methods Of Early Civilizations May Have Altered Global Climate

Example of modern-day slash-and-burn destruction of Amazon forest to clear land for cultivation. (Credit: iStockphoto)

ScienceDaily (Aug. 18, 2009) — Massive burning of forests for agriculture thousands of years ago may have increased atmospheric carbon dioxide enough to alter global climate and usher in a warming trend that continues today, according to a new study that appears online Aug. 17 in the journal *Quaternary Science Reviews*.

Researchers at the University of Virginia and the University of Maryland-Baltimore County say that today's 6 billion people use about 90 percent less land per person for growing food than was used by far smaller populations early in the development of civilization. Those early societies likely relied on slash-and-burn techniques to clear large tracts of land for relatively small levels of food production.

"They used more land for farming because they had little incentive to maximize yield from less land, and because there was plenty of forest to burn," said William Ruddiman, the lead author and a professor emeritus of environmental sciences at the University of Virginia. "They may have inadvertently altered the climate."

Ruddiman is a climate scientist who specializes in investigating ocean-sediment and ice-core records. In recent years he has searched across scientific disciplines – anthropology, archaeology, population dynamics, climatology – to gain insight into how humans may have affected climate over the millennia.

He said that early populations likely used a land-clearing method that involved burning forests, then planting crop seed among the dead stumps in the enriched soil. They would use a large plot until the yield began to decline, and then would burn off another area of forest for planting.

They would continue this form of rotation farming, ever expanding the cleared areas as their populations grew. They possibly cleared five or more times more land than they actually farmed at any given time. It was only as populations grew much larger, and less land was available for farming or for laying fallow,

that societies adopted more intensive farming techniques and slowly gained more food yield from less land.

Ruddiman notes that with the highly efficient and intensive farming of today, growing populations are using less land per capita for agriculture. Forests are returning in many parts of the world, including the northeastern United States, Europe, Canada, Russia and even parts of China.

The positive environmental effects of this reforestation, however, are being canceled out by the large-scale burning of fossil fuels since the advent of the Industrial Revolution, which began about 150 years ago. Humans continue to add excessive levels of carbon dioxide to the atmosphere, contributing to a global warming trend, Ruddiman said.

Five years ago, Ruddiman made headlines with a hypothesis that humans began altering global climate thousands of years ago, not just since the Industrial Revolution. That theory has since been criticized by some climate scientists who believe that early populations were too small to create enough carbon dioxide to alter climate.

According to projections from some models of past land use, large-scale land clearing and resulting carbon emissions have only occurred during the industrial era, as a result of huge increases in population.

But Ruddiman, and his co-author Erle Ellis, an ecologist at UMBC who specializes in land-use change, say these models are not accounting for the possibly large effects on climate likely caused by early farming methods.

"Many climate models assume that land use in the past was similar to land use today; and that the great population explosion of the past 150 years has increased land use proportionally," Ellis said. "We are proposing that much smaller earlier populations used much more land per person, and may have more greatly affected climate than current models reflect."

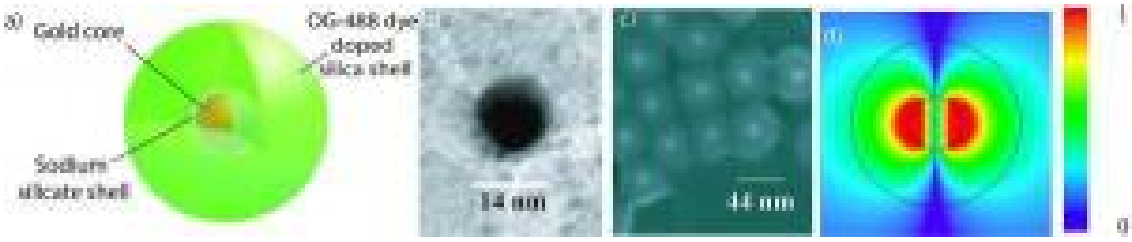
Ruddiman and Ellis based their finding on several studies by anthropologists, archaeologists and paleoecologists indicating that early civilizations used a great amount of land to grow relatively small amounts of food. The researchers compared what they found with the way most land-use models are designed, and found a disconnect between modeling and field-based studies.

"It was only as our populations grew larger over thousands of years, and needed more food, that we improved farming technologies enough to begin using less land for more yield," Ruddiman said. "We suggest in this paper that climate modelers might consider how land use has changed over time, and how this may have affected the climate."

Adapted from materials provided by University of Virginia.

http://www.sciencedaily.com/releases/2009/08/090817073502.htm

New Nanolaser Key To Future Optical Computers And Technologies



Researchers have created the tiniest laser since its invention nearly 50 years ago. Because the new device, called a "spaser," is the first of its kind to emit visible light, it represents a critical component for possible future technologies based on "nanophotonic" circuitry. The color diagram (a) shows the nanolaser's design: a gold core surrounded by a glasslike shell filled with green dye. Scanning electron microscope images (b and c) show that the gold core and the thickness of the silica shell were about 14 nanometers and 15 nanometers, respectively. A simulation of the SPASER (d) shows the device emitting visible light with a wavelength of 525 nanometers. (Credit: Birck Nanotechnology Center, Purdue University)

ScienceDaily (Aug. 17, 2009) — Researchers have created the tiniest laser since its invention nearly 50 years ago, paving the way for a host of innovations, including superfast computers that use light instead of electrons to process information, advanced sensors and imaging.

Because the new device, called a "spaser," is the first of its kind to emit visible light, it represents a critical component for possible future technologies based on "nanophotonic" circuitry, said Vladimir Shalaev, the Robert and Anne Burnett Professor of Electrical and Computer Engineering at Purdue University.

Such circuits will require a laser-light source, but current lasers can't be made small enough to integrate them into electronic chips. Now researchers have overcome this obstacle, harnessing clouds of electrons called "surface plasmons," instead of the photons that make up light, to create the tiny spasers.

Findings are detailed in a paper appearing online in the journal *Nature*, reporting on work conducted by researchers at Purdue, Norfolk State University and Cornell University.

Nanophotonics may usher in a host of radical advances, including powerful "hyperlenses" resulting in sensors and microscopes 10 times more powerful than today's and able to see objects as small as DNA; computers and consumer electronics that use light instead of electronic signals to process information; and more efficient solar collectors.

"Here, we have demonstrated the feasibility of the most critical component - the nanolaser - essential for nanophotonics to become a practical technology," Shalaev said.

The "spaser-based nanolasers" created in the research were spheres 44 nanometers, or billionths of a meter, in diameter - more than 1 million could fit inside a red blood cell. The spheres were fabricated at Cornell, with Norfolk State and Purdue performing the optical characterization needed to determine whether the devices behave as lasers.

The findings confirm work by physicists David Bergman at Tel Aviv University and Mark Stockman at Georgia State University, who first proposed the spaser concept in 2003.

"This work represents an important milestone that may prove to be the start of a revolution in nanophotonics, with applications in imaging and sensing at a scale that is much smaller than the wavelength of visible light," said Timothy D. Sands, the Mary Jo and Robert L. Kirk Director of the Birck Nanotechnology Center in Purdue's Discovery Park.

The spasers contain a gold core surrounded by a glasslike shell filled with green dye. When a light was shined on the spheres, plasmons generated by the gold core were amplified by the dye. The plasmons were then converted to photons of visible light, which was emitted as a laser.

Spaser stands for surface plasmon amplification by stimulated emission of radiation. To act like lasers, they require a "feedback system" that causes the surface plasmons to oscillate back and forth so that they gain power and can be emitted as light. Conventional lasers are limited in how small they can be made because this feedback component for photons, called an optical resonator, must be at least half the size of the wavelength of laser light.

The researchers, however, have overcome this hurdle by using not photons but surface plasmons, which enabled them to create a resonator 44 nanometers in diameter, or less than one-tenth the size of the 530-nanometer wavelength emitted by the spaser.

"It's fitting that we have realized a breakthrough in laser technology as we are getting ready to celebrate the 50th anniversary of the invention of the laser," Shalaev said.

The first working laser was demonstrated in 1960.

The research was conducted by Norfolk State researchers Mikhail A. Noginov, Guohua Zhu and Akeisha M. Belgrave; Purdue researchers Reuben M. Bakker, Shalaev and Evgenii E. Narimanov; and Cornell researchers Samantha Stout, Erik Herz, Teeraporn Suteewong and Ulrich B. Wiesner.

Future work may involve creating a spaser-based nanolaser that uses an electrical source instead of a light source, which would make them more practical for computer and electronics applications.

The work was funded by the National Science Foundation and U.S. Army Research Office and is affiliated with the Birck Nanotechnology Center, the Center for Materials Research at Norfolk State, and Cornell's Materials Science and Engineering Department.

Adapted from materials provided by Purdue University. Original article written by Emil Venere.

http://www.sciencedaily.com/releases/2009/08/090816171003.htm

'Green' Energy From Algae

Newly developed plate reactor for an optimum light management in the cultivation of microalgae. (Credit: Photo by Florian Lehr)

ScienceDaily (Aug. 17, 2009) — In view of the shortage of petrochemical resources and climate change, development of CO_2-neutral sustainable fuels is one of the most urgent challenges of our times. Energy plants like rape or oil palm are being discussed fervently, as they may also be used for food production. Hence, cultivation of microalgae may contribute decisively to tomorrow's energy supply. For energy production from microalgae, KIT scientists are developing closed photo-bioreactors and novel cell disruption methods.

Microalgae are monocellular, plant-like organisms engaged in photosynthesis and converting carbon dioxide (CO_2) into biomass. From this biomass, both potential resources and active substances as well as fuels like biodiesel may be produced. While growing, algae take up the amount of CO_2 that is later released again when they are used for energy production. Hence, energy from algae can be produced in a CO_2-neutral manner contrary to conventional energy carriers.

Apart from CO_2-neutral closed loop management, algae have an-other advantage: Industrial CO_2 emissions may be used as a "resource", as algae grow faster at high carbon dioxide concentrations and, hence, produce more biomass for energy production.

However, this is not their only advantage: "Compared to land plants, algae produce five times as much biomass per hectare and contain 30 to 40% oil usable for energy production", says Professor Clemens

Posten, who directs this research activity at the KIT Institute of Life Science Engineering. As the algae may also be cultivated in arid i.e. dry, areas not suited for agriculture, there is hardly any competition with agricultural areas. There, however, closed systems are required.

Presently, algae are being produced in open ponds in southern countries of relatively small productivity. This is where Posten's new technology starts. "In terms of process technology, our approach is completely different, as we are working with closed photobioreactors", underlines the scientist. "Our plants convert solar energy into biomass, the efficiency being five times higher than that in open ponds." The plates in usual photo-bioreactors are arranged vertically.

"Every alga sees a little bit less light, but the plant is operated at increased efficiency", emphasizes the biologist and electrical engineer. Modern designs under investigation will find more intelligent ways to light distribution.

Consequently, algae production does not only work in countries with an extremely high solar irradiation. Most algae need a maximum of ten percent of the incident sunlight intensity. According to Posten, the remaining fraction would just be wasted. Posten points out that the Sahara offers just twice as much sun as Central Europe. But there, the reactor contents would have to be cooled. Other advantages of the closed system are drastic savings of water and fertilizers. Double use of algae for the production of food or fine chemicals and subsequent energy production from the residual biomass may also be conceivable.

Posten's institute hosts one of the two KIT working groups focusing on research in the field of algae biotechnology. "As far as the development of photobioreactors is concerned, we are among the three locations worldwide, where considerable progress is being achieved in both process technology and biology", explains Posten.

To close the cycle for the complete use of algae biomass for energy production, KIT researchers have more in mind. The biomass remaining after extraction (60 – 70%) is planned to be converted into other energy carriers like hydrogen or methane by means of the hydrothermal gasification process.

Adapted from materials provided by Karlsruhe Institute of Technology, via AlphaGalileo.

http://www.sciencedaily.com/releases/2009/08/090806080337.htm

Magazines For Women Depict Babies In Unsafe Sleep Environments, Study Finds

ScienceDaily (Aug. 17, 2009) — More than one third of photos in women's magazines depicted babies in unsafe sleep positions, according to a new study in *Pediatrics*. Additionally, the study found that two-thirds of sleep environments depicted in these magazines were also unsafe.

Led by SIDS researchers Rachel Moon, MD, a pediatrician, and Brandi Joyner at Children's National Medical Center, the study analyzed pictures of sleeping infants in 24 magazines with wide circulation among 20- to 40-year-old women.

The authors evaluated pictures for sleep positions, including whether or not the baby was placed on its side or stomach rather than on its back, as well as hazards in infant sleeping environments, including soft bedding. The study reviewed photos in both articles and advertisements.

"There are major discrepancies between what doctors recommend to prevent sudden infant death syndrome and what moms may see in mainstream media," said Dr. Moon. "The most important thing for moms to realize is that what they see in magazines may not be what's best for their baby in real life."

To reduce the risk of SIDS, the American Academy of Pediatrics recommends that babies be placed on their backs when sleeping, on a separate sleep surface from their parents, without blankets, pillows, or other soft bedding. Dr. Moon is a member of the AAP's Task Force on SIDS, which issued revised guidelines for SIDS prevention in October of 2005.

The study, titled "Infant Sleep Environments Depicted in Magazines Targeted to Women of Childbearing Age," appears in the September issue of *Pediatrics*.

Adapted from materials provided by Children's National Medical Center, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/08/090817073504.htm

New Method Takes Aim At Aggressive Cancer Cells

In a comparison of a control to the chemical identified by the Weinberg/Lander team, called salinomycin, the tumor cells (stained dark purple in the slide above) were unaffected by the control, but salinomycin killed many tumor cells (stained pink). (Credit: Piyush Gupta, Kai Tao, Charlotte Kuperwasser, Cell, August 21, 2009.)

ScienceDaily (Aug. 17, 2009) — A multi-institutional team of Boston-area researchers has discovered a chemical that works in mice to kill the rare but aggressive cells within breast cancers that have the ability to seed new tumors.

These cells, known as cancer stem cells, are thought to enable cancers to spread — and to reemerge after seemingly successful treatment. Although further work is needed to determine whether this specific chemical holds therapeutic promise for humans, the study shows that it is possible to find chemicals that selectively kill cancer stem cells. The scientists' findings appear in the August 13 advance online issue of *Cell*.

"Evidence is accumulating rapidly that cancer stem cells are responsible for the aggressive powers of many tumors," says Robert Weinberg, a Member of Whitehead Institute for Biomedical Research and one of the authors of the study. "The ability to generate such cells in the laboratory, together with the powerful techniques available at the Broad Institute, made it possible to identify this chemical. There surely will be dozens of others with similar properties found over the next several years."

"Many therapies kill the bulk of a tumor only to see it regrow," says Eric Lander, Director of the Broad Institute of MIT and Harvard, and an author of the Cell paper. "This raises the prospect of new kinds of anti-cancer therapies."

An emerging idea in cancer biology is that tumors (breast, prostate, colon, lung, etc.) harbor a group of cells with the unique ability to regenerate cancers. In addition to promoting tumor growth, these so-called cancer stem cells are largely resistant to current cancer therapies. If it were possible to identify chemicals that selectively kill cancer stem cells, such chemicals might become critical candidates for future drug development.

However, researchers have struggled to study cancer stem cells directly in the laboratory. The cells' relative scarcity compared to other tumor cells, combined with a tendency to lose their stem cell-like properties when grown outside of the body, have severely limited the amount of material available for analysis.

To overcome these hurdles, Broad and Whitehead Institute researchers drew upon recent findings from Weinberg and his colleagues that suggested a way to generate in the laboratory large numbers of cancer cells with stem cell-like qualities. The technique works by coaxing adult cells to undergo a critical change (known as an "epithelial-to-mesenchymal transition") that alters their shape and motility. At the same time, the cells also adopt similar properties as stem cells.

"A critical aspect of our work was to generate relatively homogenous and stable populations of cancer stem-like cells that could then be used for screening," says Tamer Onder, a former graduate student in Weinberg's lab and co-first author of the study. (Onder is now a postdoctoral research fellow at Children's Hospital in Boston.) "We were able to achieve this by inducing the cancer cells into an epithelial-to-mesenchymal transition using novel reagents that we had developed in the lab."

With an ample number of stem cells in hand, the Broad-Whitehead team undertook a large-scale analysis of thousands of chemical compounds, applying automated methods to search for ones with activity against breast cancer stem cells. From a pool of more than 30 promising candidates, the researchers identified a compound with surprising potency.The compound, called salinomycin, kills not only laboratory-created cancer stem cells, but also naturally occurring ones. Compared to a common chemotherapeutic drug prescribed for breast cancer (known as paclitaxel), salinomycin reduced the number of cancer stem cells by more than 100-fold. It also diminished breast tumor growth in mice.

To further dissect the function of salinomycin, the researchers also examined its genetic effects. Previous studies of tumors from breast cancer patients have revealed groups of genes that are highly active in cancer stem cells. Many of these same genes are linked with particularly aggressive tumors and poor patient prognoses. The researchers' studies show that salinomycin (but not paclitaxel) treatment can decrease the activity of these genes, revealing a possible molecular basis for the chemical's biological effects.

"Our work reveals the biological effects of targeting cancer stem cells," says co-first author Piyush Gupta, a researcher at the Broad Institute. "Moreover, it suggests a general approach to finding novel anti-cancer therapies that can be applied to any solid tumor maintained by cancer stem cells."

Although the new findings signal a noteworthy scientific milestone, it is still too early to know whether cancer patients will reap benefits from it. Additional research is needed to determine exactly how salinomycin works to kill cancer stem cells and if it can wield the same tumor-reducing power in humans as it does in mice. These types of analyses generally take several years to complete.

But even with such tempered enthusiasm, there is also cause for optimism. In the current study, just 16,000 chemical compounds were tested, of which a small subset showed toxicity against cancer stem cells. Therefore, deeper investigations of these compounds as well additional tests of broader collections of chemicals may yield other potential additions to the anti-cancer arsenal.

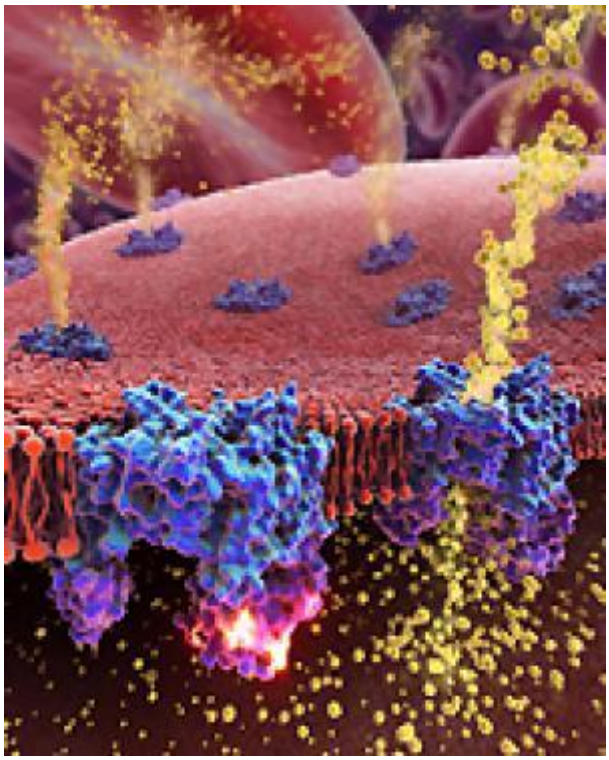
Journal reference:

1. Piyush B. Gupta, Tamer T. Onder, Guozhi Jiang, Kai Tao, Charlotte Kuperwasser, Robert A. Weinberg, and Eric S. Lander. **Identification of selective inhibitors of cancer stem cells by high-throughput screening**. *Cell*, 2009; DOI: 10.1016/j.cell.2009.06.034

Adapted from materials provided by Whitehead Institute for Biomedical Research.

http://www.sciencedaily.com/releases/2009/08/090813142135.htm

Researchers Find Key To Keeping Cells In Shape



Ion transporter in blue within the red blood cell membrane. When phosphorylated or inactivated (white flash) the transporter shuts down. When dephosphorylated it is active, allowing potassium and chloride to leave the cell. (Credit: Yale University)

ScienceDaily (Aug. 17, 2009) — Yale University researchers have discovered how a protein within most cell membranes helps maintain normal cell size, a breakthrough in basic biology that has implications for a variety of diseases such as sickle cell anemia and disorders of the nervous system.

Cell size is regulated by the balance of positively and negatively charged ions and other solutes in the fluid inside and outside cells, which in turn prevents water from moving across cell membranes and changing cell size. Changes in chemical composition of extracellular fluid can disrupt this balance, sometimes with damaging consequences to health.

"If you eat a bag of salty potato chips or a jug of water, the cells lining your stomach will be under pressure to shrink or expand," explains Richard Lifton, senior author of the paper and Sterling Professor of Genetics and Internal Medicine. "Cells need to rapidly change their ionic composition to compensate and avoid blowing up like balloons or shrinking like raisins, and they do this by almost instantly changing their chloride levels."

In the Aug. 7 issue of the journal *Cell*, a team of Yale scientists led by Jesse Rinehart, associate research scientist in genetics and Lifton, an investigator of the Howard Hughes Medical Institute, report they used innovative new quantitative proteomics technologies to identify two key regulatory transporter sites that control the exit of potassium and chloride out of cells.

The proteomics technologies allow scientists to observe specific sites on proteins that undergo phosphorylation. Phosphorylation is a common and reversible modification made to a protein after it is synthesized and can turn a protein's function on or off. The Yale scientists show that the regulatory sites they identified are almost completely phosphorylated under normal conditions, when the transporter is

inactive. When confronted with changes in the environment that challenge the cell, the proteins are rapidly dephosphorylated and dramatically increase transport activity.

"These transporters are overactive in sickle cell anemia and play a role in the dehydration of sickle cells," said Patrick Gallagher, professor of pediatrics at the Yale School of Medicine and a co-author of the study. "With this new information, we may be able to find new strategies to manipulate this activity and identify new treatments that are so urgently needed."

Gallagher's lab is already studying genetic variations in the potassium-chloride pathway in a search of new drug targets.

This same system also helps regulate how brain cells respond to the neurotransmitter GABA, which governs wakefulness and has been implicated in anxiety and other disorders, Lifton said. The investigators found that phosphorylation of the regulatory sites worked the same way in the brain.

Looking to the future, Rinehart speculated that application of these new technologies will prove to be relevant to understanding many other biological regulatory systems.

The study was funded by the National Institutes of Health and the Leducq Foundation.

Other Yale authors of the research were Yelena D. Maksimova, Jessica E. Tanis, Kathryn L. Stone, Caleb A. Hodson, Junhui Zhang, Weijun Pan, Dianqing Wu, Christopher M. Colangelo, Biff Forbush, Erol E. Gulcicek,

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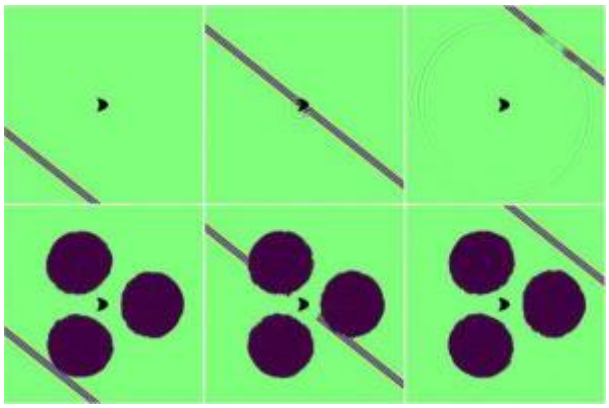
Adapted from materials provided by Yale University.

http://www.sciencedaily.com/releases/2009/08/090806121752.htm

New Cloaking Method Could Shield Submarines From Sonar, Planes From Radar, Buildings From Earthquakes



These images are from animated computer simulations of a new method -- developed by University of Utah mathematicians -- for cloaking objects from waves of all sorts. While the new method is unlikely to lead to invisibility cloaking like that in 'Star Trek' or 'Harry Potter' movies, it may eventually help shield submarines from sonar, planes from radar, buildings from earthquake waves, and oil rigs and coastal structures from tsunamis. The top three images show a wave front passing the kite-shaped object in the middle and hitting the object as it does. In the bottom three images, the kite-shaped object if surrounded by three cloaking devices and the waves they emit. So when the wave front passes, it moves by the object without touching it. (Credit: Fernando Guevara Vasquez)

ScienceDaily (Aug. 17, 2009) — University of Utah mathematicians developed a new cloaking method, and it's unlikely to lead to invisibility cloaks like those used by Harry Potter or Romulan spaceships in "Star Trek." Instead, the new method someday might shield submarines from sonar, planes from radar, buildings from earthquakes, and oil rigs and coastal structures from tsunamis.

"We have shown that it is numerically possible to cloak objects of any shape that lie outside the cloaking devices, not just from single-frequency waves, but from actual pulses generated by a multi-frequency source," says Graeme Milton, senior author of the research and a distinguished professor of mathematics at the University of Utah.

"It's a brand new method of cloaking," Milton adds. "It is two-dimensional, but we believe it can be extended easily to three dimensions, meaning real objects could be cloaked. It's called active cloaking, which means it uses devices that actively generate electromagnetic fields rather than being composed of 'metamaterials' [exotic metallic substances] that passively shield objects from passing electromagnetic waves."

Milton says his previous research involved "just cloaking clusters of small particles, but now we are able to cloak larger objects."

For example, radar microwaves have wavelengths of about four inches, so Milton says the study shows it is possible to use the method to cloak from radar something 10 times wider, or 40 inches. That raises hope for cloaking larger objects. So far, the largest object cloaked from microwaves in actual experiments was an inch-wide copper cylinder.

A study demonstrating the mathematical feasibility of the new cloaking technique – active, broadband, exterior cloaking – was published online today in the journal Optics Express. A related paper was published online Aug. 14 in *Physical Review Letters*.

Milton conducted the studies with Fernando Guevara Vasquez and Daniel Onofrei, both of whom are assistant professors-lecturers in mathematics. The research was funded by the National Science Foundation and the University of Utah.

Cloaking: From Science Fiction to Science

Cloaking involves making an object partly or completely invisible to incoming waves – sound waves, sea waves, and seismic waves, but usually electromagnetic waves such as visible light, microwaves, infrared light, radio and TV waves.

Cloaking things from visible light long has been a staple of science fiction, from invisible Romulan Bird of Prey warships in "Star Trek" to cloaking devices in books, games, films and shows like "Harry Potter," "Halo," "Predator," and "Stargate."

In recent years, scientists devised and tested various cloaking schemes. They acknowledge practical optical cloaking for invisibility is many years away. Experiments so far have been limited to certain wavelengths such as microwaves and infrared light, and every method tried so far has limitations.

Compared with passive cloaking by metamaterials, the new method – which involves generating waves to protect or cloak an object from other waves – can cloak from a broader band of wavelengths, Milton says.

"The problem with metamaterials is that their behavior depends strongly on the frequency you are trying to cloak from," he adds. "So it is difficult to obtain broadband cloaking. Maybe you'd be invisible to red light, but people would see you in blue light."

Most previous research used interior cloaking, where the cloaking device envelops the cloaked object. Milton says the new method "is the first active, exterior cloaking" technique: cloaking devices emit signals and sit outside the cloaked object.

Videos Simulate How Cloaking Method Works

The new studies are numerical and theoretical, and show how the cloaking method can work. "The research simulates on a computer what you should see in an experiment," Milton says. "We just do the math and hope other people do the experiments."

The Physical Review Letters study demonstrates the new cloaking method at a single frequency of electromagnetic waves, while the Optics Express paper demonstrates how it can work broadband, or at a wide range of frequencies.

In Optics Express, the mathematicians demonstrate that three cloaking devices together create a "quiet zone" so that "objects placed within this region are virtually invisible" to incoming waves. Guevara Vasquez created short videos of mathematical simulations showing a pulse of electromagnetic or sound waves rolling past an object:

- In one video, with the kite-shaped object uncloaked, the wave clearly interacts with the object, creating expanding, circular ripples like when a rock is thrown in a pond.
- In the second video, the object is surrounded by three point-like cloaking devices, each of which emits waves that only propagate a short distance. Those points and their emissions resemble purple sea urchins. As the passing waves roll by the cloaking devices, waves emitted by those devices interfere with the passing waves. As a result, the passing waves do not hit the cloaked object and there are no ripples.

Milton says the cloaking devices cause "destructive interference," which occurs when two pebbles are thrown in a pond. In places where wave crests meet, the waves add up and the crests are taller. Where troughs meet, the troughs are deeper. But where crests cross troughs, the water is still because they cancel each other out.

The principle, applied to sound waves, is "sort of like noise cancelation devices you get with headphones in airplanes if you travel first class," Milton says.

Protecting from Destructive Seismic and Tsunami Waves

"We proved mathematically that this method works when the wavelength of incoming electromagnetic radiation is large compared with the objects being cloaked, meaning it can cloak very small objects," Milton says. "It also can cloak larger objects."

Because visible light has tiny wavelengths, only microscopic objects could be made invisible by the new method.

"The cloaking device would have to generate fields that have very small wavelengths," Milton says. "It is very difficult to build antennas the size of light waves. We're so far from cloaking real-sized objects to visible light that it's incredible."

But imagine incoming waves as water waves, and envision breakwater cloaking devices that would generate waves to create a quiet zone that would protect oil rigs or specific coastal structures against incoming tsunami waves. Or imagine cloaking devices around buildings to generate vibrations to neutralize incoming seismic waves.

"Our method may have application to water waves, sound and microwaves [radar]," including shielding submarines and planes from sonar and radar, respectively, and protecting structures from seismic waves during earthquakes and water waves during tsunamis, Milton says. All those waves have wavelengths much larger than those of visible light, so the possible applications should be easier to develop.

"It would be wonderful if you could cloak buildings against earthquakes," Milton says. "That's on the borderline of what's possible."

The new method's main disadvantage "is that it appears you must know in advance everything about the incoming wave," including when the pulse begins, and the frequencies and amplitudes of the waves within the pulse, Milton says. That might require placement of numerous sensors to detect incoming seismic waves or tsunamis.

"Even though cloaking from light is probably impossible, it's a fascinating subject, and there is beautiful mathematics behind it," Milton says. "The whole area has exploded. So even if it's not going to result in a 'Harry Potter' cloak, it will have spinoffs in other directions," not only in protecting objects from waves of various sorts, but "for building new types of antennas, being able to see things on a molecular scale. It's sort of a renaissance in classical science, with new ideas popping up all the time."

A video showing an object uncloaked and cloaked as a wave passes may be seen and downloaded from http://vimeo.com/6092319 or as separate videos from http://vimeo.com/5406253 (no cloaking) and http://vimeo.com/5406236 (with cloaking).

Adapted from materials provided by University of Utah.

http://www.sciencedaily.com/releases/2009/08/090817073508.htm

Why More Autumn Leaves Are Red In America And Yellow In Europe: New Theory

Walking outdoors in the fall, the splendidly colorful leaves adorning the trees are a delight to the eye. In Europe these autumn leaves are mostly yellow, while the United States and East Asia boast lustrous red foliage. But why is it that there are such differences in autumnal hues around the world? (Credit: Copyright Michele Hogan)

ScienceDaily (Aug. 17, 2009) — Walking outdoors in the fall, the splendidly colorful leaves adorning the trees are a delight to the eye. In Europe these autumn leaves are mostly yellow, while the United States and East Asia boast lustrous red foliage. But why is it that there are such differences in autumnal hues around the world?

A new theory provided by Prof. Simcha Lev-Yadun of the Department of Science Education- Biology at the University of Haifa-Oranim and Prof. Jarmo Holopainen of the University of Kuopio in Finland and published in the *Journal New Phytologist* proposes taking a step 35 million years back to solve the color mystery.

The green of a tree's leaves is from the larger proportion of the chlorophyll pigment in the leaves. The change in color to red or yellow as autumn approaches is not the result of the leaves' dying, but of a series of processes – which differ between the red and yellow autumn leaves. When the green chlorophyll in leaves diminishes, the yellow pigments that already exist become dominant and give their color to the leaves. Red autumn leaves result from a different process: As the chlorophyll diminishes, a red pigment, anthocyanin, which was not previously present, is produced in the leaf. These facts were only recently discovered and led to a surge of research studies attempting to explain why trees expend resources on creating red pigments just as they are about to shed their leaves.

Explanations that have been offered vary and there is no agreement on this as of yet. One discipline suggests that the red pigment is produced as a result of physiological functions that make the re-translocation of amino acids to the woody parts of the tree more efficient in setting up its protection

against the potential damage of light and cold. Other explanations suggest that the red pigment is produced as part of the tree's strategy for protecting itself against insects that thrive on the flow of amino acids. But whatever the answer is, these explanations do not help us understand why the process of creating anthocyanin, the red pigment, does not occur in Europe.

An evolutionary ecology approach infers that the strong autumn colors result from the long evolutionary war between the trees and the insects that use them as hosts. During the fall season, which is when the insects suck the amino acids from the leaves and later lay their eggs, the tree colors its leaves in red because aphids are attracted to yellow ones, so as to advertise to the insects as to the defensive quality of the tree in order to lower the tendency of the insects to occupy the leaves for nutrition and the bark for breeding. In this case too, the protective logic of red pigmentation may be sound, but the yellow leaves cannot be reconciled with this approach. But to settle this point, the new theory can be applied.

According to the theory provided by Prof. Lev-Yadun and Prof. Holopainen, until 35 million years ago, large areas of the globe were covered with evergreen jungles or forests composed of tropical trees. During this phase, a series of ice ages and dry spells transpired and many tree species evolved to become deciduous. Many of these trees also began an evolutionary process of producing red deciduous leaves in order to ward off insects. In North America, as in East Asia, north-to-south mountain chains enabled plant and animal 'migration' to the south or north with the advance and retreat of the ice according to the climatic fluctuations. And, of course, along with them migrated their insect 'enemies' too. Thus the war for survival continued there uninterrupted.

In Europe, on the other hand, the mountains – the Alps and their lateral branches – reach from east to west, and therefore no protected areas were created. Many tree species that did not survive the severe cold died, and with them the insects that depended on them for survival. At the end of the repeated ice ages, most tree species that had survived in Europe had no need to cope with many of the insects that had become extinct, and therefore no longer had to expend efforts on producing red warning leaves.

According to the scientists, evidence supporting this theory can be found in the dwarf shrubs that grow in Scandinavia, which still color their leaves red in autumn. Unlike trees, dwarf shrubs have managed to survive the ice ages under a layer of snow that covered them and protected them from the extreme condition above. Under the blanket of snow, the insects that fed off the shrubs were also protected – so the battle with insects continued in these plants, making it necessary for them to color their leaves red.

Adapted from materials provided by University of Haifa.

http://www.sciencedaily.com/releases/2009/08/090813142150.htm

Braille Displays Get New Life With Artificial Muscles

A blind person uses the dielectric elastomer EAP based refreshable Braille display developed at Sungkyunkwan University, South Korea. (Credit: HR Choi, Sungkyunkwan University, South Korea)

ScienceDaily (Aug. 17, 2009) — Research with tiny artificial muscles may yield a full-page active Braille system that can refresh automatically and come to life right beneath your fingertips.

Yosi-Bar Cohen, a senior researcher at NASA's Jet Propulsion Laboratory in Pasadena, Calif, was inspired during a business trip to Washington, D.C., where a convention for people with visual impairments was taking place.

Bar-Cohen came up with an idea to create a "living Braille," a digital, refreshable Braille device using electroactive polymers, also known as artificial muscles. He wrote up a technology report and included information in a related book that he published. His writings inspired other scientists and engineers to create active displays using this technology, and prototypes are now under development around the world.

"I hope that sometime in the future we will have Braille on an iPhone. It will be portable and able to project a picture of a neighborhood popping up in front of you in the form of raised dots," said Bar-Cohen. "A digital Braille operated by artificial muscles could provide for rapid information exchange, such as e-mail, text messaging and access to the web and other electronic databases or archives."

According to the World Health Organization, about 314 million people are visually impaired worldwide; 45 million of them are blind.

Recently, Bar-Cohen was contacted by the Center for Braille Innovation of the Boston-based National Braille Press to reach out to the Electroactive Polymer community and take advantage of his role in this field. The National Braille Press is a non-profit Braille printing and publishing house that promotes the literacy of blind children through Braille.

Current Braille Display Technologies

The challenge for creating an active Braille display is in packing many small dots into a tiny volume.

Unlike hardcopy Braille, a refreshable display requires the raising and lowering of a large number of densely packed dots that allow a person to quickly read them. Currently, commercial active Braille devices are limited to a single line of characters. A full page of Braille typically has 25 lines of up to 40

characters per line. Characters are represented by six or eight dots per cell, arranged in two columns. To produce a page of refreshable Braille using electroactive polymers requires individually activating and controlling thousands of raiseable dots.

Developing New Braille Technologies

Some of the leading-edge work in Braille technology was developed at SRI in Menlo Park, Calif. Richard Heydt, a senior research engineer there who was involved in developing a prototype says, "The electroactive polymer technology seems to be a natural fit for Braille and tactile display applications."

The Braille display developed at SRI is based on activating a type of polymer consisting of a thin sheet of acrylic that deforms in response to voltage applied across the film. The individual Braille dots are defined by a pattern on this film, and each dot is independently activated to produce the dot combinations for Braille letters and numbers.

In currently available active refreshable Braille displays, each dot is a pin driven by a small motor or electromagnetic coil. In contrast, in the SRI display the actuators are defined regions on a single sheet of film. Thus, while each dot is raised or lowered by its own applied voltage, there are no motors, bulky actuators, or similar components. Since the system has far fewer discrete components for a Braille dot array, it would be potentially much lower in cost.

"The contributions of the developers of electroactive materials to making a low-cost, active Braille display would significantly improve the life of many people with visual impairments, while advancing the field to benefit other applications" said Bar-Cohen.

Looking for the 'Holy Braille'

The Boston-based National Braille Press has recently established a Center for Braille Innovation. They're looking for the "Holy Braille," a full-page electronic Braille display, at a low cost.

"We feel that the exciting field of electroactive polymer technology has matured to the point where it can provide real solutions for Braille displays. We welcome and encourage anyone who wants to take part in Braille innovation," said Noel H. Runyan, National Braille Press, Center for Braille Innovation

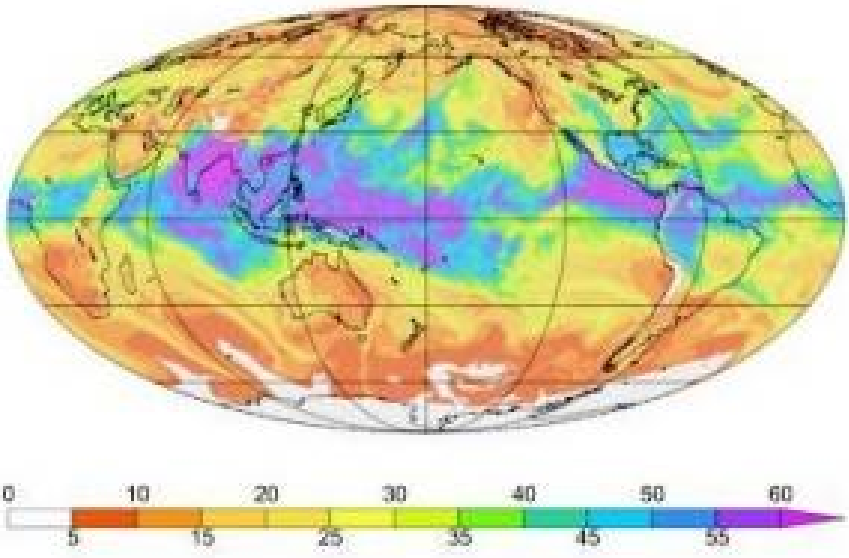
In the spring of 2010, Bar-Cohen is including a special session on tactile displays at an SPIE conference. SPIE is the international society for optics and photonics. Tactile displays will be presented and possibly demonstrated at the conference. He hopes these baby steps may someday lead to a full-page Braille system that will allow people to feel and "see" the universe beneath their fingers.

JPL is managed for NASA by the California Institute of Technology in Pasadena.

Adapted from materials provided by NASA/Jet Propulsion Laboratory.

http://www.sciencedaily.com/releases/2009/08/090814202711.htm

Climate Models Confirm More Moisture In Atmosphere Attributed To Humans



Total amount of atmospheric water vapor over the oceans on July 4, 2009. The scale is 10° x 10° latitude/longitude. These results are from operational weather forecasts of the European Centre for Medium-Range Weather Forecasting (ECMWF). (Credit: Image courtesy of DOE/Lawrence Livermore National Laboratory)

ScienceDaily (Aug. 17, 2009) — When it comes to using climate models to assess the causes of the increased amount of moisture in the atmosphere, it doesn't much matter if one model is better than the other.

They all come to the same conclusion: Humans are warming the planet, and this warming is increasing the amount of water vapor in the atmosphere.

In new research appearing in the Aug. 10 online issue of the *Proceedings of the U.S. National Academy of Sciences*, Lawrence Livermore National Laboratory scientists and a group of international researchers found that model quality does not affect the ability to identify human effects on atmospheric water vapor.

“Climate model quality didn't make much of a difference,” said Benjamin Santer, lead author from LLNL's Program for Climate Modeling and Intercomparison. “Even with the computer models that performed relatively poorly, we could still identify a human effect on climate. It was a bit surprising. The physics that drive changes in water vapor are very simple and are reasonably well portrayed in all climate models, bad or good.”

The atmosphere's water vapor content has increased by about 0.4 kilograms per cubic meter (kg/m_) per decade since 1988, and natural variability alone can't explain this moisture change, according to Santer. “The most plausible explanation is that it's due to human-caused increases in greenhouse gases,” he said.

More water vapor - which is itself a greenhouse gas - amplifies the warming effect of increased atmospheric levels of carbon dioxide.

Previous LLNL research had shown that human-induced warming of the planet has a pronounced effect on the atmosphere's total moisture content. In that study, the researchers had used 22 different computer models to identify a human “fingerprint” pattern in satellite measurements of water vapor changes. Each

model contributed equally in the fingerprint analysis. “It was a true model democracy,” Santer said. “One model, one vote.”

But in the recent study, the scientists first took each model and tested it individually, calculating 70 different measures of model performance. These “metrics” provided insights into how well the models simulated today's average climate and its seasonal changes, as well as on the size and geographical patterns of climate variability.

This information was used to divide the original 22 models into various sets of “top ten” and “bottom ten” models. “When we tried to come up with a David Letterman type 'top ten' list of models,” Santer said, “we found that it's extremely difficult to do this in practice, because each model has its own individual strengths and weaknesses.”

Then the group repeated their fingerprint analysis, but now using only “top ten” or “bottom ten” models rather than the full 22 models. They did this more than 100 times, grading and ranking the models in many different ways. In every case, a water vapor fingerprint arising from human influences could be clearly identified in the satellite data.

“One criticism of our first study was that we were only able to find a human fingerprint because we included inferior models in our analysis,” said Karl Taylor, another LLNL co-author. “We've now shown that whether we use the best or the worst models, they don't have much impact on our ability to identify a human effect on water vapor.”

This new study links LLNL's “fingerprint” research with its long-standing work in assessing climate model quality. It tackles the general question of how to make best use of the information from a large collection of models, which often perform very differently in reproducing key aspects of present-day climate. This question is not only relevant for “fingerprint” studies of the causes of recent climate change. It is also important because different climate models show different levels of future warming. Scientists and policymakers are now asking whether we should use model quality information to weight these different model projections of future climate change.

“The issue of how we are going to deal with models of very different quality will probably become much more important in the next few years, when we look at the wide range of models that are going to be used in the Fifth Assessment Report of the Intergovernmental Panel on Climate Change,” Santer said.

Other LLNL researchers include Karl Taylor, Peter Gleckler, Celine Bonfils, and Steve Klein. Other scientists contributing to the report include Tim Barnett and David Pierce from the Scripps Institution of Oceanography; Tom Wigley of the National Center for Atmospheric Research; Carl Mears and Frank Wentz of Remote Sensing Systems; Wolfgang Brüggemann of the Universität Hamburg; Nathan Gillett of the Canadian Centre for Climate Modelling and Analysis; Susan Solomon of the National Oceanic and Atmospheric Administration; Peter Stott of the Hadley Centre; and Mike Wehner of Lawrence Berkeley National Laboratory.

Founded in 1952, Lawrence Livermore National Laboratory is a national security laboratory, with a mission to ensure national security and apply science and technology to the important issues of our time. Lawrence Livermore National Laboratory is managed by Lawrence Livermore National Security, LLC for the U.S. Department of Energy's National Nuclear Security Administration.

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

http://www.sciencedaily.com/releases/2009/08/090811091832.htm

Study: 18- To 24-year-old Group More Politically Active, But Not More Knowledgeable

ScienceDaily (Aug. 17, 2009) — A study by three Kansas State University graduate students finds that the 18- to 24-year-old demographic became more politically active during the 2008 U.S. election season through the use of new media, but that the young adults were not necessarily more knowledgeable about politics.

The K-State study examined young adults' media consumption and the effects of new media on their political knowledge and political activism. While the study showed that 18- to 24-year-olds were actively engaging in politics through media such as blogs and YouTube, their involvement did not increase their knowledge.

The K-State researchers conducting the study, all master's students in journalism and mass communications, were Keunyeong Kim, and Sookyong Kim, both from Manhattan, and Chance York, Wamego. William Adams, K-State professor of journalism and mass communications, was the project adviser. The research was presented at the 2009 Association for Education in Journalism and Mass Communication convention.

"Politicians in general are so reliant on political polling, but politicians are not examining how much the voter knows about the issues they're voting on," York said.

The study targeted the 18- to 24-year-old demographic and examined the group's usage of new media. The researchers surveyed more than 160 undergraduate students in February about their use of both traditional media sources, including radio campaign commercials, and new media sources, like blogs, to obtain information about presidential candidates and their campaign issues.

"We were trying to find what information sources 18- to 24-year olds were looking at and how that might have affected their political activism and their level of political knowledge," York said.

The survey's measures for political activism included yes or no questions that dealt with traditional and online forms of political involvement. The traditional methods of activism included volunteering for a presidential candidate's campaign or attending a candidate's rally, while online forms of involvement included checking a presidential candidate's campaign Web site. The measure for political knowledge was similar to a current events quiz with questions like the name of the U.S. secretary of defense.

The survey also measured the demographics of the students, including their political affiliation and ideology and whether they voted in the 2008 election.

"We found that the students were really politically active," York said. "They talked about the campaigns with their friends, and a lot of people got online on a social networking site to talk about the campaigns. Not many wrote blogs, but a considerable amount kept up with blogs."

The study also found that most students were not politically knowledgeable, York said. For instance, many students did not know what Guantanamo Bay was; some said it was a Caribbean resort.

There also was a set of people that were both politically active and knowledgeable, and there was a high correlation between those two variables and voting.

"People who were actually voting were both active and knowledgeable, and that wasn't affected by whether the student was a Democrat or Republican, or liberal or conservative," York said.

Additionally, the study indicated that among the 18- to 24-year-old demographic, the individuals who voted were not the ones using new media to obtain political information.

The researchers also looked at the different types of new media, such as those that would be considered "gatekeepers," where an editorial member controls the flow of knowledge, and "gatewatchers," where information flows more freely.

The study showed that the more people used new media that would be considered "gatewatched," such as blogs, the more likely they were to be politically active -- but not politically knowledgeable. New media that would be "gatekept," such as online news articles, had less of an impact on political activism and no significant effect on political knowledge. Survey respondents' use of traditional media did not play a significant role in their political activism or political knowledge.

York said the study has limitations, particularly since the students were not selected from a random sample.

"What we can't say is that this is true for all 18-to 24-year-olds, and statistically we can't make a significant inference," York said. "However, there is not a lot of research in this area, and so trying to forge out that path is a good start."

Adapted from materials provided by Kansas State University.

http://www.sciencedaily.com/releases/2009/08/090813142420.htm

Family-friendly baby units urged

Neonatal units looking after premature babies need redesigning to put parents at the heart of care, say campaigners.

Parents' needs can get overlooked as the medical needs of the babies are the main priority for staff, Bliss and the National Childbirth Trust (NCT) found.

They are asking health workers to put themselves "in the shoes" of parents.

Part of the problem, they say, is a lack of family-friendly facilities, like designated rooms on units for parents or play areas for siblings.

A survey of UK neonatal units by investigators from the University of Warwick found one in 10 units did not have a parents' sitting room close to clinical areas where the babies were being cared for.

" **While babies are the main priority for health professionals in a neonatal unit, it is extremely important not to forget the needs of parents and the positive impact that they can have on the care of their baby too** "
Bliss chief executive Andy Cole

A quarter of units had no single rooms for babies in which families could care for their newborn while preparing for discharge home.

Few had playrooms or areas for siblings and there were also important gaps in psychosocial support services for parents.

Only half of the units had a parents' group and only a third had a one-to-one parent support scheme.

And few had policies on proven beneficial ways to involve families in care, including opportunities for parents to have skin-to-skin contact with their newborn.

Family-friendly

Parents say they value being given consistent, clear information about the unit and caring for their baby, as well as receiving emotional advice.

Bliss chief executive Andy Cole said: "While babies are the main priority for health professionals in a neonatal unit, it is extremely important not to forget the needs of parents and the positive impact that they can have on the care of their baby too.

"This project highlights the importance of effective communication and support for families and that services both in hospital and at home should take full account of their individual needs at what can be a very uncertain and stressful time.

"Parents must feel confident and supported to provide the best possible care to their vulnerable baby."

Professor David Field, president of the British Association of Perinatal Medicine, said: "This is a very important piece of work in highlighting the needs of parents who have a baby requiring neonatal care.

"These needs are easily forgotten when so much focus is on the baby."

The lottery-funded POPPY Project (Parents of Premature babies Project), run by Bliss, the NCT, the Royal College of Nursing Research and the National Perinatal Epidemiology Unit at Oxford University, will send out a range of materials to help units implement family-centred care.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8194770.stm

Published: 2009/08/11 23:03:46 GMT

Ideas sought for open government

A DIY guide to becoming an MP and a database of the connections between the powerful could soon be created online.

The two ideas are among those being considered by MySociety - a charitable group that helps construct civic tools.

It is looking for ideas for new ideas to enhance its existing sites, entirely new projects or ways to spread the word about the digital democracy group.

Previous competitions have produced a site that automated and logged Freedom of Information (FOI) requests.

Statistics from the Ministry of Justice suggest that the FOI site, WhatDoTheyKnow, is behind 8.5% of the requests received by central government departments.

MySociety also set up the WriteToThem website that helps people get in touch with their MP.

Similar requests for proposals were run in 2003 and 2006 and this time, said MySociety founder Tom Steinberg, it was looking for one big idea to develop.

"The next step will be on a different scale from what we have built before," said Mr Steinberg, "something that might have an order of magnitude more impact or more users."

Those submitting ideas do not need to provide detailed technical specifications, said Mr Steinberg, but the proposal must be possible to build.

All the ideas submitted will be subject to public scrutiny said Mr Steinberg. The comments will help decide which one to build. The judging panel will be comprised of the 30 or so people who keep MySociety and its associated websites running.

Those with good ideas have until 15 September to submit them to MySociety. Early suggestions include Me MP, which would make it easier to stand as an independent in a election, and LittleSis which would plot the social relationships between those in power.

Mr Steinberg said he expected recent events, both political and technological, to influence the ideas sent in.

"We are seeing a world that's being more informed by the existence of social networks," he said.

"We're also in a post MPs' expenses era when transparency has gone, temporarily, from being only of theoretical interest to literally the most contentious issue of the moment."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/technology/8194859.stm

Published: 2009/08/11 14:01:22 GMT

Traces of planet collision found

A Nasa space telescope has found evidence of a high-speed collision between two burgeoning planets orbiting a young star.

Astronomers say the cosmic smash-up is similar to the one that formed our Moon some four billion years ago, when a Mars-sized object crashed into Earth.

In this case, two rocky bodies are thought to have slammed into one another in the last few thousand years.

Details are to be published in the Astrophysical Journal.

The collision involved one object that was at least as big as our Moon and another that was at least as big as Mercury.

The impact destroyed the smaller body, vaporising huge amounts of rock and flinging plumes of hot lava into space.

Infrared detectors on Nasa's Spitzer Space Telescope were able to pick up the signatures of the vaporised rock, along with fragments of hardened lava, known as tektites.

Melted glass

"This collision had to be huge and incredibly high-speed for rock to have been vaporised and melted," said lead author Carey M Lisse of the Johns Hopkins University Applied Physics Laboratory at Laurel in Maryland, US.

"This is a really rare and short-lived event, critical in the formation of Earth-like planets and moons. We're lucky to have witnessed one not long after it happened."

Dr Lisse and his team observed a star called HD 172555, which is about 12 million years old and situated about 100 light-years away in the far southern constellation Pavo (the Peacock).

The astronomers used a spectrograph instrument on Spitzer to look for the fingerprints of chemicals in the spectrum of light from the star.

The researchers identified large amounts of amorphous silica - melted glass.

Silica can be found on Earth in obsidian rocks and tektites.

Obsidian is black, shiny volcanic glass. Tektites are hardened chunks of lava thought to have formed when meteorites hit the Earth.

Large quantities of orbiting silicon monoxide gas were also detected, created when much of the rock was vaporised. In addition, the astronomers found rocky rubble that was probably flung out from the planetary wreck.

The two bodies must have been travelling at a speed of at least 10km/s (about 22,400mph) relative to one other before the collision.

Rocky planets form and grow in size by colliding and sticking together. This process merges their cores and causes some of their surfaces to be shed.

Though things have settled down in the Solar System today, impacts still occur, as was observed last month when a small comet or asteroid struck Jupiter.

"The collision that formed our Moon would have been tremendous, enough to melt the surface of Earth," said co-author Geoff Bryden of Nasa's Jet Propulsion Laboratory (JPL) in Pasadena, California.

"Debris from the collision most likely settled into a disc around Earth that eventually coalesced to make the Moon. This is about the same scale of impact we're seeing with Spitzer."

"We don't know if a moon will form or not, but we know a large rocky body's surface was red hot, warped and melted."

The Spitzer telescope has witnessed the dusty aftermath of large impacts before, but did not find evidence for rock that had been melted and vaporised.

Instead, large amounts of dust, gravel, and boulder-sized rubble were observed, indicating collisions that were slower-paced.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8195467.stm

Published: 2009/08/11 14:31:03 GMT

Simply Irresistible

By: Joan Melcher

A governor leaves the country for a sexual liaison on another continent, saying he's going on a hike, and ignores repeated calls from his chief of staff over the course of several days. It's easy to roll your eyes and ask the heavens, "How did he think he could get away with *that*?"

It turns out the answer is not in the stars, but, yes, Brutus, in ourselves. Mortals not only overestimate our ability to resist temptation, we also tend to miscalculate the amount of temptation we can handle.

Homer was onto it: Odysseus put wax in his shipmate's ears and had himself tied to the ship's mast before being exposed to the Sirens' song.

But humans today may need a sociological study to understand that our abilities to control impulses are not what we think they are and can lead to poor decision-making and a greater likelihood of indulging in impulsive or addictive behavior.

Loran Nordgren, assistant professor of management and organizations at Northwestern University's Kellogg School, recently tackled this issue with two other researchers, Joop van der Pligt and Frank van Harreveld, both of the University of Amsterdam.

Their study, "The Restraint Bias: How the Illusion of Self-Restraint Promotes Impulsive Behavior," to be published in the journal *Psychological Science*, shows a "restraint bias" that causes people to miscalculate the amount of temptation they can handle.
More than that, there's a downward spiral working: Individuals who believe they have a high capacity for impulse control will expose themselves to greater levels of temptation and ultimately exhibit more impulsive behavior. The Greeks had a word for it: hubris.

Lead author Nordgren suggests people should "keep a humble view of their willpower," given that we are not particularly good at anticipating the power of our urges. "Those who are the most confident about

their self-control are the most likely to give into temptation," he said. "The key is simply to avoid any situations where vices and other weaknesses thrive."

The researchers drew on previous studies that have shown people often have difficulty understanding the power of impulsive states, what has been termed the "empathy gap": that individuals in a "cold" state (not experiencing hunger, anger, sexual arousal, etc.) are likely to underestimate how a "hot," impulsive state will influence their behavior.

In four experiments the researchers exposed study participants to fatigue, hunger and smoking temptations. In the hunger experiment, satiated and hungry participants were asked to rank seven snacks and select a snack that they could eat whenever they chose, or return with it one week later. If they returned with the snack, they would be paid four Euros and be allowed to keep the treat.

Results showed satiated subjects believed they had more control over their impulses and often chose a more tempting treat — a favorite or second-favorite snack. This group was least likely to return the snacks. About half the participants returned the snack, but in general those returning had chosen a less tempting snack.

"A system which assumes people will control themselves is going to fall prey to this restraint bias," Nordgren said. "We expose ourselves to more temptation than is wise, and subsequently we have millions of people suffering with obesity, addictions and other unhealthy lifestyles."

Nordgren noted the gap between willpower and understanding of personal foibles is something that relates to more than food and tobacco cravings.

"The recent lending crisis provides an example of how restraint bias plays out in the business world," he said. "There was quite a lot of temptation to cut corners and act shortsightedly and there weren't a lot of guidelines and restraints on people's behavior."

One thing the study might suggest is it's never too late to take a refresher course in the Classics.

http://www.miller-mccune.com/news/simply-irresistible-1421

Why insults are better taken lying down

- 14:22 11 August 2009 by **Ewen Callaway**

If you really must offend someone, wait until they are lying down: people handle anger differently when they're lying on their backs, compared with sitting upright.

University students who heard personal insults while seated exhibited brain activity linked to so-called "approach motivation" – the desire to approach and explore something. This potential urge disappeared when students took their insults lying down, despite their anger remaining.

"In the upright or leaning forward state one might be more likely to attack," says Eddie Harmon-Jones, a cognitive scientist at Texas A&M University in College Station, who led the study. "Maybe in the reclining state you're more likely to brood."

Harmon-Jones worries that MRI studies performed on subjects lying on their backs – which is practically all of them – could miss the neural signatures of certain emotions.

Seeing red

It isn't every study that requires researchers to infuriate their volunteers, and Harmon-Jones and his colleagues have honed their technique over more than decade.

Students are not told that they are participating in an anger study. The researchers instead ask them to pick a hot-button issue, such as abortion or public smoking, and write a brief essay on their stance. Next, they are hooked to an electroencephalograph, which measures electrical pulses created by firing neurons, and told that a person in an adjacent room will evaluate the essay.

This is a ruse, and Harmon-Jones's team play a voice recording of someone disparaging the intelligence, likeability and logical skills of the essayist. "People get angry in response to this kind of feedback," he says.

Chilled out

Volunteers who heard these insults while on their backs felt as angry as volunteers who were seated. But EEG recordings showed that, for the upright volunteers, a brain region called the left prefrontal cortex was more active than its counterpart in the brain's right hemisphere. Other research has linked this lopsided activation to anger and approach motivation.

Volunteers who received their digs while lying down, however, exhibited EEG patterns no different from subjects who got slightly positive reviews, Harmon-Jones says.

He thinks lying down could affect how the brain handles other emotions, such as desire and happiness. The mental shift provoked by lying down may even be strong enough to affect the results of brain-imaging studies performed on people lying on their backs.

Unnatural circumstances

"It's unknown how much of an effect this has, but this study suggests that people should start looking to see if body position is affecting processing in other types of experiments," Harmon-Jones says, noting that most of our decisions are made while we're upright, not lying down.

Peter Bandettini, a brain imager at the National Institute of Mental Health in Bethesda, Maryland, agrees – to a point. "It never occurred to me that body position might influence behavioural or neuronal activity in the context of aggression – but it makes sense," he says. "I do think that this is somewhat specialised to things like aggression or anger."

After all, he says, it's not as if neuroscientists pretend that massive, tunnel-like MRI scanners are exact replicas of regular human environments. "The scanner noise, closed space, and generally very alien context might influence the results of other studies as well," Bandettini adds.

Journal reference: *Psychological Science* (DOI: 10.1111/j.1467-9280.2009.02416.x)

http://www.newscientist.com/article/dn17580-why-insults-are-better-taken-lying-down.html

New exoplanet orbits 'backwards'

By Paul Rincon
Science reporter, BBC News

Astronomers have discovered the first planet that orbits in the opposite direction to the spin of its star.

Planets form out of the same swirling gas cloud that creates a star, so they are expected to orbit in the same direction that the star rotates.

The new planet is thought to have been flung into its "retrograde" orbit by a close encounter with either another planet or with a passing star.

The work has been submitted to the Astrophysical Journal for publication.

Co-author Coel Hellier, from Keele University in Staffordshire, UK, said planets with retrograde orbits were thought to be rare.

"With everything [in the star system] swirling around the same way and the star spinning the same way, you have to do quite a lot to it to make it go in the opposite direction," he told BBC News.

The direction of orbit is known for roughly a dozen exoplanets (planets outside our solar system). This is the only example with a retrograde orbit. All others are prograde; they orbit in the same direction as the spin of their star.

Close encounters

Professor Hellier said a near-collision was probably responsible for this planet's unusual orbit.

"If you have a near-collision, then you'll have a large gravitational slingshot from that interaction," he explained.

"This is the likeliest explanation. But it might be possible you can do it by gradually perturbing the orbit through the influence of a second planet. So far, we haven't found any evidence of a second planet there."

The new object has been named WASP-17b. It is the 17th exoplanet to have been discovered by the Wide Area Search for Planets (WASP) consortium of UK universities.

The gas giant is about twice the size of Jupiter, but has about half the mass. This bloatedness might also be rooted in the close encounter that changed the planet's direction.

WASP-17b was detected using an array of cameras set up to monitor hundreds of thousands of stars.

Astronomers were searching for small dips in light from these stars that occur when a planet passes in front of them. When this happens, the planets are said to transit their parent star.

A team from Geneva Observatory in Switzerland then looked for spectral signs that the star was wobbling due to gravitational tugs from an orbiting planet.

"If you look at how the spectrum of the star changes when the planet transits across it, you can work out which way the planet is travelling," Professor Hellier added.

"That allows you to prove that it's in a retrograde orbit."

The size of the dip in light from the star during the transit allowed astronomers to work out the planet's radius.

To work out how massive it was, they recorded the motion of the star as it was tugged on by the orbiting planet.

Paul.Rincon-INTERNET@bbc.co.uk

Story from BBC NEWS:
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India's water use 'unsustainable'
By Richard Black
Environment correspondent, BBC News website

Parts of India are on track for severe water shortages, according to results from Nasa's gravity satellites.

The Grace mission discovered that in the country's north-west - including Delhi - the water table is falling by about 4cm (1.6 inches) per year.

Writing in the journal Nature, they say rainfall has not changed, and water use is too high, mainly for farming.

The finding is published two days after an Indian government report warning of a potential water crisis.

That report noted that access to water was one of the main factors governing the pace of development in the world's second most populous nation.

" **The situation has to stop today or tomorrow** "
Dr Raj Gupta CIMMYT

About a quarter of India is experiencing drought conditions, as the monsoon rains have been weaker and later than usual.

But weather and climatic factors are not responsible for water depletion in the northwestern states of Rajasthan, Haryana and Punjab, according to the Nasa study.

"We looked at the rainfall record and during this decade, it's relatively steady - there have been some up and down years but generally there's no drought situation, there's no major trend in rainfall," said Matt Rodell, a hydrologist at Nasa's Goddard Space Flight Center near Washington DC.

"So naturally we would expect the groundwater level to stay where it is unless there is an excessive stress due to people pumping too much water, which is what we believe is happening."

State of Grace

The Grace (Gravity Recovery And Climate Experiment) mission uses two satellites flying along the same orbit, one just in front of the other.

Minute differences in the Earth's gravitational pull cause the two craft to shift slightly in their positions relative to one another.

The mission can measure groundwater depletion because the amount of water in aquifers has a small gravitational attraction for the satellites.

Three years ago, Grace scientists noted a loss of water in parts of Africa - but the Indian result is more striking.

"Over the six-year timeframe of this study, about 109 cubic kilometres of water were depleted from this region - more than double the capacity of India's largest reservoir is gone between 2002 and 2008," Dr Rodell told the BBC.

The northwest of India is heavily irrigated; and the Indian government's State of the Environment report, published on Tuesday, noted that irrigation increased rice yields seven-fold in some regions compared to rain-fed fields.

Dr Raj Gupta, a scientist working for the International Maize and Wheat Improvement Center (CIMMYT), said that the current drought would lead to more groundwater extraction.

"Farmers receive no rains so they are pumping a lot more water than the government expected, so the water table will fall further," he said.

"The farmers have to irrigate, and that's why they're pumping more water, mining more water. The situation has to stop today or tomorrow."

Dr Gupta noted that some farmers might be able to switch from rice to crops that demand less water, such as maize or sorghum.

But, he said, that would depend on government policies - which have traditionally promoted rice - and on market demand.

Climate change is likely to be a constraint too, with the area of South Asia suitable for wheat forecast to halve over the next 50 years.

Richard.Black-INTERNET@bbc.co.uk

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Calatrava's $3.2 Billion Hub to Brighten Ground Zero: Interview

Interview by James S. Russell

Aug. 20 (Bloomberg) -- A set of delicate, rib-like columns was recently roofed over in the World Trade Center pit in downtown Manhattan. They are the first visible elements of the new transportation hub, the celebrated $3.2 billion work of architect and engineer Santiago Calatrava. You won't see the dramatic winged entrance hall until at least 2012.

The breathtaking price tag and slow progress at the site have soured many New Yorkers on the station, once the most- admired element of the reconstruction. Calatrava has remained largely mum through it all, but agreed to speak to Bloomberg News about the project from his office in Zurich on the occasion of an exhibition of the project at the Queen Sofia Spanish Institute in Manhattan.

There have been cuts to the project. The iconic wings above the station entrance have been clipped and they will not majestically flap up and down. Skylights over the train platforms have been eliminated. Still, one question is inevitable: How can the project possibly cost $3.2 billion?

"The station itself is a fraction of this cost," said Calatrava. Indeed the Port Authority of New York & New Jersey has swept a great amount of peripheral work into the station project -- including 500,000 square feet of retail -- which may prove far too much. The four-platform expanded station serves the PATH train to New Jersey, but an underground web of pedestrian passages links to streets, subways and buildings in every direction.

Most Complex

"I have designed stations in Zurich, Lisbon, and Lyons," Calatrava said. "And this is the most complex I have done."

That admission surprised me, because Calatrava has designed flowing structures that appear far more complex. They spin steel and concrete into astonishingly delicate fretworks of vaults, arches, braces, cables and ribs. They intersect and overlap like the skeletons of gigantic birds.

Calatrava explained that the most expensive work at Ground Zero is underground and largely invisible: "It was a challenge to make a building that is secure yet very generous."

His first design lacked the fortress quality of much else at the site, but the delicacy did not endure. The ribbed supports of what Calatrava calls the oculus -- the grand oval entrance hall -- are much beefier. All this added heft (plus an additional $591 million in costs) came, Calatrava explained, after the terrorist bombings of Spanish commuter trains in Madrid in 2004 and the London Underground a year later.

Keep It Light

I asked him if this more earthbound and monumental version was an improvement over the elegant lightness that had attracted so many to his first design.

"We put enormous effort into maintaining the lightness and airiness of the structure," he said. "You will enter the oculus and it will be full of light." Next to the very large office towers that will one day rise on the site, Calatrava's winged station entrance looks small, but it stretches nearly a block. Is such a large station grandiose, as critics have claimed?

He said the station was sized for growth. Also, the long, clear sightlines of the large oculus and the shallow undulating vaults above the tracks are essential, Calatrava argued. "The goal of any transportation project is to find your way through the logic of the design and to have as little signage as possible. You are more comfortable when you can sense which movement is the right one. The oculus stretches from the Trade Center station on the No. 1 subway line east to the R and W station. It could not be more clear."

Hanging Escalators

The dramatically suspended escalators that hang at either end of the oculus also aid security, he said, and are easy for people to comprehend.

"Entering and getting down is a very important process. I think it will be a very beautiful experience, to descend from the street, seeing into the subway stations, then turning to a deep perspective into the oculus and beyond to the train mezzanine," Calatrava said. "It took a lot of time to satisfy all the needs there and to clarify very confused circumstances."

September sees the opening of a rail hub in Liege, Belgium, part of Europe's growing high-speed rail network. He's adding to a Frank Lloyd Wright-designed campus in Florida, as well as universities in Rome and Taiwan. He's building a dramatically arched bridge in Dallas.

The most important of those projects, he said, "is Ground Zero." The exhibition continues through Aug. 31 at the Spanish Institute, 684 Park Ave. Information: +1-212-628-0420; http://www.spanishinstitute.org.

(James S. Russell is Bloomberg's U.S. architecture critic. The opinions expressed are his own.) To contact the writer of this column: James S. Russell in New York at jamesrussell@earthlink.net.

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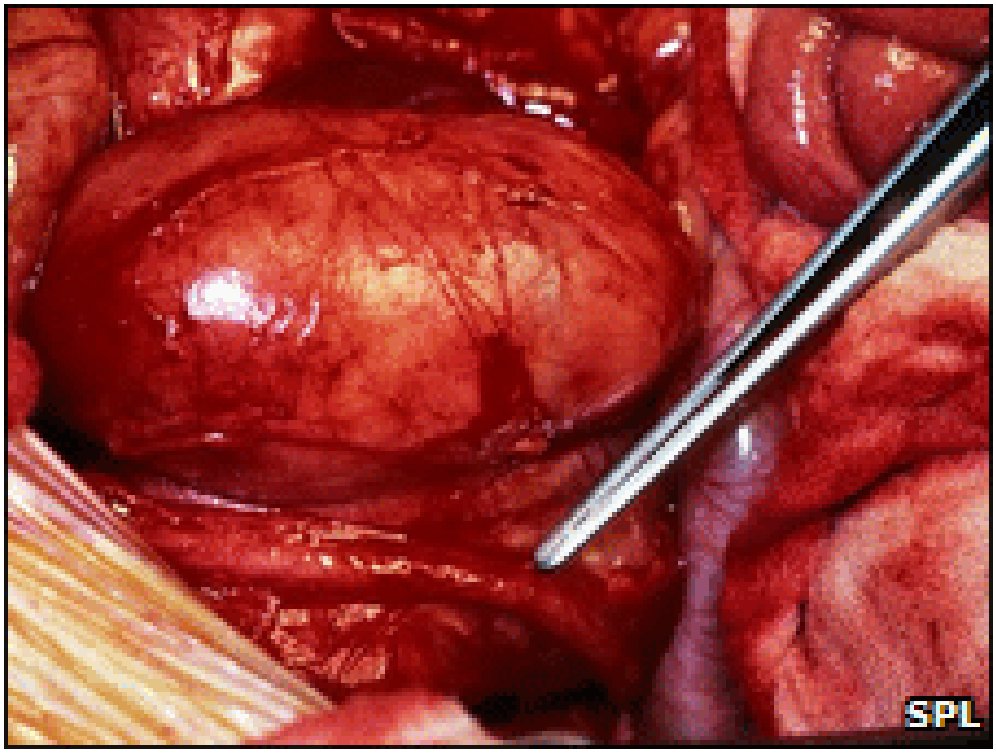
Primary liver cancers 'soaring'

Cases of primary liver cancer, an often preventable disease, have trebled in the last 30 years, figures suggest.



While it is not uncommon for cancer to spread to the liver, Cancer Research UK statistics show incidents where it starts in the organ have risen sharply.

Cases of cancer overall have increased over recent decades as people live longer and detection methods improve.

But experts say hepatitis C infections, as well as alcohol and obesity, have helped fuel the spike in liver cases.

Primary tumours frequently develop as a result of cirrhosis, itself associated with these risk factors.

Hepatitis C is a virus spread by blood-to-blood contact. Prior to 1991, transfusions were the most common source of infection, but since screening was introduced the disease is most commonly spread among intravenous drug users.

Matt Seymour, professor of gastronintestinal cancer at the University of Leeds, said: "We are seeing more patients with cirrhosis and, in turn, more patients with primary liver cancer.

"This is likely to continue. There is a long delay between exposure to the risk factors and the onset of cancer.

"It might take between 20 and 40 years for liver cancer to develop after infection with hepatitis C. So even if new cases of infection stopped, the number of cases would continue to rise for some years."

Screening call

Obesity is now thought to be one of the most common causes of liver disease, while cases of cirrhosis associated with excessive drinking are known to have soared in the UK in recent years.

Caught early enough, some of the damage caused by liver disease can be reversed and the risk of cancer developing reduced.

But many people with hepatitis C do not know they are carrying the virus: estimates suggest that while more than 250,000 people in the UK have been infected, eight out of 10 are unaware.

The five-year survival rate for primary liver cancer is low, and Cancer Research UK says it is currently supporting a number of trials to improve the treatment of the condition.

Imogen Shillito, of the British Liver Trust, said: "We know liver cancer is caused by years of liver damage, often from infection with hepatitis B or C, or regular excessive drinking.

"But there are many interventions that can prevent liver cancer. In particular, if people at risk are screened for hepatitis B or C and are offered effective treatment before liver damage has set in, their risk of liver cancer drops dramatically.

"We want to see the NHS diagnosing and treating liver disease at an early stage to prevent liver cancer developing and save lives."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8210208.stm

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'Green' vaccine for vomiting bug

Scientists say they are ready to begin human testing of a plant-based vaccine for the winter vomiting virus.

The norovirus stomach bug is highly contagious and can rapidly sweep through 'close-knit' environments like hospitals, schools and cruise ships.

Currently there is no vaccine to prevent the million cases that occur each year in the UK alone.

The latest US work from Arizona State University was presented to a meeting of the American Chemical Society.

A number of research teams have been looking at developing a norovirus vaccine.

" **There are several vaccines for norovirus in development but all are probably several years away from being in general use** "
Health Protection Agency spokeswoman

But because noroviruses are continually mutating, much like flu, it is a moving target for vaccine developers and production costs can skyrocket.

According to the Arizona team, using plants to make and grow the vaccines offers an answer to this because the manufacturing process is fast enough to keep pace with the shape-shifting virus.

Lead researcher Dr Charles Arntzen said: "With plant-based vaccines, we can generate the first gram quantities of the drug and do clinical tests within eight to 10 weeks.

"We could easily scale that up for commercial use in a two- to four-month period."

There are cost advantages too relating to vaccine purification and formulation, says Dr Arntzen.

After successful experiments in mice of a candidate vaccine, his team has developed a nasal delivery system for the vaccine that is ready for testing in clinical trials planned for later this year.

The new vaccine was manufactured in a tobacco plant using an engineered plant virus. It contains none of the infectious material of the original virus but is able to trigger the body's immune response to ward off an actual norovirus infection.

A spokeswoman for the Health Protection Agency said: "There are several vaccines for norovirus in development but all are probably several years away from being in general use.

"In the meantime, until one is produced that is effective and safe we recommend strict adherence to the outbreak control measures that exist to stop the virus spreading in hospitals and cruise ships.

"On an individual level, if someone has a norovirus infection they are advised to stay at home and practise good hand hygiene using soap and water to stop the virus from spreading to other members of the household."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8206743.stm

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Autonomous tech 'requires debate'

By Jason Palmer
Science and technology reporter, BBC News

The coming age of lorries that drive themselves or robots that perform surgery is fraught with legal and ethical issues, says a new report.

The Royal Academy of Engineering says that automated freight transport could be on the roads in as few as 10 years.

Also, it says, robotic surgery will begin to need less human intervention.

But it suggests that much debate is needed to address the ethical and legal issues raised by putting responsibility in the hands of machines.

"We're all used to automatic systems - lifts, washing machines. We're talking about levels above that," said Lambert Dopping-Heppenstal of the Academy's engineering ethics working group.

"It's about systems that have some level of self-determination."

Coming era

Issues surrounding autonomous systems and robots with such self-determination have been discussed for a number years, particularly with regard to

.

However, the era of autonomous road vehicles and surgeons is slowly becoming reality, making the issues more urgent, the report says.

The removal of direct control from a car's driver is already happening, with anti-lock braking systems and even automatic parking systems becoming commonplace.

But the next step is moving toward completely driverless road vehicles, which already exist in a number of contexts, including London's Heathrow Airport.

The Darpa Grand Challenge, a contest sponsored by the US defence department's research arm, has driverless cars negotiating traffic and obstacles and obeying traffic rules over courses nearly 100km long.

"Those machines would have passed the California driving test, more than I would have," said Professor Will Stewart, a fellow of the Academy.

"Autonomous vehicles will be safer. One of the compelling arguments for them is that the machine cannot have an argument with its wife; it can run 24 hours a day without getting tired. But it is making decisions on its own."

Professor Stewart and report co-author Chris Elliott remain convinced that autonomous systems will prove, on average, to be better surgeons and better lorry drivers than humans are.

But when they are not, it could lead to a legal morass, they said.

"If a robot surgeon is actually better than a human one, most times you're going to be better off with a robot surgeon," Dr Elliott said. "But occasionally it might do something that a human being would never be so stupid as to do."

Professor Stewart concluded: "It is fundamentally a big issue that we think the public ought to think through before we start trying to imprison a truck."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/technology/8210477.stm

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'Simple' endometriosis test hope

Scientists have developed a quick and simple way to diagnose endometriosis, without requiring surgery.

All that is needed is a small sample of womb lining, taken in a similar way to a smear test, that can be checked for the presence of nerve fibres.

According to the Human Reproduction journal, this can predict with nearly 100% accuracy the condition's presence.

Endometriosis is a common problem where cells that usually line the womb are found elsewhere in the body.

It affects about two million women in the UK, most of whom are diagnosed between the ages of 25 and 40.

As well as causing pain and discomfort, it can also lead to infertility.

" **If other doctors can confirm this test, this might become the standard way of diagnosing endometriosis** "
Professor David Healy

President-elect of the International Federation of Fertility Societies

Conventionally, doctors use laparoscopy to diagnose endometriosis.

This involves the woman being booked into hospital for the invasive "keyhole" surgical procedure carried out under general anaesthetic.

Laparoscopy itself can be associated with complications and can harm a woman's fertility.

In contrast, an endometrial biopsy requires no surgery and is relatively quick and easy to perform in a clinic setting with the woman fully conscious.

Non-invasive test

In a trial involving 99 women with pelvic pain, the test accurately spotted 63 out of 64 cases of endometriosis.

It correctly identified 29 out of the 34 women with no signs of endometriosis upon laparoscopy.

In the remaining six women found to have nerves in their biopsy samples, one had a previous history of endometriosis and another had physical signs that were considered too slight to be endometriosis.

Lead researcher Dr Moamar Al-Jefout of Mu'tah University in Jordan said: "This test is probably as accurate as assessment via laparoscopy, the current gold standard, especially as it is unclear how often endometriosis is overlooked, even by experienced gynaecologists.

"Endometrial biopsy is clearly less invasive than laparoscopy, and this test could help to reduce the current lengthy delay in diagnosis of the condition, as well as allowing more effective planning for formal surgical or long-term medical management."

Professor David Healy, president-elect of the International Federation of Fertility Societies, said the new simple test to diagnose endometriosis was very exciting.

"If other doctors can confirm this test, this might become the standard way of diagnosing endometriosis. This would mean that the condition could be identified earlier, which could give real benefits for infertile women," he said.

Nemone Warner, head of external relations at Endometriosis UK, said women would benefit from earlier diagnosis without the risk of surgical complications.

Mr Chris Mann, gynaecology expert and spokesman for the Endometriosis SHE Trust, said the findings were promising but larger trials were needed to prove the test's worth.

He said it would not replace the role of laparoscopy, which is useful for determining disease severity, but could be a useful addition.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8205769.stm

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Snorkel rice could feed millions
By Sudeep Chand
Science Reporter, BBC News

A new rice plant has been developed which grows "snorkels" when exposed to floods.

A paper in the journal Nature, describes how the plant elongates rapidly in response to being submerged.

One of the scientists, Motoyaki Ashikari from Nagoya University in Japan, said "the impact is huge".

It could also boost the production of rice in Asia and Africa, where up to 40% of crops are subject to flash floods or deep water.

"People cannot plant any crops in the rainy season, because the crops drown and die in the floods," said Mr Ashikari.

Writing in Nature, Laurentius Voesenek describes how the Japanese scientists discovered the "snorkel" genes in flood-tolerant rice, and introduced them to more sensitive high-yield rice.

"Snorkels" grow as hollow tubes from parts of the plant called internodes, preventing it from drowning.

When the floods arrive, the super rice plants can grow up to 25cm per day.

Story from BBC NEWS:
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