Infoteca's E-Journal

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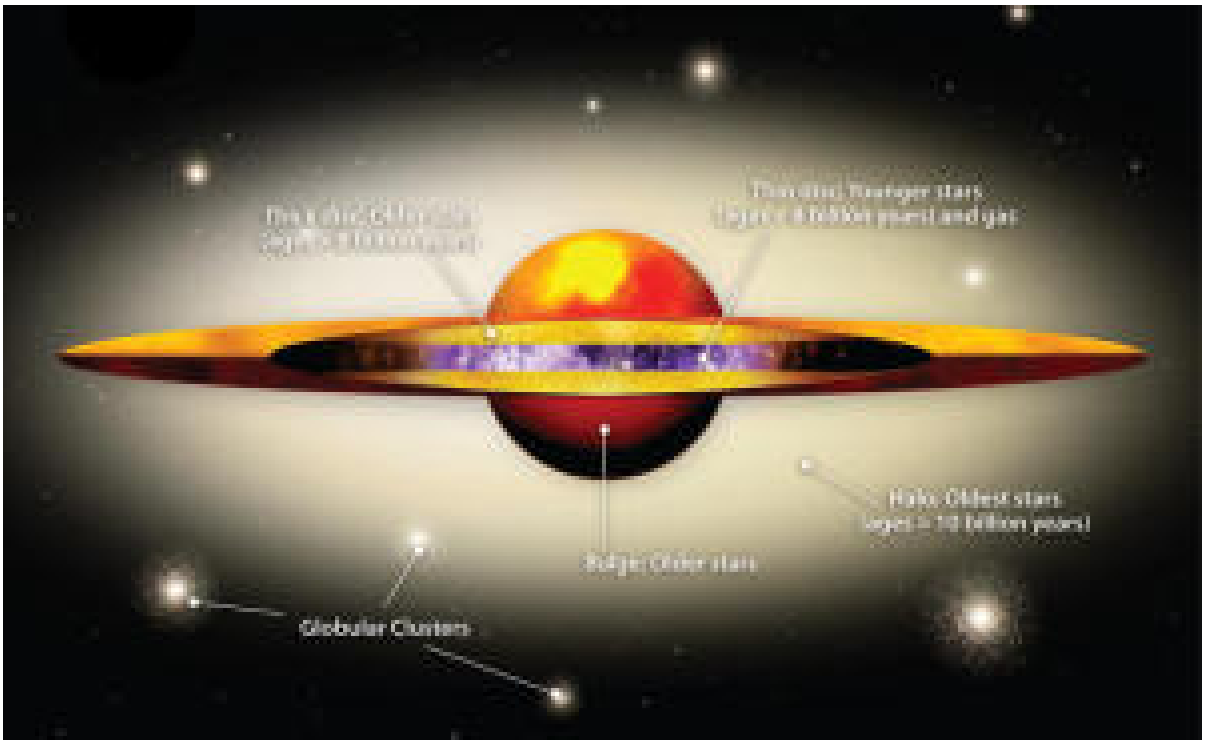
Isolating the Stellar Discs of Andromeda



Schematic representation of a thick disc structure. The thick disc is formed of stars that are typically much older than those in the thin disc, making it an ideal probe of galactic evolution. (Credit: Amanda Smith, IoA graphics officer)

ScienceDaily (Feb. 14, 2011) — A team of astronomers from the UK, the US and Europe have identified a thick stellar disc in the nearby Andromeda galaxy for the first time. The discovery and properties of the thick disc will constrain the dominant physical processes involved in the formation and evolution of large spiral galaxies like our own Milky Way.

By analysing precise measurements of the velocities of individual bright stars within the Andromeda galaxy using the Keck telescope in Hawaii, the team have managed to separate out stars tracing out a thick disc from those comprising the thin disc, and assess how they differ in height, width and chemistry. They publish their results in the journal *Monthly Notices of the Royal Astronomical Society.*

Spiral structure dominates the appearance of large galaxies at the present time, with roughly 70% of all stars contained in a flat stellar disc. The disc structure contains the spiral arms traced by regions of active star formation, and surrounds a central bulge of old stars at the core of the galaxy. "From observations of our own Milky Way and other nearby spirals, we know that these galaxies typically possess two stellar discs, both a 'thin' and a 'thick' disc," explains the leader of the study, Michelle Collins, a PhD student at Cambridge's Institute of Astronomy. The thick disc consists of older stars whose orbits take them along a path that extends both above and below the more regular thin disc.

"The classical thin stellar discs that we typically see in Hubble imaging result from the accretion of gas towards the end of a galaxy's formation," Collins continues, "whereas thick discs are produced in a much earlier phase of the galaxy's life, making them ideal tracers of the processes involved in galactic evolution."

Currently, the formation process of the thick disc is not well understood. Previously, the best hope for comprehending this structure was by studying the thick disc of our own Galaxy, but much of this is obscured from our view. The discovery of a similar thick disk in Andromeda presents a much cleaner view of spiral structure. Andromeda is our nearest large spiral neighbour -- close enough to be visible to the unaided eye -- and can be seen in its entirety from the Milky Way.

Astronomers will be able to determine the properties of the disk across the full extent of the galaxy and look for signatures of the events connected to its formation. It requires a huge amount of energy to stir up a galaxy's stars to form a thick disc component, and theoretical models proposed include accretion of smaller satellite galaxies or more subtle and continuous heating of stars within the galaxy by spiral arms.

"Our initial study of this component already suggests that it is likely older than the thin disc, with a different chemical composition" commented UCLA Astronomer, Mike Rich, "Future more detailed observations should enable us to unravel the formation of the disc system in Andromeda, with the potential to apply this understanding to the formation of spiral galaxies throughout the Universe."

"This result is one of the most exciting to emerge from the larger parent survey of the motions and chemistry of stars in the outskirts of Andromeda," said fellow team member, Dr. Scott Chapman, also at the Institute of Astronomy. "Finding this thick disc has afforded us a unique and spectacular view of the formation of the Andromeda system and will undoubtedly assist in our understanding of this complex process."

Story Source:

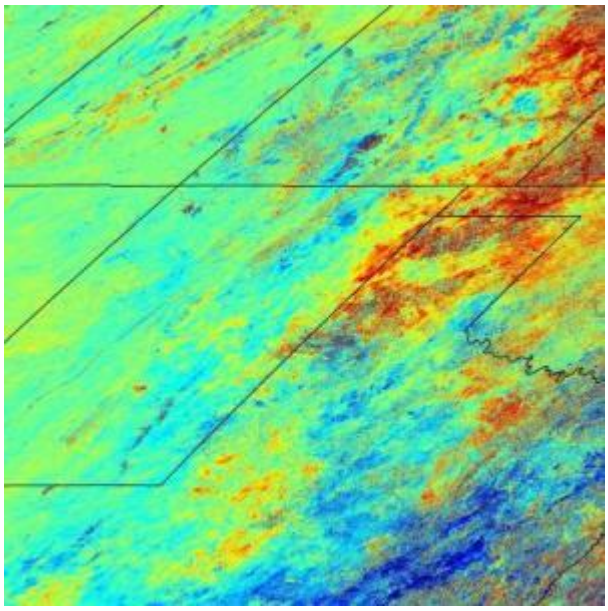
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Royal Astronomical Society (RAS)**.

Journal Reference:

1. Collins M., Chapman S. et al. **The kinematic identification of a thick stellar disc in M31**. *Monthly Notices of the Royal Astronomical Society*, (in press) [link]

http://www.sciencedaily.com/releases/2011/02/110214204052.htm

Monitoring Killer Mice from Space: Green on Satellite Images Warns of Hantavirus Outbreaks



The satellite image shows the change in plant cover -- as measured by the Enhanced Vegetation Index -- in the US Southwest between June 2003 and June 2004. Yellow and red areas had lower green vegetation cover in 2004 relative to 2003. Blue areas had higher green vegetation cover in 2004 relative to 2003. By identifying surges in plant growth using satellite images, University of Utah researchers showed it is possible to forecast subsequent booms in deer mouse populations and a resulting increase in the risk they will transmit the deadly hantavirus to people. The image was made from data from an instrument named MODIS on NASA's Terra satellite. (Credit: Philip Dennison, University of Utah)

ScienceDaily (Feb. 14, 2011) — The risk of deadly hantavirus outbreaks in people can be predicted months ahead of time by using satellite images to monitor surges in vegetation that boost mouse populations, a University of Utah study says. The method also might forecast outbreaks of other rodent-borne illnesses worldwide.

"It's a way to remotely track a disease without having to go out and trap animals all the time," says Denise Dearing, professor of biology at the University of Utah and co-author of the study published online Feb. 16, in the journal *Global Ecology and Biogeography*. "The satellite measures the greenness of the Earth, and we found that greenness predicts deer mouse population density."

While the study focused on hantavirus in deer mice, its findings could help health officials fight other rodent-borne diseases such as rat-bite fever, Lyme disease, bubonic plague, Lassa fever, salmonella infection and various hemorrhagic fevers.

The method was tested on deer mice that carry hantavirus and proliferate when their food supply is abundant, "but it potentially could be applied to any animal that responds to vegetation," says Dearing. "It would have to be calibrated against each specific species of rodent and the disease, but it's really powerful when it's done."

The study combined satellite imagery with data from thousands of mice captured over three years in central Utah. The total number of trapped mice and the number of mice with the disease, a strain of hantavirus known as Sin Nombre virus, both climbed after peaks in greenery.

Sin Nombre virus is carried by rodents, primarily deer mice, in the western United States. In humans, it causes a disease known as hantavirus pulmonary syndrome. It was discovered in 1993 after several young, otherwise healthy people in the Four Corners area of Utah, Colorado, New Mexico and Arizona died of a mysterious respiratory illness. Hantavirus kills 42 percent of its victims and is contracted by inhaling dust containing mouse urine or feces.

Previous studies also have looked for links between satellite images and deer mouse populations, but they used less trapping data and collected it in a single trapping season. The mice in the new study were caught during six trapping seasons in the spring and fall over three years, revealing how the population changed over time.

The study also used several different methods for estimating the amount of fresh vegetation in an area from satellite images, and a goal of the research was to see which measures are the best predictors of mouse populations. Health officials can use such information to see where hantavirus outbreaks are likely to occur.

"The point of this whole exercise is to develop disease-risk maps, which would show the distribution of infected hosts -- in this case, deer mice -- overlaid with human population density," explains Thomas Cova, an author of the study and associate professor of geography at the University of Utah.

"Although the focus of this work is hantavirus in deer mice, it contributes to our broader understanding of how to monitor the spread of infectious diseases from space, which in the long run could save lives," he adds.

Catching Sick Mice

The study was conducted at the University of Utah by Lina Cao, a graduate student in geography, and Philip Dennison, an associate professor of geography, as well as Dearing and Cova. The field data came from an ongoing mouse-trapping project funded by the University of Utah and the National Science Foundation.

Twice a year for the past nine years, scientists from Dearing's lab have traveled to Juab County, Utah to trap deer mice. During each trapping season, they set up 1,728 traps for three consecutive nights; tag each mouse's ear so they can identify mice that are recaptured; record their sex, weight and condition; and draw blood to test whether they are infected with hantavirus.

During the early years, Dearing and her colleagues checked their traps wearing protective gear that looked like space suits, inspiring the nickname "hantanauts."

"We still didn't understand the risk of trapping mice and contracting hantavirus," she says. "We didn't understand the risk to personnel so we took extreme precautions."

Now scientists have a better understanding of how hantavirus is transmitted. Mice get it from other mice, probably through bites, while humans get it by breathing in mouse urine and feces during activities such as sweeping out a garage. Humans can't get it by handling infected mice or even by being bitten, so the "hantanauts" have been able to shed their space suits and check traps unencumbered.

The new study looked at the overall number of captured mice and the number that were infected in the spring and fall of 2004, 2005 and 2006.

Seasonal heavy rains in the U.S. Southwest spur the growth of plants such as juniper, sagebrush and spring-blooming annuals. While deer mice do not feed on such vegetation, they directly depend on it because they eat seeds and plant-eating insects.

The satellite images came from Moderate Resolution Imaging Spectroradiometer (MODIS), a sensor on NASA's Terra satellite. The images of the study site were processed using four different vegetation indices -- mathematical techniques for turning satellite data into plant-cover measurements. Three of the four indices measure green light reflecting from chlorophyll in plants. One measures infrared light absorbed by water in plant leaves. The researchers measured changes in plant cover from 2003 to 2006.

Greenery Blooms, then Mouse Population Booms

The study answered two questions: which vegetation indices are the best predictors of hantavirus risk and how long does it take for that risk to peak after surges in plant growth?

To find the best vegetation indices, the researchers looked for correlations between vegetation and the numbers of trapped and infected mice. To see how long it took for mice to respond, they tested for correlations at various time lags: 0.3 years, 1 year and 1.3 years after the satellite images were taken.

All the vegetation indices were significantly correlated with mouse population. The best predictors of mouse populations were two greenness indices named the Normalized Difference Vegetation Index (NDVI) and the enhanced vegetation index (EVI). For both indices, the strongest correlations were for mouse population booms 1 year and 1.3 years after surges in plant growth stemming from snow and rainfall.

"You can think of it as a kind of air drop of food for the mice," says Cova. "It's rained and suddenly there's just so much food that they're rich. They get fat, population density goes up, and about a year-and-a-half later population peaks."

After vegetation growth spurts, the fraction of mice that carried hantavirus stayed relatively constant, but the absolute number of infected mice increased along with the mouse population. More infected mice mean more opportunities for humans to get sick, so mouse population size indicates risk to humans.

The new study indicates people are at greatest risk of catching hantavirus a little over a year after peaks in plant growth, and it pinpoints the best methods for measuring those peaks. This should allow researchers to create risk maps showing where and when outbreaks are likely to occur.

Cova says 2004 and 2005 were really wet years. The vegetation indices showed lots of plant growth in those years, and the number of mice peaked the year after that. Later, the mouse food ran out and their population crashed. The results are consistent with earlier findings showing an increase in hantavirus infections the year after the heavy rains of the 1991-92 El Nino, a quasi-periodic climate pattern characterized by abnormal warming of eastern Pacific waters and increased rains in the U.S. Southwest.

Story Source:

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

http://www.sciencedaily.com/releases/2011/02/110215081740.htm

Lavender Oil Has Potent Antifungal Effect

These are Lavendula viridis plants. (Credit: Mónica Zuzarte)

ScienceDaily (Feb. 14, 2011) — Lavender oil could be used to combat the increasing incidence of antifungal-resistant infections, according to a study published in the *Journal of Medical Microbiology*. The essential oil shows a potent antifungal effect against strains of fungi responsible for common skin and nail infections.

Scientists from the University of Coimbra in Portugal distilled lavender oil from the Lavandula viridis L'Hér shrub that grows in southern Portugal. The oil was tested against a range of pathogenic fungi and was found to be lethal to a range of skin-pathogenic strains, known as dermatophytes, as well as various species of Candida.

Dermatophytes cause infections of the skin, hair and nails as they use the keratin within these tissues to obtain nutrients. They are responsible for conditions such as Athletes' foot, ringworm and can also lead to scalp and nail infections. Candida species coexist with most healthy individuals without causing problems but may cause mucocutaneous candidosis -- or thrush -- in some people. In immunocompromised patients, Candida species are able to cause serious infection if the fungal cells escape into the blood stream.

Currently, there are relatively few types of antifungal drugs to treat infections and those that are available often have side effects. Professor Lígia Salgueiro and Professor Eugénia Pinto who led this study explained why novel fungicides are urgently needed. "In the last few years there has been an increase in the incidence of fungal diseases, particularly among immunocompromised patients," they said. "Unfortunately there is also

increasing resistance to antifungal drugs. Research by our group and others has shown that essential oils may be cheap, efficient alternatives that have minimal side effects."

Essential oils distilled from the Lavandula genus of lavender plants are already used widely, particularly in the food, perfume and cosmetic industries. Studies of the biological activities of these oils suggest Lavandula oils have sedative and antispasmodic properties as well being potent antimicrobials and antioxidants.

This group has demonstrated that these oils work by destroying fungal cells by damaging the cell membrane. They believe that further research into the mechanisms by which this essential oil works could have significant clinical benefits. "Lavandula oil shows wide-spectrum antifungal activity and is highly potent. This is a good starting point for developing this oil for clinical use to manage fungal infections. What is now required is clinical trials to evaluate how our in vitro work translates in vivo," said Professor Salgueiro.

Story Source:

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

http://www.sciencedaily.com/releases/2011/02/110214201842.htm

J. D. Salinger's Love and Squalor

By JAY McINERNEY

J. D. SALINGER

A Life

By Kenneth Slawenski

Illustrated. 450 pp. Random House. $27.

J. D. Salinger spent the first third of his life trying to get noticed and the rest of it trying to disappear. He would have hated "J. D. Salinger: A Life," Kenneth Slawenski's reverent new biography, which comes to us just a year after the writer's death and creditably unearths and aggregates the facts and reads them into the fiction — reanimating the corpse without quite making it sing.

If you really want to hear about it, what's missing — and this is not necessarily Slawenski's fault — is Salinger's voice. I was tempted to say his inimitable voice, but of course it's been imitated more often than that of any American writer, except possibly Salinger's pal Hemingway, infiltrating the language of our literature and refertilizing the American vernacular from which it sprang.

Slawenski is handicapped in part by the legacy of Ian Hamilton, author of "In Search of J. D. Salinger" (1988). As Slawenski recounts, after being

stonewalled by Salinger and his small, tight circle of friends, Hamilton tracked down a great deal of unpublished correspondence and quoted extensively from Salinger's letters and books. When a galley of the book reached Salinger, he called in the lawyers and demanded that Random House remove quotations of unpublished letters from the text. The initial district court ruling in favor of Random House and Hamilton was overturned on appeal — with major repercussions for American copyright law and with the immediate result that Hamilton was forced to paraphrase the letters he'd relied so heavily on. Slawenski is muzzled by that 1987 ruling and also by his fastidious interpretation of fair-use copyright law in regard to quoting from the fiction, limiting himself pretty much to short phrases. The bulk of the book was written when the litigious Salinger was still alive, but I can't help wondering if his heirs might have proved a little more relaxed about quotation. Margaret Salinger's memoir, "Dream Catcher" (2000), to which Slawenski is heavily indebted, quotes great swatches of the prose, but she may have presumed that even J. D. Salinger was loath to sue his own daughter.

The most comprehensive biography to date has been Paul Alexander's "Salinger" (1999), which was sympathetic but far from hagiographic. Slawenski is a fan, not to say a fanatic. For seven years he's run a Web site called Dead Caulfields, and in a maudlin introduction he reports on his anguish upon learning of his subject's death. "The news stared me down from my in-box through the starkest, most ugly of headers. It read: Rest in Peace J. D. Salinger. . . . Impossibly, I fumbled for a sentiment that would match the man." Readers looking for a balanced assessment may be inclined to stop here, where the page is virtually damp. Thankfully, the tone of the book itself is generally more measured.

Slawenski seems to have uncovered the facts of Salinger's lineage, about which the writer and his sister were in doubt. His mother, Miriam, née Marie Jillich, was born in a small town in Iowa of German and Irish stock. Her fair skin and red hair seem to have given credence to the widely circulated idea that she was an Irish immigrant, which is what Salinger told his daughter. Marie changed her name to Miriam, after the sister of Moses, not long after she married Solomon Salinger, who managed a theater in Chicago before moving to New York to work as an importer of European meats and cheeses.

Jerome David Salinger was born in New York City in 1919 and grew up in increasing prosperity in a nonsecular household that "celebrated both Christmas and Passover." (Although, according to Margaret's memoir, he celebrated his bar mitzvah shortly before learning he was only half Jewish.) In 1932, the family moved from the Upper West Side to the decidedly gentile Park Avenue, to the rambling apartment that would become the Glass family home in "Franny and Zooey." Young Sonny, as he was known, went to camp, attended the McBurney School on the West Side before being expelled for poor grades, and eventually went to Valley Forge Military Academy, which years later transmogrified into Pencey Prep, the unhappy backdrop of Holden Caulfield's adolescence. Slawenski judges that Salinger himself, after a rocky start, seems to have thrived at Valley Forge. Though not insensitive to the ubiquitous anti-Semitism in the period in which Salinger grew up — an era when most Ivy League colleges had strict quotas limiting the number of Jews — the author reveals no overt instances of it in the young Salinger's life, although his sister, Doris, told her niece, "I think he suffered terribly from anti-Semitism when he went away to military school."

Salinger's education after that was desultory: a semester at New York University and yet another at Ursinus, a small college in Pennsylvania. It was only when he enrolled in a short-story writing class at Columbia in 1939 that he found his calling under the tutelage of Whit Burnett, founder and editor of Story magazine. Salinger's first published story, "The Young Folks," appeared in Story shortly after his 21st birthday. Set at a young adult party in Manhattan, it's a sketch more than a story, but Salinger's deft use of dialogue and mastery of idiomatic speech are already on display.

Jerry, as he was now called, decided to embark on a literary career instead of re-enrolling at Columbia, but his early triumph was followed by a string of rejections. Still, he found representation with Harold Ober Associates, the literary agency that also represented his idol, F. Scott Fitzgerald. (While Hemingway, whom he would later meet and correspond with, was an obvious influence, Salinger always held the author of "Gatsby" in higher regard. "I was crazy about 'The Great Gatsby,' " Holden says. "Old Gatsby. Old sport. That killed me.")

Even as he struggled to find his voice, Salinger enjoyed social success with a fashionable group of debutantes that included Eugene O'Neill's daughter, Oona, who was 16 when she met the 22-year-old Salinger. Apparently, it wasn't her mind that captivated him. "She was a blank," the daughter of a friend of Salinger's said, "but she was stunning in her beauty." Unfortunately, Slawenski, lacking the specifics, reaches for clichés: "Catering to Oona's flamboyant tastes, he paraded down Fifth Avenue with her, dined at fine restaurants he could barely afford and spent evenings sipping cocktails at the glamorous Stork Club, where they socialized with movie stars and high-society celebrities in an atmosphere that must have made Salinger cringe." Which restaurants? Did they really socialize with movie stars, or just share the room with them? What was said? The speculative, conditional mode of the last phrase indicates just how little we know. Slawenski's brief sketch of Salinger's postwar adventures in Greenwich Village is similarly hackneyed; his associates are labeled "trendy artist types" and "in-vogue intellectuals."

In October 1941, Salinger got the news that The New Yorker, which he'd been deluging with submissions, had accepted his story "Slight Rebellion Off Madison." The story marked the debut of Holden Caulfield, although it's told in the third person rather than in the intimate first person of "The Catcher in the Rye."

Before The New Yorker published the story, the Japanese bombed Pearl Harbor, after which the editors judged Holden and his whining about the Madison Avenue bus to be out of tune with the new public mood and suspended publication of "Slight Rebellion" indefinitely.

For this reader, the great achievement of Slawenski's biography is its evocation of the horror of Salinger's wartime experience. Despite Salinger's reticence, Slawenski admirably retraces his movements and recreates the savage battles, the grueling marches and frozen bivouacs of Salinger's war. It's hard to think of an American writer who had more combat experience. He landed on Utah Beach on D-Day. Slawenski reports that of the 3,080 members of Salinger's regiment who landed with him on June 6, 1944, only 1,130 survived three weeks later. Then, when the 12th Infantry Regiment tried to take the swampy, labyrinthine Hürtgen Forest, in what proved to be a huge military blunder, the statistics were even more horrific. After reinforcement, "of the original 3,080 regimental soldiers who went into Hürtgen, only 563 were left." Salinger escaped the deadly quagmire of Hürtgen just in time to fight in the Battle of the Bulge, and shortly thereafter, in 1945, participated in the liberation of Dachau. "You could live a lifetime," he later told his daughter, "and never really get the smell of burning flesh out of your nose."

That July he checked himself into a hospital for treatment of what we would now recognize as post-traumatic stress disorder. In a letter to Hemingway, whom he'd met at the Ritz bar shortly after the liberation of Paris, he wrote that he'd been "in an almost constant state of despondency." He would later allude to that experience in "For Esmé — With Love and Squalor." Readers are left to imagine the horrors between the time that Sergeant X, stationed in Devon, England, meets Esmé and her brother, Charles, two war orphans, and the time that Esmé's letter reaches him in Bavaria a year later, after he has suffered a nervous breakdown.

It seems remarkable that this deeply ambitious writer, who continued to send stories to Ober from foxholes, chose not to write about his combat experience when he clearly had the material for a European-campaign version of "The Naked and the Dead." From another angle — Slawenski sees it this way — his avoidance of the most dramatic material of his life suggests post-traumatic stress disorder.

Salinger did write several stories about the war years, at least two of which could stand alongside those he eventually collected in "Nine Stories." But with one exception, they took place on the home front, as is the case with "Last Day of the Last Furlough" and "The Stranger," with its haunting echoes of Fitzgerald. Listen to Babe Gladwaller, home from the war, examining a pile of records:

"His mind began to hear the old Bakewell Howard's rough, fine horn playing. Then he began to hear the music of the unrecoverable years . . . when all the dead boys in the 12th Regiment had been living and cutting in on other dead boys on lost dance floors: the years when no one who could dance worth a damn had ever heard of Cherbourg or St.-Lô, or Hürtgen Forest or Luxembourg."

Only "A Boy in France," a meditative story about a soldier's attempt to find a dry foxhole in which to sleep, takes place on the front lines, and Salinger chose not to reprint it. Slawenski claims that "through his writings, he sought answers to the questions that his service experiences had exposed, questions of life and death, of God, of what we are to each other." Perhaps, though this list of concerns applies to any number of writers who never fired a shot in anger.

The war hovers in the background of "A Perfect Day for Bananafish," published in The New Yorker in January 1948, after Salinger spent a year revising it with the help of William Maxwell. After passing a day on the beach at a Florida hotel chatting with a bratty young girl and avoiding his wife, Seymour Glass blows his brains out with a pistol. The story opens with a conversation between Seymour's wife, Muriel, and her mother, during which it is suggested that Seymour's behavior has become erratic since he returned from the war. The precision of observation and the ear for dialogue are masterly; the ending is as abrupt as a car crash. Readers who aren't baffled tend to attribute Seymour's suicide to his wartime trauma — although there's also a school of thought that blames his horrible wife.

On the basis of that story Salinger was offered a "first look" contract with The New Yorker, although his relationship with the magazine's editors under Harold Ross was difficult. They rejected several of his stories before publishing "For Esmé," the most hopeful and affirmative of his early stories, which elicited a raft of fan mail from readers. Also rejected was "The Catcher in the Rye," which Salinger had completed in the fall of 1950, some nine years after Holden Caulfield was born in "Slight Rebellion." In his letter, Gus Lobrano, Salinger's editor, complained of "writer-consciousness." The intimate, idiomatic, self-conscious first-person narrative of "Catcher," many degrees warmer than the cool Flaubertian mode of his early New Yorker short stories, didn't fit the magazine's standards of literary decorum.

When "The Catcher in the Rye" was published by Little, Brown in 1951, the critical and popular reception was more favorable, although the reviews were much more mixed than Slawenski would have us believe. It was praised as "unusually brilliant" in The New York Times and soon appeared on the Times best-seller list, where it would remain for seven months. William Faulkner was a big fan. Despite its immediate success, its enormous impact on the culture was gradual and inexorable. Several years before Elvis or James Dean came along — let alone the Beats or the Beatles — Salinger practically invented teenage angst. Like Mark Twain, whom he mimicked in the opening line of "The Catcher in the Rye," he injected a new slangy, colloquial tone into our literature. Like Huck, Holden would become an adolescent American icon.

In 1974, John Updike remarked, "J. D. Salinger wrote a masterpiece, 'The Catcher in the Rye,' recommending that readers who enjoy a book call up the author; then he spent his next 20 years avoiding the telephone." But even before publication, Salinger was showing signs of the mania for privacy that would make him still more famous. He demanded his photograph be removed from the back jacket and decamped for England to avoid the hubbub of publication. There is ample testimony here that he was fiercely private, not to say paranoid, long before celebrity engulfed him. Though Slawenski never quite pronounces the diagnosis, it seems clear he suffered from clinical depression. Slawenski also offers a theoretical justification for his desire for privacy: his devotion to the Buddhist principle of transcending the ego. Shortly after his return to New York from the war, Salinger became absorbed in the study of Zen Buddhism and Catholic

mysticism; later his interest would shift to Vedanta, “a form of Eastern philosophy centered on the Hindu Vedas.” His religious interests would profoundly color his life and his fiction after “Catcher.” (While Slawenski tends to see his religious pursuits evolving systematically, Margaret portrays him as a fickle cultist flitting from one spiritual fad to the next.)

“After ‘The Catcher in the Rye,’ ” Slawenski proposes, “the aim of Salinger’s ambition shifted and he devoted himself to crafting fiction embedded with religion, stories that exposed the spiritual emptiness inherent in American society.” Slawenski gives sympathetic readings of “Franny and Zooey,” Salinger’s inaugural Glass family chronicles, with their curious amalgam of Christian and Eastern religious notes, in light of Salinger’s evolving beliefs.

Whereas Holden had railed against phonies, Zooey Glass tells his sister Franny, who has suffered some sort of mental collapse, that even the terrible Professor Tupper is “Christ himself.” Everyone is Christ — and, as in Buddhism, all is one. Maybe, although many of us believe that fiction is properly concerned with manyness, the particularities of identity, which Salinger once told his daughter are all Maya, or illusion. Despite its mysticism, “Franny and Zooey” was hugely popular when it was published in 1961, although critics, including Joan Didion and Updike, generally felt that Salinger, besotted with his self-contained, self-satisfied Glass family, was disappearing up his own omphalos. This was an impression that the final book-length installment of the Glass family chronicles, “Raise High the Roof Beam, Carpenters and Seymour — an Introduction,” did nothing to dispel. Even the deeply sympathetic Slawenski seems disappointed by “Hapworth 16, 1924,” the interminable story that filled most of the June 19, 1965, New Yorker. Taking the form of an impossibly precocious letter from summer camp by 7-year-old Seymour Glass, it was Salinger’s last published work.

Slawenski devotes a few short chapters to the last half of Salinger’s life, his self-imposed silent exile in Cornish, N.H. A girlfriend of mine who met him in the Dartmouth library in the mid-’70s and subsequently had lunch with him told me that he talked mainly about his macrobiotic diet, holistic medicine and his garden. After he divorced Claire Douglas, his second wife, who was just 16 when they started dating, he conducted several affairs with young women, notably 18-year-old Joyce Maynard, whose memoir about her months in Cornish enraged the faithful and tended to confirm the suspicion that one would rather read Salinger than meet him. Salinger always told friends he was still writing, and it’s possible there’s a trove of unpublished stories and novels, although readers of “Hapworth,” in which he seems to be talking to himself rather than to fans of “The Catcher in the Rye,” may wonder whether they wish to see it. “J. D. Salinger: A Life” leaves this and many other questions hanging. Though Slawenski adds to the record, Paul Alexander’s biography is, to my mind, more dramatically vivid and psychologically astute.

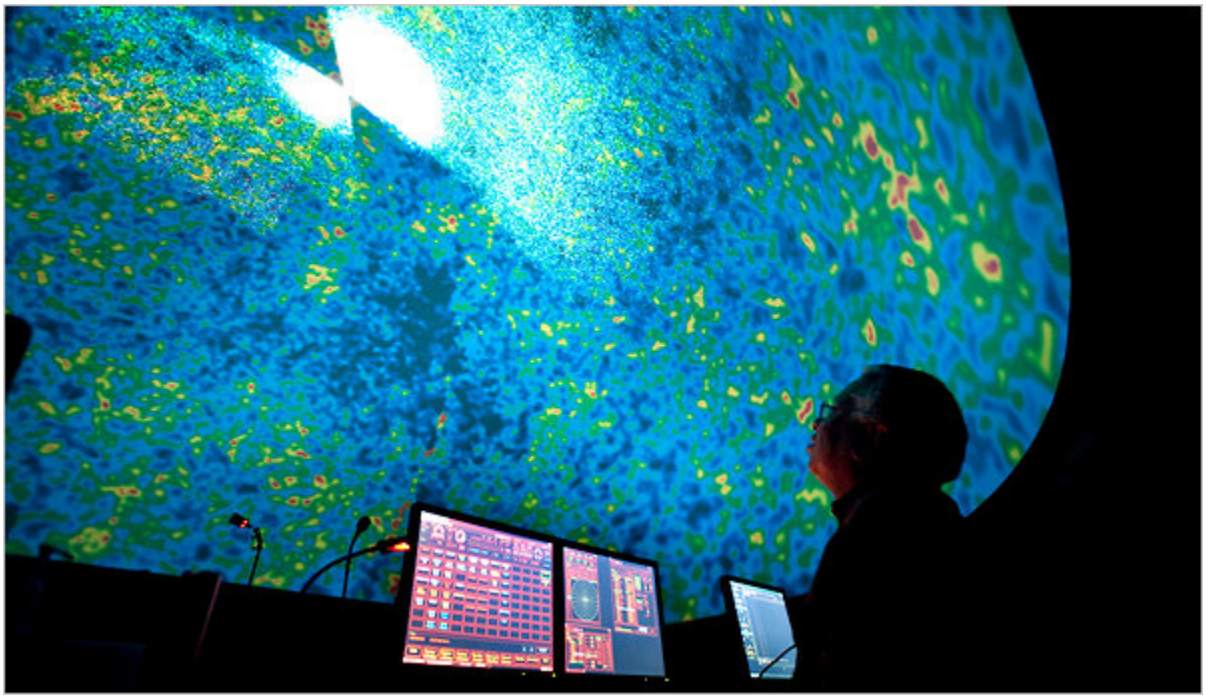
There will probably never be a definitive biography of Salinger, but our understanding will be modified by the actions of his executors and the release of unpublished material in the coming years. For the moment, at least, Holden’s creator might take some satisfaction in knowing the extent to which his efforts to erase his own story have succeeded.

Jay McInerney is the author of seven novels. His most recent book is “How It Ended: New and Collected Stories.”

http://www.nytimes.com/2011/02/13/books/review/McInerney-t.html?_r=1&nl=books&emc=booksupdateema1

Head in the Stars, Feet on the Ground

By EDWARD ROTHSTEIN



Gretchen Ertl for The New York Times

At the Charles Hayden Planetarium, Darryl Davis, the planetarium systems coordinator, with an image representing the known universe.

BOSTON — Gazing upward I can see the skylines of Cambridge and Boston on the horizon as twilight falls. In the growing hush of full darkness, more than 9,000 stars appear, with so many gradations of intensity that binoculars can reveal more detail than the naked eye. And as I lean back in cushioned comfort, I am gradually swept off into the heavens.

That is the sensation offered by the newly renovated Charles Hayden Planetarium, which opened on Sunday at the Museum of Science here, after a $9 million yearlong reconstruction, its new equipment, software and 57-foot dome promising to take the next generation to the stars.

It is easy to lose one's balance in the vastness of space, and over the last 15 years as planetariums around the country have revamped their systems and shows to take advantage of the latest in digital technology and the most refined fiber-optic projectors from Zeiss (the same company that outfitted the first modern planetarium in Germany in 1923), many times the moorings have come loose. The domes have been used to stage fantastical free-for-all shows of cinematic effects, including dinosaurs, cartoonish tubes of warped space and sub-woofer grumblings.

But Boston's planetarium, whose director is David Rabkin, is remarkable, particularly in its first show, "Undiscovered Worlds: The Search Beyond Our Sun," for never forgetting that we begin to make sense of the ethereal by keeping our feet on the ground. The pre-show presentation really does begin, as those at the old

Hayden Planetarium in New York once did, with the local skyline lining the dome at twilight. Charles Hayden (1870-1937), a financier and philanthropist, made the New York planetarium possible with a donation; the foundation established by his will donated the money for Boston's version, which opened in 1958.

Though the Hayden in Boston is now billed as "the most technologically advanced digital theater in New England," it does not pursue thrills for their own sake, or with some exaggerated notion of what is required to lure media-sodden children into space.

The show, instead, begins with a firm sense of place. And as it surveys the discovery of planets beyond our solar system, the old human-centered cosmos is never completely left behind: it actually motivates and guides the odyssey.

In a way, that motivation is even the subject of "Undiscovered Worlds," which was written by Alan Lightman, who teaches humanities at the Massachusetts Institute of Technology, along with the planetarium staff. The search for other planetary systems in the cosmos is, after all, a quest for heavenly bodies that resemble our own. So in 1995, when the first planet outside our solar system is found orbiting the star 51 Pegasi, it is described as a "monumental discovery," even though it is hardly a candidate for extraterrestrial life. It revolves so rapidly around its sun that its year lasts four Earth days, and its surface temperature is 2,000 degrees Fahrenheit.

With advances in instrumentation and measurement, hundreds of other planets have been discovered since. "We always assumed that other solar systems would resemble our own," we are told, as these newly found heavenly bodies, their details imagined in full color, fill the skies above our heads. We assumed "that planets would orbit a star in tidy circles, with inner planets smaller and made of rock and outer ones larger and made of gas."

"We were wrong," we learn. Almost all planets found so far have been at least as large as our Jupiter, but much closer to their suns than Mercury is to ours — phenomena unaccounted for by contemporary theories of the solar system. And it wasn't until 2009 that a planet was discovered that, like Earth, is mostly made of rock. (Just this month The New York Times reported the possible discovery of over 1,200 smaller planets.)

But held out to us is the tantalizing possibility of finding a planet that might be Earth-like enough so we can begin to imagine creatures bearing some resemblance to ourselves. We are even shown the hypothetical surface of such a planet, with lapping waves and lush plant life (their leaves black to absorb the full range of light offered in this galaxy far, far away). The entire journey, though, has been grounded in scientific principle rather than fantasy; it is careful while still being exotic.

The planetarium here doesn't have the advantage of a separate building (as in New York or Chicago) or an exquisite setting (as in Los Angeles), so the temptation must have been great to do something more: to create extravagant spectacles, perhaps, at least as flamboyant as the Imax theater across the museum's corridor. So the Hayden's more poised approach must have arisen out of philosophical or educational concerns, which are also reflected in the introductory exhibition leading into the planetarium, "Cosmic Light."

It provides a basic understanding of the planets by connecting them with ordinary earthly experience. On Mars, for example, we learn, the year is 1.9 Earth years in length, that a 200-pound person would weigh just 75 pounds, and that if you drove to the Sun at 60 m.p.h., it would take 270 years.

More could have been done with this exhibition, but the planetarium's approach is clear: We begin to imagine the cosmos from where we stand. This is not as common an approach as it should be.

One example of a planetarium with a similar perspective is the Griffith Observatory in Los Angeles, which reopened after renovations in 2006. Its Art Deco building inspires a remarkable retro-sensibility in the planetarium show. A live presenter enters the dark theater holding an illuminated globe, speaking of the "ancient mystery of the night sky" with such appeal that later we are prepared to go outside in the evening air and look for ourselves.

Something like that is possible here too. One Hayden show, "The Sky Tonight," offers a human-led tour of the earthly heavens. And beginning in March the Gilliland Observatory, erected on the top level of the museum's parking lot, will have its seasonal opening; visitors will be able to use its 11-inch telescope to view some of the same phenomena shown on the planetarium's dome.

There is also a technological aspect to the Hayden's interaction between earthly perspective and cosmic speculation, as I learned from speaking with Darryl Davis, the systems coordinator for the planetarium. The Zeiss projector, which sets the standard for star configurations on domed ceilings, can only replicate the heavens as seen from Earth. In its earlier incarnations, it looked like a giant barbell; here the Zeiss Starmaster (as it is called) is egg shaped and compact, but its star displays are still geocentric. It can show the sky from different earthly locations and from different eras, but it is still our sky and only our sky.

In a way the Zeiss is pre-Copernican; it makes the Earth the center of the cosmos. Its advantage though is that it is extraordinarily precise, and can give a sense of the night sky unmatched by any other kind of projection, so subtly detailed that binoculars really can be used to discern what the eye cannot.

But step off Earth's surface, as almost all planetarium shows now do, and the Zeiss images on the dome must give way to those of another projection system (here using Sky-Skan's DigitalSky 2 software). It draws on enormous databases of information about planets, stars and galaxies. Mr. Davis moves a cursor on a computer-screen grid and clicks on "Go to Jupiter." Above, the domed sky whirls about, and we catapult through space until the planet with its famous surface storms appears.

He clicks on other controls and the planet spins. We approach Jupiter's surface, map out the orbits of its moons and project their names. The stars here are not the pin pricks of precise illumination produced by the Zeiss, but are more hazy, calculated points, showing the heavens from another part of space.

Mr. Davis, comfortable navigating around the known universe, hands me the controls. I've never commanded this model starship, though, and I zoom in so fast on Saturn that I crash through it, until I learn to slide the cursor along the correct axis. I glide past the rings and go into gentle orbit, as another control speeds up the passing of time. And all the while, my feet are firmly on the ground — a good way to begin to see the stars.

The Charles Hayden Planetarium is at the Museum of Science in Boston; www.mos.org.

http://www.nytimes.com/2011/02/15/arts/design/15planetarium.html?ref=design

A Life of Melting the Status Quo

By HILARIE M. SHEETS

Beatrice de Gea for The New York Times

The artist Lynda Benglis, in her studio turned office at 222 Bowery, is the subject of a retrospective at the New Museum.

LYNDA BENGLIS has gone her own way since first taking on the New York art world in the 1960s. She one-upped Jackson Pollock's action paintings in the late 1960s by pouring pools of swirling pigmented latex directly on the floor and obscuring the distinction between painting and sculpture. She challenged the rigidity of Minimalism in the early '70s with her hardened flows of polyurethane careening off walls and bristling with allusions to the body and landscape. She lampooned both the machismo of the art world and the way artists were expected to promote themselves in a market-driven system by exposing herself, with a dildo between her legs, in a 1974 Artforum advertisement that she paid for, earning her as many fans as detractors.

With bravado and humor she has carried her ideas to logical extremes, in a way that's been hugely influential to a younger generation interested in everything from performance to process-oriented art. The photographer Cindy Sherman has described her college-age encounter with the Artforum ad, in all its audacity, as "one of the most pivotal moments of my career."

Laura Hoptman, a curator at the Museum of Modern Art, who contributed to the catalog accompanying the four-decade retrospective of Ms. Benglis's work that opened last week at the New Museum on the Lower East Side of Manhattan, said: "There's nobody like Lynda. There's a streak of independence that takes her outside the crowd, be it posing naked in the Artforum ad or putting sparkles on her work at the moment the austerity of Minimalism was raging." Her rebelliousness has been at least as evident in her formal experimentation over the years as in that one outrageous gesture.

"She set herself up a project early on, which was to explore materials, whether metal or polyurethane or rubber or glitter, and to test the boundaries of abstract sculpture," Ms. Hoptman said. "She's been doing that till now."

These days Ms. Benglis, 69, moves between homes in Santa Fe, N.M.; East Hampton, N.Y.; New York City; Greece (where her father's family is from); and India (home of her life partner, Anand Sarabhai). Ms. Benglis was warm and garrulous on a recent afternoon at the New York studio turned office that she's had since the 1970s at 222 Bowery, a building inhabited over the years by Mark Rothko and William Burroughs, among others. Frequently lying back on her daybed, she referred to the space around her, packed with old works, as a "marker of time" and recalled giving Burroughs a wide berth when passing on the stairs. "I didn't want to cross him," she said.

Born in Lake Charles, La., where her father had a building-materials business, Ms. Benglis moved to New York in 1964 after studying painting and ceramics at Newcomb College, the women's college at Tulane University in New Orleans.

The New York art world was smaller then, and early on she met artists including Barnett Newman, Andy Warhol and David Hockney. Ms. Benglis has been both a witness to and a catalyst for changes in the artistic climate of New York, particularly the primacy of Minimalism.

"To me it was so closed and systematic that it had nothing to do with art, really," she said. She adopted the vast scale and industrial materials favored by Minimalists like Donald Judd and Carl Andre, but let her colorful latex pouring allude to bodily gestures, fluids and topographies, and harden into a kind of skin.

The largest of these works is "Contraband," streaming for almost 40 feet. It has been added to the New Museum version of the exhibition, on view through June 19, which made previous stops in the Netherlands, Ireland, France and at the Rhode Island School of Design in Providence. Ms. Benglis originally made the piece for the 1969 show "Anti-Illusion" at the Whitney Museum. She then withdrew it from the show after the curators expressed discomfort with juxtaposing the Day-Glo palette of her piece with monochrome works by Richard Serra and Robert Ryman.

It can evoke a view of Earth from a great distance ("We were just in space at the time, looking back at ourselves from the Moon," she said) or the unnerving beauty of many toxic spills. (Contraband was also the name of the Louisiana bayou where the oil slicks were.) Almost four decades after the public controversy aroused by her removal of the work, the Whitney acquired it for its permanent collection.

Another addition to the United States leg of the show is "Phantom," one of six environments that Ms. Benglis made in 1971 at sites around the country. For each show she affixed armatures of chicken wire covered in plastic to a wall and poured buckets of vibrantly colored polyurethane foam over them. Once the material hardened, she removed the armatures, leaving forms evocative of lava flows, monstrous crustaceans and petrified tsunamis cascading into the exhibition space.

For "Phantom," at Kansas State University, the only one of the installations to have survived, she added phosphorescent salts to the pigments. The five cantilevered limbs of the piece have been reassembled at the New Museum in a darkened room, where the radiant forms simultaneously seem to be rising and falling.

Ms. Benglis recalled that the critic Robert Pincus-Witten dismissed these works at the time as theatrical. "I said, 'What's wrong with that?' " Her garishly ornamented work of the 1970s poked fun at what she considered puritanical aesthetic and feminist theories, but it also embraced her roots. Her love of decoration and bodily flamboyance was part of the culture of Mardi Gras that she grew up with.

"All those things I wore — masks, costumes — later influenced my ideas as I began to think of painting as a skin," said Ms. Benglis, who made a series of giant heads cast directly from Mardi Gras floats in the late 1970s. The fun houses of her childhood, where she rode little trains and things popped out from the dark, played into her conception of "Phantom."

While she said she was pleased that "Phantom" has survived, she sees it as a relic of the time. "To me it seemed the most direct way of doing what I felt I had to do, given the context of the thinking that was going on," she said. Through the decades, as "theatrical" ceased to be a pejorative in the art world, Ms. Benglis continued to bring a visceral quality to her experimentations with glass, video, metals, ceramics, gold leaf, paper and plastics.

Today, she said, she is most excited about her work with fountains, including "North South East West," installed in the gardens of the Irish Museum of Modern Art in Dublin in tandem with a version of the traveling retrospective that opened there in 2009. It revives the form of a swelling wave cast in bronze that she used for her first fountain, made for the 1984 World's Fair in New Orleans.

For Dublin she made bronze waves oriented in four directions that seemed directed inward, with real water spurting from the center and dripping over the frozen primordial forms. "There was something spooky about it in that Irish setting," she said. "You feel the grayness, the winds, the sea and nature everywhere."

Judith Tannenbaum, who organized the retrospective for the Rhode Island School of Design, said she felt that the directness of Ms. Benglis's work has been far reaching. "She's not a performance artist, but her active making of the work is somehow still apparent in it," she said. "That's been really influential on a generation."

While Ms. Hoptman said she would never term the artist popular, her impact on contemporary art is unquestionable. "Anybody who is using that bodily biomorphism is Benglis," she said. "Anybody who is being very out with her sexuality is Benglis. The world turned, and Lynda is still here and still avant-garde."

http://www.nytimes.com/2011/02/13/arts/design/13benglis.html?ref=design

The Met's Plans for Virtual Expansion

By RANDY KENNEDY

Robert Caplin for The New York Times

Thomas P. Campbell, director of the Metropolitan Museum of Art, seeks to take it in new digital directions.

As Thomas P. Campbell begins his third year at the helm of the cultural ocean liner known as the Metropolitan Museum of Art, he hears fewer comparisons between himself and his illustrious predecessor Philippe de Montebello, who served as director for 31 years.

But the game of "Would Philippe Have ...?" remains irresistible at times, as it was in December, when Mr. Campbell seemed to be everywhere at Art Basel Miami Beach, the contemporary-art bacchanal that Mr. de Montebello virtually ignored. Or when Mr. Campbell, at a recent lunch with reporters, referred to the Met's show of renowned guitars as a "teenager's wet dream." (The description, though probably apt, was next to impossible to imagine coming out of Mr. de Montebello's mouth.)

The difference was certainly evident in a recent interview in the director's office, where Mr. de Montebello used to preside with baronial aplomb behind his desk. Mr. Campbell instead pulled up a chair around a conference table and talked with boyish enthusiasm not just about art but also about the kinds of things that increasingly accompany it in 21st-century museums. The Met has created its first app, to accompany the guitar show. It is embarking on the daunting task of wiring its huge building for Wi-Fi, he said, so that patrons will eventually be able to read and watch videos about art museumwide on their phones and tablet computers. And it is venturing as never before into the rapidly evolving field of what museum administrators call "visitor engagement": a social science aimed at trying to reach every patron, from the first-timer to the seasoned scholar.

Such ambitions for the Met might not sound revolutionary, especially after the kinds of grand expansions and acquisitions that more than doubled the museum's size during the de Montebello years, leaving little room for his successor to start putting his stamp on the place.

But in two wide-ranging interviews over the last month Mr. Campbell said that he did not see it that way and that he viewed the museum's next frontier to be less physical than philosophical and virtual: a change in the Met's tone and public face, making it a more open and understandable museum, largely by thoroughly rethinking the way it uses technology.

"It's not sexy and glamorous, like building a new wing," he said, "but I think it's a fundamental part of our responsibility to our audience."

And if the plans come together in the way he said he hoped, the effect might indeed change the Met in fundamental ways. For much of its 140-year existence, the museum's philosophy about attracting and accommodating visitors has been a variation on the "Field of Dreams" mantra: We are the Met, so they will come (and they will be awed).

They did, and they were. But Mr. Campbell, 49, who was raised in Britain and who has spent 15 years at the museum as a tapestry specialist, said he thought that in maintaining its standards, the Met had too often failed to reach out to less knowledgeable visitors.

"We have to recognize that a great many of our visitors don't know their way around and they don't know much about art," he said

Trying to open up art museums to the broadest possible audience while maintaining standards can be a tricky balancing act — one that large institutions like the Brooklyn Museum and the Victoria and Albert in London have struggled with as they introduce more technology to galleries and use more entertaining approaches to attract visitors. But the task is one that confronts almost all art museums now as they compete against pop culture and try to foster a new generation of museumgoers.

Mr. Campbell said that technology, which the Met has embraced only slowly, is one of the best ways to bridge those kinds of gaps without sacrificing any of the seriousness or ambition of the museum's exhibitions and collections. He describes it as a way to "demystify the museum through digital means."

Now that huge amounts of information can be delivered to hand-held wireless devices, the museum will be able to do so at many levels of sophistication. Several different tours of a gallery or exhibition — tailored for neophytes and specialists, young students and frequent museum patrons — can be made available at a tap of a screen. And text, narration and images can be conveyed unobtrusively to those who want it.

The worry, of course, is rooms filled with people in "head-down as opposed to head-up mode," Mr. Campbell said, but he added that he believed that the museum could "still keep the spotlight on the objects," even as it caters "with much greater sensitivity to different audiences."

Trying to get a better picture of those audiences, Mr. Campbell recently brought in Bonnie Pitman, the director of the Dallas Museum of Art, considered a leader in the field of visitor engagement — she classifies museum patrons as either "observers, participants, independents or enthusiasts" — to talk to his staff.

But it is much easier said than done to change the feel of a museum whose size and complexity can make even small course deviations the work of years.

"The Met is an absolutely astounding museum, but it is a better museum for people who already know something about art and have a familiarity with the place, which can be intimidating," said Ford Bell, president of the American Association of Museums in Washington. "They face a big challenge trying to address that because of their sheer size and complexity. Smaller museums can try these things out much more quickly."

Mr. Campbell said that as far as the Met could determine, the museum had never even had a numbered gallery system to help people find their way around, a basic visitor-friendly feature of many large museums. "It's kind of bizarre," he added. (Wall signs and a new map with numbers will be introduced by spring.)

The Met is essentially a compound of 21 connected buildings, many with thick walls that will make building a Wi-Fi network an expensive job. The museum has only recently consolidated its decentralized technology operations into a single digital-media department, which will report to Mr. Campbell. It has been working for many months now to revamp its Web site, which will relaunch in the summer, and the departments of the museum are on their way to meeting an early mandate of Mr. Campbell's to ensure that an online record exists for every object in the collection — more than 1.6 million of them. (The Met's research has found that 40 percent of the people who come to the museum have first visited the Web site.)

And Mr. Campbell has championed the creation of a new audio-and-slide-show feature on the museum's Web site called "Connections," which brings curators and other staff members out from behind the curtains in a way the museum has never quite done before. A video producer talks about his Tennessee childhood and art that reminds him of it. An educator discusses her feelings about the color black. George Goldner, the curator of drawings and prints, and Melanie Holcomb, a curator of medieval art, have a frank conversation about the museum's responsibilities when showing religious art.

Mr. Goldner said he agreed willingly to the Web project, a new experience for him. "I can't tell you everybody's enthusiastic about it," he said, "but there are always people who aren't enthusiastic about something." Mr. Campbell is said to be widely liked by the museum's trustees and curators, though there are some lingering resentments among staff members who had backed other candidates for his job. Curators describe his leadership style as being much like his personality — that of a diffident, deliberative Briton who preaches hard work and dislikes drama and grandstanding.

"I have found that in certain ways Tom is more resolute than Philippe was," said Mr. Goldner, who supported Mr. Campbell's candidacy for director. "Philippe could be very instinctual — which is not to say that many of the instincts weren't brilliant — and then he would sometimes retrench a little. Tom is a very analytical person by nature. Once he gets his point of view, he's less likely to turn around."

Every few weeks, Mr. Campbell said, he invites his predecessor to lunch or breakfast, and Mr. de Montebello, who now teaches at New York University, mostly refrains from offering advice.

"He doesn't exactly ask me for advice," Mr. de Montebello said. "We talk about our wives and children. He says, 'Here's what I'm doing.' And sometimes I say, 'I would have done that the same way.' "

Most of Mr. Campbell's waking hours are now consumed by the museum. "My exercise is often just moving around this table," he said, pointing to the locus of the back-to-back meetings that cram his schedule. But he is not complaining about having one of the world's most coveted cultural jobs, he said, reaching for another metaphor that the previous occupant of the office probably would not have:

"It's like being in a video game sometimes. It certainly keeps you concentrating."

http://www.nytimes.com/2011/02/12/arts/design/12campbell.html?ref=design

When Picasso Changed His Tune

By HOLLAND COTTER

Marilynn K. Yee/The New York Times

"Still Life With Guitar" is the centerpiece of MoMA's new exhibition about Picasso's Cubist revolution, just before World War I

It's 1912, and Pablo Picasso is in Paris, thinking: All right, what's next?

A few years earlier he painted a killer picture, "Les Demoiselles d'Avignon." People had thrown up their hands in alarm; his friends hardly knew what to say. Energized by the fuss, he punched out variations on the theme: paintings of sharp-elbowed, wood-brown nude women, their bodies all ax-cut facets, set in pockets of shallow space.

He'd changed history with this work. He'd replaced the benign ideal of the Classical nude with a new race of sexually armed and dangerous beings. He'd made art as much a problem as a pleasure. At the same time he left fundamentals unchanged. The human figure remained sovereign, abstraction unexplored. Painting was still a reflection of the world we knew, not an alternative reality with laws of its own.

So there were further leaps to take. And Picasso had to ask himself how far he was willing to go.

Quite far, it turned out, and exactly how far is the subject of "Picasso: Guitars 1912-1914," a subtly buzzing manifesto of an exhibition that opens Sunday at the Museum of Modern Art. It's made up of 70 smallish, thematically related objects borrowed from hither and yon: paintings, drawings, collages and combinations thereof, along with two renowned sculptures, one seen complete for the first time since it left Picasso's studio after his death.

Piece by piece it's entrancing. Taken as a whole it's a record of a brief but intense revolution that generated some of the most challenging ideas in modern art.

By 1912, inspired by his friend Georges Braque, Picasso turned his attention away from figures to still lifes. And the two men, working side by side — "like roped mountain climbers," in Braque's words — developed what would come to be called Cubism.

Cubism was, initially, far less a style (though it became that) than a way of rethinking art's place in the world. To some artists at the beginning of the 20th century that place felt uncertain. Photography's recording eye had made realist painting redundant. At the same time, with old social, scientific, religious and political certainties giving way, the very definition of reality was up for grabs.

What kind of art could find a foothold on this shifting ground? An art that rethought its relationship to "real." On the one hand, this art would plug itself into the everyday world (as opposed to the academy); on the other, it would create a world of its own, one that embraced constant experimentation but that also remodeled and repurposed existing traditions.

This is the kind of thinking Picasso and Braque were doing in that original Cubist moment. Given the complexities they were juggling, it's a wonder they didn't either short-circuit or get lost in some byway and lose momentum. But they didn't. "Above all we were very concentrated," Braque later wrote. And in MoMA's Picasso show, where Braque is invisible but ever present, you can see that.

One obvious way they streamlined their task was by narrowing their inventory of still-life elements: wine glasses, bottles, coffee cups and musical instruments — violins and guitars — in different combinations, and that's about it. All of these things were commonly found in the cheap bars and cafes where artists congregated to get warm when their studios got cold. So Cubism was already claiming a reality of its own, one that was part of the everyday world, but not.

In the earliest work in the show Picasso is still clinging to his identity as a painter, an identity that, in the traditional art-media hierarchy — a hierarchy that Cubism set out to collapse — ranked highest. An elaborate composition of sliced-up objects and tipsy stacked planes titled "Bottle, Guitar, and Pipe," from the fall of 1912, it has the earmarks of a dense collage, right down to a bit of cut-and-paste-style text and faint shadows showing between the stacked planes. But the shadows and text are brushed on. The whole thing is oil on canvas. Soon, though, Picasso is expanding his formal repertory. "Guitar, Sheet Music, and Glass," from later in the fall of 1912, is a collage, made from cut newspaper, sheet music and faux-wood paper. A pasted-in drawing is the only exercise in studio skills. The patterns of the faux-wood paper are hand painted, but probably not by Picasso.

And in a particularly snazzy collage called "Guitar," dated March 31, 1913, there's no paint at all. Pictorial realism, with its artificial mirroring of nature, is absent. What's left is Cubist realness: stuff glued to other funky stuff. There's a ghost of the shape of a guitar in there somewhere, all cut up, but no volume, no depth, no effort to refer to any outside reality for validation. In pieces like this Picasso seems to favor intriguing shapes over cohesive forms, the way his friend Gertrude Stein privileged sound over sense in "Tender Buttons," which was written the year before this collage was made.

Today, nearly a century on, it's hard to grasp how disturbing such work was to some at the time. More than just an example of bad-boy high jinks, it was perceived as a slap in the face to beauty, idealism and decorum, proof of European culture on the slide.

People got angry. When the Parisian arts journal Les Soirées de Paris ran a photograph of one of Picasso's sculptural guitars constructed from paperboard and string, furious letters came in; subscriptions were

canceled. That sculpture is the centerpiece of this MoMA show. Picasso made it in Paris sometime in the fall or winter of 1912. About the size of a real guitar, it now looks achingly fragile and was, of course, never playable. And it embodies many of the aesthetic questions that Cubism raised:

What's real? And why is one version of real better than another? What's "high," what's "low"? What makes durable worthier than ephemeral? What makes an object art, and an idea not? Precisely because it evokes such ideas, the paperboard guitar, along with a later sheet-metal version of it, also in the show, was one of the most influential sculptures of the 20th century. Picasso seems to have valued it highly. He photographed it in 1912 and a few years later disassembled and packed it away. Despite requests, he didn't exhibit it during his lifetime. He left it to MoMA at his death, in 1973.

In 2005 an art historian at the University of Pennsylvania, Christine Poggi, inquired whether the sculpture, as MoMA had exhibited it, was missing a component, a round slice of cardboard that had originally formed a "tabletop" on which the guitar had rested. A search of museum storage was undertaken. The tabletop, cut from a cardboard box, was located and put in place.

Plans to display the restored sculpture supplied the pretext for a larger show. Its organizers — Anne Umland, a curator in the department of painting and sculpture, and Blair Hartzell, a curatorial assistant — really ran with the idea. They put together an exceptional ensemble of works that are wonderful and rare — will we ever again lay eyes on the privately owned 1913 "Bar Table With Guitar," a paper collage held together entirely with pins? — and that give a vivid sense of the degree to which Picasso stretched himself during two watershed years.

He didn't have an easy time. He was a born figure painter, and it must have been a punishment to try to stick to Braque's still-life diet, and he didn't entirely. The body keeps turning up in Picasso's Cubism, with guitars morphing into torsos and violins into heads.

And though he traveled far, he had his limits. He never made the great free-fall from representation into abstraction. He came awfully close in the little 1913 collage "Head," on loan from the Scottish National Gallery of Modern Art in Edinburgh. And he might have gone all the way had he not added — was it a last-minute touch? — a pencil-dot eye to the simple arrangement of a white cone on a dark base. As for Cubism, at least in its early form, it was shot down by World War I. By the time that horror ended, no one wanted to hear about the instability of reality, or the relativism of values, aesthetic or otherwise. Which isn't to say that Cubism died. As a style, it flourished, but that's another story.

And after 1914 Picasso embarked on a new story, or rather picked up an old one. He went back to the figure, in Ingres-like portraits, chiton-clad maidens and fleshy, somnolent Rubenesque nudes, who seem to know nothing at all about the race of erotic warriors he had introduced years before, or about the startling little worlds-within-the-world collages, so audacious and so delicate, that survive from the Cubist revolution, which was Picasso's very finest hour.

Picasso: Guitars 1912-1914

WHEN AND WHERE Sunday through June 6. Museum of Modern Art.

MORE INFO (212) 708-9400, moma.org.

"Picasso: Guitars 1912-1914" is on view from Sunday to June 6 at the Museum of Modern Art; (212) 708-9400; moma.org.

http://www.nytimes.com/2011/02/11/arts/design/11picasso.html?ref=design

Workers at Rest: Smoking and Playing Cards

By KAREN ROSENBERG

Samuel Courtauld Trust, The Courtauld Gallery, London

Metropolitan Museum of Art "Cézanne's Card Players" features the artist's family gardener and a farm worker

"Cézanne's Card Players," at the Metropolitan Museum of Art, sounds like a show for our high-stakes moment. But the real appeal of this mini-blockbuster is its modest vision of a rural pastime, rendered with infinite patience. The big players who dominate the art world today would have a hard time identifying with Cézanne's peasants and laborers: men quietly passing the time, happy enough with the hand that life has dealt them.

With his series of "Card Players," Cézanne reclaimed — and transformed — an activity from 17th-century genre painting. He dispensed with the sermonizing implicit in most earlier images of card playing, replacing sloppy-drunk gamblers with sober, stone-faced tradesmen. Yet he stopped short of portraiture, keeping his subjects — who were also his employees — at a socially appropriate distance.

"Today everything is changing, but not for me," Cézanne said. "I live in my hometown, and I rediscover the past in the faces of people my age." He found at least two such faces close at hand, on his family's estate outside Aix-en-Provence: those of the gardener Paulin Paulet and the farm worker Père Alexandre.

At the Met these rugged characters appear again and again in the paintings and in numerous individual figure studies. Yet we never really get to know them; they remain "types," as defined by their leisure activities — card playing, smoking — as they are by their métiers, their work.

In that sense the "Card Players," which all date from the 1890s, romanticize agrarian Provençal culture and reaffirm centuries-old French social hierarchies. They're the product of an isolated man in his 50s, living and working on his family estate hundreds of miles away from an uproarious Paris. But it's impossible to ignore the paintings' overtures to Modernism: their patchy surfaces, compressed spaces and figurative liberties, which have moved Léger and Jeff Wall, among others, to pay tribute.

"Cézanne's Card Players" was organized by the Met in conjunction with the Courtauld Gallery in London, where it appeared last fall. The Met's version of the show has fewer major works, even without accounting for the absence of "The Smoker," from the Hermitage in St. Petersburg; a recent legal dispute has prevented that painting from traveling to the United States. Two important versions of the "Card Players"— the Barnes Foundation's large one, which never travels, and a smaller canvas from a private collection — are here only in reproduction. But the Met's incomplete deck is still deeply engrossing.

The Met curator Gary Tinterow has fleshed out the show with a small gallery of works from the museum's collection that typify the card-playing and smoking genres. These include 17th-century Dutch and Flemish etchings of jolly taverngoers, politically incisive 19th-century cartoons by Daumier, and Manet's print of a philosophical-looking smoker.

The players in most of these works are prone to greed, lust or acts of violence — sometimes all three. An etching after Caravaggio's "Cardsharps" carries an inscription from Horace: "That game indeed gives rise to restless strife and anger."

Cézanne had clearly studied images like this one; he called his "Card Players" "souvenirs of the museums." But he managed to separate the motif from its attendant morality.

Wine? In Cézanne's paintings there's sometimes a bottle on the table, but no glasses. Women? Not a one. And gambling? We don't see any money changing hands. Nor do we have any sense of who's winning or losing.

Much wall text is devoted to the curatorial parlor game of sequencing the paintings in the series; new research indicates that Cézanne worked on the four- and five-figure groupings first, then moved on to the two-player compositions.

More intriguing, to the nonexpert, is Cézanne's way of shuffling the cards: making individual studies and then assembling them on canvas, in various permutations. This explains the curious lack of interaction between the players — "a kind of collective solitaire," in the words of the critic Meyer Schapiro.

The alienation is most pronounced in the Barnes painting, but it's apparent enough in the Met's version. The table seems hardly big enough to accommodate the three broad-shouldered men, yet each is absorbed in his hand. A fourth, standing, waits his turn.

The mood is more intense, and the dynamic a bit less stable, in the two-player groupings on the opposite wall. (One hails from the Musée d'Orsay, the other from the Courtauld.) The peasants, seated on opposite sides of a

table, mirror each other's gestures; a wine bottle divides the scene neatly in half. But the scene, though exquisitely balanced, isn't symmetrical; the table is slightly askew, and you can tell from the men's shoulders — one pair thin and rounded, the other broad and square — that they would not be well matched in a fight.

The angular physique belongs to the gardener, Paulet, recognizable from several studies. The other man, with the pipe and the more Gallic profile, also appears on paper but hasn't been conclusively identified. Both, along with Père Alexandre, return in a final and phenomenal gallery of single-figure paintings.

Here smoking, not card playing, is the main activity. You can almost smell the tobacco in "Man With a Pipe," with its proto-Giacometti, nicotine-stained palette, and "The Smoker" (from the Kunsthalle Mannheim, the only one of three "Smokers" to have made the trip). Looking at the able-bodied yet vacant-eyed figure of Paulet, in the riveting "Smoker," you sense that Cézanne needed his subjects to be as absorbed in their leisure as he was in his work.

It's strange, then, that the young peasant in another standout painting — from a private collection — isn't smoking or playing cards or doing anything at all. His eyes are downcast but expressive, shaded with anxiety or exhaustion. Here Cézanne comes close to portraiture. Otherwise, he is a master of the poker face.

"Cézanne's Card Players" continues through May 8 at the Metropolitan Museum of Art; (212) 535-7710, metmuseum.org.

http://www.nytimes.com/2011/02/11/arts/design/11cezanne.html?ref=design

It's the Craftsman, Not the Singer or the Song

By KEN JOHNSON

Scott Chinery Collection, Archtop History, Inc.

A guitar made by James D'Aquisto

"Guitar Heroes," an exceptionally interesting exhibition at the Metropolitan Museum of Art, has nothing to do with the video game that enables nonmusicians to imagine themselves playing like rock stars. The heroes here are three craftsmen known for producing some of the most sought-after jazz guitars of the last seven decades: John D'Angelico (1905-1964), James D'Aquisto (1935-95) and John Monteleone (born 1947).

Organized by Jayson Kerr Dobney, a curator in the Met's musical instruments department, this exhibition of about 100 instruments comes in two parts. The first presents a history of Italian luthiers, from string instrument makers in 17th-century Naples to Italian immigrants producing guitars and mandolins in New York in the late 19th and early 20th centuries.

Part 2 presents lovingly made guitars and mandolins dating from 1923 to 2008, made by inheritors of that tradition, D'Angelico, D'Aquisto and Mr. Monteleone.

Among the lutes, mandolins and violins in the show's premodern section, the oldest object resembling a guitar was made in Venice between 1630 and 1650. Its narrow, hourglass body is lavishly decorated, its spruce top inlaid with ivory hearts and, around the sound hole, an intricately patterned ring of bone is engraved with leaping hares and dogs.

More plain but more appealing to modern taste is the Rawlins (1700), one of only four guitars known to have been made by Antonio Stradivari, the famous violinmaker. Fancy or simple? That is still the question of the modern luthier.

The archtop, the specialty of the show's three modern stars, was invented in the early 1890s by Orville Gibson, founder of the Gibson Guitar Corporation. With its convex back and front, it had a bigger sound than the flattop guitar, so it could hold its own as an unamplified rhythm instrument in jazz bands.

D'Angelico's first archtop was a nearly exact copy of the Gibson L5, then popular. Compare the 1928 Gibson and D'Angelico's 1932 version in the exhibition, both with traditional sunburst tops, and you notice slight changes: D'Angelico's has a double rather than a single line of white celluloid around the top's edge and a pick guard, whose straight and curved outline reflects Art Deco taste.

D'Angelico's signature model, the New Yorker, is a classic of Art Deco design. It has a mother-of-pearl profile of the ziggurat architecture of the New Yorker Hotel inlaid in its headstock (the part at the end of the neck with the tuning pegs), and the steps, curves and cut-out triangles of the brass tailpiece to which the strings attach are in a style you might call Aztec Moderne. It is very cool.

An excellent Web site for the show (blog.metmuseum.org/guitarheroes) is loaded with information and offers audio and video recordings of musicians like Django Reinhardt, Chet Atkins, George Benson and others playing instruments in the exhibition. You can view and listen to performances and interviews on your own or with the museum's handheld devices, too.

As a teenager in the early 1950s, D'Aquisto began hanging out at D'Angelico's shop on Kenmare Street in Little Italy, and by the early 1960s was doing most of the work there. After his mentor's death, D'Aquisto continued to produce New Yorkers but with his own name emblazoned on the headstock. Eventually he began making guitars according to his own taste and philosophy. Believing that fewer parts made for better sound and durability, he eliminated plastic ornament and tended to a more simplified aesthetic.

Among the most beautiful D'Aquistos in the exhibition is one he made for Paul Simon in 1975. With its mother-of-pearl inlay, the headstock is still florid, but the body, whose sunburst top fades from burnt orange to cherry, is free of nonfunctional decoration. Its nearly round sound hole, substituting for the twin f-holes of the conventional archtop, and its streamlined, ebony pick guard, bridge and tailpiece add to its sumptuous spareness.

D'Aquisto experimented with colored stains, as in a blue sunburst model commissioned by the guitar collector Scott Chinery, whose Blue Collection consists of almost two dozen blue guitars made by the world's best archtop makers.

But D'Aquisto's approach was more like a sculptor's than like a painter's, as he focused on tweaking the three-dimensional forms of the instrument's basic elements.

Mr. Monteleone, who befriended and learned from D'Aquisto in the '80s, also has a sculptor's attitude, but is willing to add elements that exceed strictly functional necessities. His most spectacular effort in the exhibition is a quartet of guitars representing the four seasons. Winter has a nearly white top of alpine spruce. Autumn, in red-and-yellow sunburst with leaf-shaped sound holes, is just a bit more mellow than the fiery Summer, whose upper-left shoulder spirals to a point like a flame. The chilly blue-and-white Spring has sound holes and inlays representing raindrops. The list of materials used collectively is not exactly Spartan. Besides exotic woods, it includes sterling silver, diamonds, turquoise, red coral and rubies.

For all its technical perfection, however, there's an off-putting artistic pretentiousness about Mr. Monteleone's Four Seasons. It is contemporary but it already looks dated to a time, the '80s, when luthiers began catering to collectors' tastes not just for fine instruments but also for visually impressive showpieces. I prefer his Radio City, a debonair update of D'Angelico's New Yorker. A sometime guitar player myself, I wish I could pick it up and strum a few chords.

"Guitar Heroes: Legendary Craftsmen From Italy to New York" runs through July 4 at the Metropolitan Museum of Art; (212) 535-7710, metmuseum.org.

http://www.nytimes.com/2011/02/11/arts/design/11heroes.html?ref=design

Phys Ed: Does Loneliness Reduce the Benefits of Exercise?
By GRETCHEN REYNOLDS

Luke White

With Valentine's Day around the corner, this seems the proper moment to ask whether being in a relationship changes how you exercise and, perhaps even more intriguing, whether relationships affect how exercise changes you.

That latter possibility was memorably raised in an elegant series of experiments conducted not long ago at Princeton University. The researchers were trying to replicate earlier work in which the brains of mice given free access to running wheels subsequently fizzed with new brain cells, a process known as neurogenesis, and the mice performed better on rodent intelligence tests than those without access to wheels. To the Princeton researchers' surprise, when they performed the same study with rats, "which are a little closer, physiologically, to humans," said Alexis Stranahan, the lead author of the Princeton study, running did not lead to neurogenesis. The rats' brains remained resolutely unaffected by exercise.

Hoping to discover why, the researchers examined how the rats and mice had been housed and learned that while the mice in the earlier experiments had lived in groups, the rats were kept in single-occupancy cages. Rats, in the wild, are gregarious. They like to be together. The researchers wondered whether isolation could somehow be undermining the cerebral benefits of exercise at a cellular level.

Putting this idea to the test, they divided young male rats into groups housed either in threes or singly and, after a week, gave half of them access to running wheels. All of these rats ran, but only the rats with cage mates experienced rapid and robust neurogenesis. Not until after weeks of running, long after the other socially engaged rats' brains had sprouted plentiful new neurons and neural connections, did the lone rats start to produce brain cells. Social isolation had dramatically suppressed and slowed the process.

A recent follow-up experiment by scientists at the University of Houston produced similar results in female rats, which are even more sociable than males. Housed alone, the distaff rats experienced significantly less

neurogenesis than female rodents with roommates, even though both groups ran similar distances on their wheels.

Why and how isolation affects exercise and neurogenesis remain somewhat mysterious, said Dr. Stranahan, now an assistant professor at Georgia Health Sciences University. But part of the cause almost certainly involves an excess of tension. “Exercise is a form of stress,” she pointed out. So is social isolation. Each, independently, induces the release of stress hormones (primarily corticosterone in rodents and cortisol in people). These hormones have been found, in multiple studies, to reduce neurogenesis. Except after exercise; then, despite increased levels of the hormones, neurogenesis booms. It’s possible, Dr. Stranahan said, that social connections provide a physiological buffer, a calming, that helps neurogenesis to proceed despite the stressful nature of exercise. Social isolation removes that protection and simultaneously pumps more stress hormones into the system, blunting exercise’s positive effects on brainpower.

Does this happen in lonely human exercisers? No one knows, Dr. Stranahan said, since comparable experiments on people are impossible. (The animals were sacrificed.) But she added, “There is abundant epidemiological literature in people that loneliness has cognitive consequences, contributing to depression, strokes, Alzheimer’s and so on.”

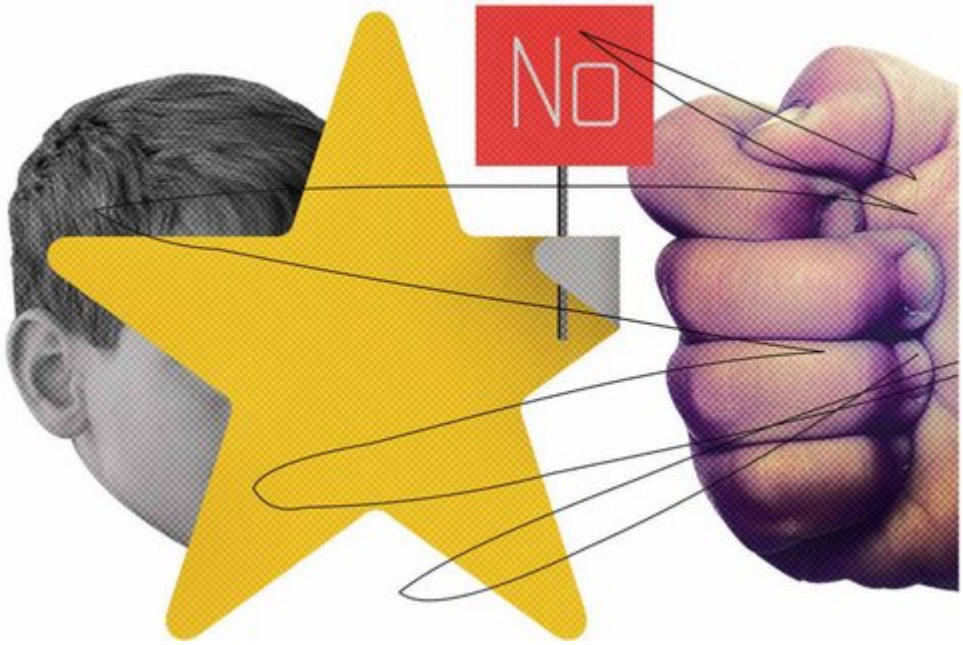
On the other hand, new science suggests that at least in people, close relationships may reduce how fit someone is. For a study published online in December, researchers cross-correlated data about the cardiovascular fitness and relationship status of 8,871 adults who had been tested several times over the years at the Cooper Clinic in Dallas. They found that single women who remained single also retained most of their fitness, while those who married tended to become less fit. Meanwhile, men who divorced became fitter; men who remarried often let themselves go. The authors speculated that divergent worries about appearance and desirability could have been motivating single people to work out and married couples to slack off. (No data was included about those insidious destroyers of workouts, children.)

Taken together, these otherwise varying studies of rodents and humans suggest that while exercise may seem a simple physical activity engaged in by individuals, it is not. It is in fact a behavior plaited with social and emotional concerns that can influence how often you work out and with what physiological consequences. It may take longer for lonely people to improve the state of their brains with exercise, Dr. Stranahan said, just as it may take a divorce to get some men in shape. But thankfully, there are some aspects of exercise and interpersonal relationships that remain stubbornly unambiguous. In a 2010 study from the Neuroscience Institute at Princeton, male rats given access to “sexually receptive” females enthusiastically engaged in procreative activity, a moderate workout in its own right and, despite raising their stress hormones, vigorously pumped up the amount of neurogenesis in their brains. Sex improved their ability to think, obvious jokes notwithstanding.

http://well.blogs.nytimes.com/2011/02/09/phys-ed-does-loneliness-reduce-the-benefits-of-exercise/?ref=magazine

Web of Popularity, Achieved by Bullying

By TARA PARKER-POPE



Stuart Bradford

For many teenagers navigating the social challenges of high school, the ultimate goal is to become part of the "popular" crowd.

But new research suggests that the road to high school popularity can be treacherous, and that students near the top of the social hierarchy are often both perpetrators and victims of aggressive behavior involving their peers.

The latest findings, being published this month in The American Sociological Review, offer a fascinating glimpse into the social stratification of teenagers. The new study, along with related research from the University of California, Davis, also challenges the stereotypes of both high school bully and victim.

Highly publicized cases of bullying typically involve chronic harassment of socially isolated students, but the latest studies suggest that various forms of teenage aggression and victimization occur throughout the social ranks as students jockey to improve their status.

The findings contradict the notion of the school bully as maladjusted or aggressive by nature. Instead, the authors argue that when it comes to mean behavior, the role of individual traits is "overstated," and much of it comes down to concern about status.

"Most victimization is occurring in the middle to upper ranges of status," said the study's author, Robert Faris, an assistant professor of sociology at U.C. Davis. "What we think often is going on is that this is part of the way kids strive for status. Rather than going after the kids on the margins, they might be targeting kids who are rivals."

Educators and parents are often unaware of the daily stress and aggression with which even socially well-adjusted students must cope.

"It may be somewhat invisible," Dr. Faris said. "The literature on bullying has so focused on this one dynamic of repeated chronic antagonism of socially isolated kids that it ignores these other forms of aggression. It's entirely possible that one act, one rumor spread on the Internet could be devastating."

In a series of studies, some still awaiting publication, the U.C. Davis researchers asked 3,722 eighth to 10th graders in three counties in North Carolina to name their five best friends. Then the students were asked whether they had ever been a target of aggressive behavior by their peers — including physical violence, verbal abuse and harassment, rumors and gossip, or ostracism — and whether they had engaged in such behavior themselves.

The researchers used the data to construct complex social maps of the schools, tracking groups of friends and identifying the students who were consistently at the hub of social life. "It's not simply the number of friends the kid has, it's who their friends are," Dr. Faris said. "The kids we're talking about are right in the middle of things."

Using the maps, the researchers tracked the students most often accused of aggressive behavior. They found that increases in social status were associated with subsequent increases in aggression. But notably, aggressive behavior peaked at the 98th percentile of popularity and then dropped.

"At the very top you start to see a reversal — the kids in the top 2 percent are less likely to be aggressive," Dr. Faris said. "The interpretation I favor is that they no longer need to be aggressive because they're at the top, and further aggression could be counterproductive, signaling insecurity with their social position.

"It's possible that they're incredibly friendly and everybody loves them and they were never mean, but I'm not so convinced by that, because there are so many kids right behind them in the hierarchy who are highly aggressive."

Over all, the research shows that about a third of students are involved in aggressive behavior. In another paper presented last year, Dr. Faris reported that most teenage aggression is directed at social rivals — "maybe one rung ahead of you or right beneath you," as he put it, "rather than the kid who is completely unprotected and isolated."

"It's not to say those kids don't get picked on, because they do," he said. "But the overall rate of aggression seems to increase as status goes up. What it suggests is that a student thinks they get more benefit to going after somebody who is a rival."

The research offers a road map for educators struggling to curb bullying and aggression both inside and outside of school. One option may be to enlist the support of students who aren't engaged in bullying — those at the very top of the social ladder, and the two-thirds who don't bully.

Richard Gallagher, director of the Parenting Institute at the New York University Child Study Center, said the research added to a growing body of scientific literature documenting the role that popularity plays in aggressive teasing and bullying behavior.

"It does highlight that it's a typical behavior that's used in establishing social networks and status," said Dr. Gallagher, an associate professor of child and adolescent psychiatry. "Schools and parents need to be tuned into this as a behavior that occurs all the time. It means that school districts need to have policies that deal with this, and I think it means also that we need to turn to the adolescents for some of the solutions."

Dr. Gallagher said that although results had been mixed, some research showed that schools could reduce bullying and aggression by enlisting the help of students as well as administrators.

"It's not likely to eliminate it completely, but it's likely to decrease its occurrence," he said. "The programs that have been successful are the ones that get kids to stop being passive bystanders who go along with teasing or bullying. Efforts have been made to get the popular kids to say, 'This is not cool.' "

Dr. Faris said he planned to conduct new research that would match the social maps with yearbooks to better document a school's social hierarchy. A related study, he added, also suggests that it's not just popularity that influences aggressive behavior, but how much the student cares about being popular.

"Historically, all the attention has been on the mental health deficiencies of the bullies," he said. "We need to direct more attention to how aggression is interwoven into the social fabric of these schools."

http://well.blogs.nytimes.com/2011/02/14/web-of-popularity-weaved-by-bullying/?ref=health

Clearing the Fog in Nursing Homes

By PAULA SPAN

The woman, who was in her 90s, had lived for several years at the Ecumen Sunrise nursing home in Two Harbors, Minn., where the staff had grown accustomed to her grimaces and wordless cries. She took a potent cocktail of three psychotropic drugs: Ativan for anxiety and the antipsychotic Risperdal to calm her, plus an antidepressant. In all the time she'd lived at Sunrise, she hadn't spoken. It wasn't clear whether she could recognize her children when they came to visit.

Belinda Day Saylor Eva Lanigan, right, director of nursing at the Ecumen nursing home in Two Harbors, Minn., with a resident, Marjorie Labrie, 94.

The Two Harbors home happened to be where Ecumen, which operates 16 nonprofit Minnesota nursing homes, was preparing an experiment to see if behavioral rather than pharmacological approaches could help wean residents off antipsychotic medications. They called it the Awakenings program.

"What's people's biggest fear? Being a 'zombie' in a nursing home," said Laurel Baxter, the Awakenings project manager.

Any visitor can see what she means. Even in quality nursing homes, some residents sit impassively in wheelchairs or nod off in front of televisions, apparently unable to interact with others or to summon much interest in their lives. Nursing home reformers and regulators have long believed that this disengagement results in part from the overuse of psychotropic medication to quell the troublesome behaviors that can accompany dementia — yelling, wandering, aggression, resisting care. For nearly 25 years, federal law has required that psychotropic drugs (which critics call "chemical restraints") be used only when necessary to ensure the safety of a resident or those around her.

The drugs can cause serious side effects. Since 2008, the Food and Drug Administration has required a so-called black box warnings on their packaging, cautioning that they pose an increased mortality risk for elderly patients. Nevertheless, a national survey reported that in 2004 about a quarter of nursing home residents were receiving antipsychotic drugs. (Among the antipsychotic drugs most commonly used in nursing homes are Risperdal, Seroquel and Zyprexa.)

Though they may be prescribed less frequently following the F.D.A.'s warnings, these drugs are still overused in long-term care, said Dr. Mark Lachs, chief of geriatrics at Weill Cornell Medical College. And once the pills are prescribed, residents keep taking them. "They get perpetualized, like insulin," he told me, even though the behaviors they're meant to soothe may wane anyway as dementia progresses.

"If a place is understaffed, if it takes particularly unruly patients, you can see how it happens," Dr. Lachs added. "Behavioral interventions are far more time-consuming than giving a pill."

Nevertheless, Ecumen's Awakenings project emphasizes nondrug responses. "Medications have a place, but that shouldn't be the first thing you try," said Eva Lanigan, director of nursing at the Two Harbors facility.

So the home trained its entire staff (housekeepers, cooks, dining room servers, everyone) in a variety of tools to calm and reassure its 55 residents: exercise, activities, music, massage, aromatherapy. It taught people the kind of conversation known as "redirecting" — listening to elders and responding to them without insisting on facts that those with dementia can't absorb or won't recall.

"The hands-on, caring part is the most important," Ms. Lanigan said. "Sometimes, people just want a hug. You sit and hold their hand."

At the same time, consulting with a geriatric psychiatrist and a pharmacist, the home began gradually reducing the doses of antipsychotics and antidepressants for patients whose families agreed. Among them: the woman with the mysterious cries.

As Dr. Lachs pointed out, behavioral interventions are labor-intensive. Two Harbors hired an additional nurse to oversee those efforts, and Ms. Lanigan was available to answer staff questions around the clock. Ecumen estimates that introducing the program to a 60-bed nursing home cost an additional $75,000 a year for two full-time employees.

The results startled even the believers, however. Every resident on antipsychotics (about 10) was able to stop taking them, and 30 to 50 percent of those taking antidepressants also did well without them. When drugs still seemed necessary, "we tried to reduce them to the lowest dose possible," Ms. Lanigan said.

Encouraged, Ecumen has introduced the Awakenings program to its 15 other nursing homes, using a $3.8 million, three-year grant from the state of Minnesota. "I believe we may learn that spending a little time now with a resident, preventing the use of psychiatric medications and their side effects, you'll save time and money in the long run," said Ms. Baxter, the project manager. "I'm optimistic."

Of course, you can't tell how well nondrug approaches work based on one facility's outcomes. "We know how to reduce behavior problems and mood issues in controlled clinical trials," said Kimberly Van Haitsma, a senior research scientist at the Polisher Research Institute in Philadelphia. "The actual nuts and bolts of how do you do this and keep it in place — over not weeks or months, but years — is a question the field is struggling with." Turnover among both staff and residents is high in nursing homes, she pointed out.

But with reduced medications, the woman at the Two Harbors home did seem to awaken. She was able to speak — haltingly and not always understandably, but enough to communicate. And what she let Ms. Lanigan

know, after years of being virtually nonverbal, was that she was suffering physical pain, the cause of her crying out.

It took doctors a while to find effective medications for her nerve condition, but they were eventually able to make her more comfortable without further fogging her mind. She stopped taking psychotropic drugs altogether.

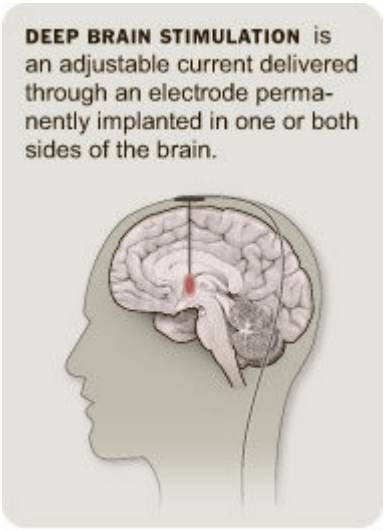
None of this can halt dementia; it's a terminal disease, and it took this resident's life last year. But in her final months, she smiled and played balloon volleyball with other residents and could say she felt fine or was hungry.

"She engaged more. Her family came to help her eat," Ms. Lanigan said. "It was a big change."

http://newoldage.blogs.nytimes.com/2011/02/15/clearing-the-fog-in-nursing-homes/?ref=health

Wariness on Surgery of the Mind

By BENEDICT CAREY



In recent years, many psychiatrists have come to believe that the last, best chance for some people with severe and intractable mental problems is psychosurgery, an experimental procedure in which doctors operate directly on the brain.

Hundreds of people have undergone brain surgery for psychiatric problems, most in experimental trials, with some encouraging results. In 2009, the government approved one surgical technique for certain severe cases of obsessive-compulsive disorder, or O.C.D. For the first time since frontal lobotomy fell into disrepute in the 1950s, surgery for behavior problems seemed back on the road to the medical mainstream.

But now some of the field's most prominent scientists are saying, "Not so fast."

In a paper in the current issue of the journal Health Affairs, these experts say approving the surgery for O.C.D. was a mistake — and a potentially costly one. They argue that the surgery has not been sufficiently tested, that neither its long-term effectiveness nor its side effects are well known and that even calling it "therapy" raises people's hopes well beyond what is scientifically supportable. "We're not against the operation, we just want to see it tested adequately before it's called a therapy," said the paper's lead author, Dr. Joseph J. Fins, chief of medical ethics at NewYork-Presbyterian/Weill Cornell hospital. "With the legacy of psychosurgery, it's important that we don't misrepresent things as therapy when they're not."

Doctors who run programs offering the operation strongly object. "These patients are very capable of making informed decisions based on our experience with the surgery," said Dr. Wayne K. Goodman, chairman of psychiatry at the Mount Sinai School of Medicine, "and I would not want to deprive them of the option, any more than I would deny someone with AIDS access to a promising therapy that has not been established yet. Their life has been so destroyed by O.C.D. that they might contemplate suicide" if the surgery were not available.

The debate on this question — should experimental surgery be allowed, in some cases, before long, costly trials are completed? — will largely set the future course of modern psychosurgery. And it may turn on the interpretation of an arcane Food and Drug Administration regulation that allows manufacturers to put a device

on the market without rigorously proving its effectiveness when it is intended to treat or diagnose a fairly rare condition.

It was this exemption that the agency applied in 2009 to a device used to perform so-called deep brain stimulation, or D.B.S., for patients with obsessive-compulsive disorder who had not been helped by other treatments. In this procedure, a surgeon sinks wires deep into the brain and leaves them in place; a device like a pacemaker sends a current to the electrodes, interfering with circuits that appear to be hyperactive in people with the disorder.

Deep brain stimulation has a proven track record in reducing the tremors and stiffness of Parkinson's disease; and in studies, doctors have performed the operation on people with depression and Tourette's syndrome, among other things. It is the most commonly used of several psychosurgery techniques available, the most familiar to doctors, and the one that experts say is most likely to set the expectations and public image of modern psychosurgery — for good or ill.

The authors of the paper in Health Affairs say this is all the more reason to revoke the exemption and subject the technique to proper testing in studies of O.C.D. patients. Even if the device is the same, its effects on different diseases must be studied separately.

And those studies must look at quality of life, not just the severity of the disease. In a 2008 study, Swedish researchers found that patients who had another type of surgery for O.C.D., called a capsulotomy, had symptoms of apathy and poor self-control for years after the procedure, even though they scored lower on a measure of severity.

"Just because we recognize that there is a need for this doesn't mean we don't have to proceed in an agnostic, scientific manner to see whether, in fact, it improves people's lives," said a co-author of the Health Affairs paper, Dr. Helen S. Mayberg of Emory University, a neurologist who has pioneered the use of D.B.S. for depression.

She and many of the other authors — including Dr. Bart Nuttin of the University Hospitals in Leuven, Belgium, who published the first report of using deep brain stimulation for O.C.D. about a decade ago — hold patents related to the procedure or have received industry support for their work. So have most others in the field, and the new paper argues that commercial interest has been working to push D.B.S. into the psychiatric market ahead of the science.

Yet doctors who offer the surgery say most of the paper's authors do not work extensively with obsessive-compulsive disorder. "I believe the F.D.A. acted correctly," Dr. Benjamin D. Greenberg, a Brown University psychiatrist who directs the O.C.D. surgery program at Butler Hospital in Providence, R.I., wrote in an e-mail. "The data on effectiveness are not perfect, which is why we're doing a controlled study. But they are substantial."

Whether surgery for behavior problems is confined to studies or continues to be offered through a regulatory exemption, everyone agrees that the field should set up a registry of all patients who have had surgery for psychiatric problems. Some patients may do better with time, for instance, and others crash: no one knows, because no one is systematically following a large enough group of patients for years.

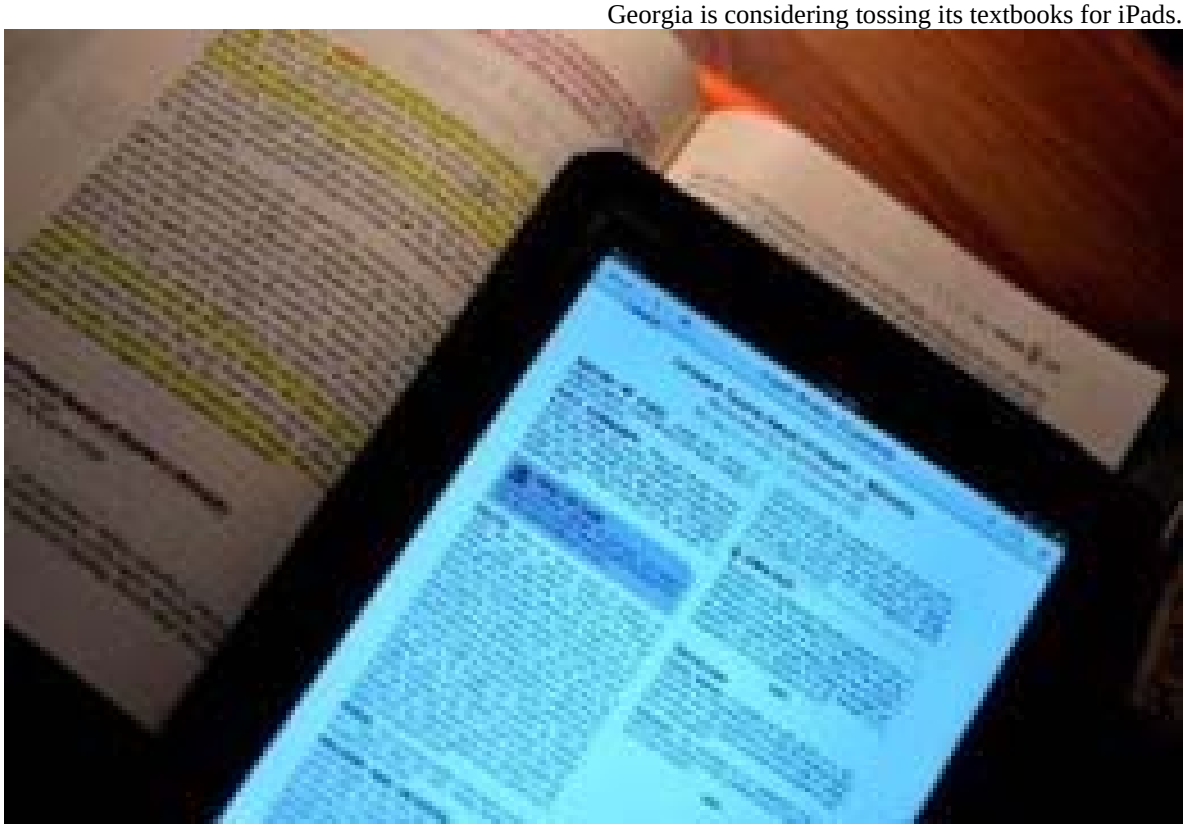
"Just because it looks good at first and everyone gets excited," Dr. Mayberg said, "doesn't mean it's necessarily efficacious or your work is done."

http://www.nytimes.com/2011/02/15/health/15brain.html?ref=health

Georgia May Ditch Textbooks for iPads

By Lauren Barack February 15, 2011

Georgia is considering tossing its textbooks for iPads.



In a move led by its senate president Tommie Williams, the state is looking to see if it can substitute print books with iPads, according to a recent story in the Atlanta *Journal-Constitution*.

(Williams did not return repeated calls to his district and state offices.)

With an annual outlay of $40 million for textbooks, the state is investigating if it can—and should—divert those funds to purchase the Apple tablet computers, says Williams.

As K-12 schools around the country begin to adopt ereaders in classrooms and media centers, few schools have attempted to implement the devices school wide, nor has a whole state, as Georgia appears to be doing, elected to replace printed matter for digital text entirely.

Even media specialists, often some of the first in schools to adopt digital tools, say an all or nothing approach such as the one Georgia is considering may be an extreme one.

"I don't object to the use of iPads but I would hope that the district doesn't do away with everything else," says Cassandra Barnett, school librarian at Fayetteville (AR) High School Library and past president of the American Association of School Librarians, by email. "The philosophy of a library is to provide a wide variety of materials and formats to meet everyone's needs. The iPads alone may not do that."

Of concern, too, say educators, is the content that's currently available on iPads. While the device's iBook application provides access to a wide range of digital books, educators would like to see districts look beyond simply replacing textbooks, as Williams has stated, and consider the kind of specialized material, apps and otherwise, that maximize the iPad's capability. Moreover, many hope that legislators open to adopting these tools will consider expanding beyond digital versions of a standard textbook and truly embrace 21st-century education to its fullest.

"I would love to see more of these open sources, authoritative approaches to online textbooks, but one of my worries is that textbooks made for iPads would (at least initially) be text versions mashed up with their website videos and dumped into a digital file," says Melissa Techman, librarian and tech lead teacher at Broadus Wood Elementary School, based in Earlysville, VA. "Moving content from one medium to another without any or much change seems contrary to the whole spirit of the hybrid and interactive learning possibilities we want."

http://www.schoollibraryjournal.com/slj/newslettersnewsletterbucketextrahelping2/889233-477/georgia_may_ditch_textbooks_for.html.csp

Teenage Wastelands
By CHARLES McGRATH

DreamWorks Pictures
Extraterrestrial angst in “I Am Number Four.”

Vampires live forever, but vampire novels, even ones as popular as the “Twilight” series, eventually molder just like everything else, so publishers of young-adult fiction and the moviemakers who find inspiration from them have already moved on from fantasy about the undead to science fiction. A harbinger of what’s to come is “I Am Number Four,” based on the novel of the same title, which just opened in theaters. “I Am Number Four,” sold to DreamWorks even before it found a publisher, is ostensibly the work of one Pittacus Lore, an extraterrestrial. It’s really by James Frey, the author of the factually challenged memoir “A Million Little Pieces,” and Jobie Hughes, a minion hired as part of Frey’s latest project: Full Fathom Five, a literary sweatshop modeled on Damien Hirst’s art factory and designed to churn out Y.A. material for books, movies and TV.

The novel, the first of a projected series, frequently reads like an assembly-line product, poorly written and thinly imagined, but it has one diverting idea. While lots of high-school students sometimes feel like aliens, the protagonist of “I Am Number Four” really is one. John Smith, as he calls himself, is No. 4 on a hit list compiled by assassins from a rival planet and is hiding out on Earth, trying to pass as a normal high-school student in Paradise, Ohio, even though he is fire-resistant and telekinetic and, embarrassingly, his hands glow in the dark. He probably ought to confine his romantic attentions to his own kind (girls on his home planet love “differently,” readers learn), but as tends to happen in the vampire novels, he develops strong feelings for a human girl and she for him, and this is what drives the plot forward into the next volume. In the realm of Y.A. fiction, the series is the grail; the single-volume one-off is a lost franchise.

“I Am Number Four” came out in August, a few months before a much better book, “Matched,” also the first in a planned series, by Ally Condie. It, too, was quickly snapped up by Hollywood. The impediment to true love here is the Society, a Big Brother-like entity that chooses your mate for you as soon as you turn 17. The world has apparently barely survived something called the Warming, partly brought on by too much technology, and the Society has determined that the key to survival is simplicity and restricted choice. All of culture has been winnowed down, like an Advanced Placement curriculum, to just 100 of everything: songs, stories, paintings, poems. Cassia, the protagonist of the novel, yearns, not unreasonably, for a little more

variety and is also torn between the boy the Society has picked out for her and another, a member of a social class known as Aberrations, not considered suitable for reproduction.

With its echoes of Orwell and Huxley, “Matched” represents a trend in young-adult fiction actually more persistent and highly developed right now than Frey’s vision of lovelorn visitors from another galaxy: sci-fi novels of teenage dystopia in which everyone is an alien, or feels like one, in a false, stage-managed world run by adult authority that is remote, controlling and unfeeling. Where grown-up dystopian novels — books like “Oryx and Crake,” by Margaret Atwood; “The Pesthouse,” by Jim Crace; and “The Road,” by Cormac McCarthy — lately seem to dwell on a vision of a bestial, plague-ridden world where civilization has collapsed, these new Y.A. books imagine something far worse: a world where civilization feels an awful lot like high school and everyone is under pressure to conform. Another popular series, for example, is Scott Westerfeld’s “Uglies” books, about a world where all 16-year-olds undergo extreme plastic surgery to adapt them to a universal standard of beauty. And in “The Hunger Games” trilogy, by Suzanne Collins, so far the best of the teen dystopian novels (the movie version of the first book is projected to open about a year from now), adolescence is a kind of life-and-death popularity contest.

Here again, there is an authoritarian governing body, the Capitol, headed by the creepy President Snow, which once a year puts on a nationally televised gladiatorial contest in which 24 children, chosen more or less at random, fight in an outdoor arena until only one is left alive. Before the contestants go out to compete, in a spectacle that is supposed to unite the entire country, they’re given fashion makeovers, go to glitzy parties and are extensively interviewed: they become celebrities and, by creating public personas for themselves, compete for sponsorships that may help them survive the battles ahead. Katniss, the protagonist, is so mixed up from pretending to love a fellow contestant that she no longer knows what she feels.

Sound familiar? “The Hunger Games” reminds you of both “Survivor” and the great Shirley Jackson story “The Lottery,” and maybe a little of “The Bachelorette.” Part of its cleverness is the way it taps into the same themes of anxiety and fear of elimination. This story, too, has a teenage protagonist trying to choose between two romantic partners, but much of the interest comes from its persistent teasing out of a premise that is a twist on the old dorm-room speculation about whether life might be a dream: what if there was a reality show that really was — you know, real?

What distinguishes this kind of dystopian fiction from its adult counterpart — beyond its being less dire and apocalyptic — is a certain element of earnestness, even preachiness, and the moral is pretty transparent: be yourself. That’s because most young-adult novels are not written by young adults. They’re grown-up guesses or projections about what we suspect or hope might be on the minds of teenagers, or they’re cynical attempts to plant a profitable notion there. Frey didn’t have to do much more than think “vampires = aliens” before calling in someone to write it up for him.

But inevitably such books reveal something about our grown-up preoccupations too. For one thing, they suggest we’re possibly more worried than our children are about caving in to authority and about finding the right person to love. And “The Hunger Games,” besides dwelling, like so many of these books, on the age-old American concern about phoniness and authenticity, also points out the dark, scapegoating side of our preoccupation with reality shows, especially elimination contests like “American Idol” and “The Biggest Loser.” We like for there to be winners, but even more we love for there to be losers, as long as they’re not us.

Charles McGrath, a writer at large for The Times, last wrote for the magazine about Hugh Hefner.

http://www.nytimes.com/2011/02/20/magazine/20FOB-WWLN-t.html?_r=1&ref=magazine

What Really Causes Runner's High?

By GRETCHEN REYNOLDS

Jordan Siemens/Getty Images

For decades, endorphins have hogged the credit for producing "runner's high," that fleeting sense of euphoria and calm that many people report experiencing after prolonged exercise. Who among us, after an especially satisfying workout, hasn't thought, "ah, my endorphins are kicking in." Endorphins are the world's sole celebrity peptide.

Endorphins first gained notoriety in exercise back in the 1980s when researchers discovered increased blood levels of the substance after prolonged workouts. (Endorphins, for those who know the word but not the molecules' actual function, are the body's home-brewed opiates, with receptors and actions much like those of pain-relieving morphine.) Endorphins, however, are composed of relatively large molecules, "which are unable to pass the blood-brain barrier," said Matthew Hill, a postdoctoral fellow at Rockefeller University in New York. Finding endorphins in the bloodstream after exercise could not, in other words, constitute proof that the substance was having an effect on the mind. So researchers started to look for other candidates to help explain runner's high. Now an emerging field of neuroscience indicates that an altogether-different neurochemical system within the body and brain, the endocannabinoid system, may be more responsible for that feeling.

In a groundbreaking 2003 experiment, scientists at the Georgia Institute of Technology found that 50 minutes of hard running on a treadmill or riding a stationary bicycle significantly increased blood levels of endocannabinoid molecules in a group of college students. The endocannabinoid system was first mapped some years before that, when scientists set out to determine just how cannabis, a k a marijuana, acts upon the body. They found that a widespread group of receptors, clustered in the brain but also found elsewhere in the body, allow the active ingredient in marijuana to bind to the nervous system and set off reactions that reduce pain and anxiety and produce a floaty, free-form sense of well-being. Even more intriguing, the researchers found that with the right stimuli, the body creates its own cannabinoids (the endocannabinoids). These cannabinoids are composed of molecules known as lipids, which are small enough to cross the blood-brain barrier, so cannabinoids found in the blood after exercise could be affecting the brain.

Since that 2003 study, a flurry of research has been teasing out the role that endocannabinoids play in the body's reaction to exercise. In some of Dr. Hill's work, for instance, rats treated with a drug that blocked their endocannabinoid receptors did not experience the increase in new brain cells that usually accompanies running, suggesting that a well-functioning endocannabinoid system may be required for cognitive

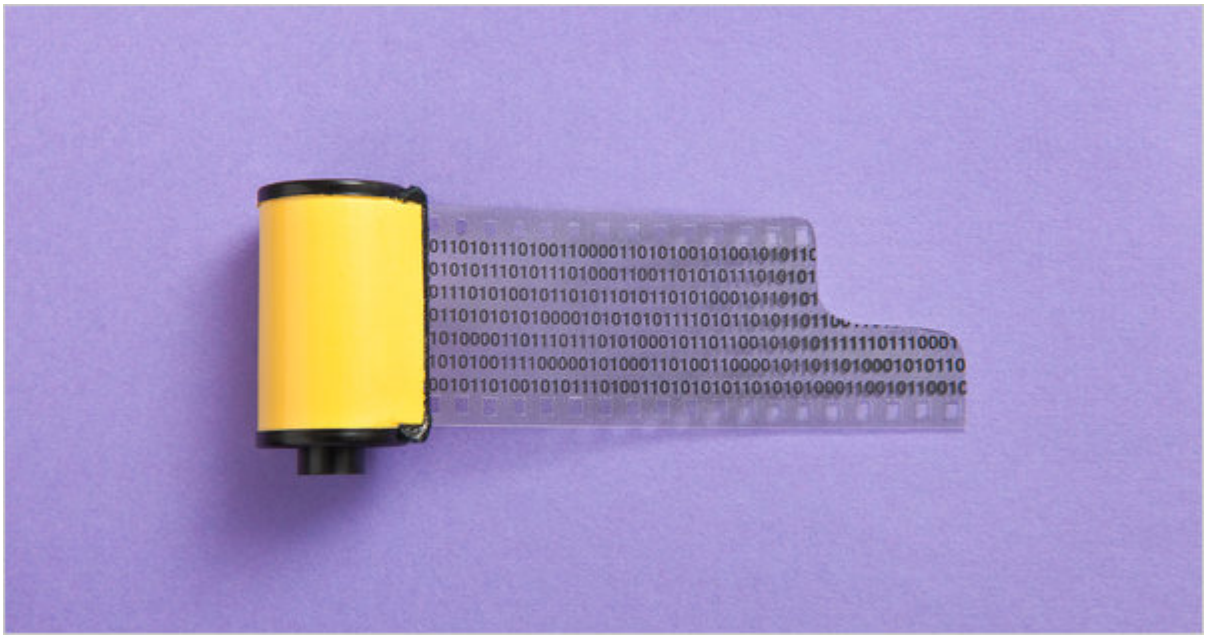
improvements from exercise. Other researchers have found that endocannabinoids may be what nudge us to tolerate or enjoy exercise in the first place. In an experiment published last year, groups of mice were assigned either to run on wheels or sip a sweetened drink. Running and slurping sugar previously were identified as pleasurable behaviors in animals. Now the researchers saw that both activities lit up and sensitized portions of the animals' endocannabinoid systems, intimating that the endocannabinoid connection may lend both exercise and dessert their appeal.

But perhaps the most telling experiment was published last year by researchers in France who had bred mice with no functioning endocannabinoid receptors. Mice usually love to run, but the genetically modified animals, given free access to running wheels, ran about half as much as usual. Although the full intricacies of the endocannabinoid system's role in motivating and rewarding exercise is not yet understood, it seems obvious, the researchers say, that the cannabinoid-deprived mice were not getting some necessary internal message. Typically, the endocannabinoid system "is well known to impact onto central reward networks," the authors write. Without it, exercise seemed to provide less buzz, and the animals didn't indulge as much.

Whether this accumulating new science establishes, or ever can establish, definitively, that endocannabinoids are behind runner's high, is uncertain. As Francis Chaouloff, a researcher at the University of Bordeaux in France and lead author of the genetically modified mouse study, pointed out in an e-mail, rodents, although fine models for studying endocannabinoid action, "do not fill questionnaires to express their feelings related to running," and runners' high is a subjective human experience. Still, endocannabinoids are a more persuasive candidate, especially given the overlap between the high associated with marijuana use and descriptions of the euphoria associated with strenuous exercise. One recent review article described them: "pure happiness, elation, a feeling of unity with one's self and/or nature, endless peacefulness," and "inner harmony." Ahhhh.

http://well.blogs.nytimes.com/2011/02/16/phys-ed-what-really-causes-runners-high/?ref=magazine

Magic and Loss
By VIRGINIA HEFFERNAN



Kevin Van Aelst for The New York Times

It has been more than 20 years since Tim Berners-Lee first proposed the World Wide Web as a shared system of hypertext that would give almost anyone access to the resources of the Internet. Nearly two billion people now surf the Web. They join up around the world from cellphones, fancy tablets, slender laptops and bulky desktops.

The Internet is a massive and spontaneous civilization whose population is greater than China's. It's one of the strangest phenomena mankind has ever seen, and yet it's now difficult to even imagine ordinary life without it. At some point during these past two decades, the Internet left behind its status as a techie experiment, or merely an unprecedentedly vast collaboration between humans and machines. Instead, it quickened into magic. It's worth remembering the Arthur C. Clarke quotation from "Profiles of the Future": "Any sufficiently advanced technology is indistinguishable from magic."

"Magic" is a word that Apple uses often these days. The iPad was introduced last year as a "magical and revolutionary device at an unbelievable price." And "magic" is also a word that appears in discussions about programming. Computer code is considered magic when it accomplishes highly complex operations while appearing simple. By this definition, the Internet is magic. It turns experiences from the material world that used to be ridiculously complicated — involving licking stamps, say, or winding clocks — into frictionless, flashing and fantastic abstractions. As Lawrence Lessig puts it, "The digital world has more in common with the world of ideas than with the world of things."

We are agitated when the Internet doesn't work but lack the proper amazement when it does.

But the digital world also brings dysphoria — a low-level but constant heartbreak that is one of its most controversial side effects. I used to try to ignore the blue mood that haunts much of the writing about the Web. Like a Bolshevik in 1917, I chalked my resistance to its promises up to cowardice and coldly considered a certain amount of individual suffering the cost of the digital revolution. Maybe it was dialectical immaterialism — I thought we were moving away from the stuff-heaps of the past toward lives of near-total abstraction. I also believed that we'd be over our nostalgic fixation on analog culture and its totems very quickly. Even the manual typists and vinyl collectors would find eBay soon, or YouTube or fantasy football, and they'd be off and running.

And yet it's still here, the persistent sense of loss. The magic of the Internet — the recession of the material world in favor of a world of ideas — is not working for everyone. In essence, we are missing something very

worthwhile and identity-forming from our predigital lives. Is it a handwritten letter? Is it an analog phone call? Is it a quality of celluloid film, a multivolume encyclopedia or a leatherbound datebook? Is it a way of thinking or being or even falling in love?

During the process of converting analog audio to digital, something is lost. MP3 compression, in particular, squeezes out certain sounds believed to be superfluous to the ear. That transformation is called "lossy compression." Something we can't quite put our finger on is lost. Comparable lossiness informs digital film, digital images, digital social life.

And that profound conviction that the Web has taken something from us is an idea that's as old as the Web itself. You can find plenty of this sentiment in alarmist best sellers and in articles and reports about attention spans, as well as the superiority of vinyl to MP3s and paper books to e-books. Today, especially as people modulate their Web use by turning to apps (which keep the Web at a distance), Web users feel more confident in voicing their unhappiness than in the past, when nostalgia for childish analog things could get you labeled a Luddite or worse. Too many refusals — to use e-mail, or instant messaging, or Twitter — could even get you fired.

Many who remember life before the Web have tried to placate the more anxious of us by arguing that the Internet is just old hat, a translation or merely a retread of other existing institutions, and nothing more. EBay is a bigger, more eclectic Sotheby's. Amazon is a virtual Barnes & Noble. Craigslist is just like the classifieds in the old New York Herald-Tribune or The Village Voice. Lately there has been a strenuous and sophistic effort to show that the new social media — Facebook, especially, but there are certainly others — are just outsize reworkings of earlier forms of social organization, like the elite clubs of the Ivy League that have enjoyed a mystique since the 1960s.

But whether we admit it or not, the Internet and its artifacts are not just like their cultural precedents. They're not even a rough translation — or a strong misreading — of those precedents. The Internet has a logic, a tempo, an idiom, a color scheme, a politics and an emotional sensibility all its own. Tentatively, avidly or kicking and screaming, nearly two billion of us have come to take up residence on the Internet, and we've adjusted to its idiosyncratic ways.

This transformation of everyday life includes moments of magic, and an unavoidable experience of profound loss. Any discussion of the Internet that merely catalogs its wonders and does not acknowledge these two central themes is propaganda, and it no longer does it justice.

Points of Entry: This Week's Recommendations

FUTURE TENSE

"They will serve the Overmind because they had no choice, but even in that service they would not lose their souls." This is "**Childhood's End**," the great **Arthur C. Clarke** sci-fi novel from 1953. Pick up a copy, then watch "**2001**" again, and reassess how you feel about the future.

LESSIG'S LESSONS

"**The Future of Ideas**," Lawrence Lessig's 2001 book about intellectual property in the digital age, is well worth rereading in 2011. Though an early Internet enthusiast, **Lessig** recognizes the pressure it puts on the law, the language and the culture.

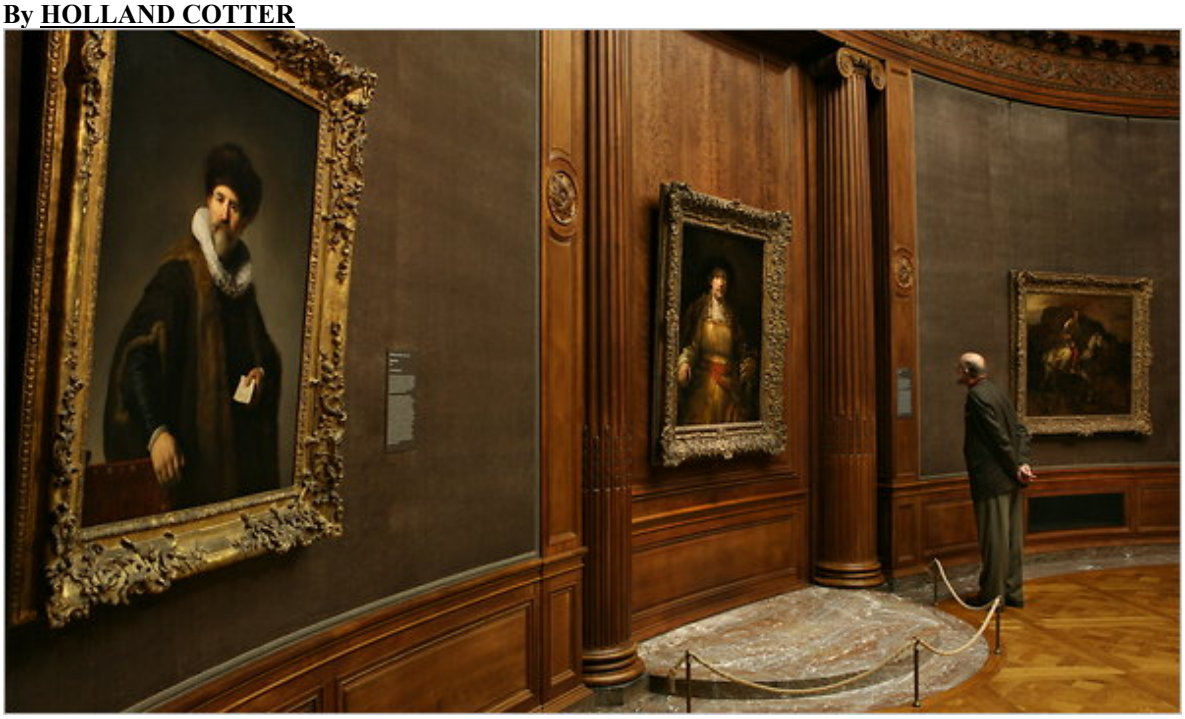
A BIGGER BOAT

It's imperfect but enormously compelling: **Crazy Boat**, a Facebook app that turns you and your Facebook friends into seafaring entrepreneurs, charged with cleaning up the seas and, of course, facing off with giant squids.

http://www.nytimes.com/2011/02/20/magazine/20FOB-Medium-t.html?ref=magazine

Pride of Place, Brighter Than Ever

By HOLLAND COTTER



Ozier Muhammad/The New York Times

A view of three Rembrandt paintings in the Oval Room at the Frick Collection: from left, “Nicolaes Ruts,” “Self-Portrait” (back from a restorative stay at the Met) and “The Polish Rider,” part of the current exhibition “Rembrandt and His School.

Rembrandt’s jowly, battered face glows like a night light in the great late self-portrait from 1658 at the Frick Collection. And it glows more brightly than ever now that layers of old varnish have been cleaned away. Colors — the gold of the artist’s shirt, the wine-red of his Middle Easternish sash, the pink of the chafe mark on his chin — are rich. For the first time in memory the shape of his cap, a floppy black beret in an antique style, is clearly visible against the dark ground.

To celebrate the painting’s return from a restorative stay in the Metropolitan Museum’s conservation labs, the Frick has awarded it pride of place right at the center of things in the wood-paneled Oval Room. There it’s flanked by the collection’s other two glorious Rembrandts, “The Polish Rider” and the portrait of Nicolaes Ruts. And it hangs across from a pair of ex-Rembrandts, “Old Women with a Book,” now attributed to Carel van der Pluym, and “Portrait of a Young Artist,” admirable painter unknown.

No museum in the city is more adept than the Frick at capitalizing on what it owns. Spiff up a picture, repaint some walls and — presto! — you have a show. But the exhibition called “Rembrandt and His School: Masterworks from the Frick and Lugt Collections” offers more. In addition to paintings we know, it gives us a handful of Frick prints we seldom see, and — the big attraction — a gallery of Rembrandt drawings brought from Europe.

Henry Clay Frick (1849-1919) and his Gilded Age peers would have been pleased with all this. Rembrandt was their man. Why? His paintings, with their encrusted surfaces, have an inherent look of luxe. And there were lots of them available in a cash-strapped Europe at the turn of the 20th century. Also, Rembrandt’s demographic was attractive: northern European, Protestant, merchant class — and Protestant without churchiness (at least if you stuck with portraits), and merchant class with a new-money social lift, of the kind that let America’s wealthy robbers and industrialists think of themselves as barons and czars.

Finally this artist came with a brave, sad story: visionary outsider, ahead of his time, shunned by his world, painting only for himself. That was enough for Frick, even if the tale wasn't entirely true. In reality Rembrandt had been an art world entrepreneur of Continental stature — dealer, collector, art adviser, teacher — with a lucrative painting and printmaking practice. And when hard times hit, they didn't come out of nowhere. Rembrandt was heedless in his habits, spending what he earned, living on credit, signing onto bad deals. One thing went sour, then everything did, and he lost his shirt.

The 1658 self-portrait dates from that time. He was 52 when he painted it. A year earlier he'd been forced to hawk his art collection. Soon he would lose his home. He kept painting, not primarily to work out his feelings but to bring in some guilders. And it was with the market in mind that he took the attention-grabbing style he'd been developing and pushed it hard: splashy strokes, chunky surfaces, tonal contrasts that could be read from across a room.

That late style — tactile, almost sculptural — worked its magic on a young collector named Frederik Johannes Lugt (1884-1970), who picked up Rembrandt drawings and prints during his teens in Amsterdam. Lugt went on to amass encyclopedic holdings in European works on paper, creating the Fondation Custodia in Paris to house them. Two years ago the Frick exhibited the foundation's French drawings. For this show it has borrowed 18 Rembrandt drawings, 11 of his prints and work by a posse of followers.

A few of the drawings are superbly finished. "Interior With Saskia in Bed" is one. Usually assumed to depict Rembrandt's invalid wife attended by a nurse or maid, it is vaguely dated to within the two years before Saskia's death in 1642. That neither the subject nor date can be confirmed doesn't make the picture any less poignant. With sinewy skeins of ink, and pools and streaks of wash, Rembrandt gives a bourgeois bedroom the shadowed silence of an aisle chapel in a church.

Other drawings are looser, snapshots of life, terrestrial and otherwise. A woman coos over a baby spooked by a dog. A prostitute gingerly relieves a dozing client of his purse. An angel, wings aflutter, startles a prophet. A female martyr meets her end behind a bonfire of scribbles so dense as to half-obscure the scene.

The exhibition curators — Colin B. Bailey, Margaret Iacono and Joanna Sheers, all of the Frick — devote a second gallery to Rembrandt's pupils. Some, like Lambert Doomer, were assiduous copiers of the master's drawings. Others, like Govert Flinck, hewed closely to his style, as did Ferdinand Bol, whose jittery "Elijah Sleeping Beneath a Tree" was a Rembrandt not too long ago.

We get only a flash of the keenest talent here, the short-lived Carel Fabritius, in a drawing not even certainly by him. And we find lots of a dimmish bulb named Gerbrand van den Eeckhout. In genres he covered the waterfront. You could plug him in anywhere, from history painting to book design, and he'd get the job done, though without the gleam that Rembrandt brought to everything.

To see the difference, compare van den Eeckhout's placidly capable "Youth Smoking" with any of eight self-portrait etchings by Rembrandt that round out the Lugt display. All but one of the etchings is from the early 1630s, when he moved from Leiden to Amsterdam to open a studio. There he became an instant dot-com type — big house, status wife, power job — but with a crazy rebel streak.

You see it in the self-portrait etchings. (They are in a tradition of depicting moral and psychological portraits, but as always, Rembrandt pushed tradition in idiosyncratic directions.) They're like a series of Monty Python skits, with Rembrandt playing all the parts: metrosexual masher with puffy Titian sleeves; nerdy accountant hoarding his receipts; saber-wielding pooh-bah with a tam-o'-shanter crown. An incorrigible mugger, he changes expression from print to print. He scowls ferociously; he mopes; he smiles a goofy, stoned "What, me worry?" smile.

Over the years Lugt assembled a near-complete set of Rembrandt's prints; Frick bought some too, but unadventurously, and just a few. Self-portraits are not among the 10 examples installed in the small Cabinet gallery near the lobby. Instead there are classic landscapes and, oddly, religious scenes: "Christ Preaching," also known as "The Hundred Guilder Print"; "Christ Presented to the People," also called "Ecce Homo"; and so on. They're wonderful things and seldom shown, but after the self-portrait etchings they feel a little staid.

Was Frick familiar with the loose-cannon Rembrandt of the etchings? Whether he knew it or not, he was, because the same Rembrandt appears, older, quieter, but still acting out, in the 1658 self-portrait painting. Current scholarship tells us that 17th century Dutch artists didn't use self-portraiture as a vehicle for personal probing, that Rembrandt's princely orientalist drag in the Frick painting was intended neither as a statement of outsiderness nor as a cue to some private drama about losing a fortune but keeping your soul.

No, the get-up was functional. It would have been understood by everyone at the time as form of professional advertising, a way for an ambitious artist symbolically to remind his clientele, actual and potential, that he was a player in art history's royal line.

No doubt that explanation holds true for most artists of the day. But, I'm sorry, the artist we're talking about here is Rembrandt — who, to judge by even the small amount of work in this modest show — probed the depths of practically every person and situation he encountered, took everything to heart and made a life and a living out of being in drag of one kind or another.

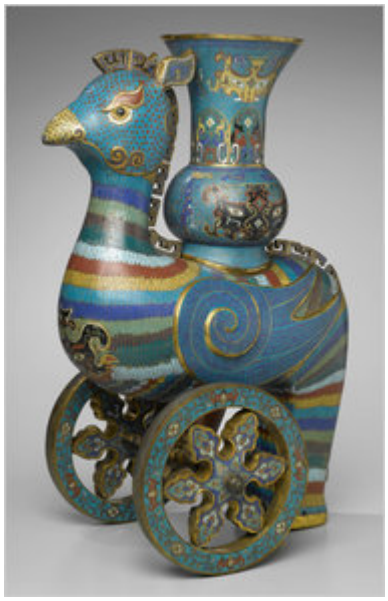
Not an outsider? This man who, over and over, embarrassed himself in front of the world and keeps embarrassing us because we're never sure how to react him, whether to laugh or cry?

Only one thing's for sure: You can clean his paintings, but you can't clean up his act, which glows brighter each time we experience it, which is why we keep coming back.

"Rembrandt and His School: Masterworks from the Frick and Lugt Collections" is on view through May 15 at the Frick Collection, 1 East 70th Street, Manhattan, (212) 288-0700, frick.org.

http://www.nytimes.com/2011/02/18/arts/design/18rembrandt.html

When Enamel Wares Adorned China's Imperial Courts
By KEN JOHNSON



Brooklyn Museum

A ceremonial wine vessel in the shape of a bird from the Qing dynasty.

Many human beings evidently share with the magpie a gene causing an irrational attraction to bright and shiny objects. If you suffer from this disorder, you will love "Cloisonné: Chinese Enamels From the Yuan, Ming and Qing Dynasties," a ravishing exhibition at the Bard Graduate Center.

Displaying more than 160 items ranging from pocket- to armchair-size, the exhibition, on three floors of a former town house, samples almost seven centuries' worth of domestic and ceremonial enamel ware. Bowls, vases, incense burners, jewelry boxes and garden stools made of copper alloys have surfaces covered with intricate mosaic patterns and imagery in pure blues, reds, yellows and greens. Many have additional gilded-metal ornamentation in the form of dragons, lions, bears and elephants.

The show, which comes with a richly informative, lavishly illustrated catalog, was organized by the Bard Graduate Center in collaboration with Musée des Arts Decoratifs in Paris. The curator is Béatrice Quette of the Musée des Arts Decoratifs.

The cloisonné process entails application of pastes made of ground colored glass into cells that are bounded by thin strips of metal standing on edge on flat or curved surfaces. Heated in a kiln, the paste melts into enamel; sanding and buffing results in glossy surfaces.

Unlike lacquer ware, whose traditionally black or cinnabar red hue has a sobering effect on its otherwise sumptuous designs, Chinese cloisonné — much of which was made for imperial court decoration — can have a gaudy opulence like that of French Rococo. The intoxicating sensual appeal may seem out of step with imperatives of Buddhist humility, but there is often a transcendentalist aspect in cloisonné's metaphysical symbolism and its otherworldly beauty. A Qing dynasty plate with a ferocious, serpentine dragon flying toward the viewer with talismanic emblems gripped in its talons is like a hallucinatory emissary from the collective unconscious.

Cloisonné was not invented in China; it was a 13th- or 14th-century import from Byzantium. But Chinese craftsmen certainly made it their own. Its stylistic evolution is hard to track because of the Chinese penchant for recycling the past and because dating marks inscribed on metal bottoms, which could be added at any time, cannot be trusted. The general trend, however, was toward bigger, more complicated and luxurious creations.

Simpler early works, like a pair of Yuan dynasty (1279-1368) bottles with cylindrical necks and rotund bodies bearing lively floral patterns, were inspired by Han dynasty forms from more than 1,000 years before. Four

centuries after those modest containers come pieces like the fabulous 3 ½-foot-tall Qing dynasty “Grand Imperial Vase,” whose five parts include a trumpet-shaped top with gold handles in the form of curvy, semi-abstract mythic creatures; a bulbous body profusely covered by fish and flowers on a turquoise background; and a base supported by three golden chimera.

There are remarkable exceptions to the polychrome rule. An exceedingly elegant example is an 18th-century ivory-white basin with a dense vine pattern drawn in copper alloy lines.

Some of the most enchanting works represent animals. A festive wine vessel from the 18th century has a vase supported on the back of a fanciful, rainbow-feathered bird whose breast rides on a pair of ornate wheels. It could be a pull toy for a wealthy child.

Degrees of realism vary widely. Based on a Han dynasty prototype, an 18th-century bottle with a neck ending in the head of a duck and a spherical body covered by hexagonal modules and red blossoms offers an archaic, semi-abstract simplicity. A seven-inch sculpture of a goose (possibly 17th century), on the other hand, is wonderfully naturalistic. Standing flat on golden, webbed feet, it turns its head to stare with goosey, goggle-eyed curiosity.

Certain works exert mystic electricity. A large Qing dynasty vase in the form of a flattened sphere known as a “pilgrim flask” has a mesmerizing mandala on either side. At the center is a small black-and-white yin-yang symbol. And eight traditional Buddhist “auspicious symbols” — including the Lotus, the Twin Fish and the Endless Knot — are incorporated into the black and red trellislike pattern on a blue ground radiating from the center. Meditate on this piece long enough and you might achieve Tantric liftoff.

Western interest in Chinese cloisonné blossomed after the second Opium War, which ended in 1860. (That conflict arose because the British had been smuggling opium in vast quantities from India to China, contrary to Chinese law.) Britain prevailed, and, in addition to forcing the Chinese to accept opium importing, liberalized trade with China generally. All kinds of Chinese antiquities found their way into the hands of Western scholars, collectors and museums. Duly impressed by cloisonné discoveries, some European artists designed their own Chinese-style cloisonnés. Several examples are in the exhibition, including one by the French painter James Tissot.

Around 1870, Tissot acquired a gorgeous basin with pastoral and mountainous landscapes on its sides that was among many treasures looted from the Summer Palace in Beijing by British and French soldiers in 1860. That object is here displayed next to a Tissot design that it inspired. The pairing is instructive. Tissot substituted for the cute golden lion-shaped handles a pair of languorous, long-haired nude women seated on dragon heads. The cloisonné landscapes on his basin relate to those of the Chinese piece, but they are pedestrian by comparison. His work is suave but spiritually dull; the Chinese piece is pure magic.

“Cloisonné” runs through April 17
at Bard Graduate Center, 18 West 86th Street, Manhattan; (212) 501-3000, bgc.bard.edu.

http://www.nytimes.com/2011/02/18/arts/design/18cloisonne.html?ref=design

Today's Lab Rats of Obesity: Furry Couch Potatoes

By ANDREW POLLACK

HILLSBORO, Ore. — Like many these days, Shiva sits around too much, eating rich, fatty foods and sipping sugary drinks. He has the pot belly to prove it, one that nearly touches the floor — when he's on all fours, that is.

Shiva belongs to a colony of monkeys who have been fattened up to help scientists study the twin human epidemics of obesity and diabetes. The overweight monkeys also test new drugs aimed at treating those conditions.

"We are trying to induce the couch-potato style," said Kevin L. Grove, who directs the "obese resource" at the Oregon National Primate Research Center here. "We believe that mimics the health issues we face in the United States today."

The corpulent primates serve as useful models, experts say, because they resemble humans much more than laboratory rats do, not only physiologically but in some of their feeding habits. They tend to eat when bored, even when they are not really hungry. And unlike human subjects who are notorious for fudging their daily calorie or carbohydrate counts, a caged monkey's food intake is much easier for researchers to count and control.

"Nonhuman primates don't lie to you," said Dr. Grove, who is a neuroscientist. "We know exactly how much they are eating."

To allow monitoring of their food intake, some of the obese monkeys are kept in individual cages for months or years, which also limits their exercise. That is in contrast to most of the monkeys here who live in group indoor/outdoor cages with swings and things to climb on.

While this research is not entirely new and has been the target of some animal rights' group complaints, demand for the overweight primates is growing as part of the battle against the nation's obesity epidemic, according to Dr. Grove and other researchers working with such monkeys in Florida, Texas and North Carolina, and also overseas.

Some tests have already produced tangible results. Rhythm Pharmaceuticals, a start-up company in Boston, tested its experimental diet drug on some of the Oregon monkeys. After eight weeks, the animals reduced their food intake 40 percent and lost 13 percent of their weight, without apparent heart problems.

"We could get a much better readout on chronic safety and efficacy early," said Bart Henderson, the president of Rhythm, which now plans to move into human testing.

In another study, a group of academic researchers is using the monkeys to compare gastric bypass surgery with weight loss from forced dieting. One goal is to try to figure out the hormonal mechanisms by which the

surgery can quickly resolve diabetes, so that drugs might one day be developed to have the same effect. To that end, the study will do what cannot be done with people — kill some of the monkeys to examine their brains and pancreases.

The primate center here, which is part of Oregon Health and Science University, has more than 4,000 monkeys, mostly rhesus macaques. About 150 of them are the rotund rhesuses. Some receive daily insulin shots to treat diabetes, and some have clogged arteries. One monkey died of a heart attack a few years ago at a fairly young age.

Shiva, a young adult, gained about 15 pounds in six months and weighs about 45 pounds, twice the normal weight for his age. Like other monkeys with a weight problem, he carries much of the excess in his belly, not his arms and legs.

The monkey's daily diet consists of dried chow pellets, with about one-third of the calories coming from fat, similar to a typical American diet, Dr. Grove said, though the diet also contains adequate protein and nutrients.

They can eat as many pellets as they want. They also snack daily on a 300-calorie chunk of peanut butter, and are sometimes treated to popcorn or peanuts. Gummy bears were abandoned because they stuck to the monkeys' teeth.

They also drink a fruit-flavored punch with the fructose equivalent of about a can of soda a day. In all, they might consume about twice as many calories as a normal-weight monkey.

Dr. Grove and researchers at some other centers say the high-fructose corn syrup appears to accelerate the development of obesity and diabetes.

"It wasn't until we added those carbs that we got all those other changes, including those changes in body fat," said Anthony G. Comuzzie, who helped create an obese baboon colony at the Southwest National Primate Research Center in San Antonio.

Still, about 40 percent do not put on a lot of weight.

Barbara C. Hansen of the University of South Florida said calories, but not high fat, were important. "To suggest that humans and monkeys get fat because of a high-fat diet is not a good suggestion," she said.

Dr. Hansen, who has been doing research on obese monkeys for four decades, prefers animals that become naturally obese with age, just as many humans do. Fat Albert, one of her monkeys who she said was at one time the world's heaviest rhesus, at 70 pounds, ate "nothing but an American Heart Association-recommended diet," she said.

Mice and rats remain the main animals for medical research, but the effects on rodents often do not mirror those in people.

Rinat Neuroscience had an experimental drug that sharply reduced appetite in rodents. But obese baboons in San Antonio doubled or tripled their food intake when they got the drug.

The surprising result prompted Pfizer, which acquired Rinat, to explore whether the drug instead could promote weight gain, perhaps for cancer patients or others suffering from wasting.

Some companies see no need to use primates to study obesity and diabetes, saying it is almost as easy to do human studies.

Monkey studies can cost up to several million dollars. The animals are so precious that only a small number can be used. And there are ethical reviews before a study can begin.

"Doing primate studies is about as difficult as doing human studies from an ethical standpoint," said Dr. Lee M. Kaplan, director of the weight center at Massachusetts General Hospital, who is one of the researchers in the bariatric surgery study here.

Animal rights activists say primate studies subject animals to needless suffering, like the stress of being caged. Two activists got jobs here in the last decade and presented evidence of what they said were mistreated and unhealthy monkeys.

Jim Newman, a spokesman for the primate center, said the accusations were unfounded and that after both instances, inspectors from the Department of Agriculture found no violations of rules.

Activists also question whether the studies are needed.

For example, they point to studies in the last two years by Dr. Grove and colleagues showing that when pregnant monkeys ate the high-fat diet, their offspring had metabolic problems. The babies were also more prone to anxiety when confronted with threatening objects, like a Mr. Potato Head with huge eyes.

"Terrorizing Monkeys with Mr. Potato Head is Research?" Alisa Mullins of People for the Ethical Treatment of Animals wrote in November. She noted that in the study, fetuses were taken from wombs and killed so their brains could be dissected. She also questioned the need to study fat monkeys: "Gee, couldn't he have hung out at the local McDonald's and learned the same thing?"

Dr. Grove said he understood the protesters' view: "I applaud them for that pressure because it makes us do our job better."

But he said the study found the diet induced chemical changes in the brains of fetuses that might be responsible for the problems in the offspring. The findings might also apply to humans but could not be studied in people.

The studies also found something else that could be important for people — that eating a healthy diet during pregnancy reduced troubles in the offspring. That suggests, he said, that the diet of a pregnant woman matters more than whether she is obese.

He also defended keeping the animals in some studies in individual cages. Not all labs do. At Wake Forest University, the monkeys are housed in pairs and separated only at meal times so that researchers can monitor what each monkey eats.

"These are social animals," said Janice D. Wagner, a professor of pathology there. "We think they are happier that way."

But Dr. Grove said he needed the animals separated at all times so they could snack between meals, since that is an important reason people gain weight. And allowing them outside, even one at a time, would mean they would exercise more.

"Our research model is a sedentary lifestyle with calorically dense diets," he said.

As pharmaceutical companies move some research to less expensive countries, the obese monkeys are following. "This is a booming industry in China," said Dr. Grove. "They have colonies of thousands of them."

http://www.nytimes.com/2011/02/20/health/20monkey.html?ref=health

Study of Breast Biopsies Finds Surgery Used Too Extensively
By DENISE GRADY

Kelly Jordan for The New York Times

A study by Dr. Stephen R. Grobmyer, the director of the breast cancer program at the University of Florida in Gainesville, has found that too many surgical biopsies are being performed

Too many women with abnormal mammograms or other breast problems are undergoing surgical biopsies when they should be having needle biopsies, which are safer, less invasive and cheaper, new research shows.

A study in Florida found that 30 percent of the breast biopsies there from 2003 to 2008 were surgical. The rate should be 10 percent or less, according to medical guidelines.

The figures in the rest of the country are likely to be similar to Florida's, researchers say, which would translate to more than 300,000 women a year having unnecessary surgery, at a cost of hundreds of millions of dollars. Many of these women do not even have cancer: about 80 percent of breast biopsies are benign. For women who do have cancer, a surgical biopsy means two operations instead of one, and may make the cancer surgery more difficult than it would have been if a needle biopsy had been done.

Dr. Stephen R. Grobmyer, the senior author of the Florida study, said he and his colleagues started their research because they kept seeing patients referred from other hospitals who had undergone surgical biopsies (also called open biopsies) when a needle should have been used.

"After a while you keep seeing this, you say something's going on here," said Dr. Grobmyer, who is director of the breast cancer program at the University of Florida in Gainesville.

The reason for the overuse of open biopsies is not known. Researchers say the problem may occur because not all doctors keep up with medical advances and guidelines. But they also say that some surgeons keep doing open biopsies because needle biopsies are usually performed by radiologists. The surgeon would have to refer the patient to a radiologist, and lose the biopsy fee.

A surgical biopsy requires an inchlong incision, stitches and sometimes sedation or general anesthesia. It leaves a scar. A needle biopsy requires only numbing with a local anesthetic, uses a tiny incision and no stitches and carries less risk of infection and scarring.

If the abnormality in the breast is too small to be felt and has been detected by a mammogram or other imaging method, the needle biopsy must also be guided by imaging — mammography, ultrasound or M.R.I. — and will often have to be performed by a radiologist. If a lump can be felt, imaging is not needed to guide the needle, and a surgeon can perform it.

"Surgeons really have to let go of the patient when they have an image abnormality," said Dr. I. Michael Leitman, the chief of general surgery at Beth Israel Medical Center in Manhattan. "They are giving away a potential surgery. But the standards require it. And I'm a surgeon."

Dr. Grobmyer's study, published by The American Journal of Surgery, is based on 172,342 biopsies entered into a state database in Florida. It is the largest study of open biopsy rates in the United States, and the first to include patients with and without cancer.

About 1.6 million breast biopsies a year are performed in the United States. But in 2010, only about 261,000 found cancer (207,000 women had invasive breast cancer, and another 54,000 had a condition called ductal carcinoma in situ, in which cancer cells have not invaded the surrounding tissue).
Hospitals charge $5,000 to $6,000 for a needle biopsy, and double that for an open biopsy, according to Dr. Grobmyer's article. Doctors' fees for an open biopsy range from $1,500 to $2,500, he said, and $750 to $1,500 for a needle biopsy.
A surgeon who was not part of Dr. Grobmyer's study said she often encountered patients referred from other hospitals whose open biopsies should have been done with a needle.
"I see it all the time," said the surgeon, Dr. Elisa R. Port, the chief of breast surgery at Mount Sinai Medical Center in Manhattan. "People are causing harm and should be held accountable."
Dr. Melvin J. Silverstein, a breast cancer surgeon at Hoag Memorial Hospital Presbyterian in Newport Beach, Calif., and a clinical professor of surgery at the University of Southern California, said it was "outrageous" that 30 percent of breast biopsies were done by surgery.
He said some of the unnecessary procedures were being performed by surgeons who did not want to lose biopsy fees by sending patients to a radiologist.
"I hate to even say that," Dr. Silverstein said. "But I don't know how else to explain these numbers."
A study at Beth Israel Medical Center in Manhattan (Dr. Leitman was an author), published in 2009, found that the rate of open breast biopsies in 2007 varied with the type of surgeon.
Breast surgeons employed by the hospital and involved in teaching had a 10 percent rate. Breast surgeons in private practice who operated at Beth Israel had a 35 percent rate. Among general surgeons, who do not specialize in breast surgery (some who were on staff at the hospital and some who were not), the rate was 37 percent. All the doctors earn biopsy fees, so they all had the same incentive.
The lead author of the study, Dr. Susan K. Boolbol, chief of breast surgery at Beth Israel, said the difference could be explained, in part, by training. She said the academic breast surgeons on the hospital staff were more likely than the others to keep up with new developments in the field and to work closely with radiologists. As for the idea that the motivation was money, she said, "A huge part of me doesn't want to believe it's true."
She said that when she asked surgeons in the study why they were doing open biopsies, many said patients wanted them. "My comeback was, 'Do you think you had an inherent bias in the way you explained it?' " In the past seven years, she said she had only one patient choose an open biopsy over a needle biopsy.
Dr. Boolbol says some patients fear that sticking a needle into a cancer will cause it to spread, and she spends a lot of time explaining that it is not true. She said that open biopsy rates declined among surgeons at Beth Israel who were told about her study's findings, but newcomers still tended to have higher rates.
"This is a constant education process for surgeons," she said.
One way for hospitals to stop excess open biopsies is to ban them, Dr. Silverstein said, unless they are truly necessary, as in uncommon cases in which a needle cannot reach the spot.
"We made a rule," he said. "If it can be done with a needle, it has to be. We embarrass you if you do an open biopsy. We bring you before a tumor board to explain."
Dr. Silverstein says that when he lectures and asks how many surgeons in the audience perform open biopsies, no hands go up. "Nobody will admit it," he said.
He said there is more to be gained by taking his message straight to the patients. He and other doctors say that any woman who is told that she needs a surgical biopsy should ask why, and consider a second opinion.
"Maybe we have to get patients to say, 'This guy took a big chunk out of me and I didn't even have cancer, and now I'm deformed,' " Dr. Silverstein said. "Who just overthrew Mubarak? The people. This is exactly the same thing."

http://www.nytimes.com/2011/02/19/health/19cancer.html?ref=health

A Homecoming for Bighorn Sheep in Colorado

By KIRK JOHNSON

Matthew Staver for The New York Times
Heather Halbritter, a biologist for the Colorado Division of Wildlife, released three bighorn sheep on Wednesday in an area of the Pike National Forest that was devastated by a fire in 2002.

SEDALIA, Colo. — The mechanics were simple. A trailer latch popped, a gate swung open and three wild bighorn sheep — two females, presumably pregnant, and a year-old lamb, definitely frisky — trotted up the rocky slope of Thunder Butte under a pale afternoon sun.

It is the back story of the animals' release this week by wildlife biologists here in the mountains southwest of Denver that can stagger the mind with its complications of coincidence, historical accident, devastation and hope.

A truck breakdown on a highway in February 1946 played a role, believe it or not, as did the biggest Colorado wildfire in memory, the Hayman, in June 2002. The fire roared through the cliffs in the Pike National Forest with flames hundreds of feet high, scouring the land of trees across 138,000 acres.

Human intervention, from the mining boom in the late 1800s, when timber was cut by the trainload for fuel and construction, through the bighorn reintroduction program in the Hayman burn area by the Colorado Division of Wildlife, begun last year, completed the circle of natural and wild that brought the bighorns home. They were last seen in this area in the mid-1960s.

However the pieces fit, biologists and land managers say a bighorn homecoming to the Hayman is a powerful reaffirmation of hope in the West for a creature that has long symbolized the ideals of sure-footed survival in the high lonesome aeries where they evolved and still persist. Sheep restoration began here last year with the first 12 animals and continued with 12 more this month.

"We're back," Janet George, a senior biologist at the Colorado Division of Wildlife, said as the animals peered around at their new home (their eyesight is excellent, which is why they stake out rocky perches, the better to spot approaching predators). "This was historically bighorn range, and then it couldn't sustain a sheep herd any more," Ms. George said. "And now nine years after the fire, it can again."

But back to that truck accident. In early 1946, state wildlife managers were hauling 14 bighorns near Colorado Springs, intending to start a herd of transplants near Pikes Peak. When the truck broke down, the animals were instead released right where they were. The 14 pioneers — 10 ewes, 2 rams and 2 lambs — drifted north and established vibrant herd from which the Hayman group was drawn for release.

The accidental but successful herd created the gene pool, and the Hayman fire restored a habitat of treeless rock that bighorns love, and where they seek shelter from predators who cannot match them in cliff-side clambering.

Their agility is partly due to unique hooves that have evolved specifically for climbing rocks, with a hard outer wall and a soft inner wall for traction. Combined with iron-lunged endurance, they can even sometimes evade mountain lions, which are fierce and fast but quickly winded.

It is a life and a niche in the high rocky places, where — crucially — humans usually do not build ranches or mansions, that has allowed the bighorns' numbers to hold strong along the spine of the Rockies from Colorado through Wyoming, Montana and into Alberta, Canada, each of which has bighorn populations estimated at 7,000 animals or more.

But the Hayman burn site is as much a character in this saga as the animals, and the healing from its giant scar has been slow. On June 8, 2002, a United States Forest Service employee named Terry Barton said that she burned a letter from her estranged husband at a campground, and that the fire spread. Ms. Barton ultimately pleaded guilty to arson and spent six years in prison.

Hayman was also calamitous for Denver's water system, which has spent millions of dollars rebuilding and cleaning a reservoir in the burn area that became clogged with sediment from eroding soils that were no longer held in place by grasses and trees.

Ms. George, the state biologist, said it would take decades before Thunder Butte became reforested. That is very good news for the sheep, which have survived in part by avoiding forests, where predators like lions can drop from above.

But that is also assuming that the historical cycle of rebirth and growth repeat in the same way. With climate change and planetary warming in the decades to come, Ms. George said, the next-generation forest here might be very different from the one that was erased by Hayman.

Meanwhile, as the three new residents disappeared up into the rocks, another biologist with the Division of Wildlife, Heather Halbritter, was tracking the nine sheep released earlier this month from that same post-1946 group, using the radio-beacon collars they had been fitted with.

"They're in those rocks, up along the ridgeline," she said, waving the tracking device and pointing in the very direction the newcomers were going. A herd reunion might be in the offing.

Then the two ewes and their tag-along lamb stopped on a cliff. As if posing for a picture, or assessing the strangely beautiful moonscape of the Hayman, they stood in silhouette.

"That's what sheep do," Ms. George said. "They climb out on a rock and look."

http://www.nytimes.com/2011/02/19/us/19bighorn.html?ref=science

Can Botox really cure chronic migraine?

- 14:01 18 February 2011 by **Jessica Hamzelou**

Smoothing it all away (Image: Image Source/Rex Features)

Beyond erasing wrinkles, Botox can now help people who spend more than half their lives in headache agony. But is there enough evidence to support treating chronic migraine sufferers with regular shots of the toxin around the head and neck? Doctors are divided.

What is Botox?

Botox is the trade name for botulinum toxin – a protein produced by the *Clostridium botulinum* bacterium. By blocking the release of a chemical messenger in the brain, the toxin stops muscles from contracting.

Why try preventing migraines with it?

The story starts around 10 years ago, with some of Hollywood's most revered residents – cosmetic surgeons. "The plastics people suggested that some of their patients had relief from migraine after Botox treatment," says Peter Goadsby, director of the University of California, San Francisco's Headache Centre.

The idea began to spread and clinicians started giving Botox as an "off-label" treatment – that is, in a way not approved by regulators – to people with migraines.

Allergan, the pharmaceutical company that developed Botox, soon cottoned on and started marketing Botox as a migraine treatment. However, with no proof that the treatment worked, last year the company was fined $375 million for unlawful marketing.

Since then, a number of clinical trials have ruled out any significant reduction in normal tension headaches and non-chronic migraine after Botox treatment.

Chronic migraine differs from ordinary migraines and tension headaches, however. In chronic migraine, the person has a headache on more than 15 days of each month, at least eight of which are migraines.

What is the evidence for using Botox for chronic migraine, then?

Two clinical trials have investigated this. In both, people with chronic migraine received a series of five 12-weekly rounds of injections of either Botox or a placebo. In each round, individuals were given 31 injections at specific sites around the head and neck.

The first trial concluded that the Botox injections had no effect on the number of headaches experienced by those with chronic migraine, but hinted that the number of days affected by migraine might have been reduced.

When the same team looked at the latter outcome in the second trial, they found a 10 per cent reduction in the number of headache days compared with the placebo group.

How is Botox thought to help chronic migraine?

No one knows. The general consensus is that the blocking of muscle contraction isn't involved in headache relief, says Goadsby. Beyond that, researchers are generally stumped.

How solid is the evidence that Botox works?
Solid enough for the US Food and Drug Administration and the UK Medicines and Healthcare products Regulatory Agency: both bodies approved the therapy for chronic migraine last year.
Others remain unconvinced. Jes Olesen, a neurologist at the University of Copenhagen and chief of the Danish Headache Centre at Glostrup University Hospital in Denmark, has identified a number of faults in the trials, listed in a letter to *The Lancet* in November. His concerns were echoed in an editorial published in Drug and Therapeutics Bulletin this month.
Why is there a dispute?
According to Olesen, over half the trial participants overused pain medication, so the researchers wouldn't have been able to tell whether the participants had chronic migraine or medication overuse headache. What's more, it's impossible to hide the fact that people are receiving Botox, he adds – and that would invalidate the double-blind nature of the experiment. "Their facial expressions change," he says.
Even if you were able to get over those issues, the 10 per cent improvement pales in comparison to the usual 20 to 30 per cent required for most approved drugs, he says. "The FDA has committed one of the biggest blunders in regulatory history."
Sheena Aurora, neurologist at the Swedish Pain and Headache Center in Seattle, Washington, and lead researcher in the clinical trials, says the criticisms are "shocking". People with chronic migraine regularly take painkillers, so the trial represents the real-life situation, she argues.
The placebo group saw a 30 per cent response to the injections, compared with a 40 per cent response from the real injection. This indicates that people weren't looking for changes in their appearance to judge pain relief, either, she adds. And as for the 10 per cent improvement of the Botox group over the placebo group: "Who are we to say 10 per cent isn't enough for these patients?"
Goadsby agrees. "People with chronic migraine are highly disabled and have an unmet need for therapy," he says. "Everyone in clinical practice knows that chronic migraine is very difficult to treat."
While academic criticisms of trials are interesting, Goadsby says, they're not helpful to the millions of migraineurs. "Worrying about a little stone on the road is interesting, but we need to look at the bigger picture."

http://www.newscientist.com/article/dn20150-can-botox-really-cure-chronic-migraine.html?full=true&print=true

Vacuum has friction after all

- 11 February 2011 by **David Harris**
- Magazine issue 2799.

Don't stop me now (Image: Ellinor Hall/Johner/Corbis)

A BALL spinning in a vacuum should never slow down, since no outside forces are acting on it. At least that's what Newton would have said. But what if the vacuum itself creates a type of friction that puts the brakes on spinning objects? The effect, which might soon be detectable, could act on interstellar dust grains.

In quantum mechanics, the uncertainty principle says we can never be sure that an apparent vacuum is truly empty. Instead, space is fizzing with photons that are constantly popping into and out of existence before they can be measured directly. Even though they appear only fleetingly, these "virtual" photons exert the same electromagnetic forces on the objects they encounter as normal photons do.

Now, Alejandro Manjavacas and F. Javier García de Abajo of the Institute of Optics at the Spanish National Research Council in Madrid say these forces should slow down spinning objects. Just as a head-on collision packs a bigger punch than a tap between two cars one behind the other, a virtual photon hitting an object in the direction opposite to its spin collides with greater force than if it hits in the same direction.

So over time, a spinning object will gradually slow down, even if equal numbers of virtual photons bombard it from all sides. The rotational energy it loses is then emitted as real, detectable photons (*Physical Review A*, DOI: 10.1103/PhysRevA.82.063827).

The strength of the effect depends on the object's make-up and size. Objects whose electronic properties prevent them from easily absorbing electromagnetic waves, such as gold, may decelerate little or not at all. But small, low-density particles, which have less rotational momentum, slow down dramatically.

The rate of deceleration also depends on temperature, since the hotter it is the more virtual photons pop in and out of existence, producing the friction. At room temperature, a 100-nanometre-wide grain of graphite, the kind that is abundant in interstellar dust, would take about 10 years to slow to about one-third of its initial speed. At 700 °C, an average temperature for hot areas of the universe, that same speed decrease would take only 90 days. In the cold of interstellar space, it would take 2.7 million years.

Could this effect be tested in the lab? Manjavacas says the experiment would require an ultra-high vacuum and high-precision lasers to trap the nanoparticles, conditions that are "demanding but reachable in the foreseeable future".

John Pendry of Imperial College in London calls the analysis a "fine piece of work" and says it could provide insights into whether quantum information is ever destroyed, for example, when it falls into a black hole. He says the real photons emitted during the deceleration process should contain information about the quantum state of the spinning particle, much as the photons thought to escape from black holes as Hawking radiation are thought to encode information about the holes.

"This is one of the few elementary processes that converts what appears to be purely classical mechanical energy into a highly correlated quantum state," Pendry says.

How to float above a vacuum

Houdini would be proud. It seems there is a way to levitate an object in a vacuum just by channelling the quantum fluctuations.

The trick involves the Casimir effect, in which objects very close to one another are pulled together thanks to quantum fluctuations in the vacuum between and around them. When two plates are brought ever closer together, for example, fewer fluctuations can occur in the gap between them. Fluctuations on their outer sides, however, continue as normal. This pressure difference on either side of the plates forces them to stick together.

In recent years, physicists have been trying to develop ways to reverse the Casimir effect and repel nearby objects, causing them to levitate. Previous suggestions have included inserting various materials between the objects to be repelled - such as exotic metamaterials, which bend electromagnetic waves in the opposite way to that expected, reversing the Casimir effect.

Now, Stanislav Maslovski and Mário Silveirinha of the University of Coimbra in Portugal outline a way to repel objects with no filler material. Their setup, described in a paper to appear in *Physical Review A*, uses 40-nanometre-wide silver rods stuck in a substrate like candles on a cake.

The metallic "candles" would channel the fluctuations between them, pushing anything placed there away. So if a perforated metal bar was lowered over the candles, with a candle poking through each hole, the bar should float, repelled in all directions by the candles between and around each hole.

http://www.newscientist.com/article/mg20927994.100-vacuum-has-friction-after-all.html

Gushing flood formed giant Martian sinkhole

- 10 February 2011
- Magazine issue 2799.

Hebes Chasma's formation has been a puzzle (Image: ESA/DLR/FU Berlin/G. Neukum)

LIKE water draining from an unplugged bathtub, meltwater flowing through deep cracks in the Martian rock may explain the origins of the enormous Hebes Chasma canyon.

About 100,000 cubic kilometres of material had to be removed to form the scar, which is five times the width and depth of the Grand Canyon. But where that material went has been a mystery, as there are no surface channels through which water and sediment could have exited.

John Adams of the University of Washington in Seattle and colleagues proposed in 2009 that heat from magma beneath the surface caused ice held in the rock to melt and released water locked up in salts. The water then drained away through underground cracks, leaving a void into which the overlying rock collapsed, to form the canyon.

Now, a tabletop experiment has bolstered this theory. Martin Jackson of the University of Texas at Austin and colleagues filled a box with viscous silicone oil, representing a watery slush, and covered it with sand and small glass spheres. As the oil was allowed to drain out through slits in the box's floor, a structure resembling Hebes Chasma appeared (*Geological Society of America Bulletin*, DOI: 10.1130/B30307.1).

Water from the canyon may have erupted onto the surface again. This would account for a nearby valley called Echus Chasma that looks as if it was carved by water, but for which there is no other obvious source. "You've got signs that a huge amount of water just erupted out of nowhere from depth and flowed down, scouring out a valley," Jackson says.

Similar collapses might have helped form other giant canyons on Mars, perhaps including Valles Marineris, the solar system's largest, though other factors like tectonic stretching were likely involved too, Jackson says.

http://www.newscientist.com/article/mg20927994.500-gushing-flood-formed-giant-martian-sinkhole.html

Clearing up space junk, one piece at a time

- 15 February 2011 by **Paul Marks**
- Magazine issue 2799.

Armed and advantageous (Image: NASA)

As the cloud of orbiting junk shrouding the Earth grows ever denser, the most sophisticated garbage collectors of all time are taking shape

IN SEPTEMBER 2009 a giant robotic arm beneath the International Space Station plucked an uncrewed Japanese cargo ship from the void of space. It was the first time this spectacular capture mechanism had been tried, but this robotic grab was no one-off. On 27 January this year, the Japanese space agency, JAXA, was involved again with HTV2, its second cargo craft (pictured). The feats show that "robotic capture" can be a reliable option in orbit.

Their success was critical for engineers developing technologies designed to clear space debris, because they need related orbital snatch-and-grab technology to drag defunct satellites to a lower orbit to burn up on re-entry. This matters because there are now 22,000 human-made objects larger than 10 centimetres across in orbit and half a million larger than 1 centimetre - and all pose a grave risk to space missions.

More debris is on its way. Hugh Lewis, a space scientist at the University of Southampton in the UK, has calculated that the debris population in low Earth orbit will increase by at least 33 per cent over the next two centuries. Even if space agencies never launched another rocket, the cloud of debris will continue to grow as pieces of space junk crash into one another.

There are a number of ideas about how best to go about clearing up this mess. At Star Technology and Research (STR) in Mount Pleasant, South Carolina, Jerome Pearson proposes a scheme in which a spacecraft comprising a conducting-cable tether would orbit Earth, grabbing debris and casting it into lower orbits (see diagram).

Studded with solar arrays that generate electric current in the cable, STR's Electro Dynamic Debris Eliminator (EDDE) slowly rotates and uses the current's interaction with Earth's magnetic field to change its orbit. EDDE is manoeuvred until it matches orbits with the target, and rotates so it either robotically grabs the junk or ensnares it in a net. The debris can then be slung into a lower, re-entry orbit or EDDE can descend and then release it.

That's all very well if the target object is intact. But if sharp shards are protruding from a tumbling, disintegrating dead satellite, it could damage any robot arm that tries to capture it. So Shin-Ichiro Nishida and Satomi Kawamoto of JAXA's Kanagawa lab are researching how to capture such "non-cooperative" targets (*Acta Astronautica*, DOI: 10.1016/j.actaastro.2010.06.045). Their trick is to place long polymer brushes on the tips of the robot arm's graspers. The deflection of the brushes as it closes in are sensed so that the safest moment to grab hold of the craft can be calculated.

Once a craft is captured, de-orbiting it can be hastened in many ways (see opposite). JAXA says a tether can be added to create drag in the rarefied upper atmosphere, for example. Christophe Bonnal at the French space

agency CNES, in Evry, says a debris de-orbiting robot could fix a small rocket motor to a captured craft to send it down.

Re-entry is not the only option: dead satellites in geostationary orbit, at an altitude of about 36,000 kilometres, are normally placed in a "graveyard" orbit 300 kilometres above the ring of active satellites. But if a satellite runs out of fuel before it can be sent there it's stuck. Shoji Kitamura at JAXA believes an ion-engine-powered service craft could fly close to a dead satellite and use a beam of ions from a second ion engine on the opposite side to slowly nudge the dead craft into the graveyard zone. It has drawbacks - backscattered ions might damage the service craft's solar arrays for instance - but simulations suggest that it could work.

We are not going to find out a ny time soon which of these ideas will fly: legal issues over who owns space junk, combined with the expense of these technologies, means spacefaring nations first need broad agreement on debris management.

"The eventual remediation of the near-Earth space environment is a global issue and it will likely be undertaken via an international effort," says Nicholas Johnson, NASA's chief scientist for orbital debris.

System 1 The tether

The Electro Dynamic Debris Eliminator (EDDE, above) is an 11-kilometre-long aluminium tether that, once in orbit, needs no conventional propellant to carry out its mission. When launched, one end of it is given a kick by a small thruster to set it slowly spinning and to keep it under tension. The Earth's magnetic field interacts with the current flowing in the straight tether to create a net force which controls its orbit - change the current and you change the orbit. The current is produced from solar panels positioned along the tether. To help EDDE snare a defunct spacecraft, the current can be changed across different segments of the tether to induce small torques that allow its rate of rotation to be changed. Once it has reached its target, EDDE can then deploy either a net or a robotic arm to grab the object and de-orbit it.

System 2 Smart grab

The robotic arm on the space station proved that grabbing objects in space is possible. But when a satellite is retired it starts tumbling out of control as its gyroscopes fail. Combined with disintegration or collisions with other spacecraft, this can make it hazardous to grasp. This means that sensors are needed to ensure the robotic grasper system is not damaged as it grabs its target (see main story).

System 3 Socket rocket

Space junk can have a small solid-fuel rocket motor attached to it by a de-orbiting craft - requiring only a short burn in the right direction to take it down to a re-entry orbit. The craft could carry many such motors and be resupplied when necessary. The best place to attach the motor would depend on the target. Or a tether may be attached to create atmospheric drag, making the junk fall and burn up.

System 4 Ion engine

Spacecraft that fail in geostationary orbit, 36,000 kilometres from Earth, put their neighbouring TV and telecoms satellites in harm's way. The Japanese space agency (JAXA) says a "re-orbiter" with one ion engine providing its own thrust and another firing an ion beam at a geostationary debris object could lift it into a graveyard orbit 300 kilometres higher - keeping it safe for a century.

http://www.newscientist.com/article/mg20927995.400-clearing-up-space-junk-one-piece-at-a-time.html?full=true&print=true

Protein dose reverses learning problems in Down's mice

- 18 February 2011 by **Aria Pearson**
- Magazine issue 2800.

Triple trouble: chromosome 21 (Image: Wessex reg, Genetics Centre/Wellcome Images)

LEARNING and memory problems have been reversed in mice with a syndrome that mimics Down's. Catherine Spong and colleagues at the National Institutes of Health in Bethesda, Maryland, found they could prevent developmental problems in mice engineered to have Down's syndrome by injecting their mothers with two proteins, called NAP and SAL, while they were still in the womb. This treatment would carry many risks for humans, so the team wondered whether the proteins might also help adult mice.

Spong's team engineered mice to have an extra chromosome 16, which causes similar problems to those caused by an extra chromosome 21 in humans, the trigger for Down's (see picture). The mice then had to find a submerged platform in a water maze using visual cues. Down's mice usually take twice as long to find the platform as healthy mice. However, after four days of oral treatment with NAP and SAL, the Down's mice learned to navigate the maze just as easily as normal mice.

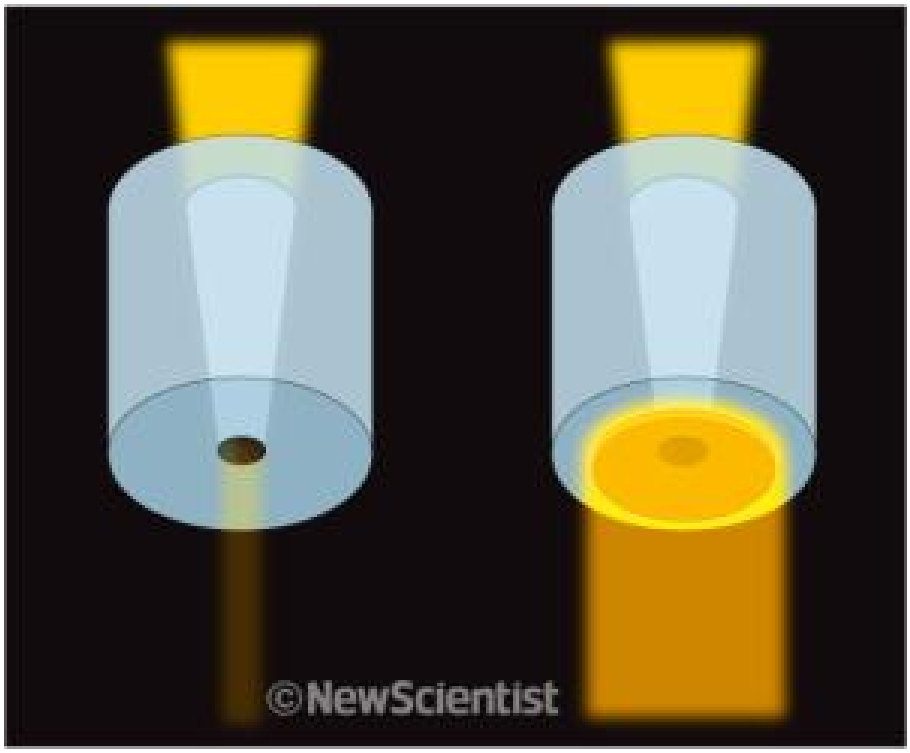
NAP and SAL are fragments of proteins normally produced by glial cells - brain cells that provide nourishment to neurons. We know that glial cells malfunction in people with Down's. Mice treated with the proteins had markers of healthy glial function that were missing in the untreated Down's mice.

In a second experiment, the team investigated whether the treatment caused changes in chemicals known to be involved in "long-term potentiation" (LTP) - a type of brain activity key to memory formation. People and mice with Down's have decreased levels of many chemicals involved in this process. However, treated mice appeared to have increased levels of a receptor called NR2B that is responsible for initiating LTP (*Obstetrics & Gynecology*, DOI: 10.1097/AOG.0b013e3182051ca5). Craig Heller, co-director of Stanford University's Down Syndrome Research Center in California, says this study makes one thing clear: "Learning disabilities and mental retardations that were considered permanent are treatable."

http://www.newscientist.com/article/mg20928004.500-protein-dose-reverses-learning-problems-in-downs-mice.html?full=true&print=true

Light through a blocked hole? Plasmonics is the answer

- 16:11 11 February 2011 by **Jon Evans**



Blocking the hole lets more light through

How would you react if a tiny hole in a piece of foil let through more light after you had covered it – or painted the foil a different colour?

With surprise, probably, like the physicists who discovered that this is just what happens with some very small holes. Both findings could lead to light-based transistors and other components for high-speed optical computers.

Conventional optics forbids light from passing through holes that are much smaller than its wavelength, which for visible light means less than around 400 nanometres wide. But in 1998, Thomas Ebbesen at the University of Strasbourg, France, reported that some wavelengths of visible light stream through holes in gold foil that are less than 300 nanometres wide.

It turns out that this is due to ripples known as plasmons that are found on the surface of metals and formed by the oscillation of electrons.

Total eclipse

If the frequency of light hitting the surface of a metal happens to match the oscillation of that metal's surface electrons, the plasmons grab the photons, guide them through the holes and release them on the other side. The plasmons on gold surfaces, for example, are particularly adept at interacting with visible light.

Now a team led by Hiromi Okamoto at the Institute for Molecular Science in Okazaki, Japan, have found another way to coax photons through tiny holes – paradoxically, by obscuring the hole with a gold disc.

The team was shining light down an optical fibre that tapered to a 100-nanometre-wide aperture. At first, barely any light made it through the aperture; instead, it was reflected back up the fibre. But when the researchers placed a small gold disc very close to the aperture, so that it completely eclipsed the hole without actually touching it, the light started streaming through (see graphic, right).

They suspect that plasmons from the gold disc are leaping up through the hole, grabbing the photons stuck inside the fibre and dragging them through. These photons then stream around the edges of the disc.

Dye enhancement

Okamoto's team found that if the disc touched the hole, the effect did not work; widening the disc, however, caused still more light to come through. "When we observed that the larger disc gives higher transmission, we were really surprised," Okamoto says.

This ability to open or block a hole to light could be useful when building components for optical computers, which transmit signals using light instead of electrons.

"The novelty is in controlling this transmission with various 'caps'," says Dmitry Skryabin, a nanophotonics researcher at Bath University in the UK.

Light transmission through a tiny hole can also be controlled with dyes, as Ebbesen and his colleague James Hutchison, also at the University of Strasbourg, recently found.

Plasmon passing

Normally, when white light is shone onto a piece of gold foil pierced with tiny holes, only the wavelengths of green light pass through. But Ebbesen and Hutchison found that coating the foil with a thin layer of green dye allowed red light to pass through as well; indeed, more red than green started to come through.

This was a shock, as green dye should absorb all light except green. "One certainly doesn't expect a sample to become transparent at the wavelengths where the molecule absorbs," says Hutchison.

The researchers suspect that the dye molecules absorb the red light but then "pass" it to the plasmons underneath the dye, which are not of the right frequency to interact with red light directly.

Hutchison says that holes painted with various dyes could also be useful in optical computing components.

Journal references: *Nano Letters*, DOI: 10.1021/nl103408h; *Angewandte Chemie*, DOI: 10.1002/anie.201006019

http://www.newscientist.com/article/dn20116-light-through-a-blocked-hole-plasmonics-is-the-answer.html?full=true&print=true

Molecules seen rebounding before they hit a surface

- 21:35 18 February 2011 by **Rachel Courtland**

Imagine watching a tennis game in which the ball bounced back before it hit the court. That's what single atoms have been seen to do for years in a phenomenon known as quantum reflection. Now physicists have performed the feat with molecules.

The bizarre bouncing arises because quantum particles behave like waves rather than single, defined points. When the wave-like particles approach a surface, they swim into the surface's electric field. Even if they are attracted by this field electrically, the sudden change in environment can cause them to rebound before actually hitting the surface, like water waves ramming together in front of a speeding boat's hull.

"Physics students learn this quantum reflection in their quantum mechanics course, but they might doubt that it's happening in the real world," says Bum Suk Zhao of the Fritz Haber Institute in Berlin, Germany.

Zhao and colleagues have shown that the effect does happen with molecules.

Dimers and trimers

The team cooled helium to about 0.001° C above absolute zero. At that temperature, some of the atoms in the gas clumped together to form fragile molecules containing two or three helium atoms, called dimers and trimers, respectively. A stream of these cooled atoms and molecules was then shot at a piece of aluminium-coated glass at a speed of 300 metres per second.

Although the helium moved quickly, it was sent towards the target at a glancing angle – just 0.02° – meaning it would impact with very little energy. The team found that the dimers and trimers rebounded when they were still tens of nanometres away from the target's surface.

They also stayed intact afterwards, without breaking up into individual helium atoms. "When we saw the dimer reflection we were surprised, because it is very fragile," Zhao says. The helium atoms in a dimer are bound together with 100 million times less energy than two bound hydrogen atoms, a connection so tenuous it has been dubbed "the weakest bond".

Molecules such as helium dimers could act as test particles to help physicists better understand the physics of surfaces. That could help refine "atom optics" devices like atomic clocks that exploit the wave nature of atoms, and could help develop "chips" that would use cold atoms for quantum computing.

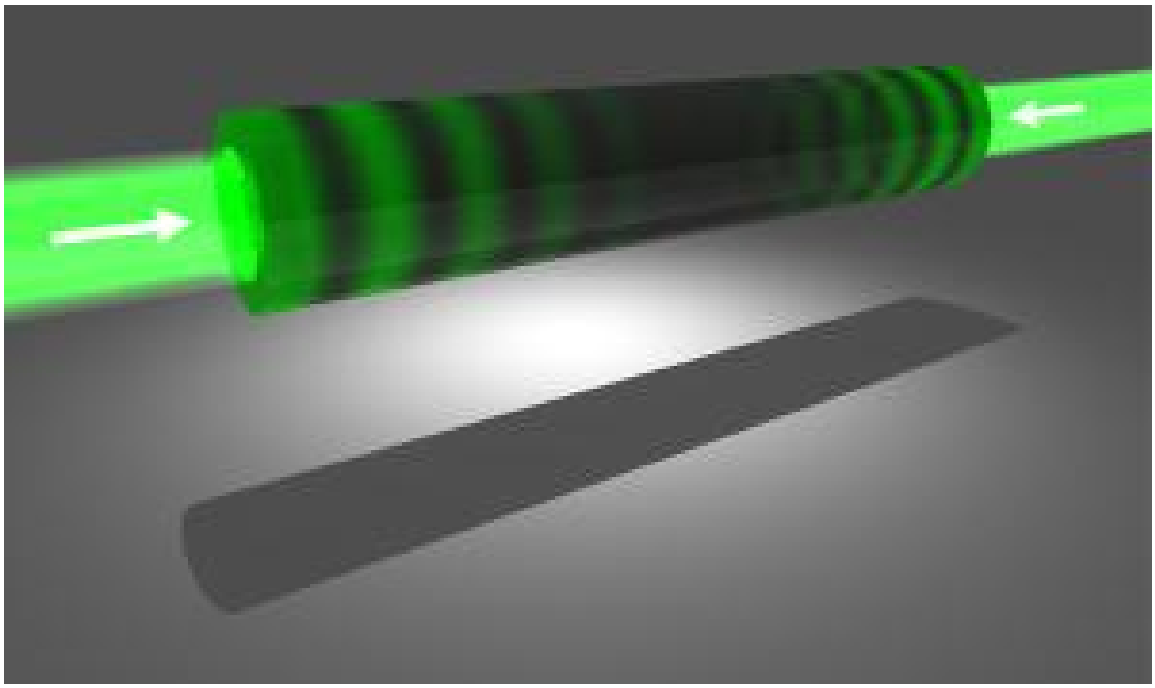
"These are tough experiments to do, and these are the experiments that one has to do in order to further develop the technology related to cold atoms," says Dennis Clougherty of the University of Vermont in Burlington.

Journal reference: *Science*, vol 331, p 892

http://www.newscientist.com/article/dn20151-molecules-seen-rebounding-before-they-hit-a-surface.html

'Anti-laser' built for first time

- 19:00 17 February 2011 by **Jeff Hecht**



In an anti-laser, or coherent perfect absorber, the outgoing laser beams are replaced by incoming ones, and light flows into a light-absorbing material instead of out of a light-amplifying one (Image: Science/AAAS)
Enlarge image

An anti-laser – which absorbs light rather than emitting it – has been built for the first time.

A laser shines by producing a cascade of photons that bounce around inside a light-amplifying material before exiting from one or both ends. In 2010, Douglas Stone at Yale University and colleagues devised a way to reverse the process, with a material that absorbs rather than amplifies light.

The researchers calculated that if they used a light-absorbing material like silicon, then at certain wavelengths, two identical laser beams shone directly at each other would cancel out inside the material.

Now, a team led by Hui Cao of Yale has done just that using a 110-micrometre-wide slab of silicon.

The researchers chose the wavelength of the laser light so that light waves hitting the outside of the slab from the laser beams were in just the right phase with the waves transmitted through the material to trap the light inside the slab.

The silicon absorbed 99.4 per cent of near-infrared light with a wavelength of 998.5 nanometres, turning it into heat. "Theory and experiment matched very well," says Stone. "We couldn't have expected to do any better."

Future computers may use light to transmit signals efficiently between their chip processors. Anti-lasers could be used to modulate the intensity of that light, or to convert light signals into electrical form for on-chip processing, the researchers say.

Journal reference: *Science*, vol 331, p 889

http://www.newscientist.com/article/dn20147-antilaser-built-for-first-time.html

Toddlers know counting rules at 18 months

- 14:57 17 February 2011 by **Wendy Zukerman**
-

Learning the rules (Image: Anthony Bradshaw/Getty)

Months before they begin to count, toddlers are teaching themselves the rules of counting. A new study suggests this starts sometime between the ages of 15 and 18 months.

To investigate infant arithmetic, Virginia Slaughter at the University of Queensland, Australia, played a video to 36 infants, half of whom were 15 months old and the rest 18 months. In the video, a finger pointed to six fish stickers one at a time while a voice counted up to six.

Next, the count up to six was repeated, but this time the finger alternated between two of the six fish on the screen.

The 15-month children appeared to make no distinction between the two videos, but the 18-month-olds looked at the correct count for 1 second longer than the incorrect count. Slaughter says the difference is statistically significant.

It is difficult to know why the 18-month-olds are looking at the incorrect videos for shorter periods, she says. But "the fact that they look longer at one or the other tells us that they are distinguishing between the two".

Japanese spoken

Slaughter replayed the videos to the 18-month-old infants with the spoken count words replaced first with beeps and then with Japanese count words. The children, none of whom had been spoken to in Japanese before, looked at both videos for the same amount of time. "This ruled out the possibility that 18-month-olds simply prefer to watch videos in which all the objects are touched," says Slaughter.

The same pattern was found when the experiment was repeated with Japanese babies: they had no preference for either video when the count terms were in English, but watched the correct count for longer when the words were in Japanese.

Slaughter says the babies are not counting, but "are working out the counting rules" – for example, that each object must be counted only once.

Point to point

A previous study found that newborns look significantly longer at screens where the number of shapes they are shown matches the number of syllables they hear. But that study didn't explicitly test whether the infants understood the counting rules, as there was nothing like the finger-pointing in Slaughter's study. "This is the first evidence that the counting rules are recognised at least six months before children produce any verbal counting behaviour," says Slaughter.

It's unclear why infants at such a young age should have counting skills. "In almost all cultures around the globe there is a counting routine," says Slaughter. But some cultures do not have one, making it unlikely the skill is innate.

Michael Nagel at the University of the Sunshine Coast in Queensland, Australia, says the study is interesting but requires confirmation. "Without further rigorous testing, findings like these can become fodder for pseudo-scientific educational programmes," he says.

Nagel suggests repeating the study while scanning toddlers' brains for activity in regions associated with counting. "Then let's see what happens."

Journal reference: *Proceedings of the Royal Society B*, DOI: 10.1098/rspb.2010.2602

http://www.newscientist.com/article/dn20142-toddlers-know-counting-rules-at-18-months.html?full=true&print=true

T. Rex More Hyena Than Lion: Tyrannosaurus Rex Was Opportunistic Feeder, Not Top Predator, Paleontologists Say

This cast of a Tyrannosaurus rex is on display in UC Berkeley's Valley Life Sciences Building. The original fossil skeleton from Montana's Hell Creek Formation is in the Museum of the Rockies in Bozeman, Mont. (Credit: Randy Irmis)

ScienceDaily (Feb. 22, 2011) — The ferocious *Tyrannosaurus rex* has been depicted as the top dog of the Cretaceous, ruthlessly stalking herds of duck-billed dinosaurs and claiming the role of apex predator, much as the lion reigns supreme in the African veld.

But a new census of all dinosaur skeletons unearthed over a large area of eastern Montana shows that Tyrannosaurus was too numerous to have subsisted solely on the dinosaurs it tracked and killed with its scythe-like teeth.

Instead, argue paleontologists John "Jack" Horner from the Museum of the Rockies and Mark B. Goodwin from the University of California, Berkeley, *T. rex* was probably an opportunistic predator, like the hyena in Africa today, subsisting on both carrion and fresh-killed prey and exploiting a variety of animals, not just large grazers.

"In our census, *T. rex* came out very high, equivalent in numbers to Edmontosaurus, which many people had thought was its primary prey," said Horner, curator of paleontology at the Museum of the Rockies in Bozeman, Mont., and Regents Professor at Montana State University. "This says that *T. rex* is not a cheetah, it's not a lion. It's more like a hyena."

"This putative apex predator is as abundant in the upper layers of the Hell Creek Formation as the herbivores, its reputed primary food source," added Goodwin, a curator in UC Berkeley's Museum of Paleontology and assistant director of the museum. "And it's even more plentiful in the other two-thirds of the formation. This supports the view that *T. rex* benefited from a much wider variety of food sources than live prey."

The dinosaur census in the Hell Creek Formation of Montana, which dates from 65-95 million years ago, was begun in 1999 by Horner and Goodwin with the financial and occasional field support of Nathan Myhrvold,

former chief technology officer for Microsoft Corp. and co-founder of Intellectual Ventures of Bellevue, Wash. The results, authored by Horner, Goodwin and Myhrvold, were published Feb. 9 in the open-access journal *PLoS ONE*.

Normally, Goodwin said, top predators are one-third or one-fourth as abundant as their prey, because of the larger energy needs of carnivores. Opportunistic hunters like the hyena, however, can be twice as abundant as the top predators.

"If you count the lions and the leopards and the cheetahs in the Serengeti, the number still does not equal the number of hyenas, because hyenas have a much wider food source," Horner said. "Cheetahs, for example, only go after things that are really fast. They don't eat turtles. But a hyena will eat a turtle, or anything else that it can catch or is dead."

Similarly, *T. rex* was eating anything it could, he said. "There's no evidence that *T. rex* could run very fast, so it wasn't out there being a cheetah. If it could get a sick animal, it would."

Horner suggests that juvenile and young adult *T. rex* may have been primarily flesh eaters, while the older adults, which developed proportionally larger, bone-crushing teeth as they aged, also consumed the bones and marrow of their prey.

Horner and Goodwin, together and separately, have been digging for dinosaurs in Eastern Montana for decades. The fossils date from a time when the area bordered an inland sea, which periodically advanced and withdrew over coastal plains, depositing sediment that was later exposed and heavily eroded. When Horner started his census of dinosaurs in the Hell Creek Formation around Fort Peck Lake in 1999, he teamed up with Goodwin to re-examine some of the dinosaurs discovered in the area.

Since then, through lab analysis and annual summer digs, they have shown that one named species, Torosaurus, was just a big, aged Triceratops; two dome-headed dinosaurs, Dracorex and Stygimoloch, were merely younger members of the genus Pachycephalosaurus; and the so-called Nanotyrannus was just a juvenile *T. rex*.

Once these fossils had been properly identified, Homer and Goodwin were able to catalog the species and relative ages of known dinosaurs in the formation, which is about 100 meters thick at exposed areas covering some 1,000 square kilometers. The census included only skeletal remains, not teeth, because the paleontologists wanted a record of the maturity of each specimen, and teeth tell little about the age of a dinosaur at death, Goodwin said.

Collating only skeletons containing three or more bones, the researchers counted 23 Triceratops, five Tyrannosaurus and five Edmontosaurus within the Upper Hell Creek Formation. The youngest or "upper" formation dates from between 65 and 70 million years ago, just before the purported mass extinction of the dinosaurs that was attributed to a comet or asteroid impact.

A census of older sediments -- the lower Hell Creek formation -- turned up 11 Triceratops, 11 *T. rex* and six Edmontosaurus partial skeletons, along with fossil bones of three other dinosaurs: Thescelosaurus and Ornithomimus, two bird-like, bipedal meat-eaters reaching some 12 feet in length at maturity; and Ankylosaurus, an armored, four-legged plant-eater with a club tail.

"Small juveniles and older adults were relatively rare compared to large juveniles and subadults for all the dinosaurs," Goodwin said. This could be explained if juveniles lived in other locations, which is not uncommon in some species. The largest adults may simply have been relatively rare.

"This adds to an emerging picture of what the dinosaur fauna looked like during the late Cretaceous," he said.

Horner noted the greater variety of dinosaurs in the older sediments, the Lower Hell Creek Formation, compared to the younger "Upper" formation.

"Definitely there was a change in population leading up to the Cretaceous-Tertiary boundary, so something was happening to the faunas prior to the impact," he said. "During the 10 million years after dinosaur diversity peaked 75 million years ago, the dinosaurs dwindled pretty fast, and there weren't many left at the end."

The work was supported by individual donations from James Kinsey, Catherine B. Reynolds and Homer Hickam, as well as Intellectual Ventures, the Windway Foundation, the Smithsonian Institution and the University of California Museum of Paleontology.

Story Source:

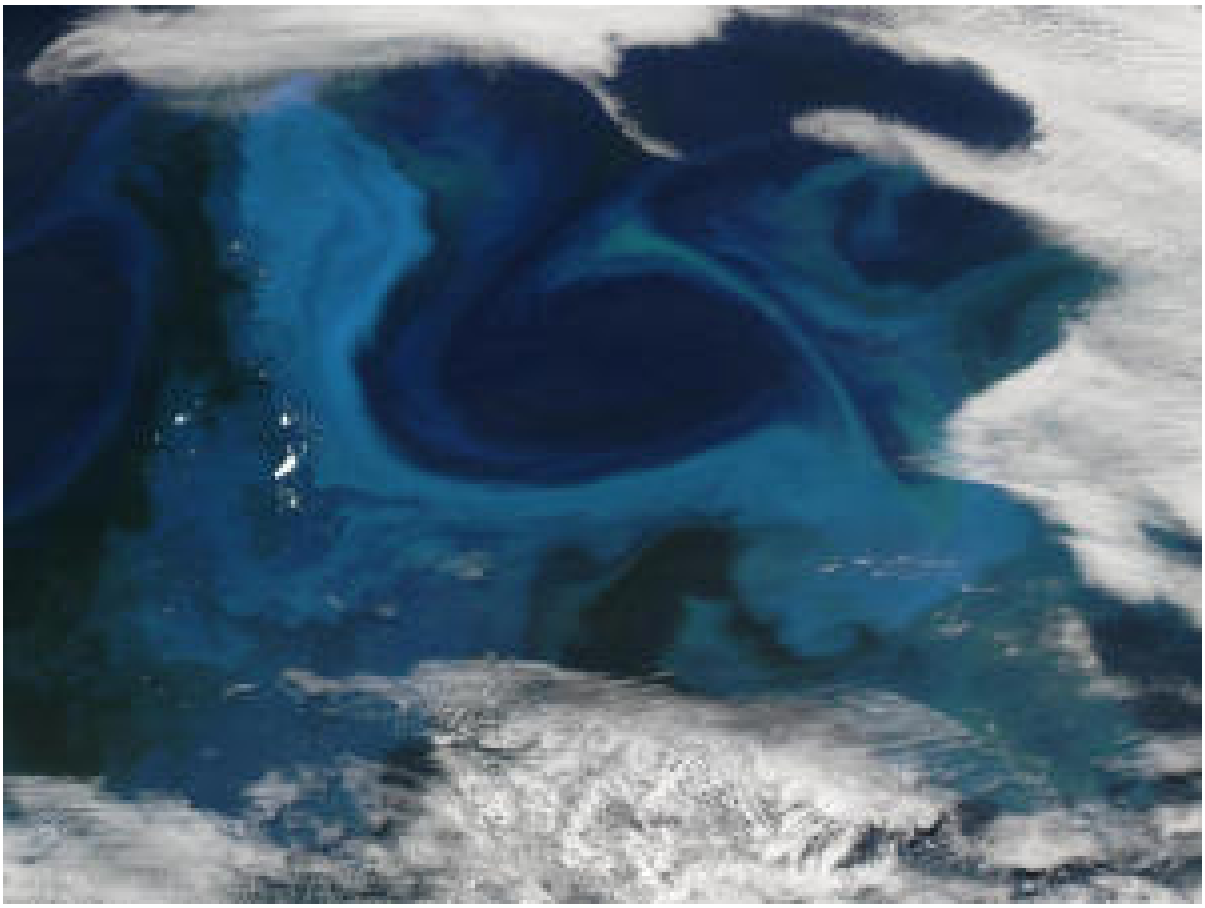
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **University of California - Berkeley**. The original article was written by Robert Sanders, Media Relations.

Journal Reference:

1. John R. Horner, Mark B. Goodwin, Nathan Myhrvold. **Dinosaur Census Reveals Abundant Tyrannosaurus and Rare Ontogenetic Stages in the Upper Cretaceous Hell Creek Formation (Maastrichtian), Montana, USA**. *PLoS ONE*, 2011; 6 (2): e16574 DOI: 10.1371/journal.pone.0016574

http://www.sciencedaily.com/releases/2011/02/110222140550.htm

Plankton Key to Origin of Earth's First Breathable Atmosphere



A phytoplankton bloom in the Southern Ocean. (Credit: NASA)

ScienceDaily (Feb. 21, 2011) — Researchers studying the origin of Earth's first breathable atmosphere have zeroed in on the major role played by some very unassuming creatures: plankton.

In a paper to appear in the online Early Edition of the *Proceedings of the National Academy of Sciences* (PNAS), Ohio State University researcher Matthew Saltzman and his colleagues show how plankton provided a critical link between the atmosphere and chemical isotopes stored in rocks 500 million years ago.

This work builds on the team's earlier discovery that upheavals in Earth's crust initiated a kind of reverse-greenhouse effect 500 million years ago that cooled the world's oceans, spawned giant plankton blooms, and sent a burst of oxygen into the atmosphere.

The new study has revealed details as to how oxygen came to vanish from Earth's ancient atmosphere during the Cambrian Period, only to return at higher levels than ever before.

It also hints at how, after mass extinctions, the returning oxygen allowed enormous amounts of new life to flourish.

Saltzman and his team were able to quantify how much oxygen was released into the atmosphere at the time, and directly link the amount of sulfur in the ancient oceans with atmospheric oxygen and carbon dioxide.

The result is a clearer picture of life on Earth in a time of extreme turmoil.

"We know that oxygen levels in the ocean dropped dramatically [a condition called anoxia] during the Cambrian, and that coincides with the time of a global extinction," said Saltzman, associate professor of earth sciences at Ohio State.

In a paper in the journal *Nature* just last month, the same researchers presented the first geochemical evidence that the anoxia spread even to the world's shallow waters.

"We still don't know why the anoxia spread all over the world. We may never know," Saltzman said. "But there have been many other extinction events in Earth's history, and with the exception of those caused by meteor impacts, others likely share elements of this one -- changes in the balance of oxygen and carbon dioxide in the atmosphere and oceans."

"By getting a handle on what was happening back then, we may improve our understanding of what's happening to the atmosphere now."

Something enabled oxygen to re-enter the oceans and the atmosphere 500 million years ago, and the study suggests that the tiny plant and animal life forms known as plankton were key.

Plankton may be at the bottom our food chain today, but back then, they ruled the planet. There was no life on land at all. And aside from an abundance of trilobites, life in the oceans was not very diverse.

Not diverse, that is, until a geologic event that scientists call the Steptoean Positive Carbon Isotope Excursion (SPICE) occurred. In previous work, Saltzman and his collaborators showed that the SPICE event was caused by the burial of huge quantities of organic matter in ocean sediments, which pulled carbon dioxide from the atmosphere and released oxygen.

The more oxygen plankton encounter in their cells, the more selective they become for the light isotope of carbon in carbon dioxide, and absorb it into their bodies.

By studying isotopes in fossilized plankton contained in rocks found in the central United States, the Australian outback, and China, the researchers determined that the SPICE event happened around the same time as an explosion of plankton diversity known as the "plankton revolution."

"The amount of oxygen rebounded, and so did the diversity of life," Saltzman explained.

Other researchers have tried to gauge how much oxygen was in the air during the Cambrian, but their estimates have varied widely, from a few percent to as much as 15-20 percent.

If the higher estimates were correct, then the SPICE event would have boosted oxygen content to greater than 30 percent -- or almost 50 percent richer than today's standard of 21 percent.

This study has provided a new perspective on the matter.

"We were able to bring together independent lines of evidence that showed that if the total oxygen content was around 5-10 percent before the SPICE, then it rose to just above modern levels for the first time after the SPICE," Saltzman said.

The study has some relevance to modern geoengineering. Scientists have begun to investigate what we can do to forestall climate change, and altering the chemistry of the oceans could help remove carbon dioxide and restore balance to the atmosphere. The ancient and humble plankton would be a necessary part of that equation, he added.

"When it comes to ancient life, they don't sound as exciting as dinosaurs, but the plankton are critical to this story."

Saltzman's coauthors on the PNAS paper include Seth Young of Indiana University; Lee Kump of Pennsylvania State University; Benjamin Gill of the University of California, Riverside, and Harvard University; Timothy Lyons, also of the University of California, Riverside; and Bruce Runnegar of the University of California, Los Angeles. Additional coauthors on the Nature paper included Andrew Knoll of Harvard University.

The National Science Foundation's Geobiology and Low-Temperature Geochemistry Program funded this research.

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Ohio State University**, via EurekAlert!, a service of AAAS. The original article was written by Pam Frost Gorder.

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http://www.sciencedaily.com/releases/2011/02/110221163052.htm

Brown Tide Culprit Sequenced: Genome of the First of Algal Bloom Species

This is an aerial view of Great South Bay, N.Y., during a brown tide bloom in June 2008. Billions of A. anophagefferens cells per liter crowded into the coastline and turned the water brown. (Credit: Suffolk County Department of Health Services)

ScienceDaily (Feb. 21, 2011) — Algae play key roles in the global carbon cycle, helping sequester significant amounts of carbon. Some algal species can bloom, or become so numerous, that they discolor coastal waters and reduce the amount of light and oxygen available in the ecosystem. Previously known as "red tide," the term "harmful algal blooms" (HABs) was introduced two decades ago to note accumulation of algal biomass can sometimes also turn the ocean waters brown or green and disrupt an ecosystem, or that red-colored waters can sometimes be harmless.

Published online the week of Feb. 21 in the *Proceedings of the National Academy of Sciences*, a team of researchers including U. S. Department of Energy (DOE) Joint Genome Institute (JGI) scientists led by Igor Grigoriev, reported the first complete and annotated genome sequence of a HAB species: *Aureococcus anophagefferens*.

At first glance the marine phytoplankton, so tiny that 50 of them side by side span the width of a single human hair, seems innocuous. "It's a photosynthetic organism that plays a big role in carbon cycling, particularly in coastal ecosystems, and can degrade organic carbon," noted first author Christopher Gobler of Stony Brook University. "When one of these blooms occurs and you get a billion cells per liter, it represents milligrams of carbon per liter, which is much higher than you typically see in coastal ecosystems." By sequencing its genome, or biological source code, scientists can examine its "parts list" for clues to *Aureococcus*' ability to capture CO2, survive in varying marine environments, exploit selenium in its proteins, and outgrow many of its competitors.

The 56-million base pair genome of *Aureococcus* was sequenced by the DOE JGI from a culture isolated sample collected from the shores of Long Island, NY, one of the areas most affected by the microalga when it first appeared 25 years ago on the east coast of the United States.

When billions of *Aureococcus* cells come together, however, they outcompete the other marine phytoplankton in the area, damaging the food chains in marine ecosystems as well as economically impacting the shellfish industry. Economic losses attributed to this and other HAB phenomena in the United States over the course of the last decade have been estimated at one billion dollars.

"In the decade since publishing the draft of the human genome, JGI has pioneered the exploration of marine algal genomics with sequences of the first diatoms, Ostreococcus and cyanobacteria," said Grigoriev. "Compared to these phytoplankton inhabiting the same estuaries, *Aureococcus*, which outcompetes them, shows genome-encoded advantages to benefit from alternative nutrients, survive under variable light conditions, and encode the largest number of selenoproteins (which use the trace element selenium to perform essential cell functions) known to date."

Gobler elaborated on how *Aureococcus* can outcompete the other phytoplankton in a coastal estuary. "When we looked at the coastal ecosystems where we find *Aureococcus* blooms, we found they were enriched in organic matter, were very turbid and enriched in trace metals," he said. "And when we looked at the genome of *Aureococcus*, it ended up being enriched in genes to take advantage of these conditions. The surprise was the concordance between the genome and the ecosystem where it's blooming."

For example, this photosynthetic microalga is well-adapted to low light, and can survive for long periods in no-light conditions. The genomic study revealed that *Aureococcus* had 62 light-harvesting genes whereas its competitors had on average a couple of dozen of these genes.

"I think this paper says it all," said Don Anderson, a senior scientist at Woods Hole Oceanographic Institution who has studied harmful algal blooms for decades and is a tireless promoter of research efforts in this field. "For decades, scientists have been trying to understand why this species blooms, when it blooms, how it is able to dominate when there are so many other competing species in the water with it. With this new genomic data we have a new approach. We're getting answers based on the genes, though we still need other approaches that collect relevant oceanographic and chemical data to go along with the inferences drawn from the presence and absence of genes. It's a great advance -- a great resource for our community. Even though there are major differences among HAB species, as we learn about *Aureococcus* with this approach, that knowledge will help us make similar advances with other HAB species."

Gobler said that one field of study that arose from the data involves these light-harvesting genes. "We know as a bloom occurs, the level of light in the estuary decreases gradually and becomes more turbid. Can we see the light-harvesting proteins expressed in *Aureococcus* turn on as a bloom occurs?" he asked. "Beyond gene expression, proteomics and looking at proteins synthesized during blooms are also other areas of future research to explore."

DOE JGI's Grigoriev also noted that the multidisciplinary approach of combining genome sequencing with other techniques allows researchers to explore a new area of ecogenomics, which is closely connected to the DOE mission in biogeochemistry. "Aligning the physico-chemical parameters of an ecosystem with the genomic potential of its inhabitants enables us to monitor changes in the environment. Harmful algal blooms are a recently reported phenomenon and could be connected to the growing human population along coastlines, which created conditions for *Aureococcus* to thrive, in turn adversely affecting estuaries. On the other hand, massive algal blooms can reduce carbon dioxide in the atmosphere. So by employing the ecogenomics approach we can start building balanced models of targeted environments."

Gobler said that the work suggests a managerial next step. "We now know this organism is genetically predisposed to exploit certain characteristics of coastal ecosystems. We also know the characteristics are there because of activities of man. If we continue to increase, for example, organic matter in coastal waters, then it's going to continue to favor brown tides since it's genetically predisposed to thrive in these conditions."

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **DOE/Joint Genome Institute**.

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http://www.sciencedaily.com/releases/2011/02/110221163128.htm

Carbon Sink at South Pole Has Grown Recently, Historical Collections Reveal

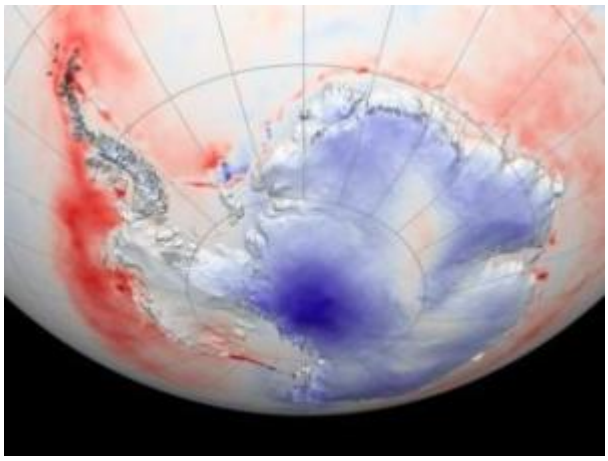

Image depicting the heating and cooling trends over and around Antarctica. Blue indicates cooling trends and red indicates warming trends (image created in 2005). New research shows that polar carbon sinks may be increasing. (Credit: NASA/Goddard Space Flight Center Scientific Visualization Studio. Data provided by Larry Stock)

ScienceDaily (Feb. 22, 2011) — By studying collections of a marine bryozoan that date back to a famous 1901 expedition to the South Pole, researchers have found that those organisms were growing steadily up until 1990, when their growth more than doubled.

The data, reported in the February 22 issue of *Current Biology*, provide the highest-latitude record of a century of growth and some of the first evidence that polar carbon sinks may be increasing.

The bryozoan in question, known as *Cellarinella nutti*, is a filter-feeding invertebrate that looks like branching twigs. *C. nutti* is found in abundance in the Antarctic and is ideal for such studies because it preserves a clear macroscopic environmental record in its skeleton, recorded as tree-ring-like growth-check lines.

"This is one of the few pieces of evidence that life in Antarctica has recently changed drastically," said David Barnes of the British Antarctic Survey. "These animals are taking more carbon dioxide out of circulation and locking it away on the seabed."

The more rapid growth of *C. nutti* reflects a coincident increase in the regional production of the phytoplankton that the bryozoan eats. Those algae rely on carbon dioxide dissolved into the seawater for their sustenance. The carbon in the algae is taken up by *C. nutti*, where it is incorporated into their skeleton and other tissues. As the animals grow, portions of it break off and are buried in the seabed. "Thus, the amount of carbon being buried on the seabed is increasing -- whilst globally we are becoming more aware of the need to reduce carbon dioxide in the atmosphere," Barnes said.

He says the shift is most likely the result of ozone losses, which have led to an increase in wind speeds over the last decade. Those stronger winds are a boon to plankton, as they blow ice out of the way and drive greater circulation of surface waters.

"If we are right, this is a rare example of animals responding to one global phenomenon, the ozone hole, and affecting another, the greenhouse effect," Barnes said.

The discovery would not have been possible without early marine collections assembled by the explorer Captain Robert Falcon Scott, a polar pioneer who led the British National Antarctic Expedition and British Antarctic Expeditions at the turn of the 20th century, along with specimens maintained by museums in the United Kingdom, United States, and New Zealand.

"Scott's most famous journey was to reach the South Pole, but a team lead by the Norwegian explorer [Roald] Amundsen beat them to it," Barnes said. "Scott's team died in 1912 on the journey back to his food depots, and so his exploits are often not associated with success. What is not so well known is that his voyages were first and foremost scientific ones, and the collections of material and information they made were impressive even by today's standards."

The findings highlight the challenges of understanding the effects of large-scale processes such as the ozone hole or climate change. "This is not just because it is patchy in space and time, but also because of interactions between effects, as we found," Barnes said.

It is not yet clear how big an impact the changes in *C. nutti* might have, and at the moment, Barnes suspects it is likely to be quite small.

"Nevertheless, we think that the combination of ice shelf losses and sea ice losses due to climate change and the effect of ozone loss-induced wind speeds offer some hope for much-needed carbon sequestration to the seabed in the Southern Ocean," Barnes said. "There are few other places in the world where global and regional changes could actually lead to more carbon being removed from the system."

Story Source:

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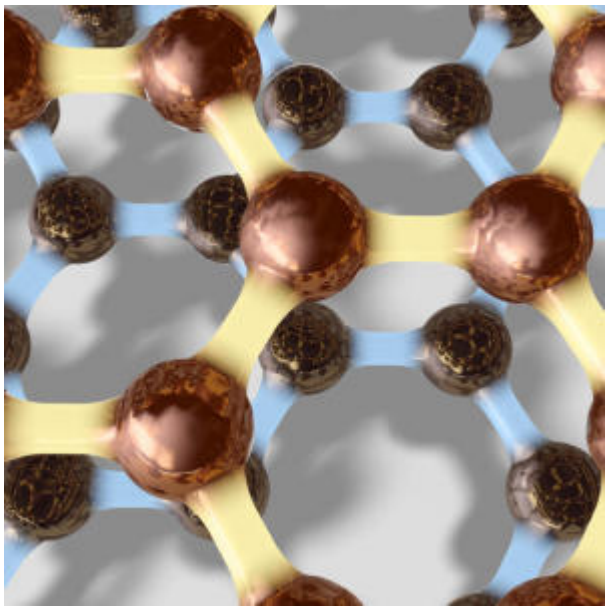
http://www.sciencedaily.com/releases/2011/02/110221120945.htm

Engineering Atomic Interfaces for New Electronics



Researchers have discovered how to manipulate electrons in oxide interfaces by inserting a single layer of atoms. (Credit: iStockphoto/Martin McCarthy)

ScienceDaily (Feb. 17, 2011) — Most people cross borders such as doorways or state lines without thinking much about it. Yet not all borders are places of limbo intended only for crossing. Some borders, like those between two materials that are brought together, are dynamic places where special things can happen.

For an electron moving from one material toward the other, this space is where it can join other electrons, which together can create current, magnetism or even light.

A multi-institutional team has made fundamental discoveries at the border regions, called interfaces, between oxide materials. Led by University of Wisconsin-Madison materials science and engineering professor Chang-Beom Eom, the team has discovered how to manipulate electrons in oxide interfaces by inserting a single layer of atoms. The researchers also have discovered unusual electron behaviors at these engineered interfaces.

Their work, which is sponsored by the National Science Foundation, is published Feb. 18 in the journal *Science* and could allow researchers to further study and develop interfaces with a wide array of properties.

Eom's team blends theorists and experimentalists, including UW-Madison physics professor Mark Rzchowski and collaborators at the University of Nebraska-Lincoln, University of Michigan, Argonne National Laboratory and Brookhaven National Laboratory.

The researchers used two pieces of precisely grown strontium titanate, which is a type of oxide, or compound with oxygen as a fundamental element. Between the pieces, the researchers inserted a one-atom-thick layer of one of five rare-earth elements, which are important components in the electronics industry.

The team found that the rare-earth element layer creates an electron gas that has some interesting characteristics. The gas actually behaves more like an electron "liquid," since the electrons move more in tandem, or in correlation, than a gas normally does.

"If you take two materials, each has different characteristics, and if you put them together, at their interface you may find something unexpected," Eom says.

This research is the first demonstration of strong correlation among electrons at an oxide interface. The electron layer displayed distinct characteristics depending on the particular rare-earth element the team used. Materials with larger ionic radii, such as lanthanum, neodymium and praseodymium, are conducting, whereas materials with smaller radii, including samarium and yttrium, are insulating.

The insulating elements form an electron gas that can be compared to a thick liquid, somewhat like honey. The higher viscosity (basically, thickness) means the electrons can't move around as freely, making them more insulating. Conversely, the conducting elements form a gas that is a "liquid" more like gasoline; the viscosity is lower, so the electrons can move more freely and are better conductors.

Prior to this research, scientists knew extra electrons could reside at interfaces, but they didn't realize the complexity of how the electrons then behaved together at those interfaces.

The discovery of liquid-like behavior in the electron layer could open up an entire field of interfacial engineering for other scientists to explore, as well as new applications that take advantage of electron interactions. Since Eom and his colleagues developed an understanding of the basic physics behind these behaviors, their work could be expanded to create not only conductive or insulating interfaces, but also magnetic or optical ones.

Though scientists previously have looked at semiconductor interfaces, Eom's team is the first to specifically address those that use oxide interfaces to control conducting states with a single atomic layer. Oxides make up a class of materials including millions of compounds, and each has its own unique set of properties. The ability to manipulate various oxide interfaces could give rise to new generations of materials, electronics and other devices.

"This advancement could make a broad impact in fields even beyond physics, materials or chemistry," Eom says. "People can use the idea that an interface made from a single atomic layer of different ions can be used to create all kinds of properties."

Story Source:

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

Journal Reference:

1. H. W. Jang, D. A. Felker, C. W. Bark, Y. Wang, M. K. Niranjan, C. T. Nelson, Y. Zhang, D. Su, C. M. Folkman, S. H. Baek, S. Lee, K. Janicka, Y. Zhu, X. Q. Pan, D. D. Fong, E. Y. Tsymbal, M. S. Rzchowski, C. B. Eom. **Metallic and Insulating Oxide Interfaces Controlled by Electronic Correlations**. *Science*, 2011; 331 (6019): 886 DOI: 10.1126/science.1198781

http://www.sciencedaily.com/releases/2011/02/110217141317.htm

Plants Cloned as Seeds: Hybrids That Breed True Would Be Major Advance for Crop Plants

Dandelion dispersing seed. Weeds such as hawkweed and dandelions, can produce true seeds that are clones of themselves without sexual reproduction -- a still poorly understood process called apomixis. (Credit: iStockphoto)

ScienceDaily (Feb. 21, 2011) — Plants have for the first time been cloned as seeds. The research by aUC Davis plant scientists and their international collaborators, published Feb. 18 in the journal *Science*, is a major step towards making hybrid crop plants that can retain favorable traits from generation to generation.

Most successful crop varieties are hybrids, said Simon Chan, assistant professor of plant biology at UC Davis and an author of the paper. But when hybrids go through sexual reproduction, their traits, such as fruit size or frost resistance, get scrambled and may be lost.

"We're trying to make a hybrid that breeds true," Chan said, so that plants grown from the seed would be genetically identical to one parent.

Some plants, especially fruit trees, can be cloned from cuttings, but this approach is impractical for most crops. Other plants, especially weeds such as hawkweed and dandelions, can produce true seeds that are clones of themselves without sexual reproduction -- a still poorly understood process called apomixis.

The new discovery gets to the same result as apomixis, although by a different route, Chan said.

Normally, eggs and sperm are haploid -- they have half the number of chromosomes of the parent. The fertilized egg and the adult plant it grows into are diploid -- containing a full complement of chromosomes, half contributed by each parent.

Chan and his colleagues focused their work on the laboratory plant *Arabidopsis*, which has certain genetic mutations that allow it to produce diploid eggs without sexual recombination. These eggs have the same genes and number of chromosomes as their parents. But those eggs cannot be grown into adult plants without fertilization by sperm, which adds another parent's set of chromosomes.

Last year, Chan and UC Davis postdoctoral researcher Maruthachalam Ravi showed that they could breed haploid *Arabidopsis* plants that carried chromosomes from only one parent. They introduced a genetic change so that after the eggs were fertilized, the chromosomes from one of the parents were eliminated. Such haploid plants would reduce the time needed to breed new varieties.

In the new study, Chan's lab, with colleagues from India and France, crossed these *Arabidopsis* plants programmed to eliminate a parent's genes with either of two mutants that can produce diploid eggs.

The result? In about one-third of the seeds produced, the diploid eggs were successfully fertilized, then the chromosomes from one parent were eliminated, leaving a diploid seed that was a clone of one of its parents.

Ravi described the result as a step on the way towards artificial apomixis. The team hopes to produce crop plants, such as lettuce and tomato, that can fertilize themselves and produce clonal seeds. Applications for provisional patents on the work have been filed.

The other authors on the paper are: Mohan Marimuthu, Jayeshkumar Davda and Imran Siddiqi from the Centre for Cellular and Molecular Biology, Hyderabad, India; Sylvie Jolivet, Lucie Pereira, Laurence Cromer, Fabien Nogué and Raphaël Mercier, L'Institut National de la Recherche Agronomique, Versailles, France; and Lili Wang, UC Davis Department of Plant Biology.

The work was principally funded by the National Science Foundation.

Story Source:

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

Journal Reference:

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http://www.sciencedaily.com/releases/2011/02/110217141315.htm

Scientists Steer Car With the Power of Thought

Computer scientists have developed a system making it possible to steer a car with your thoughts. (Credit: Image courtesy of Freie Universitaet Berlin)

ScienceDaily (Feb. 21, 2011) — You need to keep your thoughts from wandering, if you drive using the new technology from the AutoNOMOS innovation labs of Freie Universität Berlin. The computer scientists have developed a system making it possible to steer a car with your thoughts. Using new commercially available sensors to measure brain waves -- sensors for recording electroencephalograms (EEG) -- the scientists were able to distinguish the bioelectrical wave patterns for control commands such as "left," "right," "accelerate" or "brake" in a test subject.

They then succeeded in developing an interface to connect the sensors to their otherwise purely computer-controlled vehicle, so that it can now be "controlled" via thoughts. Driving by thought control was tested on the site of the former Tempelhof Airport.

The scientists from Freie Universität first used the sensors for measuring brain waves in such a way that a person can move a virtual cube in different directions with the power of his or her thoughts. The test subject thinks of four situations that are associated with driving, for example, "turn left" or "accelerate." In this way the person trained the computer to interpret bioelectrical wave patterns emitted from his or her brain and to link them to a command that could later be used to control the car. The computer scientists connected the measuring device with the steering, accelerator, and brakes of a computer-controlled vehicle, which made it possible for the subject to influence the movement of the car just using his or her thoughts.

"In our test runs, a driver equipped with EEG sensors was able to control the car with no problem -- there was only a slight delay between the envisaged commands and the response of the car," said Prof. Raúl Rojas, who heads the AutoNOMOS project at Freie Universität Berlin. In a second test version, the car drove largely automatically, but via the EEG sensors the driver was able to determine the direction at intersections.

The AutoNOMOS Project at Freie Universität Berlin is studying the technology for the autonomous vehicles of the future. With the EEG experiments they investigate hybrid control approaches, i.e., those in which people work with machines.

The computer scientists have made a short film about their research, which is available at: http://tinyurl.com/BrainDriver

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Story Source:

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

http://www.sciencedaily.com/releases/2011/02/110218083711.htm

Can WISE Find the Hypothetical 'Tyche' Planet at Edge of Our Solar System?

This colorful picture is a mosaic of the Lagoon nebula taken by NASA's Wide-field Infrared Survey Explorer, or WISE. (Credit: NASA/JPL-Caltech/UCLA)

ScienceDaily (Feb. 21, 2011) — In November 2010, the scientific journal *Icarus* published a paper by astrophysicists John Matese and Daniel Whitmire, who proposed the existence of a binary companion to our sun, larger than Jupiter, in the long-hypothesized "Oort cloud" -- a faraway repository of small icy bodies at the edge of our solar system. The researchers use the name "Tyche" for the hypothetical planet. Their paper argues that evidence for the planet would have been recorded by the Wide-field Infrared Survey Explorer (WISE).

WISE is a NASA mission, launched in December 2009, which scanned the entire celestial sky at four infrared wavelengths about 1.5 times. It captured more than 2.7 million images of objects in space, ranging from faraway galaxies to asteroids and comets relatively close to Earth. Recently, WISE completed an extended mission, allowing it to finish a complete scan of the asteroid belt, and two complete scans of the more distant universe, in two infrared bands. So far, the mission's discoveries of previously unknown objects include an ultra-cold star or brown dwarf, 20 comets, 134 near-Earth objects (NEOs), and more than 33,000 asteroids in the main belt between Mars and Jupiter.

Following its successful survey, WISE was put into hibernation in February 2011. Analysis of WISE data continues. A preliminary public release of the first 14 weeks of data is planned for April 2011, and the final release of the full survey is planned for March 2012.

Frequently Asked Questions

Q: When could data from WISE confirm or rule out the existence of the hypothesized planet Tyche?

A: It is too early to know whether WISE data confirms or rules out a large object in the Oort cloud. Analysis over the next couple of years will be needed to determine if WISE has actually detected such a world or not. The first 14 weeks of data, being released in April 2011, are unlikely to be sufficient. The full survey, scheduled for release in March 2012, should provide greater insight. Once the WISE data are fully processed, released and analyzed, the Tyche hypothesis that Matese and Whitmire propose will be tested.

Q: Is it a certainty that WISE would have observed such a planet if it exists?

A: It is likely but not a foregone conclusion that WISE could confirm whether or not Tyche exists. Since WISE surveyed the whole sky once, then covered the entire sky again in two of its infrared bands six months later, WISE would see a change in the apparent position of a large planet body in the Oort cloud over the six-month period. The two bands used in the second sky coverage were designed to identify very small, cold stars (or brown dwarfs) -- which are much like planets larger than Jupiter, as Tyche is hypothesized to be.

Q: If Tyche does exist, why would it have taken so long to find another planet in our solar system?

A: Tyche would be too cold and faint for a visible light telescope to identify. Sensitive infrared telescopes could pick up the glow from such an object, if they looked in the right direction. WISE is a sensitive infrared telescope that looks in all directions.

Q: Why is the hypothesized object dubbed "Tyche," and why choose a Greek name when the names of other planets derive from Roman mythology?

A: In the 1980s, a different companion to the sun was hypothesized. That object, named for the Greek goddess "Nemesis," was proposed to explain periodic mass extinctions on Earth. Nemesis would have followed a highly elliptical orbit, perturbing comets in the Oort Cloud roughly every 26 million years and sending a shower of comets toward the inner solar system. Some of these comets would have slammed into Earth, causing catastrophic results to life. Recent scientific analysis no longer supports the idea that extinctions on Earth happen at regular, repeating intervals. Thus, the Nemesis hypothesis is no longer needed. However, it is still possible that the sun could have a distant, unseen companion in a more circular orbit with a period of a few million years -- one that would not cause devastating effects to terrestrial life. To distinguish this object from the malevolent "Nemesis," astronomers chose the name of Nemesis's benevolent sister in Greek mythology, "Tyche."

JPL manages and operates the Wide-field Infrared Survey Explorer for NASA's Science Mission Directorate, Washington. The principal investigator, Edward Wright, is at UCLA. The mission was competitively selected under NASA's Explorers Program managed by the Goddard Space Flight Center, Greenbelt, Md. The science instrument was built by the Space Dynamics Laboratory, Logan, Utah, and the spacecraft was built by Ball Aerospace & Technologies Corp., Boulder, Colo. Science operations and data processing take place at the Infrared Processing and Analysis Center at the California Institute of Technology in Pasadena. Caltech manages JPL for NASA. More information is online at http://www.nasa.gov/wise, http://wise.astro.ucla.edu and http://www.jpl.nasa.gov/wise .

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **NASA/Jet Propulsion Laboratory**.

Journal Reference:

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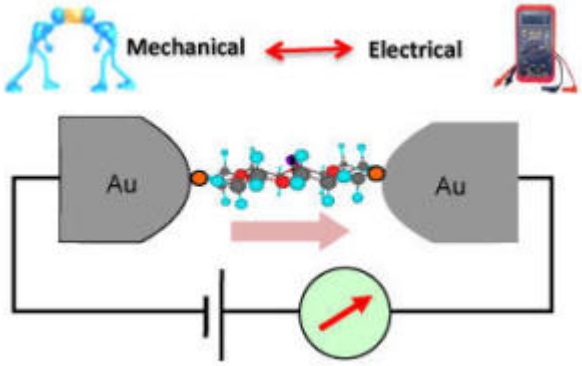
http://www.sciencedaily.com/releases/2011/02/110220204429.htm

Manipulating Molecules for a New Breed of Electronics



When electrical devices are shrunk to a molecular scale, both electrical and mechanical properties of a given molecule become critical. Specific properties may be exploited, depending on the needs of the application. Here, a single molecule is attached at either end to a pair of gold electrodes, forming an electrical circuit, whose current can be measured. (Credit: Image courtesy of Arizona State University)

ScienceDaily (Feb. 21, 2011) — In research recently appearing in the journal *Nature Nanotechnology*, Nongjian "NJ" Tao, a researcher at the Biodesign Institute at Arizona State University, has demonstrated a clever way of controlling electrical conductance of a single molecule, by exploiting the molecule's mechanical properties.

Such control may eventually play a role in the design of ultra-tiny electrical gadgets, created to perform myriad useful tasks, from biological and chemical sensing to improving telecommunications and computer memory.

Tao leads a research team used to dealing with the challenges entailed in creating electrical devices of this size, where quirky effects of the quantum world often dominate device behavior. As Tao explains, one such issue is defining and controlling the electrical conductance of a single molecule, attached to a pair of gold electrodes.

"Some molecules have unusual electromechanical properties, which are unlike silicon-based materials. A molecule can also recognize other molecules via specific interactions." These unique properties can offer tremendous functional flexibility to designers of nanoscale devices.

In the current research, Tao examines the electromechanical properties of single molecules sandwiched between conducting electrodes. When a voltage is applied, a resulting flow of current can be measured. A particular type of molecule, known as pentaphenylene, was used and its electrical conductance examined.

Tao's group was able to vary the conductance by as much as an order of magnitude, simply by changing the orientation of the molecule with respect to the electrode surfaces. Specifically, the molecule's tilt angle was altered, with conductance rising as the distance separating the electrodes decreased, and reaching a maximum when the molecule was poised between the electrodes at 90 degrees.

The reason for the dramatic fluctuation in conductance has to do with the so-called pi orbitals of the electrons making up the molecules, and their interaction with electron orbitals in the attached electrodes. As Tao notes, pi orbitals may be thought of as electron clouds, protruding perpendicularly from either side of the plane of the molecule. When the tilt angle of a molecule trapped between two electrodes is altered, these pi orbitals

can come in contact and blend with electron orbitals contained in the gold electrode -- a process known as lateral coupling. This lateral coupling of orbitals has the effect of increasing conductance.

In the case of the pentaphenylene molecule, the lateral coupling effect was pronounced, with conductance levels increasing up to 10 times as the lateral coupling of orbitals came into greater play. In contrast, the tetraphenyl molecule used as a control for the experiments did not exhibit lateral coupling and conductance values remained constant, regardless of the tilt angle applied to the molecule. Tao says that molecules can now be designed to either exploit or minimize lateral coupling effects of orbitals, thereby permitting the fine-tuning of conductance properties, based on an application's specific requirements.

A further self-check on the conductance results was carried out using a modulation method. Here, the molecule's position was jiggled in 3 spatial directions and the conductance values observed. Only when these rapid perturbations specifically changed the tilt angle of the molecule relative to the electrode were conductance values altered, indicating that lateral coupling of electron orbitals was indeed responsible for the effect. Tao also suggests that this modulation technique may be broadly applied as a new method for evaluating conductance changes in molecular-scale systems.

The research was supported by the Department of Energy -- Basic Energy Science program.

In addition to directing the Biodesign Institute's Center for Bioelectronics and Biosensors, Tao is a professor in the School of Electrical, Computer, and Energy Engineering, at ASU's Ira A. Fulton Schools of Engineering, and an affiliated professor of chemistry and biochemistry, physics and material engineering.

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Arizona State University**. The original article was written by Richard Harth, Science Writer at The Biodesign Institute.

Journal Reference:

1. Ismael Diez-Perez, Joshua Hihath, Thomas Hines, Zhong-Sheng Wang, Gang Zhou, Klaus Müllen & Nongjian Tao. **Controlling single-molecule conductance through lateral coupling of π orbitals**. *Nature Nanotechnology*, 20 February 2011 DOI: 10.1038/nnano.2011.20

http://www.sciencedaily.com/releases/2011/02/110220142929.htm

Trichinosis Parasite Gets DNA Decoded

Trichinosis is caused by eating raw or undercooked pork or carnivorous wild game animals, such as bear and walrus, infected with the parasitic worm, Trichinella spiralis. While the disease is rarely deadly, some patients live for months or years with chronic muscle pain and fatigue until the worms eventually die. (Credit: Photo by Jonathan Eisenback, Mactode Publications)

ScienceDaily (Feb. 21, 2011) — Scientists have decoded the DNA of the parasitic worm that causes trichinosis, a disease linked to eating raw or undercooked pork or carnivorous wild game animals, such as bear and walrus.

After analyzing the genome, investigators at Washington University School of Medicine in St. Louis and their collaborators report they have identified unique features of the parasite, *Trichinella spiralis*, which provide potential targets for new drugs to fight the illness. The research is published online Feb. 20 in *Nature Genetics.*

While trichinosis is no longer a problem in the United States -- fewer than a dozen cases are reported annually -- an estimated 11 million people worldwide are infected. Current treatments are effective only if the disease is diagnosed early.

"It takes less than two weeks for the larvae to travel from the intestine to muscle, where they live," says lead author Makedonka Mitreva, PhD, research assistant professor of genetics at Washington University's Genome Center. "Once the worms invade the muscle, drugs are less effective. While the disease is rarely deadly, patients often live for months or years with chronic muscle pain and fatigue until the worms eventually die."

Today, trichinosis occurs most often in areas of Asia and Eastern Europe where pigs are sometimes fed raw meat, and meat inspections are lax.

The new research also has implications far beyond a single parasitic disease, the researchers say. *T. spiralis* is just one of many thousands of parasitic roundworms called nematodes that, according to the World Health Organization, infect 2 billion people worldwide, severely sickening 300 million. Other species of parasitic nematodes cause diseases in pets and livestock and billions of dollars of crop losses annually.

Among nematodes, *T. spiralis* diverged early, some 600-700 million years before the crown species, *C. elegans*, a model organism used in research laboratories. To date, the genomes of 10 nematodes, including five parasitic worms, have been decoded. The latest addition of the *T. spiralis* genome now allows scientists to compare species that span the phylum.

"*T. spiralis* occupies a strategic position in the evolutionary tree of nematodes, which helps fill in important knowledge gaps," explains senior author Richard K. Wilson, PhD, director of Washington University's Genome Center and professor of genetics. "By comparing nematode genomes, we have identified key molecular features that distinguish parasitic nematodes, raising the prospect that a single targeted drug may be effective against multiple species."

Over all, the genome of *T. spiralis* is smaller than that of *C. elegans*. It has 15,808 genes, compared to *C. elegans*' 20,000.

Moreover, about 45 percent of *T. spiralis* genes appear to be novel. These genes have not been found in other organisms and are not listed in public gene databases. The researchers say the worm's early evolutionary split or its distinctive lifestyle -- it can't survive outside the body -- may account for this extensive collection of enigmatic genes.

The researchers also found 274 families of proteins that are conserved among all nematodes and that do not exist in other organisms, including humans. Furthermore, they identified 64 protein families that are exclusive to parasitic nematodes.

"This provides opportunities for scientists to dig deeper into the distinctive features of parasitic nematodes that can be targeted with new drugs," Mitreva says. "If those drugs target molecular features unique to parasitic worms, it is more likely the side effects of those drugs will be minimal in humans."

The research is supported by the National Human Genome Research Institute and the National Institute of Allergy and Infectious Diseases, both of the National Institutes of Health.

Collaborators include scientists at Washington State University, the U.S. Department of Agriculture, Cornell University and Divergence, Inc.

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Washington University School of Medicine**, via EurekAlert!, a service of AAAS.

Journal Reference:

1. Makedonka Mitreva, Douglas P Jasmer, Dante S Zarlenga, Zhengyuan Wang, Sahar Abubucker, John Martin, Christina M Taylor, Yong Yin, Lucinda Fulton, Pat Minx, Shiaw-Pyng Yang, Wesley C Warren, Robert S Fulton, Veena Bhonagiri, Xu Zhang, Kym Hallsworth-Pepin, Sandra W Clifton, James P McCarter, Judith Appleton, Elaine R Mardis & Richard K Wilson. **The draft genome of the parasitic nematode Trichinella spiralis**. *Nature Genetics*, 20 February 2011 DOI: 10.1038/ng.769

http://www.sciencedaily.com/releases/2011/02/110220142819.htm

Unraveling How Prion Proteins Move Along Axons in the Brain

ScienceDaily (Feb. 17, 2011) — Researchers at the University of California, San Diego School of Medicine have identified the motors that move non-infectious prion proteins (PrPC) -- found within many mammalian cells -- up and down long, neuronal transport pathways. Identifying normal movement mechanisms of PrPC may help researchers understand the spread of infectious prions within and between neurons to reach the brain, and aid in development of therapies to halt the transport.

Their study is published in the February 18 edition of the journal *Cell*.

The small prion protein is found in the cell membrane of brain neurons. The misfolded or infectious form of this protein (also called "scrapie"), is responsible for "mad cow" disease and has also been implicated in Creutzfeldt-Jakob disease in humans. Non-infectious and scrapie forms interact to produce disease; so, in order to help uncover how the infection is spread within and among neuron cells to the brain, the UCSD scientists studied the movement mechanism of normal PrPC in mouse neuronal cells.

"Our work unraveling the normal mechanism of movement of this prion protein will help us understand how the devastating pathogenic versions found in mad cow disease and other prion diseases are formed and transmitted in the brain. Intriguingly, our work may also shed light on what goes wrong in other neurodegenerative diseases such as Alzheimer's disease," said principal investigator Larry Goldstein, PhD, professor of Cellular and Molecular Medicine, Howard Hughes Medical Institute investigator and director of the UC San Diego Stem Cell Program.

It is known that normal prion proteins and infectious prions need to interact in order for prion pathogenesis to occur, though not how or why these interactions occur. Discovering the transport mechanisms of prions is one key to the puzzle of how the two types of proteins interact, and an important question in transport regulation has been how motor activity is controlled in cells.

The prion protein cargo travels on long microtubule tracks along the peripheral and central nervous system nerves toward the terminus, or synapse, in membrane-bound sacs called vesicles. Intracellular transport is often bi-directional, because cargoes regularly reverse their course en route to their final destinations.

The researchers identified the motors driving these vesicles as anterograde Kinesin-1 -- which moves only toward the synapse -- and dynein, which is retrograde, moving away from the synapse. These two motor proteins assemble on the PrPC vesicles to "walk" them back and forth along the microtubules.

Secondly, they discovered that the back and forth cargo movement is modulated by regulatory factors, rather than by any structural changes to the motor-cargo associations. The study data show that the activity of Kinesin-1 and dynein are tightly coupled, with PrPC vesicles moving at different velocities and for varied lengths along axons. However, the type and amounts of these motor assemblies remain stably associated with stationary as well as moving vesicles, and normal retrograde transport by Kinesin-1 is independent of dynein-vesicle attachment.

The UCSD study of the mechanisms behind normal vesicle movement along the axons in mouse cells might also shed light on other neurodegenerative disease. While Alzheimer's is not generally considered an infectious disease like mad cow disease, emerging data suggest that Tau, amyloid-beta, and alpha-synuclein -- proteins implicated in Alzheimer's and Parkinson's disease -- have self-propagating fibril structures with prion-like characteristics.

"Whether these toxic molecules spread along neuronal transport pathways in ways similar to the normal prion protein is unknown," said first author Sandra E. Encalada, PhD, of the UCSD Department of Cellular and

Molecular Medicine. "But characterization of these normal mechanisms might lead to a way to control movement of intracellular aggregates, and perhaps to therapies for many neurodegenerative diseases."

Additional contributors to the study include Lukasz Szpankowski, of the UCSD bioinformatics graduate program and the Howard Hughes Medical Institute, and Chun-hong Xia, UCSD Department of Cellular and Molecular Medicine, now at UC Berkeley.

The study was supported in part by the National Institutes of Health's National Institute on Aging.

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **University of California - San Diego**. The original article was written by Debra Kain.

Journal Reference:

1. Sandra E. Encalada, Lukasz Szpankowski, Chun-Hong Xia and Lawrence S. Goldstein. **Stable Kinesin and Dynein Assemblies Drive the Axonal Transport of Mammalian Prion Protein Vesicles**. *Cell*, Volume 144, Issue 4, 18 February 2011, Pages 551-565 DOI: 10.1016/j.cell.2011.01.021

http://www.sciencedaily.com/releases/2011/02/110217125111.htm

What a Rat Can Tell Us About Touch

Rats are nocturnal, burrowing animals that move their whiskers rhythmically to explore the environment by touch. Using only tactile information from its whiskers, a rat can determine all of an object's spatial properties, including size, shape, orientation and texture. (Credit: iStockphoto/Peta Curnow)

ScienceDaily (Feb. 22, 2011) — In her search to understand one of the most basic human senses -- touch -- Mitra Hartmann turns to what is becoming one of the best studied model systems in neuroscience: the whiskers of a rat. In her research, Hartmann, associate professor of biomedical engineering and mechanical engineering in the McCormick School of Engineering and Applied Science at Northwestern University, uses the rat whisker system as a model to understand how the brain seamlessly integrates the sense of touch with movement.

Hartmann discussed her research in a daylong seminar "Body and Machine" at the American Association for the Advancement of Science (AAAS) annual meeting in Washington, D.C. Her presentation was part of the session, "Linking Mechanics, Robotics, and Neuroscience: Novel Insights from Novel Systems," held on Feb. 18.

Rats are nocturnal, burrowing animals that move their whiskers rhythmically to explore the environment by touch. Using only tactile information from its whiskers, a rat can determine all of an object's spatial properties, including size, shape, orientation and texture. Hartmann's research group is particularly interested in characterizing the mechanics of sensory behaviors, and how mechanics influences perception.

"The big question our laboratory is interested in is how do animals, including humans, actively move their sensors through the environment, and somehow turn that sensory data into a stable perception of the world," Hartmann says.

Hundreds of papers are published each year that use the rat whisker system as a model to understand neural processing. But there is a big missing piece that prevents a full understanding the neural signals recorded in these studies: no one knows how to represent the "touch" of a whisker in terms of mechanical variables. "We

don't understand touch nearly as well as other senses," Hartmann says. "We know that visual and auditory stimuli can be quantified by the intensity and frequency of light and sound, but we don't fully understand the mechanics that generate our sense of touch."

In order to gain a better understanding of how the rat uses its whiskers to sense its world, Hartmann's group works to both better understand the rat's behavior and to create models of the system that enable the creation of artificial whisker arrays.

To determine how a rat can sense the shape of an object, Hartmann's team developed a light sheet to monitor the precise locations of the whiskers as they came in contact with the object. Using high-speed video, the team can also analyze how the rat moves its head to explore different shapes.

More recently, Hartmann's team has created a model that establishes the full structure of the rat head and whisker array. This means that the team can now simulate the rat "whisking " into different objects, and predict the full range of inputs into the whisker system as a rat encounters an object. The simulations can then be compared against real behavior, as monitored with the light sheet.

These advances will provide insight into the sense of touch, but may also enable new technologies that could make use of the whisker system. For example, Hartmann's lab created arrays of robotic whiskers that can, in several respects, mimic the capabilities of mammalian whiskers. The researchers demonstrated that these arrays can sense information about both object shape and fluid flow.

"We show that the bending moment, or torque, at the whisker base can be used to generate three-dimensional spatial representations of the environment," Hartmann says. "We used this principle to make arrays of robotic whiskers that in replicate much of the basic mechanics of rat whiskers." The technology, she said, could be used to extract the three-dimensional features of almost any solid object.

Hartmann envisions that a better understanding of the whisker system may be useful for engineering applications in which vision is limited. But most importantly, a better understanding of the rat whisker system could translate into a better understanding of ourselves.

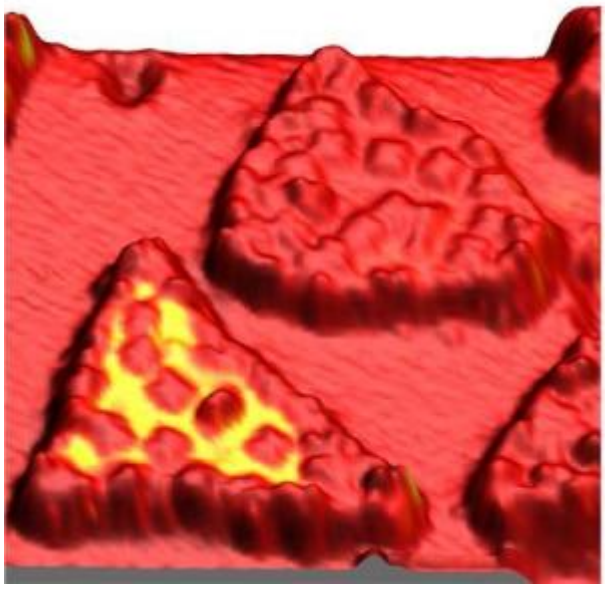
"Although whiskers and hands are very different, the basic neural pathways that process tactile information are in many respects similar across mammals," Hartmann says. "A better understanding of neural processing in the whisker system may provide insights into how our own brains process information."

Story Source:

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

http://www.sciencedaily.com/releases/2011/02/110218092535.htm

World's Smallest Magnetic Field Sensor: Researchers Explore Using Organic Molecules as Electronic Components



Scanning tunneling microscopy (50 x 50 nm2) of organic molecules. Coloring indicates variable spin orientation. (Credit: CFN)

ScienceDaily (Feb. 21, 2011) — Further development of modern information technology requires computer capacities of increased efficiency at reasonable costs. In the past, integration density of the relevant electronic components was increased constantly. In continuation of this strategy, future components will have to reach the size of individual molecules. Researchers from the KIT Center for Functional Nanostructures (CFN) and IPCMS have now come closer to reaching this target.

For the first time, a team of scientists from KIT and the Institut de Physique et Chimie des Matériaux de Strasbourg (IPCMS) have now succeeded in combining the concepts of spin electronics and molecular electronics in a single component consisting of a single molecule. Components based on this principle have a special potential, as they allow for the production of very small and highly efficient magnetic field sensors for read heads in hard disks or for non-volatile memories in order to further increase reading speed and data density.

Use of organic molecules as electronic components is being investigated extensively at the moment. Miniaturization is associated with the problem of the information being encoded with the help of the charge of the electron (current on or off). However, this requires a relatively high amount of energy. In spin electronics, the information is encoded in the intrinsic rotation of the electron, the spin. The advantage is that the spin is maintained even when switching off current supply, which means that the component can store information without any energy consumption.

The German-French research team has now combined these concepts. The organic molecule H_2-phthalocyanin that is also used as blue dye in ball pens exhibits a strong dependence of its resistance, if it is trapped between spin-polarized, i.e. magnetic electrodes. This effect was first observed in purely metal contacts by Albert Fert and Peter Grünberg. It is referred to as giant magnetoresistance and was acknowledged by the Nobel Prize for Physics in 2007.

The giant magnetoresistance effect on single molecules was demonstrated at KIT within the framework of a combined experimental and theoretical project of CFN and a German-French graduate school in cooperation with the IPCMS, Strasbourg. The results of the scientists are now presented in the journal *Nature Nanotechnology*.

Karlsruhe Institute of Technology (KIT) is a public corporation and state institution of Baden-Wuerttemberg, Germany. It fulfills the mission of a university and the mission of a national research center of the Helmholtz Association. KIT focuses on a knowledge triangle that links the tasks of research, teaching, and innovation.

Story Source:

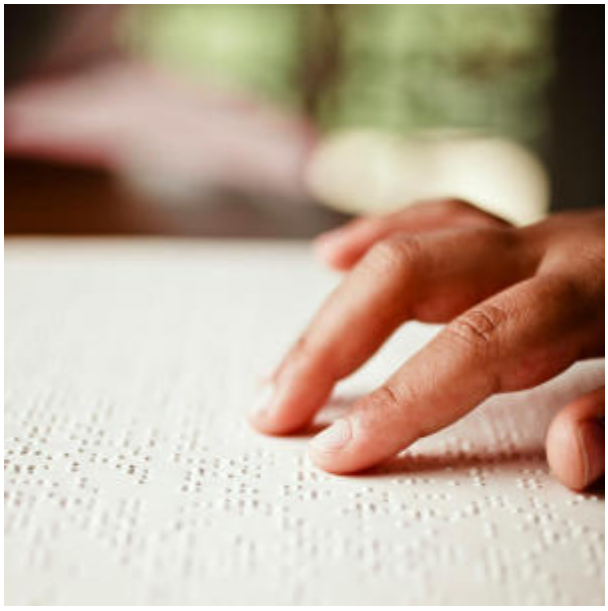
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Karlsruhe Institute of Technology**.

Journal Reference:

1. Stefan Schmaus, Alexei Bagrets, Yasmine Nahas, Toyo K. Yamada, Annika Bork, Martin Bowen, Eric Beaurepaire, Ferdinand Evers, Wulf Wulfhekel. **Giant magnetoresistance through a single molecule**. *Nature Nanotechnology*, 2011; DOI: 10.1038/nnano.2011.11

http://www.sciencedaily.com/releases/2011/02/110221081539.htm

Brains of Blind People Reading in Braille Show Activity in Same Area That Lights Up When Sighted Readers Read



Reading in Braille. (Credit: iStockphoto/Marilyn Nieves)

ScienceDaily (Feb. 17, 2011) — The portion of the brain responsible for visual reading doesn't require vision at all, according to a new study published online on Feb. 17 in *Current Biology*, a Cell Press publication. Brain imaging studies of blind people as they read words in Braille show activity in precisely the same part of the brain that lights up when sighted readers read. The findings challenge the textbook notion that the brain is divided up into regions that are specialized for processing information coming in via one sense or another, the researchers say.

"The brain is not a sensory machine, although it often looks like one; it is a task machine," said Amir Amedi of The Hebrew University of Jerusalem. "A brain area can fulfill a unique function, in this case reading, regardless of what form the sensory input takes."

Unlike other tasks that the brain performs, reading is a recent invention, about 5400 years old. Braille has been in use for less than 200 years. "That's not enough time for evolution to have shaped a brain module dedicated to reading," Amedi explained.

Nevertheless, study coauthor Laurent Cohen showed previously in sighted readers that a very specific part of the brain, known as the visual word form area or VWFA for short, has been co-opted for this purpose. But no one knew what might happen in the brains of blind people who learn to read even though they've had no visual experience at all.

In the new study, Amedi's team used functional magnetic resonance imaging to measure neural activity in eight people who had been blind since birth while they read Braille words or nonsense Braille. If the brain were organized around processing sensory information, one might expect that Braille reading would depend on regions dedicated to processing tactile information, Amedi explained. If instead the brain is task oriented, you'd expect to find the peak of activity across the entire brain in the VWFA, right where it occurs in sighted readers, and that is exactly what the researchers found.

Further comparison of brain activity in blind and sighted readers showed that the patterns in the VWFA were indistinguishable between the two groups.

"The main functional properties of the VWFA as identified in the sighted are present as well in the blind, are thus independent of the sensory modality of reading, and even more surprisingly do not require any visual experience," the researchers wrote. "To the best of our judgment, this provides the strongest support so far for the metamodal theory [of brain function]," which suggests that brain regions are defined by the tasks they perform. "Hence, the VWFA should also be referred to as the tactile word form area, or more generally as the (metamodal) word form area."

The researchers suggest that the VWFA is a multisensory integration area that binds simple features into more elaborate shape descriptions, making it ideal for the relatively new task of reading.

"Its specific anatomical location and its strong connectivity to language areas enable it to bridge high-level perceptual word representation and language-related components of reading," they wrote. "It is therefore the most suitable region to be taken over during reading acquisition, even when reading is acquired via touch without prior visual experience."

Amedi said the researchers plan to examine brain activity as people learn to read Braille for the first time, to find out how rapidly this takeover happens. "How does the brain change to process information in words?" he asked. "Is it instantaneous?"

Story Source:

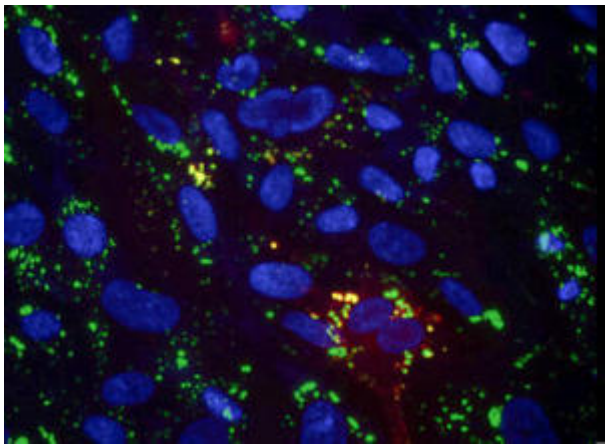
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Cell Press**, via EurekAlert!, a service of AAAS.

Journal Reference:

1. Lior Reich, Marcin Szwed, Laurent Cohen, and Amir Amedi. **A Ventral Visual Stream Reading Center Independent of Visual Experience**. *Current Biology*, 2011; DOI: 10.1016/j.cub.2011.01.040

http://www.sciencedaily.com/releases/2011/02/110217124903.htm

How Disordered Proteins Spread from Cell to Cell, Potentially Spreading Disease



An image of U2OS cells infected with Q91 polygluytamine aggregates (in green) colocalized with intracelluluar expressed (red) Q25. (Credit: Photo courtesy of Ron Kopito)

ScienceDaily (Feb. 18, 2011) — One bad apple is all it takes to spoil the barrel. And one misfolded protein may be all that's necessary to corrupt other proteins, forming large aggregations linked to several incurable neurodegenerative diseases such as Huntington's, Parkinson's and Alzheimer's.

Stanford biology Professor Ron Kopito has shown that the mutant, misfolded protein responsible for Huntington's disease can move from cell to cell, recruiting normal proteins and forming aggregations in each cell it visits.

Knowing that this protein spends part of its time outside cells "opens up the possibility for therapeutics," he said. Kopito studies how such misfolded proteins get across a cell's membrane and into its cytoplasm, where they can interact with normal proteins. He is also investigating how these proteins move between neuronal cells.

The ability of these proteins to move from one cell to another could explain the way Huntington's disease spreads through the brain after starting in a specific region. Similar mechanisms may be involved in the progress of Parkinson's and Alzheimer's through the brain.

Kopito discussed his research on Feb. 18 at the annual meeting of the American Association for the Advancement of Science in Washington, D.C.

Not all bad

Not all misfolded proteins are bad. The dogma used to be that all our proteins formed neat, well-folded structures, packed together in complexes with a large number of other proteins, Kopito said. But over the past 20 years, researchers have found that as much as 30 percent of our proteins never fold into stable structures. And even ordered proteins appear to have some disordered parts.

Disordered proteins are important for normal cellular functions. Unlike regular proteins, they only interact with one partner at a time. But they are much more dynamic, capable of several quick interactions with many different proteins. This makes them ideal for a lot of the standard communication that happens within a cell for its normal functioning, Kopito said.

But if some of our proteins are always disordered, how do our cells tell which proteins need to be properly folded, and which don't? "It's a big mystery," said Kopito, and one that he's studying. This question has implications for how people develop neurodegenerative diseases, all of which appear to be age-related.

Huntington's disease is caused by a specific mutated protein. But the body makes this mutant protein all your life, so why do you get the disease in later adulthood? Kopito said it's because the body's protective mechanisms stop doing their job as we get older. He said his lab hopes to determine what these mechanisms are.

A bad influence

But it's clear what happens when these mechanisms stop working -- misfolded proteins start recruiting normal versions of the same protein and form large aggregations. The presence of these aggregations in neurons has been closely linked with several neurodegenerative diseases.

Kopito found that the mutant protein associated with Huntington's disease can leave one cell and enter another one, stirring up trouble in each new cell as it progresses down the line. The spread of the misfolded protein may explain how Huntington's progresses through the brain.

This disease, like Parkinson's and Alzheimer's, starts in one area of the brain and spreads to the rest of it. This is also similar to the spread of prions, the self-replicating proteins implicated in mad cow disease and, in humans, Creutzfeldt-Jakob disease. As the misfolded protein reaches more parts of the brain, it could be responsible for the progressive worsening of these diseases.

Now that we know that these misfolded proteins spend part of their time outside of cells, traveling from one cell to another, new drugs could target them there, Kopito said. This could help prevent or at least block the progression of these diseases.

Kopito is currently working to figure out how misfolded proteins get past cell membranes into cells in the first place. It is only once in the cell's cytoplasm that these proteins can recruit others. So these studies could help find ways to keep these mischief-makers away from the normal proteins.

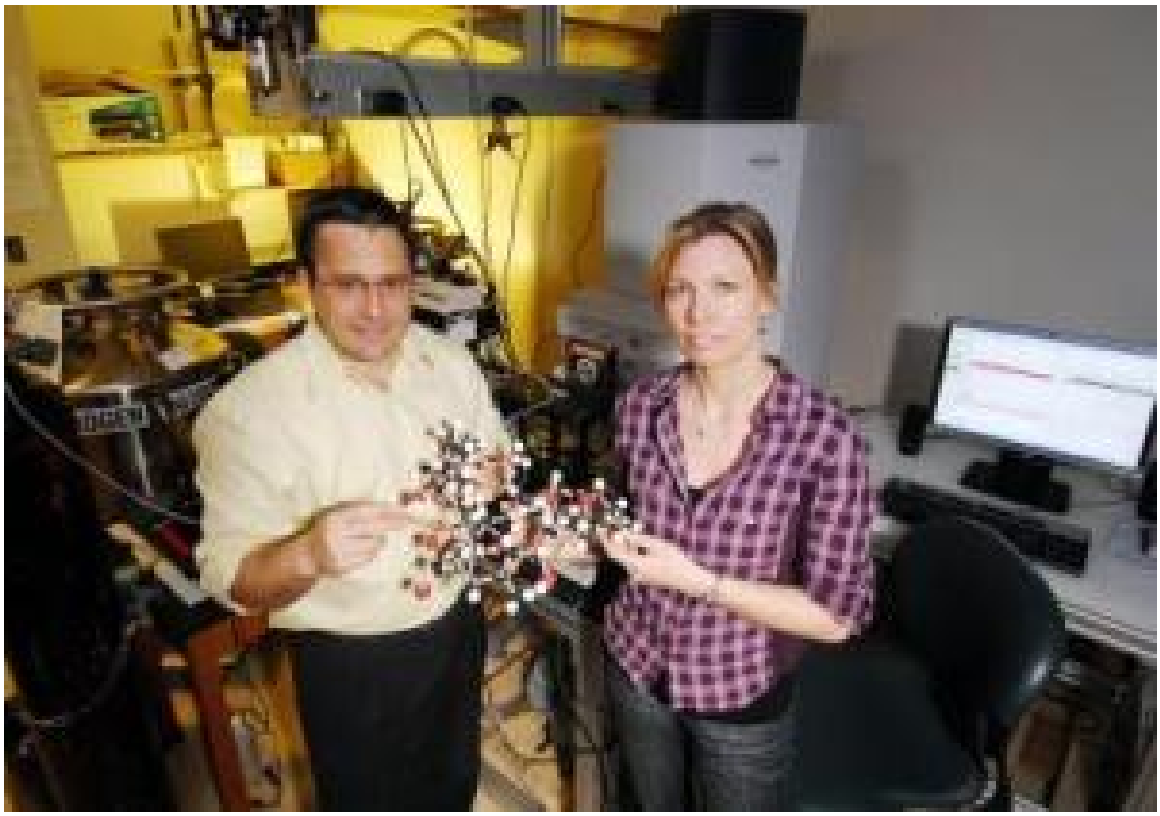
He is also collaborating with biology professor Liqun Luo to track these proteins between cells in the well-mapped fruit fly nervous system. In the future, Kopito said he hopes to link his cell biology work to disease pathology in order to understand the role misfolded proteins play in human disease.

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Stanford University**. The original article was written by Sandeep Ravindran, science-writing intern, Stanford News Service.

http://www.sciencedaily.com/releases/2011/02/110218165254.htm

Antifungal Compound Found on Tropical Seaweed Has Promising Antimalarial Properties



Julia Kubanek and Facundo Fernandez, both associate professors at the Georgia Institute of Technology, hold a molecular model of a potential antimalarial drug under study. (Credit: Georgia Tech Photo: Gary Meek)

ScienceDaily (Feb. 22, 2011) — A group of chemical compounds used by a species of tropical seaweed to ward off fungus attacks may have promising antimalarial properties for humans. The compounds are part of a unique chemical signaling system that seaweeds use to battle enemies -- and that may provide a wealth of potential new pharmaceutical compounds.

Using a novel analytical process, researchers at the Georgia Institute of Technology found that the complex antifungal molecules are not distributed evenly across the seaweed surfaces, but instead appear to be concentrated at specific locations -- possibly where an injury increases the risk of fungal infection.

A Georgia Tech scientist reports on the class of compounds, known as bromophycolides, at the annual meeting of the American Association for the Advancement of Science (AAAS) Feb. 21, 2011 in Washington, D.C. The research, supported by the National Institutes of Health, is part of a long-term study of chemical signaling among organisms that are part of coral reef communities.

"The language of chemistry in the natural world has been around for billions of years, and it is crucial for the survival of these species," said Julia Kubanek, an associate professor in Georgia Tech's School of Biology and School of Chemistry and Biochemistry. "We can co-opt these chemical processes for human benefit in the form of new treatments for diseases that affect us."

More than a million people die each year from malaria, which is caused by the parasite *Plasmodium falciparum*. The parasite has developed resistance to many antimalarial drugs and has begun to show resistance to artemisinin -- today's most important antimalarial drug. The stakes are high because half of the world's population is at risk for the disease.

"These molecules are promising leads for the treatment of malaria, and they operate through an interesting mechanism that we are studying," Kubanek explained. "There are only a couple of drugs left that are effective against malaria in all areas of the world, so we are hopeful that these molecules will continue to show promise as we develop them further as pharmaceutical leads."

In laboratory studies led by Georgia Tech student Paige Stout from Kubanek's lab -- and in collaboration with California scientists -- the lead molecule has shown promising activity against malaria, and the next step will be to test it in a mouse model of the disease. As with other potential drug compounds, however, the likelihood that this molecule will have just the right chemistry to be useful in humans is relatively small.

Other Georgia Tech researchers have begun research on synthesizing the compound in the laboratory. Beyond producing quantities sufficient for testing, laboratory synthesis may be able to modify the compound to improve its activity -- or to lessen any side effects. Ultimately, yeast or another microorganism may be able to be modified genetically to grow large amounts of bromophycolide.

The researchers found the antifungal compounds associated with light-colored patches on the surface of the *Callophycus serratus* seaweed using a new analytical technique known as desorption electrospray ionization mass spectrometry (DESI-MS). The technique was developed in the laboratory of Facundo Fernandez, an associate professor in Georgia Tech's School of Chemistry and Biochemistry. DESI-MS allowed researchers for the first time to study the unique chemical activity taking place on the surfaces of the seaweeds.

As part of the project, Georgia Tech scientists have been cataloging and analyzing natural compounds from more than 800 species found in the waters surrounding the Fiji Islands. They were interested in *Callophycus serratus* because it seemed particularly adept at fighting off microbial infections.

Using the DESI-MS technique, researchers Leonard Nyadong and Asiri Galhena analyzed samples of the seaweed and found groups of potent antifungal compounds. In laboratory testing, graduate student Amy Lane found that these bromophycolide compounds effectively inhibited the growth of *Lindra thalassiae*, a common marine fungus.

"The alga is marshalling its defenses and displaying them in a way that blocks the entry points for microbes that might invade and cause disease," Kubanek said. "Seaweeds don't have immune responses like humans do. But instead, they have some chemical compounds in their tissues to protect them."

Though all the seaweed they studied was from a single species, the researchers were surprised to find two distinct groups of antifungal chemicals. From one seaweed subpopulation, dubbed the "bushy" type for its appearance, 23 different antifungal compounds were identified. In a second group of seaweed, the researchers found 10 different antifungal compounds -- all different from the ones seen in the first group.

In the DESI-MS technique, a charged stream of polar solvent is directed at the surface of a sample under study at ambient pressure and temperature. The spray desorbs molecules, which are then ionized and delivered to the mass spectrometer for analysis.

"Our collaborative team of researchers from the Department of Biomedical Engineering and the College of Sciences has worked within the Bioimaging Mass Spectrometry Center at Georgia Tech to better understand

the mechanisms of chemical defenses in marine organisms," said Fernandez. "This is an example of cross-cutting interdisciplinary research that characterizes our institute."

Kubanek is hopeful that other useful compounds will emerge from the study of signaling compounds in the coral reef community.

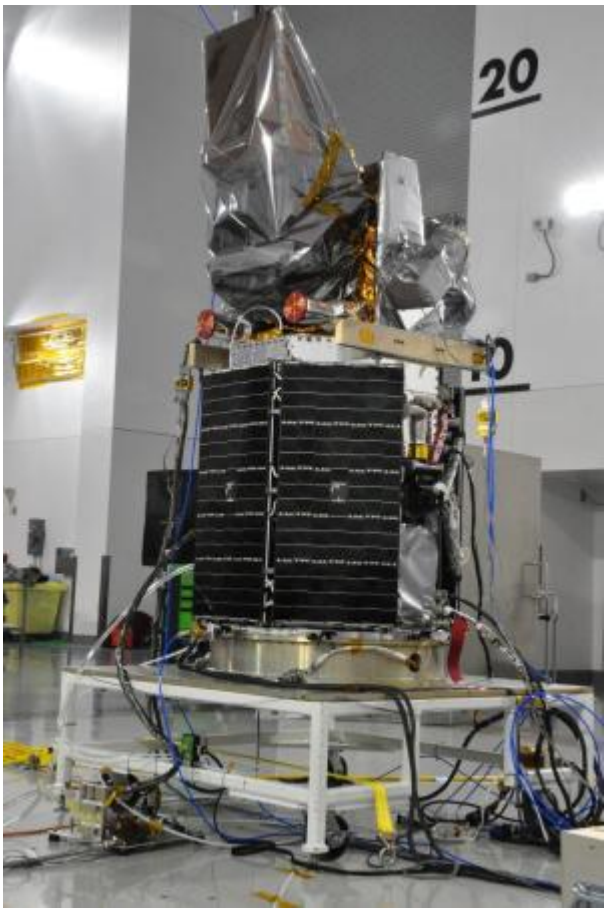
"In the natural world, we have seaweed that is making these molecules and we have fungi that are trying to colonize, infect and perhaps use the seaweed as a substrate for its own growth," Kubanek said. "The seaweed uses these molecules to try to prevent the fungus from doing this, so there is an interaction between the seaweed and the fungus. These molecules function like words in a language, communicating between the seaweed and the fungus."

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Georgia Institute of Technology Research News**, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2011/02/110221081648.htm

Climate and Aerosols: NASA's Glory Satellite Promises New View of Perplexing Particles



Glory's Aerosol Polarimetery Sensor (APS), under a protective bag here, is the triangular-shaped part of the spacecraft highest from the ground in this photograph. (Credit: NASA/KSC)

ScienceDaily (Feb. 22, 2011) — Climatologists have known for decades that airborne particles called aerosols can have a powerful impact on the climate. However, pinpointing the magnitude of the effect has proven challenging because of difficulties associated with measuring the particles on a global scale.

Soon a new NASA satellite -- Glory -- should help scientists collect the data needed to provide firmer answers about the important particles. In California, engineers and technicians at Vandenberg Air Force Base are currently prepping Glory for a Feb. 23 launch.

Aerosols, or the gases that lead to their formation, can come from vehicle tailpipes and desert winds, from sea spray and fires, volcanic eruptions and factories. Even lush forests, soils, or communities of plankton in the ocean can be sources of certain types of aerosols.

The ubiquitous particles drift in Earth's atmosphere, from the stratosphere to the surface, and range in size from a few nanometers, less than the width of the smallest viruses, to several tens of micrometers, about the diameter of human hair.

The particles can directly influence climate by reflecting or absorbing the sun's radiation. In broad terms, this means bright-colored or translucent aerosols, such as sulfates and sea salt aerosols, tend to reflect radiation

back towards space and cause cooling. In contrast, darker aerosols, such as black carbon and other types of carbonaceous particles, can absorb significant amounts of light and contribute to atmospheric warming.

Research to date suggests that the cooling from sulfates and other reflective aerosols overwhelms the warming effect of black carbon and other absorbing aerosols. Indeed, the best climate models available show that aerosol particles have had a cooling effect that has counteracted about half of the warming caused by the build-up of greenhouse gases since the 1880s.

"However, the models are far from perfect," said Glory Project Scientist Michael Mishchenko, a senior scientist at the Goddard Institute for Space Studies (GISS). "The range of uncertainty associated with the climate impact of aerosols is three or four times that of greenhouse gases," he said.

In comparison to greenhouse gases, aerosols are short-lived, and dynamic -- making the particles much harder to measure than long-lived and stable carbon dioxide. Aerosols usually remain suspended in the atmosphere for just a handful of days. Complicating matters, the particles can clump together to form hybrids that are difficult to distinguish.

In addition to scattering and absorbing light, aerosols can also modify clouds. They serve as the seeds of clouds, and can also affect cloud brightness and reflectivity, how long clouds last, and how much they precipitate. Reflective aerosols, like sulfates, for example, tend to brighten clouds and make them last longer, whereas black carbon from soot generally has the opposite effect.

Still, much remains unknown about aerosols and clouds. How do aerosols other than sulfates and black carbon affect clouds? How do aerosol impacts differ in warm and cold environments? Can infusions of aerosols near clouds spark self-reinforcing feedback cycles capable of affecting the climate?

The climate impact of clouds remains one of the largest uncertainties in climate science because of such unanswered questions. Some models suggest a mere 5 percent increase in cloud reflectivity could compensate for the entire increase in greenhouse gases from the modern industrial era, while others produce quite different outcomes.

Such unresolved issues prompted the Intergovernmental Panel on Climate Change (IPCC) to list the level of scientific understanding about aerosols as "low" in its last major report. Of the 25 climate models included by the IPCC in the Fourth Assessment Report, only a handful considered the scattering or absorbing effects of aerosol types other than sulfates.

"And less than a third of the models included aerosol impacts on clouds, even in a limited way, and those that did only considered sulfates," said Mian Chin, a physical scientist at NASA's Goddard Space Flight Center who specializes in modeling aerosols.

Glory, which contains an innovative aerosol-sensing instrument called the Aerosol Polarimetry Sensor (APS), aims to change this. By more accurately identifying a broad suite of aerosol types -- such as salt, mineral dust and smoke -- the instrument should help climatologists fill in key gaps in climate models.

While other NASA instruments -- including ground, aircraft, and satellite-based instruments -- have studied aerosols in the past, APS is NASA's first satellite-based instrument capable of measuring the polarization, the orientation of light-wave vibrations.

Raw sunlight, explained Mishchenko, is unpolarized. This means the waves oscillate in an unpredictable, random fashion as they move through space -- much like a rope would wiggle about if it had two people flapping its ends up and down in no particular pattern.

When light waves pass through certain types of filters called polarizers the waves are forced into a more ordered form. Imagine that wobbling rope trying to pass throw a narrow slit in a fence: only the waves vibrating at a certain angle could make it through. The result is polarized light, or light for which the waves only oscillate at specific angles. The surface of glass, sunglasses, even clouds of aerosol particles can polarize light.

APS's ability to measure the polarization of light scattered by aerosols and clouds is the key strength of the instrument. Other NASA satellite instruments have measured aerosols, but such instruments have typically done so by looking at the intensity of light -- the amplitude of the light waves -- not their polarization.

Yet, ground and aircraft-based studies, particularly those conducted with an aircraft instrument called the Research Scanning Polarimeter, which is quite similar to APS, show that polarized light contains the most information about aerosol features. "Earlier instruments can approximate the abundance of aerosol in general terms, but they leave much to be desired if you're trying to sort out the shape and composition of the particles," said APS Instrument Scientist Brian Cairns, also of GISS.

Large, spherical particles -- sea salt, for example -- leave a very different imprint on light in comparison to smaller and more irregularly-shaped particles such as black carbon. As a result, much like forensic scientists might study the details of blood droplets at a crime scene to reconstruct what happened, climatologists using Glory data will look to the polarization state of scattered light to work backwards and deduce the type of aerosol that must have scattered it.

Glory will not be the first Earth-observing satellite instrument to study polarization. French instruments that launched in 1996 and 2002 have as well, but the APS promises to be far more accurate and will look at the same particles from many more angles.

Nonetheless, interpreting Glory's APS data will be an extremely complex task. The mission will provide such a vast amount of new polarization data about aerosols that, in order to make sense of it, scientists will first have to validate APS science products with ground-based sensors scattered around the globe. Likewise, they will have to adapt and update mathematical techniques developed for an aircraft instrument to ensure they work well in a space environment.

All of this will take some time to refine and perfect. Mishchenko's team expects to release preliminary results as soon as possible after Glory launches, but he also expects to release improved and enhanced versions of Glory's APS data products over time.

A great deal of work lies ahead of Glory's science team and the aerosol science community more broadly, but the mission has the potential to produce profound advancements in understanding the perplexing particles. "Glory has the potential to offer a critical view of aerosols that we have never had from space before," said Glory's Deputy Project Scientist Ellsworth Welton.

Story Source:

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

http://www.sciencedaily.com/releases/2011/02/110221081512.htm

Surgery Sooner Rather Than Later Better for Children With Perforated Appendicitis

ScienceDaily (Feb. 21, 2011) — For children with a perforated appendix, early appendectomy appears to reduce the time away from normal activities and has fewer adverse events as compared to another common option, the interval appendectomy, which is performed several weeks after diagnosis, according to a report published online first in the *Archives of Surgery*, one of the JAMA/Archives journals. The paper will appear in the June 2011 print issue of the journal.

"Appendicitis is the most common gastrointestinal condition that requires urgent surgical treatment in children in the United States," according to background information provided by the authors. About 30 percent of the cases are perforated appendicitis. For acute, nonperforated appendicitis, the universally accepted treatment is urgent appendectomy.

But, for children with perforated appendicitis, there are two commonly used surgical treatment options: early appendectomy, in which the patient undergoes surgery within the first 24 hours of hospitalization, and interval appendectomy, in which the surgical removal of the appendix is planned for 6 to 8 weeks after the initial diagnosis and the patient has left the hospital and returned to normal activities.

The authors note the potential advantage of the interval appendectomy is to perform the operation when contamination in the abdominal cavity has resolved, potentially resulting in fewer surgical complications.

To compare the effectiveness and adverse event rates of early versus interval appendectomy, Martin L. Blakely, M.D., M.S., from University of Tennessee Health Science Center, Memphis, Tenn., and colleagues evaluated the surgical outcomes of 131 patients under the age of 18 who had a preoperative diagnosis of perforated appendicitis between October 2006 and August 2009.

The patients were randomized into two groups: 64 were in the early appendectomy group and 67 were in the interval appendectomy group. The researchers used time away from normal activities and overall adverse event rates (such as, intra-abdominal abscess, surgical site infection, unplanned readmission) as the main outcome measures.

"Early appendectomy, compared with interval appendectomy, significantly reduced the time away from normal activities (average, 13.8 vs. 19.4 days)," the authors report. The overall adverse event rate was 30 percent compared to 55 percent for early versus interval appendectomy. The total length of hospital stay was also reduced by an average of more than two days for patients receiving the early appendectomy compared to those who received the interval appendectomy.

Some of the patients in the interval group (23 patients or 34 percent) had an appendectomy earlier than planned because of failure to improve (17 patients), recurrent appendicitis (five patients), and other reasons (one patient).

"We found that those treated with early appendectomy return to normal activities an average of five days earlier. Because a child's time away from normal activities limits parents' abilities to work, we believe it is an important outcome from a patient and family perspective," the authors remark. "The overall adverse event rate after early appendectomy was significantly lower compared with interval appendectomy," the authors conclude.

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **JAMA and Archives Journals**.

Journal Reference:

1. Martin L. Blakely; Regan Williams; Melvin S. Dassinger; James W. Eubanks, III; Peter Fischer; Eunice Y. Huang; Elizabeth Paton; Barbara Culbreath; Allison Hester; Christian Streck; S. Douglas Hixson; Max R. Langham, Jr. **Early vs Interval Appendectomy for Children With Perforated Appendicitis**. *Archives of Surgery*, 2011; DOI: 10.1001/archsurg.2011.6

http://www.sciencedaily.com/releases/2011/02/110221163056.htm

New Marine Mollusk -- Oldest in Its Genus -- Discovered in Iberian Peninsula

Polyconites hadriani. (Credit: Eulàlia Gili et al.)

ScienceDaily (Feb. 22, 2011) — An international research team, with Spanish participation, has discovered a new species of mollusk, *Polyconites hadriani*, in various parts of the Iberian Peninsula. The researchers say this species, which is the oldest in its genus, adapted to the acidification of the oceans that took place while it was in existence. This process could now determine the evolution of modern marine systems.

The new species *Polyconites hadriani*, which was discovered in 2007, has been crowned the oldest in the Polyconites genus of the family Polyconitidae (rudists), a kind of extinct sea mollusk. To date, scientists had thought that the oldest mollusk in this genus was *Polyconites verneuili*.

"*P. hadriani* is similar in shape to *P. verneuili*, but it is smaller (with a 30mm smaller diameter), and with a thinner calcite layer to its shell (around 3mm difference)," says Eulàlia Gili, one of the authors of the study and a researcher at the Department of Geology of the Autonomous University of Barcelona (UAB).

The new species was found in several parts of the Iberian Peninsula -- in the Maestrat basin, the Vasco-Cantábrica basin, to the south of the Lusitania basin and in the Cordillera Prebética mountain range, "where it accumulated in dense conglomerations along the banks of the carbonate marine platforms of the Lower Aptian period (114 million years ago)," says Gili.

"This recognition of *P. hadriani* resolves the lengthy uncertainty about the identity of these polyconitids of the Lower Aptian," the researcher says in the study, which has been published in the *Turkish Journal of Earth Sciences*.

Adaptation to acidification of the oceans

Gili says the Lower Aptian was a convulsive period, during which significant climate change took place. *P. hadriani* existed at the time when the first oceanic anoxic event of the Cretaceous took place (between 135 and 65 million years ago). This event was characterised by a "lack of oxygen on the seabed, which led to the mass burial of organic carbon and climate cooling."

"The thicker calcite layer of the shell of this new species compared with that of its predecessor (of the Horiopleura genus), could have helped it adapt better to life in colder waters, which were more acidic due to the increased solubility of atmospheric CO_2," the geologist explains.

The researcher adds: "The response of these rudists to ocean acidification could apply to the future evolution of today's marine ecosystems, above all among those kinds of organisms that form their shells or skeletons from calcium carbonate."

Story Source:

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

Journal Reference:

1. Peter W. Skelton, Eulàlia Gili, Telm Bover-Arnal, Ramon Salas, Josep Anton Moreno-Edmar. **A New Species of Polyconites from the Lower Aptian of Iberia and the Early Evolution of Polyconitid Rudists**. *Turkish Journal of Earth Sciences*, 2010; 19 (5): 557-572 [link]

http://www.sciencedaily.com/releases/2011/02/110222083509.htm

Cold Winters Mean More Pollution, Swedish Study Suggests

The air quality in Gothenburg is linked to differences in air pressure over the North Atlantic. (Credit: Image courtesy of University of Gothenburg)

ScienceDaily (Feb. 22, 2011) — Differences in air pressure over the North Atlantic have meant that the last two winters in Gothenburg, Sweden, have been extremely cold. This has led to the air in Gothenburg being more polluted with nitrogen oxides than ever before. A new study from the University of Gothenburg shows that there is a strong link between climate and air pollution.

The winter weather in Gothenburg and large parts of North-West Europe is partly down to the North Atlantic Oscillation (NAO), in other words the differences in air pressure over the North Atlantic. The NAO swings between positive and negative phases depending on the differences in air pressure between Iceland and the Azores. When the NAO is in a negative phase -- as has been the case during the last two winters -- the city has cold winters because the low pressure sits over southern Europe, while cold air from the polar region or Siberia sits over northern Europe.

In a study carried out in Gothenburg, a group of researchers from the University of Gothenburg investigated how the concentrations of nitrogen oxides (NO and NO_2) in the air can be linked to the weather. Published in the scientific journal *Atmospheric Environment*, the study shows that the air quality standard has been exceeded more and more frequently during periods of a negative NAO even though emissions have fallen in the city centre since 2000 according to official measurements from the Environmental Administration.

"These extremely cold winters in Gothenburg, with high cold air, bring a clear deterioration in air quality," says Maria Grundström from the University of Gothenburg's Department of Plant and Environmental Sciences, one of the researchers behind the study. "With typical Gothenburg weather -- low air pressure with precipitation and strong winds -- the air pollution is dispersed more quickly on account of better air mixing."

Air mixing is often poor in Gothenburg during the months when the NAO is negative. This means that air pollution emitted at ground level accumulates and that the air quality becomes very poor. During the winter

months of 1997 to 2006, concentrations of nitrogen oxides were around 18% higher during months when the NAO was negative than when it was positive.

Air quality standards for nitrogen dioxide (NO_2) were exceeded far more often when the NAO was in a negative phase. The researchers refer, for example, to the fact that the number of exceedances of the hourly limit for nitrogen dioxide (90 µg/m^3) increased. This can be linked to the fact that the NAO has tended increasingly to be in a negative phase during the winter months over the last two years.

The study was carried out by Maria Grundström, Jenny Klingberg and Håkan Pleijel from the Department of Plant and Environmental Sciences at the University of Gothenburg, and climate researcher Hans Linderholm from the Department of Earth Sciences at the University of Gothenburg.

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Story Source:

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

Journal Reference:

1. M. Grundström, H.W. Linderholm, J. Klingberg, H. Pleijel. **Urban NO2 and NO pollution in relation to the North Atlantic Oscillation NAO**. *Atmospheric Environment*, 2011; 45 (4): 883 DOI: 10.1016/j.atmosenv.2010.11.023

http://www.sciencedaily.com/releases/2011/02/110222083153.htm

Brain-Machine Interfaces Make Gains by Learning About Their Users, Letting Them Rest, and Allowing for Multitasking

Robotino is a BCI distance-controlled robot to help disabled people interact with their surroundings developed at EPFL. (Credit: Alain Herzog / EPFL)

ScienceDaily (Feb. 21, 2011) — You may have heard of virtual keyboards controlled by thought, brain-powered wheelchairs, and neuro-prosthetic limbs. But powering these machines can be downright tiring, a fact that prevents the technology from being of much use to people with disabilities, among others. Professor José del R. Millán and his team at the Ecole Polytechnique Fédérale de Lausanne (EPFL) in Switzerland have a solution: engineer the system so that it learns about its user, allows for periods of rest, and even multitasking.

In a typical brain-computer interface (BCI) set-up, users can send one of three commands -- left, right, or no-command. No-command is the static state between left and right and is necessary for a brain-powered wheelchair to continue going straight, for example, or to stay put in front of a specific target. But it turns out that no-command is very taxing to maintain and requires extreme concentration. After about an hour, most users are spent. Not much help if you need to maneuver that wheelchair through an airport.

In an ongoing study demonstrated by Millán and doctoral student Michele Tavella at the AAAS 2011 Annual Meeting in Washington, D.C., the scientists hook volunteers up to BCI and ask them to read, speak, or read aloud while delivering as many left and right commands as possible or delivering a no-command. By using statistical analysis programmed by the scientists, Millán's BCI can distinguish between left and right commands and learn when each subject is sending one of these versus a no-command. In other words, the machine learns to read the subject's mental intention. The result is that users can mentally relax and also execute secondary tasks while controlling the BCI.

The so-called Shared Control approach to facilitating human-robot interactions employs image sensors and image-processing to avoid obstacles. According to Millán, however, Shared Control isn't enough to let an operator to rest or concentrate on more than one command at once, limiting long-term use.

Millán's new work complements research on Shared Control and makes multitasking a reality while at the same time allows users to catch a break. His trick is in decoding the signals coming from EEG readings on the scalp -- readings that represent the activity of millions of neurons and have notoriously low resolution. By incorporating statistical analysis, or probability theory, his BCI allows for both targeted control -- maneuvering around an obstacle -- and more precise tasks, such as staying on a target. It also makes it easier to give simple commands like "go straight" that need to be executed over longer periods of time (think back to that airport) without having to focus on giving the same command over and over again.

It will be a while before this cutting-edge technology makes the move from lab to production line, but Millán's prototypes are the first working models of their kind to use probability theory to make BCIs easier to use over time. His next step is to combine this new level of sophistication with Shared Control in an ongoing effort to take BCI to the next level, necessary for widespread use. Further advancements, such as finer grained interpretation of cognitive information, are being developed in collaboration with the European project for Tools for Brain Computer (www.tobi.com). The multinational project is headed by Professor Millán and has moved into the clinical testing phase for several BCIs.

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Ecole Polytechnique Fédérale de Lausanne**, via EurekAlert!, a service of AAAS.

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Better Way to Diagnose Pneumonia

PneumoniaCheck: The device contains a plastic tube with a mouthpiece. A patient coughs into the device to fill up a balloon-like upper airway reservoir before the lung aerosols go into a filter. Using fluid mechanics, PneumoniaCheck separates the upper airway particles of the mouth from the lower airway particles coming from the lungs. (Credit: Image courtesy of Georgia Institute of Technology)

ScienceDaily (Feb. 21, 2011) — Researchers from the Georgia Institute of Technology have created a new sampling device that could prevent thousands of people worldwide from dying of pneumonia each year.

Called PneumoniaCheck, the device created at Georgia Tech is a solution to the problem of diagnosing pneumonia, which is a major initiative of the U.S. Centers for Disease Control and Prevention (CDC).

Pneumonia, an inflammation of the lungs, kills about 2.4 million people each year. The problem is particularly devastating in Africa, Southeast Asia and the Eastern Mediterranean, where a child dies of pneumonia every 15 seconds.

Developed by mechanical engineering students, graduate business students and faculty at Georgia Tech, PneumoniaCheck will be commercially launched this month to healthcare professionals through the startup company, MD Innovate Inc.

"Georgia Tech created a simple and new device to detect the lung pathogens causing pneumonia, " said David Ku, Georgia Tech Regents' Professor of Mechanical Engineering, Lawrence P. Huang Chair Professor for Engineering Entrepreneurship in the College of Management, and Professor of Surgery at Emory University. "It has the potential to save more lives than any other medical device."

Last year, Ku was asked by the head of virology at the CDC to develop a quick and economical way to diagnose pneumonia, particularly in developing nations where it is a leading cause of death among children.

Ku challenged a group of mechanical engineering and bioengineering graduate students to develop an accurate device for diagnosing pneumonia. Current sampling methods using the mouth and nose are only 40 percent effective. The samples are typically contaminated by bacteria in the mouth, which leads to misdiagnosis and an incorrect prescription of antibiotics.

In developing nations, many children with respiratory infections fail to receive adequate care, and the overuse of antibiotics has led to an increase in drug-resistant bacteria. An accurate, easy-to-use and widely available

new diagnostic test could improve identification of bacterial respiratory infection in children, reducing the inappropriate use of antibiotics and the long-term negative impacts of drug resistance, according to a recent article in *Nature* titled "Reducing the global burden of acute lower respiratory infections in children: The contributions of new diagnostics."

As a Tech graduate student, Tamera Scholz and her peers developed the solution -- PneumoniaCheck.

The device contains a plastic tube with a mouthpiece. A patient coughs into the device to fill up a balloon-like upper airway reservoir before the lung aerosols go into a filter. Using fluid mechanics, PneumoniaCheck separates the upper airway particles of the mouth from the lower airway particles coming from the lungs.

"It's interesting because it's so simple," said Scholz (M.S. '10 Mechanical Engineering), who is now an engineer for Newell Rubbermaid. "It's not a fancy contraption. It's a device that patients cough into and through fluid mechanics it separates upper and lower airway aerosols. Through each iteration, it got simpler. … I like that I will be able to see it make a difference in my lifetime."

Once the device was developed, Taylor Bronikowski and a group of Georgia Tech M.B.A. students from the College of Management started developing a business plan for PneumoniaCheck that starts locally and grows globally. They used the device as a test case to develop a Triple Bottom Line company in India that could result in financial profits, environmental sustainability and social benefits, such as jobs and healthcare.

"Our goal is to provide better medicine at a cost savings to patients and hospitals," Bronikowski said. "We wanted a worldwide solution, so patients in developing nations can afford it."

Bronikowksi, Ku and Sarah Ku formed the startup company, MD Innovate Inc., in 2010 to manufacture the device in large quantities and organize distribution and commercialization. The device is now being used in pneumonia studies at Grady Memorial Hospital in downtown Atlanta and the Atlanta Veterans Administration Medical Center, Ku said.

The FDA has cleared PneumoniaCheck for sale in the U.S. The device is licensed but its patent is pending. The company will start selling PneumoniaCheck in the U.S. in January and it could hit other countries in two years, Ku said.

"It's a great feeling, working on something that has the potential to save thousands of lives," Bronikowski said.

On the horizon, Ku and future Georgia Tech graduate students will be developing a simple and effective method for diagnosing pneumonia in regions without healthcare facilities or basic infrastructure.

For more information, visit: http://www.mdinnov8.com/

Story Source:

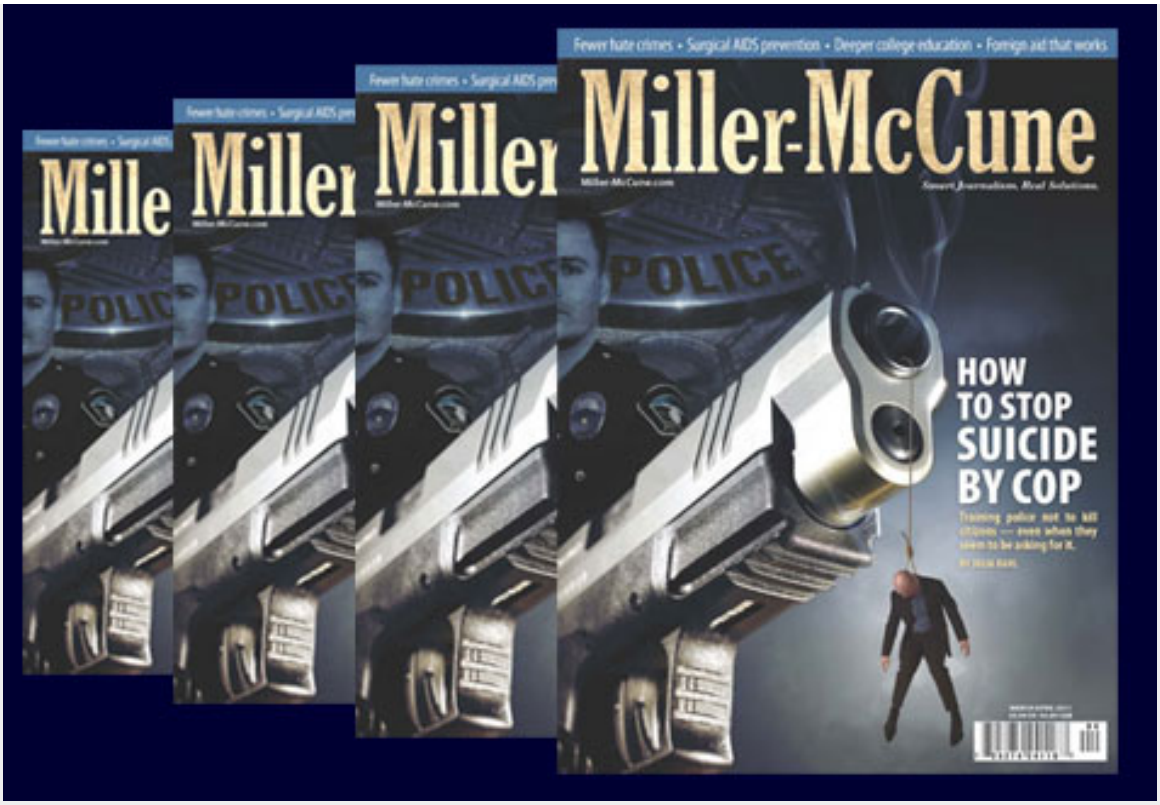
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Georgia Institute of Technology**.

http://www.sciencedaily.com/releases/2011/02/110218165256.htm

How to Stop Suicide by Cop

A growing movement is training police officers not to kill citizens — even when they seem to be asking for it.

By Julia Dahl



Police are being trained to not to kill citizens — even when they seem to be asking for it. (Illustration by Hugh Syme)

Standing before a classroom of police officers, Lt. Mark Poisson of the Wethersfield, Connecticut Police Department cues up video of a young man talking about the night he tried to get Poisson to kill him. "Seth*," who was 19 at the time and attending college in New Jersey, had already attempted suicide twice. He'd never been in trouble with the law but had spent years crippled by depression, and he was searching for the best way to die. Eventually, he decided the surest method was a gun. But he didn't own one; neither did his parents.

That's when it came to him: Police have guns.

The plan was simple: Get in the car and drive like crazy. Eventually, a cop would pull him over, and he'd do something threatening to get the cop to shoot him. On the night of March 22, 1997, Seth dropped his girlfriend off after a college formal, popped the bottle of cheap champagne knocking around in the back seat and started driving. Fast. He tore through New Jersey and into his home state of Connecticut. It was about 3 a.m., though, and he went miles without seeing a police car. So he drove to the parking lot of the Wallingford Police Department and leaned on his horn, trying to get their attention. It worked. A chase ensued with squad cars from several cities either following Seth or attempting to cut him off. Finally, Seth rammed into a police

cruiser and veered off the road. Poisson, who'd been following him, screeched to a halt and prepared for a foot chase.

But instead of running, Seth got out and started coming toward Poisson, brandishing the champagne bottle as a weapon. "I'm gonna kill you!" he screamed. "You better shoot me, or I'll kill you!"

Poisson, one of two officers on the scene, drew his gun and started to back away. He had been threatened before; two years earlier a man he'd caught stealing from vending machines came at him with a crowbar. But this was different. Poisson saw something in Seth's face that said he wasn't going to drop the bottle. Poisson kept backing up, kept telling Seth to drop it, but Seth kept coming at him, screaming "I'll kill you if you don't shoot me!" Finally, when Seth had backed Poisson into the middle of the highway, where any car coming up the hill might wipe him out, he pulled the trigger. The bullet hit Seth in the abdomen and lodged near his spine.

The officers cuffed Seth and turned him over. Poisson knelt down beside the bleeding boy, who looked at him and said, "Shoot me in the head."

Poisson switches off the video and motions for a woman sitting in the back of the room to come address the officers. "My name is Louise Pyers," says the woman. "And Seth is my son." When Seth regained consciousness after surgery in the hospital, she says, he looked at her and said, "Tell that officer I'm sorry, Mom."

In her quest to understand what happened to her son, Pyers dove into research and soon found out that there wasn't much to grab onto. Determined to bring focus to the issue, Pyers formed the Connecticut Alliance to Benefit Law Enforcement, recruited some sympathetic officers and set about convincing police chiefs all over the state that they needed to pay more attention to the devastating phenomenon.

It hasn't been an easy task. There are few circumstances more terrifying for a police officer than facing a person with nothing to lose. In the past few years, suicide by cop has become not so much a problem to be solved, but a catchy phrase that has taken on a life of its own, with the media and police spokespeople floating it as a possible explanation for a wide range of officer-involved shootings.

In 2003, Poisson and Pyers began giving a four-hour "suicide by cop" presentation to select Connecticut police officers. The men and women they're speaking to today are members of police departments across the state who have applied and been selected to take part in a 40-hour training program that will qualify them to be members of their department's Crisis Intervention Team. Developed in Memphis, Tenn., in the early 1990s, CIT — which includes officer training as well as tight police cooperation with community hospitals, mental health workers and advocacy groups — is considered the gold standard for preparing police to effectively respond to community members with mental illness, including people bent on committing suicide by cop.

But as Pyers discovered in her research, understanding of suicide by cop is far from complete. Partly, this is because only a handful of researchers have attempted to quantify how many of the 350 to 400 people cops kill each year actually *wanted* to die. Depending on whose definition of suicide by cop you accept, somewhere between 35 and 120 people use the police as instruments of their own destruction every year in the U.S. But partly because of this lack of consensus, hundreds of shootings are called "suicide by cop" in the media and occasionally by law enforcement agencies looking to justify a questionable civilian death.

Only 10 percent of the nation's approximately 15,000 police departments offer crisis intervention programs, and according to Ron Honberg, the legal adviser for the National Alliance on Mental Illness, it is often a tragic shooting — like Seth's — that serves as the catalyst for bringing the program to a community. "Police

officers are frequently not amenable to being told there's a better way of doing things than what they're doing," says Honberg, who has worked on crisis intervention for two decades. "It's an entrenched culture that doesn't change easily. The attitude is, if there's no fire, why throw water?"

But many in law enforcement believe there is, indeed, a fire. Nothing strains community-police relations like a fatal shooting, and with many police use-of-force incidents resulting in lawsuits — not to mention psychological trauma for the officer involved — advocates for crisis training believe the time has come for police organizations to take the problem seriously. "There is still no uniform definition of suicide by cop," says Anthony Pinizzotto, a former FBI forensic psychologist who has done extensive research on the phenomenon. "There are no criteria by which to judge whether it's suicide by cop, and there are no strategies to offer law enforcement to say this is how you go about investigating a suicide by cop."

Yet.

According to many researchers of the topic, the term "suicide by cop" was coined in the early 1980s by Karl Harris, a former psychologist with the Los Angeles County Coroner's office, but it doesn't appear in academic literature until a decade later, and as time passed, the number of shootings called "suicide by cop" crept up. In 1996, Rick Parent, a former member of the Delta Police Department in British Columbia, found that between 10 and 15 percent of the 58 police shootings he examined could be considered premeditated suicides. The next year, researchers using data from the Los Angeles Sheriff's Department looked at 437 officer-involved shootings between 1987 and 1997 and found that 13 percent of fatal shootings were suicide by cop situations.

They also noted that, in the last year of the sample, the number jumped to 27 percent. In 1998, three criminal justice professors published an article in the *FBI Law Enforcement Bulletin* concluding that of the 240 police shootings they looked at, 16 percent had "probable or possible suicidal motivation," but that 46 percent "contained *some evidence* of probable or possible suicidal motivation."

This wide range illustrates some of the challenges involved in studying suicide by cop. In March 2009, Kris Mohandie, a former Los Angeles Police Department psychologist who regularly consulted with the department's hostage team, made news when he published a study in the *Journal of Forensic Sciences* reporting that 36 percent of the 707 police shootings he studied were suicide by cop. Media outlets reported Mohandie's results as fact, but some in the field raised their eyebrows.

Sean Joe, a professor of psychiatry at the University of Michigan who studies suicide and participated in a University of Virginia conference on suicide by cop in 2008, told me he thinks Mohandie's criteria for a suicide by cop is too broad. "Just because a subject displays aggression toward the police, doesn't necessarily mean he has the intent to die," he says.

In his research, Mohandie broke the shootings he considered to be suicide by cop into two categories: planned and spontaneous. Seth's suicide attempt would have fallen into the first category, which Mohandie found made up just 17 percent of the incidents he deemed suicide by cop.

The second category is more controversial. Mohandie's research found that 81 percent of the suicides by cop he identified were incidents in which the subject — often someone feeling hopeless or self-destructive — did not decide he actually wanted to die until the police became involved. Such a definition, other researchers say, leaves open the possibility that police could have done something to escalate or even provoke the subject's reaction — and still have the shooting called a "suicide."

"If you get a true suicide by cop, there is no negotiating with them," says Detective Sgt. Don Hull, who has been a hostage negotiator with the Oklahoma City Police Department for more than 20 years. "I get a gut

feeling and realize, 'This guy is going to make us shoot him.'" In his two decades in law enforcement, Hull says he's seen fewer than five "true" suicides by cop.

James Drylie, a former New Jersey police officer who teaches criminal justice at Kean University in New Jersey, conducted extensive research for his book *Copicide: Concepts, Cases and Controversies of Suicide by Cop*, and explicitly left out the cases of people with a severe mental illness. He did not believe they possessed full understanding of the fact that their aggressive actions would cause their death. Mohandie disagrees with this assessment, citing the fact that people with severe mental illness, such as schizophrenia, are at high risk for suicide and suicide attempts.

Drylie developed three criteria for determining if an officer-involved shooting was a suicide by cop: The subject had to voluntarily enter into a confrontation with police; to communicate suicidal intent, either through words or gestures (like putting a gun to his head); and to act in a threatening manner toward police.

Using these criteria, Drylie spent the summer of 2005 going through the investigation files of 63 cases that officers at the FBI's National Academy had chosen to represent suicide by cop. Only 46 percent fit his criteria, which told him that most police officers don't really understand the phenomenon. "I truly believe that if police knew more about these situations, we would be able to mitigate the number of fatal shooting deaths," Drylie says.

But understanding requires data.

National data on police shootings is remarkably thin. Although the FBI publishes a detailed annual report about the circumstances surrounding the deaths of police officers killed in the line of duty (an average about 50 per year since 2002), it does not routinely collect identifying information about the hundreds of people police kill. The best data available seems to be a 2001 special report by the Bureau of Justice Statistics that looked at the 8,578 people killed by police between 1976 and 1998. The report found that 98 percent were male, 55 percent were white, and 53 percent were between ages of 18 and 30. But the report does not say whether the people killed had criminal records, whether they were armed (and if so with what) or whether they had a diagnosed mental illness.

According to Parent, who researched suicide by cop in British Columbia, this lack of data has made it easier for police departments to excuse questionable shootings by saying the subject was suicidal.

Anthony Pinizzotto has been trying to change this situation. After Congress passed the Hate Crimes Statistics Act of 1990, then-Attorney General Richard Thornburgh asked Pinizzotto, who was working with the FBI's Uniform Crime Report division, to create a way to investigate and record whether a crime was hate- or bias-related. A forensic psychologist, Pinizzotto began looking at the research on hate crimes and quickly realized that, as with suicide by cop, there was no agreed upon definition for hate crimes. So his team began meeting with departments around the country, asking about their investigative strategies and eventually developed a training guide for hate crime data collection. The next step was spreading the word to the more than 15,000 police agencies across the country. The agencies weren't terribly welcoming at first.

"Their attitude was, 'We have criteria for a crime, and if someone offends those rules we arrest them and let the judge and jury worry about motivation,'" Pinizzotto says. "I remember cops asking me, 'You want us to do that now?' The answer was yes — but we were prepared to provide them with the best information we could on how to judge that motivation."

When Pinizzotto turned his attention to suicide by cop in the late 1990s, he used his work with hate crimes as a model. In 2005, he and his research partner, former FBI behavioral scientist Edward Davis, published a definition: Suicide by cop is "an act motivated in whole or in part by the offender's desire to commit suicide

that results in a justifiable homicide by a law enforcement officer." They also published a simple protocol for who should investigate whether a shooting was a suicide by cop.

But Congress had given no mandate to create a definition or collect data on such incidents. To get people moving, Pinizzotto and Davis helped organize a small conference on the phenomenon in December 2008; among those in attendance was former attorney general Edwin Meese III, who became interested in suicide by cop through his work with the Law Enforcement Legal Defense Fund. In June 2009, Meese asked the FBI's Advisory Policy Board to adopt Pinizzotto's definition and require the bureau to begin collecting data as part of its uniform crime report. The board declined.

Audrey Honig, the chief psychologist for the Los Angeles County Sheriff's Department, sees the problem as one of inertia. "Law enforcement are so busy fighting fires that they don't get out in front to prevent the fire," she says. "When you show them something new, sometimes their initial reaction is just to jerk back and say no. It's a political thing that needs to be changed." In 2006, Honig published a paper on suicide by cop arguing that law enforcement agencies should pay attention to the phenomenon to help mitigate their liability in police shootings.

Pinizzotto and Davis say they plan to take another run at the FBI and will continue their own research on suicide by cop. They also hope the International Association of Chiefs of Police might get on board. But when I spoke with IACP President Mark Marshall, he told me that, while he's not opposed to collecting data on suicide by cop, it's not high on the association's radar. Someone, he told me, "would have to take the lead" — indicating that it wouldn't be he.

Most people who have studied the phenomenon will tell you that, typically, suicide-by-cop scenarios fall into two categories: the "fleeing felon" who tries to escape police and, once cornered, decides he's going to go out in a blaze of glory; and the "emotionally disturbed person," who, like Seth, is looking for a way out of the pain of either mental illness or some kind of life failure.

The police encounter "emotionally disturbed persons" so regularly that, in cop lingo, they are called "EDPs." Whether it's a domestic call (a man with a history of depression has become violent because his ex won't take him back), a workplace incident (an employee locks herself in a bathroom with a letter opener after being let go), or a schizophrenic homeless man screaming obscenities at shoppers at the local Dollar Store, police are often the first responders to problems involving our nation's mentally ill. Situations involving the emotionally disturbed are volatile and can quickly spiral out of control, but most American police officers receive little specialized training on dealing with them.

When police do not properly understand the mentally ill — whether suicidal or not — the result can be dangerous to everyone. Officers who shoot citizens are very often haunted by the event. When the subject is suicidal, the anguish is exacerbated, because the officer can feel manipulated. According to Mohandie, about one-third of officers suffer severe post-traumatic stress disorder or depression after killing a suicidal civilian; some are so distraught they end up leaving the profession. It's one thing to kill a "bad guy," quite another to kill, as Louise Pyers puts it, "a sad guy."

Despite the benefit to officers, training for crisis intervention teams and similar specialized groups is, by and large, offered only in departments with police chiefs who believe in it. According to Honburg, the director of policy and legal affairs for the NAMI, a lot of agencies are confused about crisis intervention training. "They say, we already do two or four hours on the mentally ill," he says. "They don't understand that CIT is about changing the culture — teaching them ways to respond that are safer for them and civilians."

And though not a magic bullet, in some places where crisis intervention teams bloom, there is progress. Oklahoma City is one of those places.

Paul Hight was a Catholic priest who suffered from paranoid schizophrenia. On the afternoon of Dec. 14, 2000, police came to his Oklahoma City apartment after neighbors called saying he was banging on doors and ranting. Hight confronted the officers with a kitchen knife; they shot him dead.

After the shooting, Paul's brother Joe Hight wanted answers. Couldn't the police have done something differently? Hight, an editor at *The Oklahoman* newspaper in Oklahoma City, arranged meetings with the chief of police and the head of the local chapter of National Alliance on Mental Illness.

"I realized these people weren't talking to each other," Hight says. Like Pyers, he formed a nonprofit to bring the groups together and helped support the creation of a crisis intervention team in Oklahoma City. Today, the 600-officer department has 117 certified crisis intervention team members. Capt. Bob Nash says they aim to keep 20 to 25 percent of all officers certified, so that on every shift in every area, there is always a crisis intervention officer available when police encounter what Sgt. Keith Simonds calls "a sick consumer."

Simonds co-taught a five-day crisis intervention course I attended in August 2008. The curriculum included everything from detailed information on the most current psychotropic drugs to site visits to halfway houses and psychiatric wards. But perhaps the most important thing officers learn in such courses is attitude adjustment.

On the first day of class, Simonds struck a typical police officer pose: feet planted firmly, hand on gun.

"Doesn't exactly say, I'm here to help you, does it?" Simonds asks. "More like, I'm here for target practice." Everybody laughs and Simonds explains that when a crisis intervention officer encounters someone in psychiatric crisis, he should approach with caution and patient talk: "How are you doing today, sir? Looks like maybe you're having a bad day. Are you taking any medication?"

Time and distance are the allies of a crisis intervention team, and for police officers used to demanding and receiving immediate answers, such an approach can seem a revolutionary concept. But the advice isn't exactly new: Florida police psychologist Dr. Laurence Miller has been writing columns for PoliceOne.com for years about an officer's most important weapons: his brain and mouth. "Ninety percent of potentially lethal situations in law enforcement can be talked down through negotiation," Miller says.

Joe Hight tells me he believes that if the Oklahoma City police had had crisis intervention training in 2000, his brother would be alive. Capt. Nash, who runs Oklahoma City's crisis intervention program, agrees, saying that it helps officers sharpen communication skills and has led to a drop in citizen deaths and injuries at the hands of police. "Now that families trust us," he says, "we're getting more and more early calls when a loved one begins to slip into a crisis, instead of waiting to call when things have deteriorated so much that communication is difficult." Also, he says, the concepts taught in the program — patience, empathy and persistence — have trickled down to other officers.

"A couple months ago, we had an incident where an officer was called to a house where shots had been fired," Nash recalls. The officer hadn't taken crisis intervention training, but on previous visits to the house — the home of a man who suffered from extreme paranoia and often called police when he was battling delusions — the officer had taken the time to sit down and listen. That experience paid off. Instead of barging in with his gun drawn and, perhaps, provoking a shooting — a shooting that might well later be classified a suicide by cop — he was able to defuse the situation.

"He made contact with the man, reminded him who he was and was able to talk him into coming outside without the shotgun," Nash says. "The man hadn't hurt anyone, so he didn't need to go to jail. The officer took him to the crisis center, and he was able to get the help he needed."

This kind of background information might have made a difference the night Lt. Poisson shot Seth. “If I had thought he might be trying to use me to commit suicide,” Poisson says, “I would have pulled up much farther away from him, so I could keep my distance and not have to make the decision to shoot.”

Seth is now in his 30s, and when he looks back on that night, he isn’t sure Poisson could have done much differently. A Taser might have been better than a bullet, but in 1997, that controversial, “less lethal” option wasn’t available.

“Maybe if he had more knowledge about people with mental disease and troubles, he wouldn’t have fired as soon,” Seth says. “But in the end, I was so hopped up and crazed I don’t know if he could have talked me down. I was committed.”

* — Seth is a pseudonym used at the request of the subject.

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http://www.miller-mccune.com/health/how-to-stop-suicide-by-cop-27758/?utm_source=Newsletter149&utm_medium=email&utm_content=0222&utm_campaign=newsletters

Circumcision: The Surgical AIDS Vaccine

Feb 22nd, 2011 @ 05:00 am › Beryl Lieff Benderly

Voters in San Francisco — the city that has probably suffered from AIDS more grievously than any other in America — may soon vote on whether to ban a safe, one-time procedure that protects against the virus that causes AIDS almost as effectively as the annual flu shot protects against the flu. Millions of dollars and years of research have thus far failed to overcome the diabolical obstacles to making an HIV vaccine. No doubt exists, however, that another treatment provides protection so effective that health experts have called it a "surgical vaccine." Unlike a flu shot, this protection lasts a lifetime and, at no extra charge, also helps reduce HIV risk for a man's sexual partners.

By now you may have guessed that this remarkable procedure is male circumcision (the word is Latin for "cutting around"), the ancient operation that removes the foreskin, the sleeve of tissue that sheathes the tip of the penis. Circumcision plays an important role in both the Muslim and Jewish religious traditions as well as in initiation rituals practiced by ethnic groups around the world, particularly in sub-Saharan Africa. Recently, however, retired hotel credit manager Lloyd Schofield, a San Francisco resident who calls himself an "intactivist" and considers circumcision mutilation, has announced that he is gathering signatures to put a referendum on the November city ballot that would ban the procedure. "Just as females are protected from having a drop of blood drawn from their genitals, baby boys deserve the same protection," Schofield told CNN. To qualify the proposition, proponents would need to gather slightly more than 7,000 signatures by late April.

Schofield is pushing the circumcision ban even though multiple lines of very strong evidence — from epidemiology, physiology, microbiology and three large, internationally recognized "gold standard" clinical trials — converge on the conclusion that removing the foreskin drastically cuts a man's risk of becoming infected by HIV. It also reduces his risk of other sexually transmitted diseases and cancer of the penis and his female partners' risk of cervical cancer. Moreover, the operation is safe, takes less than half an hour, heals in weeks and is so common that 80 percent of American men are circumcised. Nor is there scientific evidence of untoward effects, either immediately after healing or later in life, on men's health, sexual performance or desire.

The three controlled clinical trials took place in Kenya, South Africa and Uganda, in areas where circumcision rates are low and HIV levels high. More than 11,000 men, most of them young, all of them HIV-negative, uncircumcised and willing to undergo the operation, were randomly assigned either to be circumcised immediately by a doctor, or to be in the control group and wait for circumcision until after the study ended. The three trials were all stopped early, however, because of interim results so strong — a 60 percent reduction in infection risk — that researchers could no longer ethically withhold a procedure shown to be so beneficial. After the South African clinical trial had run for 18 months, for example, 49 of the 1,446

members of the control group had contracted HIV. But just 20 of the 1,431 in the circumcision group had become infected.

Dr. James Shelton, science adviser to the Bureau of Global Health of the U.S. Agency for International Development, believes the true reduction in risk is even larger than 60 percent but was masked by the structure of the experiment. Detailed statistical analysis of the results, he writes, reveals "a protective effect of 76 percent." That analysis would raise the level of protection into flu-shot range, which begins at 70 percent, according to the Centers for Disease Control and Prevention.

The World Health Organization and UNAIDS, the United Nations' HIV/AIDS agency, describe the trial results as "compelling." The two groups now recommend circumcision as "part of a comprehensive HIV prevention package."

A number of African countries have responded with programs to provide circumcision on a wide scale, particularly to men who already are or are about to become sexually active, because they make the most immediate impact on infection rates. As knowledge of circumcision's protective effect has spread, uncircumcised men have flocked to have the operation — among other things, women are urging their husbands to go — and parents have increasingly asked to have their sons circumcised. In 2006, a near-riot erupted in Mbabane, the capital of Swaziland, when men waiting outside a clinic learned that they wouldn't all be getting the appointments they hoped for.

Circumcision's origins are unknown, but its history goes back at least 4,000 years, as shown by tomb paintings from Egypt's sixth dynasty depicting men undergoing the procedure. The Hebrews, of course, have practiced it since ancient times, and it was customary among other peoples in the Middle East and East Africa long before the birth of Islam. Circumcision's ceremonial uses generally involve establishing identity, whether as a member of a community or as an adult. Many scholars argue, however, that the practice first arose out of health concerns, especially to avoid the painful irritations and infections that can result from sand becoming lodged under the foreskins in dry, desert climates. That was the reason, for example, that Australian army doctors during both world wars performed large numbers of circumcisions on soldiers serving in North Africa and the Middle East.

Depending on the ethnic and religious composition of a particular country, the number of circumcised males in Africa ranges from less than 20 percent to more than 80 percent. The large difference in HIV rates between countries with high and low rates of circumcision became obvious more than 20 years ago, alerting scientists to the potential protective effect of the procedure.

Researchers believe that the area between the foreskin and the penis shaft provides a hospitable area for HIV to exist, post-intercourse. And physiological research has identified a likely mechanism for infection there: The foreskin contains a particular type of cell that can provide the HIV virus a direct route into the body. These cells — known as Langerhans cells and discovered by the same German doctor who also found the better-known isles or islets of Langerhans in the pancreas — are plentiful on the underside of the foreskin but absent from the rest of the penis. Like the T cells that are a major target of the HIV virus, Langerhans cells belong to the immune system and are highly susceptible to HIV infection.

The shaft of the penis lacks Langerhans cells but contains a protective material called keratin that helps block entry of the virus. After circumcision, keratin develops in the tip of the penis, rendering it less vulnerable. The HIV protection that circumcision provides is not perfect, and public health authorities emphasize that circumcised men must still practice safe sex to limit risk.

Still, the clinical trials demonstrated the strong protective effect of circumcision in vaginal intercourse, which is important in Africa because the epidemic there has spread largely by heterosexual activity and involves people of both sexes. The logic of the physiology, however, argues that circumcision should also protect men

who take the insertive role in sex with other men, although this proposition has not been tested. It is clear, however, that by reducing the number of men who become infected, circumcision also reduces their partners' exposure to the virus.

"Herd immunity" is the name epidemiologists give to the reduction in risk that people not themselves vaccinated enjoy when a vaccine cuts the amount of an infectious agent that is circulating in a population. With HIV, this type of protection extends not only to circumcised men's female partners but, by cutting women's risk, to their babies as well. Fewer men becoming infected with HIV means fewer people of both genders and all ages getting the infection.

In rich countries in recent years, HIV treatment has improved so drastically that being infected no longer constitutes an imminent death warrant. Modern drug therapies now keep HIV-positive people alive for years, but in the United States each year, nearly 60,000 new people still join the more than 1.2 million already living with HIV. And 1 in 5 people with the infection don't know they have it, which helps it continue to spread. People are still dying, and treatment is costly and complicated.

Any injection offering a 60 percent reduction in the risk of contracting this plague would be received as a miracle in the HIV-ravaged regions of the world — and probably as a Nobel Prize-worthy triumph in the scientific community. Despite all these advantages, of course, some people do not think circumcision appropriate for themselves or their sons. That is certainly their right. But why would anyone — in San Francisco, which has known firsthand the grievous cost of HIV, or anywhere else — want to deprive those who wish this protection of the ability to obtain it?

http://www.miller-mccune.com/health/circumcision-the-surgical-aids-vaccine-27769/

A Genuine Jolt to the Memory

Little bits of electricity have been shown to help people remember names, a finding that might have implications for restoring memories and making new ones.

By Jill Porter

You may be shocked to learn that a little jolt of electricity can help people remember names. The discovery may have applications from helping stroke patients to those suffering with depression. (istockphoto.com/stockxchange.com)

It's a universal moment of dread. Someone with a familiar face approaches and panic ensues; you can't remember his or her name. New research suggests that this embarrassing incapacity may be helped by a shock — of electricity, that is.

Scientists from Temple University and the University of Pennsylvania discovered that a low jolt of electrical current to the brain improved name recall in young adults by 11 per cent, according to a study published in *Neuropsychologia*.

A subsequent experiment on older adults replicated the findings, and that study is being prepared for publication.

While wearing electrodes is not a practical solution to poor name recall, the research has far wider implications. "These findings hold promise because they point to possible therapeutic treatments for memory rehabilitation following a stroke or other neurological insult," senior author and Temple psychologist Ingrid Olson was quoted by her university.

Not to mention that any breakthrough in memory enhancement is significant because memory is the pivotal instrument of cognition, Olson said. Everything we learn, from walking to cooking to learning the rules of mathematics, involves different sets of neurons storing information in the brain. "But the fundamental rules that govern how that memory is created are probably the same."

Proper names are among the hardest things to recall, she said, because they're arbitrarily assigned and provide no clues about the person. In fact, the Temple researcher said her name apparently triggers visions of a "blonde Viking wearing a helmet" — so she's often called Olga. She's sympathetic to that mistake because she once lost a boyfriend in college whom she kept referring to as John. His name was Dave.

In the study, 15 young adults looking at a computer monitor were shown 165 photographs of famous people — from former British Prime Minister Tony Blair to actor Anthony Hopkins — on three separate occasions. The study subjects, wearing scalp caps that transmitted a low dose of electricity through electrodes soaked in saline solution, were given seven seconds to identify the image under three circumstances: when the left anterior lobe was electrically stimulated, when the right anterior lobe was stimulated and when "sham" or no stimulation was administered.

There was no improvement with the sham stimulation or with the left lobe, but accuracy improved from 27 percent to 38 percent with stimulation of the right anterior temporal lobe. Thirteen of the 15 participants showed increased naming performance. (Most of them particularly struggled with Tony Blair and old-time vamp Mae West.)

The research seems to confirm previous studies that suggest that the right anterior temporal lobe's function is related to name recall; when that section of the brain is removed to alleviate seizures in patients with epilepsy, a common side effect is an inability to recall names, according to Olson.

The technology of applying low dosage electricity to the brain is called transcranial direct current stimulation (tCDS), which is being studied as a treatment for everything from stroke to attention deficit disorder to depression.

While it may bring to mind visions of Jack Nicholson having his brain fried by electroshock therapy in the movie *One Flew Over the Cuckoo's Nest*, it's as different from electroshock as a chair vibrator is to a bolt of lightning. Electroshock uses 1 ampere of electricity and tCDS uses 1.5 milliamperes, which one academic likened to a tenth of the amount of current flowing through the ear buds of an iPod. It's a painless process that produces only a slight tingling at the onset.

The small surge of electricity apparently stimulates neurons into firing more readily and accessing information imbedded in memory, Olson said. It's possible, then, that learning can be expedited by applying electricity while the brain is being exposed to new information. "There are very few people using this technology, and right now it's a lot of guesswork," Olson said. "But it could be really great."

And any new discoveries involving memory are especially exciting in the scientific community.

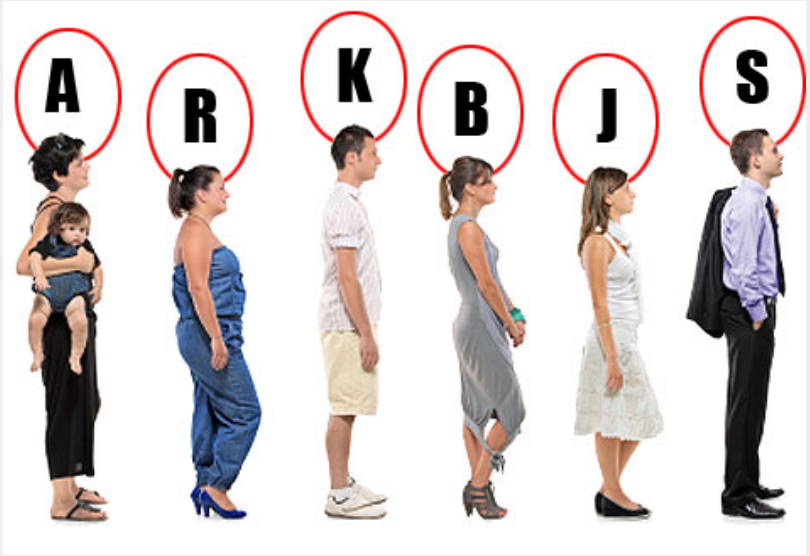
"It's a very big field of research in psychology and neuroscience because most of us think that understanding memory is the Holy Grail of what we do."

http://www.miller-mccune.com/culture/a-genuine-jolt-to-the-memory-28442/

ABCs of the Queue

Where a name appears in the alphabet may help explain how someone responds to waiting.

By John Greenya



Where your surname stands in the alphabet may hold clues to your patience levels and how that relates to success. (Ljupco / istockphoto.com)

Why do certain things bother you but not others? Like getting in line: When you have to, do you snap and snarl or do you queue up casually with no complaints?

Why is that? Kurt Carlson knows.

A professor of marketing at Georgetown University's McDonough School of Business, Carlson and his researchers regularly turn up all sorts of interesting and often surprising information on how and why we make decisions.

Take getting in line. "Why," he asks, "do people stand in line for so long at Georgetown Cupcake?" referring to a hugely popular sweets shop in Washington, D.C. "And why do some standees complain while others are unbothered?" His research suggests "it depends on where your last name falls in the alphabet.

"People whose last name appears early in the alphabet think standing in line is silly because they were privileged to be at the front of lines as children.

Those with last names toward the end of the alphabet — who were forced to the end of lines as children — act more quickly to secure a good spot in a line and are content to wait in line to preserve their spot."

Carlson and his research team asked a group of "mid-alphabet" people to imagine they were going into a witness protection program and were given the choice of taking new names early or late alphabet. "They chose early," he says.

And the women in the group also answered affirmatively when asked if, given the chance and all other things being equal, they'd choose husbands with "early alphabet surnames." Their reasoning, they told Carlson, was their belief that women who marry men with early alphabet names would be "better off."

Carlson's research team even found a candidate for public office whose platform was "End the tyranny of last names." (Asked if the candidate had won, Carlson answers, "Of course not.")

Another example cited in the same study involved students who'd enrolled in a wine evaluation course. They were told that if they took part in a 30-minute study, they'd be given a $5 bottle of wine. The researchers predicted that students with later alphabet names would respond more quickly to the offer. They were right. The same was noted when graduate students were offered a chance for free tickets to a college hoops game or were seeking their first academic job.

"The existence of the last name effect for these students," wrote Carlson and his co-author, Vanderbilt's Jacqueline M. Conard, "begs the question of whether the last name effect will exist for older adults in situations where there is a clear pressure to respond quickly."

In 2007, when a similar study — "What's in a Surname?" which included the concept of "alphabetical discrimination" — came to the attention of British journalist Richard Wiseman, he conducted his own experiment by polling his *Daily Telegraph* readership. To his astonishment, 15,000 people responded online.

"I wanted to know if people who had a surname that began with a letter near the start of the alphabet were more successful in life than those with names towards the end. In short, are the Abbots and Adams of the world likely to do better than the Youngs and the Yorks?"

The columnist found that people whose surnames began with letters at the beginning of the alphabet did, in fact, "…rate themselves as significantly more successful overall than those with surnames starting with lowly, end-of-the-alphabet initials. The surname effect was especially pronounced when it came to career, suggesting that alphabetical discrimination was alive and well in the workplace.

"So should these results give those whose surname initial falls towards the end of the alphabet cause for concern? Well, as a Wiseman, and therefore someone with a lifetime's experience of coming towards the bottom of alphabetical lists, I take some comfort from the fact that the effect is very small. Then again, when you look at some of the best-known people around today —Blair, Brown, Bush, Cameron, Branson — it does make me wonder."

So might, say, a professor of marketing in possession of such knowledge advise manufacturers (or any seller) on its potential?

The possibility does not interest Georgetown's Carlson, who neither welcomes nor seeks outside consulting work.

"I take care to avoid telling people how to run their lives, and I take care to avoid telling marketers how to run their departments. I simply provide the knowledge and leave it up to them to decide how to use it."

http://www.miller-mccune.com/culture/abcs-of-the-queue-28417/

Cling to Youthful Appearance, Annoy Actual Youth

Forty may be the new 30, but young people don't take kindly to elders trying to pass for their peers.

By Tom Jacobs

Studies reveal that adults who have a death grip on their youthful appearance can't get one over on actual young people and, in fact, may only invite their disapproval. (sdominick / istockphoto.com)

Have you dyed your hair lately? Had some wrinkles removed with a Botox injection? Perhaps considered plastic surgery?

If so, it's certainly understandable. Our youth-oriented society has, at best, an ambivalent attitude toward advanced age. If you're seeking either a job or a mate, it makes intuitive sense to look as young and vibrant as possible.

But newly published research suggests this approach can backfire. University of Kansas psychologists Alexander Schoemann and Nyla Branscombe report older adults who attempt to look youthful "are disliked, and face disapproval, from young adults."

"Individuals who attempt to look young are spending billions of dollars to conform to existing standards and escape the prejudice and discrimination directed toward older adults," they write in the *European Journal of Social Psychology.* "However, our experiments demonstrate that attempting to look younger can have both monetary and social costs."

In the first of their three experiments, 94 university students (median age 19) were assigned to read a short paragraph about a woman in her 50s. She was described as a successful shop owner who is single and has many friends.

Half the participants went on to read that “she dresses and acts much younger than her friends,” and is extremely interested in plastic surgery and “age-defying drugs and cosmetics.” The other half learned that she acts and dresses in a similar manner as her friends, and “has never been particularly interested in looking or dressing younger.”

They then assessed the women by answering a series of questions, which measured likability, deceitfulness and attractiveness. Interestingly, “there was no difference in perceived attractiveness” of the two women. But the one who was attempting to pass for younger was seen as less likeable and more deceitful than the woman who was comfortable in her own (at least moderately wrinkled) skin.

A second study repeated the first using a male subject as well as a female one; it produced the same results as the first, regardless of the person’s gender. A third study varied the age of the woman in question, with half the young participants (median age 20) informed she was in her 30s, while the others were told she was in her 60s.

“When the target was younger, she was seen as conforming to social pressure,” the researchers write, “whereas when the target was older, she was seen as attempting to avoid discrimination.” An important distinction but one that apparently didn’t elicit much empathy: “Endorsement of either attribution resulted in the target being disliked.”

Why the harsh responses?

“We found evidence in support of the idea that older adults who attempt to pass [for young] represent a threat to young adults’ social identities,” Schoemann and Branscombe write. “Young adults responded to this threat by disparaging [them].”

The researchers note that, in the third experiment, the woman in her 30s was evaluated more negatively than the one in her 60s. They note she was trying to pass for someone in her 20s and thus represented a more immediate threat to the participants’ group identity.

The study participants responded to written descriptions of the older adults, and the researchers concede they might have responded differently if they had “visual exposure” to the people they were evaluating.

That said, if you’re interviewing for a position, and the boss is younger than you, note that any attempts you make to appear youthful might mark you as an imposter and even something of a threat. All in all, the wisest approach might be to simply look your age.

http://www.miller-mccune.com/culture-society/cling-to-youthful-appearance-annoy-actual-youth-28350/

Guilt: A Double-Edged Sword

New research finds when we make amends to assuage our guilt, a third party often pays the price.

By Tom Jacobs

Researchers find that when we try to assuage our guilt, a kind of moral blindness occurs. Often, a third party will pay the price. (Klubovy / istockphoto.com)

The English dramatist Nicholas Rowe famously declared, "Guilt is the source of sorrow, 'tis the fiend, th' avenging fiend, that follows us behind, with whips and stings."

What he failed to mention is those guilt-induced lashes sometimes strike someone else's back rather than our own.

Newly published research from the Netherlands finds that while guilt can be a positive behavioral catalyst in one-on-one relationships, its consequences are more complicated when three or more people are involved. Motivated to compensate someone we have wronged but unwilling to pay a personal penalty, we often end up simply shifting the pain to a third party.

"Our experiments demonstrate that guilt motivates compensatory behavior toward the people to whom a person feels guilty, but that this occurs at the expense of others in the social environment," a research team led by Ilona de Hooge of Erasmus University writes in the *Journal of Personality and Social Psychology*.

The researchers report guilt "can lead to such a preoccupation with repairing the harm done to the victim that it makes people temporarily forget the well-being of others in their social surroundings." As a result of this temporary moral blindness, "guilt repairs the hurt relationship at the expense of others, and not — or hardly — at the expense of oneself."

De Hooge and her colleagues conducted a series of studies, beginning with a small-scale one featuring 33 residents of the city of Tilburg. They were first asked to describe either “a personal experience of feeling guilty” or “a regular weekday.” Those in the first group were then instructed to think about the individuals they felt guilty toward; those in the second thought about someone they met on that inconsequential day.

Each participant was then asked to divide 50 Euros between three uses: A birthday present for the person in question, a charity for victims of a flood in Africa and themselves.

Not surprisingly, those who were feeling guilty offered more money to the individual they had earlier singled out. However, “At the same time, guilty participants offered less money to flood victims,” the researchers note. Members of the two groups “did not differ in the amount they kept for themselves.”

The researchers performed additional experiments introducing different variables into this basic equation, but they always found the guilty person shifted the cost of reparation to a third party. This suggests the process of making amends “can produce new victims when one attempts to restore the relationship with the original victim,” they write.

So, in terms of morality, it appears guilt is something of a double-edged sword: While it “inhibits selfish tendencies in favor of behaviors that benefit people who have been wronged,” it doesn’t negate our penchant to keep our self-interest front and center.

So the next time you feel contrite, consider precisely how you plan to make amends, and take note of who will ultimately pay the price for your transgression. Chances are excellent it isn’t you.

http://www.miller-mccune.com/culture-society/guilt-a-double-edged-sword-28308/

The Educational Gap for Infants

Genes for mental ability get a boost from socioeconomic status in a study of baby twins.

By Melinda Burns

In a study of baby twins, researchers concluded that genes for mental ability get a boost from socioeconomic status — as early as infancy. (Picture Partners / istockphoto.com)

Family income and parental education begin to make a difference in a child's mental achievement as early as infancy, according to new research in behavioral genetics that advances the ill effects of poverty to late infancy.

In a study of 750 pairs of infant twins from a range of places, family incomes and ethnicities, a team of researchers led by Elliot Tucker-Drob of the University of Texas at Austin found that 2-year-olds from affluent families were scoring moderately higher than their lower-income peers on tests of mental capacity. The tests included pulling a string to ring a bell, putting three cubes in a cup, matching pictures, sorting pegs by color, and repeating vowel-consonant combinations.

Previous studies have shown that socioeconomic status has an influence on the expression of genes for mental ability across the life span, beginning at age 7. The UT research, in collaboration with the University of British Columbia and the University of Virginia, suggests that the interaction between genes and family income begins even earlier, effectively creating a performance gap between poor and wealthy children by the age of 2.

"The literature says genes matter more and more as people get older," said Tucker-Drob, an assistant professor of psychology at UT. "But there's an underrepresentation of low-income participants in most

existing twin studies. In our more diverse study of twins from both poor and wealthy families, we found that genes start to play a role by 2 years of age, but only for children being raised in wealthier families."

Previous research estimates that in the general population, 50 percent of mental ability is inherited and 50 percent is attributable to the environment.

Using methods from sociology and demography to help define the nature-nurture interaction, the UT team studied identical twins, who share 100 percent of their genes, and fraternal twins, who share 50 percent, across a range of family incomes. If identical twins were more similar in their test scores than fraternal twins, it stood to reason that genes were contributing. To calculate socioeconomic status, the researchers asked parents about their education, occupation and income.

At the age of 10 months, the study showed, socioeconomic status was not related to mental ability. By two years, however, the scores for mental ability were moderately higher for twins in affluent families with educated parents. Also in the wealthier families, the identical twins tended to be more similar to each other in their test scores than the fraternal twins. The researchers concluded that socioeconomic status was giving expression to the genes for mental ability in children being raised in wealthy families, but not in poor families.

The UT team did not attempt to identify what specific behaviors led to the disparity, but previous studies have suggested that high-income parents spend more time with their children and are able to draw on more resources to fit their educational needs.

In poor families, Tucker-Drob said, "people tend to have fewer books, are more overworked and stressed out, and their nutrition is not as good.

"Our findings suggest that children from poor families are already starting off in kindergarten, on average, at a disadvantage in their early cognitive skills."

http://www.miller-mccune.com/blogs/news-blog/the-educational-gap-for-infants-28412/

When Alzheimer's Waited Outside the Oval Office

By LAWRENCE K. ALTMAN, M.D.

Bob Galbraith/Associated Press

MENTAL STATE A memoir has rekindled debate about Ronald Reagan.

WASHINGTON — Ron Reagan's new memoir, "My Father at 100," has touched off sensational headlines with its suggestion that President Ronald Reagan might have begun showing hints of Alzheimer's disease while still in the White House.

But in two interviews this month, the younger Mr. Reagan said he never meant to suggest that his father had dementia before leaving office in 1989. And he graciously took the blame for not being more explicit in a passage that described a few personal observations along with comments from the former president's doctors.

A "rather small section of the book has attracted outsize attention," he said in a telephone interview from Seattle, where he lives.

All he meant, he continued, was that the amyloid plaque characteristic of Alzheimer's can start forming years before it leads to dementia. The former president's diagnosis was made in 1993, four years after he left office.

"Given what we know about the disease," his son told me, "I don't know how you could say that the disease wasn't likely present in him during the presidency."

Had it been stated that way, the assertion about Alzheimer's would have stirred little if any debate. Still, the issue is important for anyone — including candidates for office — because of the difficulty of distinguishing the initial symptoms of Alzheimer's from, say, simple forgetfulness.

The disease occurs most frequently after 70, but it can strike younger people. Dr. Alois Alzheimer, a German psychiatrist, diagnosed the first case in a 51-year-old woman. It is now recognized as one of a number of types of dementia. And diagnosing it with certainty requires a brain biopsy, rarely done while a patient is still alive.

Mr. Reagan's mental state was an issue even before he became the oldest man elected president, at 69, in 1980. Adversaries were fond of attributing his penchant for contradictory statements, forgetting names and general absent-mindedness to Alzheimer's.

I reported on Mr. Reagan's health, and he told me that his mother, Nelle, had died of senility — and that if he were to develop it in office he would resign.

As a follow-up to questions about Alzheimer's, my extensive interviews with his White House doctors, key aides and others, I found no evidence that Mr. Reagan exhibited signs of dementia as president. The interviews did not include family members.

Moreover, until Ron Reagan's memoir appeared, no other family member — and not Edmund Morris, the official biographer who spent seven years with Mr. Reagan in the White House — publicly hinted that he showed evidence of Alzheimer's as president.

"My Father at 100" (Viking) is an affectionate, often lighthearted account of a son's attempt to uncover his father's character by going back to his early days. It is generally well written, except for portions of the closing chapter about Alzheimer's — which Ron Reagan acknowledged were flawed because he "relied on memory" without checking facts about when and where the suspicion of his father's Alzheimer's was first raised.

He writes, for example, that after the former president fell from a bucking horse in Mexico in 1989, his doctors detected probable signs of Alzheimer's in removing a blood clot that formed between his skull and brain. But such a procedure does not involve a brain biopsy that doctors would need to diagnose dementia.

Moreover, Mr. Reagan was flown to a military hospital near Tucson — not taken to San Diego, as his son writes — and the blood clot, a subdural hematoma, was removed weeks later at the Mayo Clinic in Rochester, Minn.

In the interviews, Ron Reagan genially acknowledged the errors and said that if he had anticipated the controversy he created, he "would have done more due diligence in terms of pinning down dates."

When his father was president, Mr. Reagan, then a professional dancer with the Joffrey Ballet, visited him two or three times a year. Now 52, the younger Reagan has been a radio and television talk show host, commentator and magazine writer. In the book, he writes that he did not want his father to run for a second term, partly because of political differences (Ron has long been liberal) and partly because of his concern about Mr. Reagan's health — not the possibility of Alzheimer's, but the near-fatal gunshot wound he sustained in a 1981 assassination attempt.

Understandably, the son's memories about his father's Alzheimer's focused on when it first produced symptoms. The anecdotes that he cites are either well known or lack convincing evidence for Alzheimer's.

For example, he recounts the 1984 re-election campaign, when his father performed dismally as he floundered through his responses and was lost for words in his first debate with his opponent, Walter F. Mondale. But Mr. Reagan performed well in the second debate, 11 days later.

While spending a day in the Oval Office in 1987, the younger Reagan noticed that aides were providing his father with scripted index cards — a technique he often used when giving speeches — for phone calls lasting five minutes at most, implying signs of a failing memory. But in an interview, Mr. Reagan said it was "hard to know what to make of that" — and laughed as he said he was using similar notes in our conversation.

The son noted little things that he could not explain and to which he did not attach a name at the time. Based on knowing his father's demeanor and cognition over a lifetime, the observations created an impression "that something was amiss." But, he wrote, he did not want to leave an impression that his "father was catatonic or mumbling incoherently" at any period in the White House.

Asked if he had compared notes at the time with his mother, Nancy, Mr. Reagan said in an interview that they had — and "she did not see anything that set her antennae to vibrating."

Nor did he see evidence that his father, his siblings or anyone else was aware of impending Alzheimer's while President Reagan was in office. He did not discuss his observations with White House doctors. Considering resignation was never an issue: "We're not talking anything that approaches the level of dementia," he told me. "Not to a level where something needed to be done."

Recognizing that doctors have learned that the physiological and neurological changes linked to Alzheimer's can be seen in the brain years, even decades, before identifiable symptoms arise, Mr. Reagan wrote, somewhat ambiguously, "The question, then, of whether my father suffered from the beginning stages of Alzheimer's while in office more or less answers itself."

It was in 1990, the year after the horse accident, that the former president began taking annual mental-status tests. But they did not begin to show evidence of the disease until the summer of 1993, his White House doctor told me. In 1994, the former president wrote his poignant open letter to the American public disclosing the ailment.

Alzheimer's spared him many of its typical indignities, like unaccountable rages and fits of paranoia, and the family is grateful that "he never gave his caretakers or anyone a hard time," Ron Reagan told me.

The disease's course undulated as it progressed. Speech impairment, or aphasia, was an early cognitive deficit. "It became very difficult for him to string sentences together and eventually just words together," the son said.

Soon after the diagnosis, Mr. Reagan was told to give up horseback riding, one of his favorite hobbies. A strong swimmer in his youth — credited with 77 rescues as a lifeguard in Illinois — he now had to wear water wings while a nurse and security agent propped him up in the shallow end of a pool at home. He picked up magnolia leaves that fell from an overhanging tree or that a security agent tossed his way.

As the fog of Alzheimer's thickened, the father no longer recognized the son.

In his last months, Mr. Reagan held court from a hospital bed in his den, uncomplaining and gently agreeable. By this time he looked younger; his face had lost many of its worry lines and wrinkles. But as he stopped eating and drinking and his kidneys failed, Mr. Reagan lost the decade-long battle with Alzheimer's and died on June 5, 2004.

Alzheimer's hereditary patterns are not precisely known. Ron Reagan said he is aware that he is at risk for the disease. But he has not had genetic tests for it, and has not been asked or volunteered to take part in any study of the family history of Alzheimer's.

http://www.nytimes.com/2011/02/22/health/views/22reagan.html?_r=1&nl=health&emc=healthupdateema2

Danger Pent Up Behind Aging Dams

By HENRY FOUNTAIN

Michal Czerwonka for The New York Times

NOT INACTIVE Engineers now know that the Lake Isabella Dam lies on an active fault line. Below, a survey monument used to measure ground movement.

LAKE ISABELLA, Calif. — Frank Brassell, owner of Nelda's Diner in this town wedged between the slopes of the southern Sierra Nevada, knows his fate should Lake Isabella Dam, a mile up the road, suddenly fail when the lake is full.

"I work here," Mr. Brassell said, looking around the brightly lighted diner. "And I live right over there," he added, pointing across the town's main street.

"The water would all come down here and it would try to take a right turn and go under the freeway, and it wouldn't all go," he said.

"So I'm dead."

Lake Isabella Dam is just one acute example of a widespread problem: Of the nation's 85,000 dams, more than 4,400 are considered susceptible to failure, according to the Association of State Dam Safety Officials. But repairing all those dams would cost billions of dollars, and it is far from clear who would provide all the money in a recessionary era.

The stakes are particularly high not just for Mr. Brassell and the other 4,000 residents of Lake Isabella, but for the 340,000 people who live in Bakersfield, 40 miles down the Kern River Canyon on the edge of California's vast agricultural heartland. The Army Corps of Engineers, which built and operates the 57-year-old dam, learned several years ago that it had three serious problems: it was in danger of eroding internally; water could flow over its top in the most extreme flood season; and a fault underneath it was not inactive after all but could produce a strong earthquake. In a worst case, a catastrophic failure could send as much as 180 billion gallons of water — along with mud, boulders, trees and other debris, including, presumably, the ruins of Nelda's Diner — churning down the canyon and into Bakersfield. The floodwaters would turn the downtown and residential neighborhoods into a lake up to 30 feet deep and spread to industrial and agricultural areas.

The potential is for a 21st-century version of the Johnstown Flood, a calamitous dam failure that killed more than 2,200 people in western Pennsylvania in 1889. But corps and local government officials say that the odds of such a disaster are extremely small, and that they have taken interim steps to reduce the risk, like preparing evacuation plans and limiting how much water can be stored behind the dam to less than two-thirds of the maximum.

Still, they acknowledge that the impact of a dam failure would be enormous. “It’s not just the loss of life, potentially,” said David C. Serafini, lead technical expert for the corps on the project. “It’s the economic damages and the environmental damage, too.”

Corps engineers are preparing to propose fixes later this year. But at best, repairs would not begin until 2014 and could cost $500 million or more, money that would have to be approved by Congress.

Nationwide, the potential repair costs are staggering. A 2009 report by the state dam safety officials’ group put the cost of fixing the most critical dams — where failure could cause loss of life — at $16 billion over 12 years, with the total cost of rehabilitating all dams at $51 billion. But those figures do not include Lake Isabella and other dams among the approximately 3,000 that are owned by the federal government. The corps, for example, says that more than 300 of the roughly 700 dams it is responsible for need safety-related repairs, and estimates the total fix-up bill at about $20 billion.

The corps has already spent about $24 million just to determine the scope of the problems at Lake Isabella, and with the New Orleans levee failures during Hurricane Katrina a lingering memory, Congress has appropriated money for other federal dam repair projects as well.

But about two-thirds of all dams are private, and financially struggling state and local governments own most of the remainder. It is difficult to predict how needed repairs to these dams will be financed; legislation to provide federal money to help has languished in Congress. What’s more, the number of high-risk dams keeps rising as structures age, downstream development increases and more accurate information is obtained about watersheds and earthquake hazards.

Among the corps’s dams, Lake Isabella is one of 12 that are ranked in the highest category, as a dam with serious problems and serious failure consequences, given the large downstream population. “The classification is it’s an unsafe dam,” said Eric C. Halpin, the corps’s special assistant for dam and levee safety. But Mr. Halpin noted that 319 of the corps’s dams were considered “actionable from a safety standpoint.”

Lake Isabella would be one of the more expensive projects, but then again, its problems are legion. It is actually two earthen dams, a main one that is 185 feet high and an auxiliary one that sits on higher ground and is 100 feet high. With a rock ridge between them, they stretch for about a mile across the Kern River Valley.

For six decades the dams have controlled flooding on the Kern, helping Bakersfield to grow and thrive. And the lake that formed behind the dam has become the main driver of the economy of Lake Isabella and other towns, bringing fishers, boaters and whitewater rafters to the area.

But there have always been people in the area who felt the dams were flawed.

David Laughing Horse Robinson, an artist and teacher who lives in the lakeside town of Kernville, said his grandfather, who worked on the dam, and others used to talk about it. “Constantly,” he said. “How it was the stupidest thing they ever did. It’s doomed.”

Water seeps through the Lake Isabella dams, as it does through most earthen dams, which account for a vast majority of dams in the United States. But the seepage at Lake Isabella was especially severe — it is what prompted the corps to perform a full-scale study of the dam.

Water seeping through a dam can erode it from the inside out, to the point where the dam may fail. Engineers have learned to build structures into dams like drains and filters, to stop erosion and allow infiltrating water to drain safely away. But the Lake Isabella dams were constructed before such features became commonplace.

“It was built with the best available knowledge and technology at the time,” said Veronica V. Petrovsky, who is managing the project for the corps.

That knowledge, or lack of it, extended to the understanding of the large and complex watershed, which includes the slopes of Mount Whitney, the tallest peak in the contiguous United States. To determine how big the spillway needs to be, it is critical to know how much water might be impounded behind the dam each year.

Calculations show that in an extreme year with a “probable maximum flood,” the spillway would be far too small. “We could not release the water fast enough,” Ms. Petrovsky said. “It would overtop.” An overtopped dam can fail quickly as the water erodes the downstream side.

Concerns about seepage, in particular, prompted the corps to restrict the lake level, because less water creates less hydrostatic pressure that would force water through the dam. Earlier this winter, the lake was so low that water did not even lap up against the auxiliary dam. But the corps has been monitoring the heavy rains and snowfall that California has experienced this winter and says that in the spring and summer it may be necessary to divert water through the spillway to maintain the safer lake level. Overtopping, however, presents only a “small concern,” the corps said.

With both seepage and overtopping there would be plenty of warning that the dam was in jeopardy, allowing Lake Isabella and Bakersfield residents to evacuate. An earthquake would be a more immediate disaster, although Bakersfield would still have about seven hours before a wall of water made its way down the canyon, according to the corps.

The auxiliary dam was built, knowingly, on the Kern Canyon fault, one of many in the region. At the time the corps brought in seismologists and geologists who concluded that the fault was not active.

Only recently have scientists been able to accurately detect and measure ancient earthquakes, a field known as paleoseismology. Mr. Serafini and others determined that there have been three significant earthquakes on the fault in the past 10,000 years. “We have got a fairly active fault on our hands,” Mr. Serafini said. The last quake occurred about 3,400 years ago, he added.

It’s possible to construct a safe earthen dam on an active earthquake fault, by using the proper materials to minimize settlement or slumping when shaken, and including drains and filters to help stop the inevitable cracks from growing through erosion. Not only do the Lake Isabella dams lack those features, but the auxiliary dam was built on sediments that could turn into a virtual liquid in a quake, leading to even greater damage.

While Mr. Serafini and his team are still working on proposals, the likeliest solutions include blasting a much bigger spillway out of bedrock adjacent to the main dam and using the excavated rock to build a buttress — essentially an entirely new dam — downstream from the auxiliary dam. The old dam could still move in an earthquake, Mr. Serafini said, but the buttress would have the necessary drains and filters to prevent failure.

While the proposals are being fleshed out, the corps team has been holding meetings in the area to let people know what the possibilities are.

“We don’t hear much from the people of Bakersfield,” Ms. Petrovsky said. “It’s one of those ‘out of sight, out of mind’ things. You forget there’s a dam up here holding back a lot of water.”

Not so in Lake Isabella, however, where the dam, and its potential for failure, are harder to ignore.

“I think we’ve all put some thought into it,” said Mr. Brassell, the diner owner. “But anytime you have a diverse group of people there are going to be those who are panicked at some level, and those who are calm. Faith in God, you know. He’s going to do what he wants.”

http://www.nytimes.com/2011/02/22/science/22dam.html?ref=science

The Threatening Scent of Fertile Women

By JOHN TIERNEY

The 21-year-old woman was carefully trained not to flirt with anyone who came into the laboratory over the course of several months. She kept eye contact and conversation to a minimum. She never used makeup or perfume, kept her hair in a simple ponytail, and always wore jeans and a plain T-shirt.

Each of the young men thought she was simply a fellow student at Florida State University participating in the experiment, which ostensibly consisted of her and the man assembling a puzzle of Lego blocks. But the real experiment came later, when each man rated her attractiveness. Previous research had shown that a woman at the fertile stage of her menstrual cycle seems more attractive, and that same effect was observed here — but only when this woman was rated by a man who wasn't already involved with someone else.

The other guys, the ones in romantic relationships, rated her as significantly *less* attractive when she was at the peak stage of fertility, presumably because at some level they sensed she then posed the greatest threat to their long-term relationships. To avoid being enticed to stray, they apparently told themselves she wasn't all that hot anyway.

This experiment was part of a new trend in evolutionary psychology to study "relationship maintenance." Earlier research emphasized how evolution primed us to meet and mate: how men and women choose partners by looking for cues like facial symmetry, body shape, social status and resources.

But the evolutionary mating game wasn't just about finding a symmetrical face in the savanna's equivalent of a singles bar. Natural selection favored those who stayed together long enough to raise children: the men and women who could sustain a relationship by keeping their partners happy. They would have benefited from the virtue to remain faithful, or at least the wiliness to appear faithful while cheating discreetly.

It's possible that some of the men in Florida were just trying to look virtuous by downgrading the woman's attractiveness, the way a husband will instantly dismiss any woman pointed out by his wife. (*That Victoria's Secret model? Ugh! A skeleton with silicone.*) But Jon Maner, a co-author of the study, says that's unlikely because the men filled out their answers in private and didn't expect the ratings to be seen by anyone except the researchers.

"It seems the men were truly trying to ward off any temptation they felt toward the ovulating woman," said Dr. Maner, who did the work with Saul Miller, a fellow psychologist at Florida State. "They were trying to convince themselves that she was undesirable. I suspect some men really came to believe what they said. Others might still have felt the undercurrent of their forbidden desire, but I bet just voicing their lack of attraction helped them suppress it."

It may seem hard to believe that men could distinguish a woman who's at peak fertility simply by sitting next to her for a few minutes. Scientists long assumed that ovulation in humans was concealed from both sexes.

But recent studies have found large changes in cues and behavior when a woman is at this stage of peak fertility. Lap dancers get much higher tips (unless they're taking birth-control pills that suppress ovulation, in which case their tips remain lower). The pitch of a woman's voice rises. Men rate her body odor as more attractive and respond with higher levels of testosterone.

"The fascinating thing about this time is that it flies under the radar of consciousness," says Martie Haselton, a psychologist at U.C.L.A. "Women and men are affected by ovulation, but we don't have any idea that it is what is driving these substantial changes in our behavior. It makes it clear that we're much more like other mammals than we thought."

At this peak-fertility stage, women are more interested in going to parties and dance clubs, and they dress more attractively (as judged by both men and women). Some women's attitudes toward their own partners also change, according to research by Dr. Haselton along with a U.C.L.A. colleague, Christina Larson, and Steven Gangestad of the University of New Mexico.

"Women who are in steady relationships with men who are not very sexually attractive — those who lack the human equivalent of the peacock's tail — suddenly start to notice other men and flirt," Dr. Haselton said. "They are also more critical of their steady partners and feel less 'one' with them on those few days before ovulation." But that doesn't mean they're planning to walk out.

"These women don't show any shifts in feelings of commitment," Dr. Haselton said. "They don't want to leave their steady partners. They just want to look around at other men and consider them as alternative sex partners."

This fits the "good genes" evolutionary explanation for adultery: a quick fling with a good-looking guy can produce a child with better genes, who will therefore have a better chance of passing along the mother's genes. But this sort of infidelity is risky if the woman's unsexy long-term partner finds out and leaves her alone to raise the child. So it makes sense for her to limit her risks by being unfaithful only at those times she's fertile.

By that same evolutionary logic, it makes sense for her partner to be most worried when she's fertile, and that's just what occurred in the relationships tracked by Dr. Haselton and Dr. Gangestad. The unsexy men became especially jealous and engaged in more "mate-guarding" during the stage of high fertility — perhaps because they sense the subtle physical cues, or maybe just because they could see the overt flirting.

One safe way for both men and women to stay in a relationship is to avoid even looking at tempting alternatives, and there seem to be subtle mental mechanisms to stop the wandering eye, as Dr. Maner and colleagues at Florida State found in an experiment testing people's "attentional adhesion."

The men and women in the experiment, after being primed with quick flashes of words like "lust" and "kiss," were shown a series of photographs and other images. The single men and women in the study couldn't help

staring at photographs of good-looking people of the opposite sex — their gaze would linger on these hot prospects even when they were supposed to be looking at a new image popping up elsewhere on the screen.

But the people who were already in relationships reacted differently. They looked away more quickly from the attractive faces. The subliminal priming with words related to sex apparently activated some unconscious protective mechanism: *Tempt me not! I see nothing! I see nothing!*

This is good news for fans of fidelity, but there's one caveat from a subsequent study by Dr. Maner along with C. Nathan DeWall of the University of Kentucky and others. This time, the researchers subtly made it difficult to pay attention to the attractive faces. Both men and women responded by trying harder to look at the forbidden fruit. Afterward, they expressed less satisfaction with their partners and more interest in infidelity.

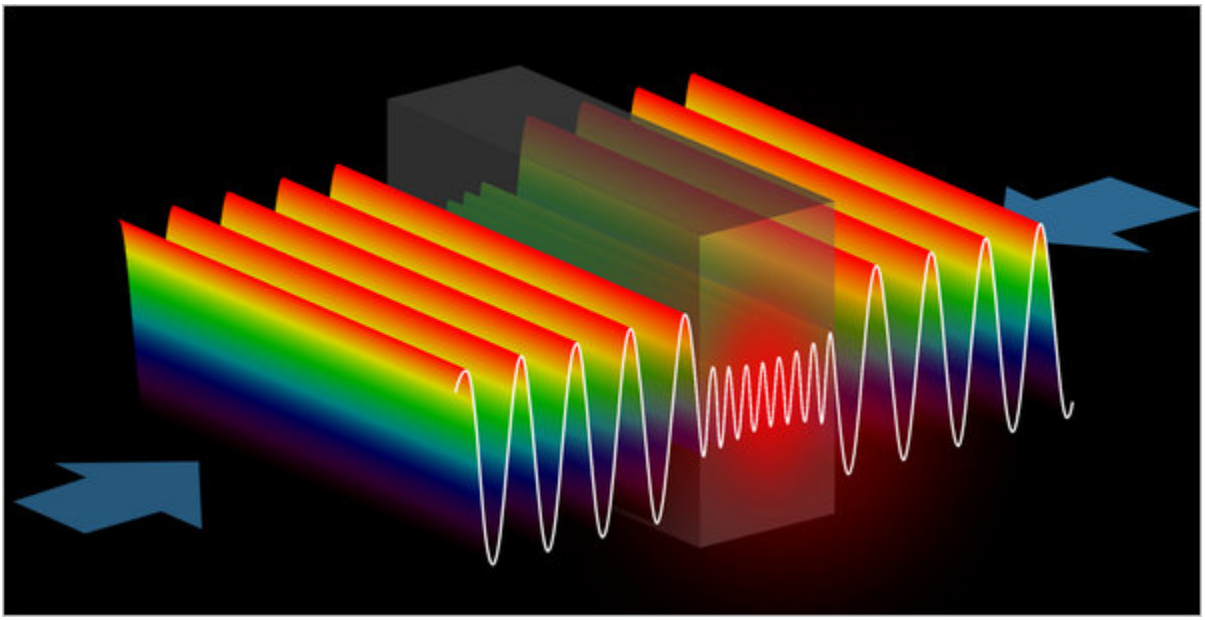
The lesson here seems to be that too much "mate-guarding" can get in the way of "relationship maintenance."

"We shouldn't want our partner to be looking at lots of other people, because that's bad for the relationship," Dr. Maner said. "At the same time, preventing them from looking doesn't help either, and can backfire." Left to their own devices, conscious or unconscious, they might just manage to restrain themselves.

http://www.nytimes.com/2011/02/22/science/22tier.html?ref=science

A Dazzling Show Inside a Laser, but a Vacuum of Light Outside

By HENRY FOUNTAIN



Yidong Chong/Yale University

FLIPPING In the anti-laser, photons bounce between the mirrors and interfere with one another, eventually wiping out in a flurry of electrons and heat.

In an elegant melding of theoretical and experimental physics, scientists at Yale University have taken the basic function of a laser and flipped it around — producing a device that absorbs, rather than emits, a beam of light.

The device, which the scientists call a "coherent perfect absorber" or, more popularly, an anti-laser, may lead to the development of new kinds of switches, filters and other components that could be useful in hybrid optical-electronic computers under development, among other applications.

A. Douglas Stone, a theoretical physicist at Yale, developed the concept of a backward-running laser in a paper in Physical Review Letters last spring. The actual device, described in a paper published last week in Science, was created in the laboratory of a laser physicist, Hui Cao.

In a laser, energy is pumped into a medium — which can be a solid, liquid or gas — between two mirrors, stimulating the emission of photons that are coherent, or of the same frequency and phase. The photons reflect back and forth between the mirrors, resulting in amplification of the light.

"You put energy into it, and some of that energy gets converted into that beautiful coherent light beam," Dr. Stone said.

In his theoretical work, Dr. Stone said, he made use of the fact that the equations that describe how a laser works have certain symmetrical properties.

"If you can make a laser of a certain type, the equations say you can make a reverse device as well," he said.

An anti-laser uses mirrors, too, but the other components are the reverse of a laser. The medium that provides amplification is replaced with one that provides absorption, and the outgoing light beam is replaced with an incoming one. (This light needs to be coherent, so it takes a laser to make an anti-laser.)

The incoming beam is split in two, and hits the medium from two sides. The photons bounce around between the mirrors and interfere with one another, eventually wiping themselves out in a flurry of electrons and heat.

The experimental device absorbed about 99.4 percent of the light. In theory, an anti-laser should be able to absorb 100 percent. "It's a one-way trap for light," Dr. Stone said.

Dr. Cao said the device they built was relatively simple, using silicon as the absorptive medium and a couple of "bad" mirrors.

"But we should be able to get coherent perfect absorption in more complicated systems," she said. Eventually it may even be possible to make an "anti" version of a so-called random laser, in which the medium is highly disordered and there are no mirrors.

The experimental device works in the near-infrared, outside of the visible spectrum. But Dr. Stone said that in principle anti-lasers would not be limited in terms of frequency.

"We could move it into the visible, or the farther infrared," he said. "It's definitely possible to engineer this across the whole range."

Stefano Longhi, a physicist at the Polytechnic Institute of Milan in Italy who was not involved in the work, said the anti-laser was an "important achievement" that was "exciting and surprising to the scientific community."

He said one important characteristic of the device is that the absorption could be turned on or off. This might make anti-lasers extremely useful as optical switching devices.

A device that absorbs light perfectly might be considered ideal for solar energy applications, but Dr. Longhi said this is not the case. Sunlight is not coherent, and an anti-laser will not work with incoherent light, he said.

A physicist would describe the device as a "time-reversed" laser, since the symmetrical properties are related to the concept of time reversal.

But Dr. Stone said he thought the term anti-laser was a better description for nonscientists, so that no one would think the device had anything to do with time travel.

But even "anti-laser" is problematic, he noted. "I don't want people to think this is some kind of laser shield," he said. "If R2-D2 had our anti-lasers, it would be melted into a puddle."

http://www.nytimes.com/2011/02/22/science/22laser.html?ref=science

Shhh, and Not Because the Fauna Are Sleeping

By FELICITY BARRINGER

Max Whittaker for The New York Times

Robert, Tatini and Ami Montgomerie of Sweden visited Muir Woods National Monument on Jan. 26.

MUIR WOODS NATIONAL MONUMENT, Calif. — At times, deep within this vaulted chamber of redwoods, it is almost quiet enough to hear a banana slug slither by. For the National Park Service, that stillness is as vital a component of the site as the trees' green needles, or the sudden darting rays of sunlight.

A decade after the agency resolved to restore natural sounds to this park in a metropolitan area of seven million people, managers at Muir Woods, in Marin Country just north of San Francisco, have made big strides in vanquishing intrusive noise. Now the background sounds are dominated by the burbling rush of Redwood Creek, the soft sibilant breeze that stirs the redwood branches, the croak of a crow.

Humans do contribute, too, but, with the exception of toddlers' squeals, their voices tend to be pitched lower than usual.

The impact of noise on wildlife ranging from birds to whales to elk has been a growing focus of scientific study. Increasing evidence suggests that animals in natural settings modify their behavior, though sometimes only briefly, in response to human commotion.

In a 2009 article in Park Science, researchers explained that animals react to human intrusions as if they were suddenly being threatened by predators.

"These disturbances evoke antipredator behaviors and interfere with other activities that enhance fitness," the article said, like foraging for food, mating and tending to the young. When such disturbances grow frequent, the researchers warned, "population consequences may result."

By 2001 or so, Muir Woods had in fact long been abandoned by otters and piliated woodpeckers, and park managers had grown concerned that sightings of a pair of northern spotted owls, an endangered species, were becoming more and more infrequent.

There were other worries besides noise levels. An asphalt walkway was cramping the growth of the redwoods' surprisingly shallow roots in some places, causing at least one tree to topple. And park visitors were straying from the path into the groves, compacting earth that was meant to be loose and harming the redwoods further.

But the noise question was the most vexing. The pathway could be altered, and was: in many places a slightly elevated boardwalk has replaced it. Visitors are firmly advised to stay on the paths. But the clatter and rumble of garbage can lids and maintenance vans remained.

Today, no Dumpsters or garbage cans are to be found along the trails. Maintenance vehicles powered by electricity glide by almost silently. Workers in emergency vehicles do not idle their engines while resolving whatever problem brought them to the park.

Once the diesel engines had been stilled, visitors began falling into line, heeding a subtle signal that human noises are superfluous here.

But some of the signals are hardly subtle: signs posted near Cathedral Grove in the heart of the park call for silence. Near the entrance to the food and gift shop close to the park's entrance, a decibel meter measures the sound of a visitor's voice.

"I could see myself crunching potato chips," Chris Mueller, a New York City tourist interviewed in the woods, said, referring to the digital readout on the decibel meter.

"Out here it is very quiet," Mr. Mueller added appreciatively. "The mumbling of the tourists and the babbling of the stream, it has a very calming sense to it."

What is more, the nocturnal spotted owls have responded: Muir Woods now has two breeding pairs instead of one.

The decade-long campaign for quiet in national parks has been little heard or noticed. The park system provides considerable autonomy to the individual parks, and officials at some parks have worried about noise and taken stronger steps more than have others.

Karen Treviño, the chief of the natural sounds and night skies division of the National Park Service, a system that includes hundreds of parks, monuments and historical tracts, said the noise issues varied widely.

In the Florida Everglades, the rhythmic thudding of electrical generators has been stilled at a campground, and park officials are negotiating with operators of airboats, whose revved-up fans can sound like miniature jet engines, to see how their impact might be reduced. They have also approached officials at Homestead Air Force Base south of Miami about the timing of the sonic booms that shake the saw grass.

For about a decade now at Zion National Park in Utah, a shuttle bus service has replaced most private cars on the main loop at the heart of the canyon. And Rocky Mountain National Park in Colorado has now ensured that some campground areas are generator-free and is weighing the best way to tackle motorcycle noise.

The progress at Muir Woods has been largely overshadowed by highly publicized noise battles between managers at the highest-profile parks and companies that pilot small planes and helicopters full of aerial sightseers.

This month, park managers at the Grand Canyon proposed requiring the operators to shift gradually to quieter aircraft, fly higher above the North Rim and refrain from flying at dawn and dusk. Yet Senator John McCain, Republican of Arizona, introduced legislation last week that could forestall the park's plan.

The measure, in the form of an amendment, specifies that noise standards "shall be considered to be achieved in the park if, for at least 75 percent of each day, 50 percent of the park is free of sound produced by commercial air tour operations."

Bill Hedden, the executive director of the Grant Canyon Trust, an Arizona environmental organization, denounced the McCain proposal. "This is an amendment that essentially gives the entire game away to the air

tour operators," Mr. Hedden said. "It redefines what constitutes natural quiet and lets them do any thing they want."

Asked about the amendment, Brooke Buchanan, a spokeswoman for the senator, warned that tighter regulation by the Park Service "could dramatically threaten tourism jobs and the tax base in Northern Arizona."

"Senator McCain's amendment would simply codify the existing definition of natural quiet that has been in place for the past 17 years," Ms. Buchanan said.

Muir Woods has airplane noise, too — it is within 30 miles of the Oakland and San Francisco airports — but officials here do not worry much about tourist flights because the tree canopy masks the view from above. The park also contends with the whine of cars and especially motorcycles making their way up Mount Tamalpais on roads just above the park.

Before the park quieted its maintenance fleet and other staff-generated noises, managers at Muir Woods had conducted a yearlong inventory of all sounds, natural and otherwise, in four places in the park, said Mia Monroe, a park ranger. To her surprise, Ms. Monroe said, noise from the parking lot and gift shop "bled a quarter-mile into the forest."

Administrators moved the parking lot about 100 yards farther from the entrance, eliminated the ice machine and installed the decibel meter.

The new concessionaire agreed to make coffee in a way that minimized the odor and to bake its scones and muffins in nearby Mill Valley rather than on site. "So when you walk in the forest, you smell the wonderful fresh air of the forest" — not blueberry scones, Ms. Monroe said.

Mr. Mueller, the New York tourist, savored the smells on his visit. "The scents are extraordinary," he said. "There's an intensity to the aromas one associates with dining. You can almost taste the air here, it's that rich."

Managers and rangers are careful nonetheless not to attribute specific improvements in the park's wildlife directly to policy changes like the new boardwalk or sound management or elimination of some invasive weeds. "It's very, very hard to say what do the peace and quiet, what does the boardwalk, what do any of these things relate to," Ms. Monroe said. "We don't know."

Still, she noted, otters have returned after a 75-year hiatus, and chipmunks are on the rebound.

And if a tree falls in this forest, it is likely to be heard.

http://www.nytimes.com/2011/02/22/science/earth/22sound.html?ref=science

Skull-Cups in British Cave Conjure an Ancient Rite

By SINDYA N. BHANOO

Natural History Museum of London

Skull-cups found in Somerset, England, were worked with flint tools 14,700 years ago.

The three human braincases, two from adults and one from a child, were carefully skinned and cleaned with flint tools. The soft tissue was removed and probably consumed, leaving a well-shaped cup, perhaps made for use in some sort of ritual.

This is not a scene from a horror film. British paleoanthropologists report the discovery of these 14,700-year-old skull-cups in the journal PLoS One. They were found in Gough's Cave in Somerset, England, and are the oldest directly dated skull-cups known, based on radiocarbon analysis.

"It shows, really, how skilled these people were in shaping the skull, and also the fact that it was a very complex ritual," said Silvia Bello, a paleontologist at the Natural History Museum in London and the study's lead author.

Historical accounts hold that other human societies, like the Scythians, nomadic Indo-European warriors, used skull-cups to sip the blood of enemies. And as late as the 19th century, skull-cups were reportedly used in Fiji and other islands in Oceania.

But archaeological evidence of skull-cups has been rare. The oldest known specimens date to the Upper Paleolithic period in Western Europe, 12,000 to 15,000 years ago, although none of those artifacts were directly dated.

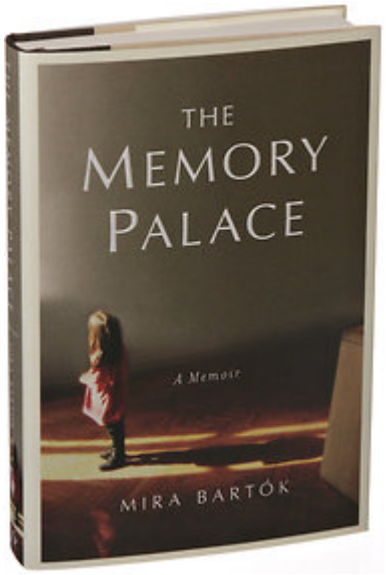
"But what we see here in Gough's Cave is very different from other cases, where maybe you killed the enemy and took the skull as the trophy," Dr. Bello said. "This seems more of a ritual, perhaps a funeral ritual."

A cast of one of the skull-cups will be on display at the Natural History Museum in London for three months, starting March 1.

http://www.nytimes.com/2011/02/22/science/22obskull.html?ref=science

Symphony of Pain in Two Accounts of Schizophrenia

By ABIGAIL ZUGER, M.D.



Patricia Wall/The New York Time

Every book is born alone, but sometimes a pair will surface in accidental synchrony, a single theme creating an impromptu pas de deux.

Such is the case with two new memoirs of schizophrenia. There is hardly a shortage of such books, but Mira Bartok and Patrick Cockburn have created mirror-image story arcs, one by the daughter of a schizophrenic mother, the other by the father of a schizophrenic son. Each is a model of narrative restraint, but in combination they combust, conveying the intensely painful experience of this disease in the literary equivalent of quadraphonic sound.

A foreign correspondent for the British press, Patrick Cockburn was on assignment in Afghanistan in the winter of 2002 when his son Henry, 20, was fished fully clothed out of an icy river back home. Henry's mother had noted "sinister changes" in his behavior for months, but this was the big break, with hallucinatory voices and visions so threatening that the river seemed the best place to hide. He was taken to a mental hospital and since then has never lived unsupervised or entirely free of disease.

The Cockburns are a prominent Irish family of letters — Mr. Cockburn's brother Alexander is the noted political journalist — and Henry, until his "final decline," in Mr. Cockburn's words, fell into the expected mold of verbal, artistically talented British schoolboy.

The elder Mr. Cockburn dispassionately reconstructs his own mental journey in the intervening years, from his first naïve assumptions that Henry would recover and resume his previous life, to his final stark, resigned descriptions of Henry at age 27, living in a halfway house in London, a person who "spent a lot of his waking life thinking about where he could get his next cigarette and where he could smoke it."

Mr. Cockburn moves through the usual soul-searching — was his own peripatetic nonpresence to blame for Henry's illness? Were family genes at fault? He muses at some length on the case of his father-in-law, a scion

of the eminent Anglo-Jewish Montefiore family, who converted to Christianity after a teenage vision of Jesus: could that be construed as a family history of psychosis?

Meanwhile, Henry contributes his own version of the story in flat staccato prose, highlighting his obsessive need to be outdoors (he has escaped from even top-security facilities dozens of times) and his profound reluctance to medicate all his vivid hallucinations away. “The forest would come alive and speak to me,” he writes. “The tree roots would move at the touch of my finger.” Indeed, the book’s ending suggests that although Henry has made an uneasy peace with his meds, the trees are still not entirely silent.

Mira Bartok’s narrative begins almost exactly where the Cockburns’ ends, with an unstable young adult and her unnerved family. Her mother, Norma Herr, had been a piano virtuoso as a child, but at 18 the voices inside her head “arrived unannounced in all their terrible glory.”

Products of a brief marriage, Mira and her sister had a childhood punctuated by their mother’s agitated pacing, her fierce conversations with herself, her suicide attempts. Occasional family trips to the symphony were invariably cut short because “something inexplicable” happened that made their mother whisper obscenities in the aisle.

The girls grew up and moved far away, but their mother tracked them down by mail, by phone or sometimes in increasingly disheveled person. “Have I been a bad mother to you? Do you still love me? I need you here. We have things to discuss.”

She wielded knives, a broken bottle. Finally, in desperation, both daughters changed their names (“She took Isaac Bashevis Singer’s last name, I took Bela Bartok’s”) and severed all contact with their now homeless mother.

Or such was the plan; Ms. Bartok never quite managed to pull it off. She continued to send her mother letters and small presents for years, even as she concealed her own address and phone number. But only as her 80-year-old mother lay dying of cancer did they meet again, and did Ms. Bartok, by then an artist and prolific author of children’s books, experience once again the disease’s tangled words and thoughts.

That was not so much through her mother’s physical presence as through the wealth of diaries she found in a storage bin, with decades of entries stumbling back and forth along a thin edge of reason: “I see that little bits of my life in distorted form have gotten into movie stories. I still have received no compensation for that. Ultimately, what I do know is this: I am a homemaker, my records have never been straightened out, and my need for privacy and house is greater than ever. I write this in a motel room looking out onto garbage bins.”

As with the Cockburns’ book, the intertwined voices of grief-stricken, articulate sanity and not-so-sane but often quite poetic illness make a duet both wonderful and terrible. Sadly, it is not nearly so terrible as the worst detail of both books: the failure of the medical system to help much with the pain of either set of writers.

In the 60-odd years separating Ms. Herr’s psychotic break from Henry Cockburn’s, mental hospitals have closed in droves, community-based services have proliferated, generations of antipsychotic drugs have been patented. The disease, at least in the severe form represented here, remains undaunted. It is hard to think of one that requires more courage from patients or their families.

http://www.nytimes.com/2011/02/22/health/views/22zuger.html?ref=science

A Founding Father's Books Turn Up

By SAM ROBERTS

Joe Angeles/WUSTL

The discovery of books that once had been in Thomas Jefferson's library has made Washington University in St. Louis the third largest repository of his collections. Above, part of its Jefferson collection.

A literary detective story that began 18 months ago and was advanced through a chance reading of an 1880 edition of The Harvard Register has led researchers from the Jefferson Library at Monticello to a trove of books that were among the last ones that Thomas Jefferson, the nation's most bibliophilic president, collected and read in the decade before he died.

The 28 titles in 74 volumes were discovered recently in the collection of Washington University in St. Louis, immediately elevating its library to the third largest repository of books belonging to Jefferson after the Library of Congress and the University of Virginia.

"My reaction was: 'Yes! It makes sense,' " said Shirley K. Baker, Washington University's vice chancellor for scholarly resources and dean of university libraries. "It strikes me as particularly appropriate these are in Missouri. Jefferson bought this territory, and we in Missouri identify with him and honor him. And I was thrilled at the detective work our curators had done."

The Washington University library learned of the Jefferson bonanza a few months ago from Endrina Tay, project manager for the Thomas Jefferson's Libraries project at Monticello, the former president's home near Charlottesville, Va., a National Historic Landmark. She has been working since 2004 to reconstruct Jefferson's collection and make the titles and supplemental reference materials available online. Jefferson had several collections, including 6,700 books that he sold to the Library of Congress in 1815 after the British burned Washington. Writing to John Adams that "I cannot live without books" and confessing to a "canine appetite for reading," Jefferson immediately started another collection that swelled to 1,600 books by the time he died on July 4, 1826. That collection became known as his retirement library.

Those books were dispersed after Jefferson's heirs reluctantly decided to sell them at auction in 1829 to pay off Jefferson's debts; auction catalogs survive, but not a record of who bought the books. The retirement collection is the least known of Jefferson's libraries and one in which classics were represented in disproportionately greater numbers than politics and the law. He cataloged all 1,600 books according to "the faculties of the human mind," like memory, reason and imagination, and then classified them further. Many were in French or Italian.

"Currently Monticello and the University of Virginia have the largest concentrations of books from the retirement library," said Kevin J. Hayes, an English professor at the University of Central Oklahoma and the author of "The Road to Monticello: The Life and Mind of Thomas Jefferson." "This new find would put Washington University among them. The question I would like to answer is: Do they contain any marginalia? Sometimes Jefferson wrote in his books; his marginalia would enhance both the scholarly and the cultural value of the books immeasurably."

The answer is yes. Jefferson initialed his books (to affirm his ownership), often corrected typographical errors in the texts and also occasionally wrote marginal notes or comments about the substance. Researchers are combing the newly discovered collection to find such notations.

“These books add a dimension to the study of the life of Jefferson at Monticello,” Ms. Tay said. “They expand our understanding and give us a tangible connection. It helps us understand how Jefferson used his books — whether they were well worn, which means he read them often. Some have annotations, and two architectural volumes include notations of calculations that Jefferson made.”

She explained that while there was no plan to reassemble the retirement library at Monticello, all of the information about it would be placed in a database.

“The physical collection is not as critical as what it represents intellectually,” Ms. Tay said. “What did he read? Where did he get his ideas? What influenced him?”

Armed with the auction catalog, Ms. Tay found letters suggesting that Joseph Coolidge of Boston, who met one of Jefferson’s granddaughters at Monticello and later married her, submitted lists of the books he wanted to buy.

Coolidge wrote Nicholas Philip Trist, who married another Jefferson granddaughter, saying, “If there are any books which have T. J. notes or private marks, they would be interesting to me.” He added, “I beg you to interest yourself in my behalf in relation to the books; remember that his library will not be sold again, and that all the memorials of T. J. for myself and children, and friends, must be secured now! — this is the last chance!”

Ms. Tay also found an annotated auction catalog with the letter “C” written next to a number of items, which seemed to indicate that Coolidge had bid successfully.

While she was tracking down the retirement library, one of her fellow Monticello scholars, Ann Lucas Birle, was researching a book about the Coolidges and, searching Google Books, found a reference in The Harvard Register to a gift in 1880 from a Coolidge son-in-law, Edmund Dwight, to a fellow Harvard alumnus and possible relative, William Greenleaf Eliot, a founder of Washington University.

“It could have been his parents have died, he’s left with 3,000 books, what should he do with these that would really do good?” Dean Baker said. “A great-uncle just founded a new university. If you send them to a university that doesn’t even have 3,000 books, it could make a world of difference.”

The discovery that the 3,000 books in the Coolidge collection included 74 that once belonged to Jefferson means that about half of his retirement library has been accounted for. It has also prompted a search by librarians at Washington University to determine whether any other books in the Coolidge collection had been Jefferson’s.

http://www.nytimes.com/2011/02/23/books/23jefferson.html?ref=arts

Letting His Life's Work Do the Talking

By CAROL KINO

Josh Anderson/The New York Times

Thornton Dial in his studio in Bessemer, Ala.

Bessemer, Ala.

THORNTON DIAL has never been one for talking much about his artwork. Ask him what inspires his monumental assemblages, made from twisted metal, tree branches, cloth, plastic toys, animal bones and all manner of found materials, and he is likely to respond tersely, as he did while showing me around his studio here one bone-chilling day last month.

"I mostly pick up stuff," he said. "I start on a picture when I get a whole lot of stuff together. And then I look at the piece and think about life."

Now 82, Mr. Dial has had a lot of life to think about — especially over the last year, during which he endured hernia surgery, pneumonia, a stroke and heart problems. Only recently did he return to making art in this cold and cavernous space at the back of Dial Metal Patterns, a fabrication shop run by his children. As he huddled in a chair, looking frail and slightly wary, his three sons hovered about him protectively.

For one paintinglike piece, made on canvas-covered plywood, Mr. Dial had used branches, metal, clothing, paint and a pair of work boots to create a lean figure fording through a tall jungle. "That's Obama," he said. "I show the struggle he got through without getting bit."

Another, saturated with powdery white pigment, presented a baby doll nested in a field of cotton-covered twigs and twisted steel. A rope encircled the doll's neck, suggesting a noose or an umbilical cord. "That's the

way they come," Mr. Dial said, chuckling, when asked about the rope's significance. "You probably see many things in my art if you're looking at it right."

Because Mr. Dial is self-taught and illiterate, he has generally been classified as a folk or outsider artist. But that pigeonhole has long rankled his admirers, because his work's look, ambition, and obvious intellectual reach hew so closely to that of many other modern and contemporary masters, from Jackson Pollock and Robert Rauschenberg to Jean-Michel Basquiat. "If anybody else had created a major opus of this scope," said Joanne Cubbs, an adjunct curator at the Indianapolis Museum of Art, "he or she would be recognized as a major force in the art world. Instead Dial struggles at the margins."

But his marginalization may not last much longer. Mr. Dial's first career retrospective, " Hard Truths," opens at the museum in Indianapolis on Friday. And on March 19 the Andrew Edlin Gallery in Chelsea will open Mr. Dial's first solo gallery show in New York in 11 years. "This feels like the moment when the cultural world is ready to understand Mr. Dial and perhaps to embrace him," said Ms. Cubbs, who organized the museum survey.

That exhibition, which runs through Sept. 18 before traveling to New Orleans; Charlotte, N.C.; and Atlanta, includes examples from many different periods, starting with the pictures that made Mr. Dial's name in the early '90s, when he used the tiger to symbolize the struggles and triumphs of African-American life. He has continued to invoke the specter of slavery, in pieces like "High and Wide (Carrying the Rats to the Man)," a large 2002 construction in which a grinning Mickey Mouse toy is chained to the hull of a ship.

The show also includes work he made in response to the 2001 World Trade Center attack and the gulf war: sculptures like the monumental "Crosses to Bear (Armageddon)," dated 2001-4, in which a nine-foot-high expanse of rusty iron crosses is festooned with rag and rubber detritus; and paintings that appear to be made from torn and bloodied American flags, like "Don't Matter How Raggly the Flag, It Still Got to Tie Us Together" (2003).

"The power and clarity of his work measures up to any artist of any color in the last decades," said Maxwell L. Anderson, the director of the museum, noting the works' superficial resemblance to those by Julian Schnabel and Anselm Kiefer. "But unlike those figures this work is imbued with an experiential dimension. For Dial, politics is personal."

Certainly Mr. Dial has one of the more amazing art historical biographies on record. Although he had little formal schooling, he developed an intimate acquaintance with postmodernist art-making materials early in life.

Born in 1928 in a cornfield in the tiny rural hamlet Emelle, Ala., and raised by his great-grandmother, Mr. Dial went to work as soon as he could walk, harvesting sweet potatoes and corn, and gathering twigs and "the stuff my great-grandmother needed to make fire," he said. After her death Mr. Dial and his younger half brother went to live with another relative in Bessemer, a small industrial town, where he hauled ice, poured concrete, raised cattle, did carpentry and laid bricks, among other things, until he found employment as a metalworker at the local Pullman-Standard boxcar factory. He worked there on and off until it closed in 1981.

All the while — throughout his long marriage to Clara Mae Murrow, who died in 2005, and the birth of his five children (one daughter died at 28 from cerebral palsy) — Mr. Dial was quietly observing and honing his skills. "I was just watching people that make stuff," he said. "I watch everything."

He was also making things himself, from the functional, like fishing nets and lures, chimneys, bricks, funerary monuments, furniture and houses ("I made a whole lot of them and tore them down," Mr. Dial said) to the less obviously useful, like animal sculptures made from tin and tree branches or plastic bread wrappers, or a slave

ship built from metal and wood. As his sons recalled, during another interview in the shop office with nearly a dozen relatives and family friends in attendance, Mr. Dial would come home from work, watch the evening news, do some farming out back with his children and then set to work making things again.

Even with something ostensibly practical like a lure, "it was odd, the way he took his time and painted them and stuff like that," his son Richard said. "Whatever he worked on had to be different from somebody else." Mr. Dial was so prolific, he added, that his wife often made the boys tidy up by burying his old work in the yard. (Mr. Dial has said in the past that he sometimes hid his work himself because he feared the attention it might attract during the Jim Crow years.)

Life changed dramatically for Mr. Dial in the late '80s, when he was discovered by William Arnett, a wealthy white Atlanta collector who was obsessively scouring the South for unheralded African-American work. (Among his discoveries are the Gee's Bend quilters, whose work toured to 12 museums in a widely lauded show.)

Mr. Arnett was smitten from the start. "Dial possessed a combination of pride, dignity and determination, along with a wry sense of humor," he wrote in an e-mail. "His earliest artworks demonstrated an unlimited creative imagination. All he lacked was encouragement and opportunity."

For Mr. Dial the meeting was transformative. "He didn't have to bury stuff anymore," his son said, "because Mr. Arnett would give him money for things, and Daddy was kind of fascinated. There was a point where he said, 'Ya'll been laughing at me, but look at what the man just paid me for doing this.' "

Or, as Mr. Dial put it, "That's the time I did start thinking about art."

Mr. Arnett gave him a monthly stipend in exchange for right of first refusal, which allowed Mr. Dial to make art full time. Mr. Arnett visited frequently, and introduced Mr. Dial to curators and other collectors, including Jane Fonda, who remains a major supporter. He also set the wheels in motion for Mr. Dial's first museum exhibition, "Image of the Tiger." Organized by the critic Thomas McEvilley, it opened at two New York institutions, the Museum of American Folk Art and the New Museum of Contemporary Art, in November 1993. The show seemed poised "to break down the border between outside and inside," Mr. McEvilley said. Critically it was successful: "He has a genuine talent that he brandishes fearlessly," Roberta Smith wrote in The New York Times. But soon after the opening "60 Minutes" ran a segment that suggested Mr. Arnett was exploiting the folk artists whose work he had championed, particularly Mr. Dial. Suddenly "my show died on the vine," Mr. McEvilley said. And so did several other major exhibitions of Mr. Dial's art in the works.

Since then, although Mr. Dial has exhibited in galleries and been included in many group outsider art shows, as well as the 2000 Whitney Biennial, he has had only one other major museum solo exhibition, "Thornton Dial in the 21st Century," at the Museum of Fine Arts Houston in 2005. (Mr. Dial, who remains close to Mr. Arnett, memorialized the debacle with the 2003 self-portrait assemblage "Strange Fruit: Channel 42": it involves an eyeless scarecrow-like creature wearing a bloody tie strung up from a television antenna.) Yet the event had one positive effect on Mr. Dial, Ms. Cubbs said: "It made him re-evaluate what the relationship would be between his art and its audience, and his work became more complex and powerful."

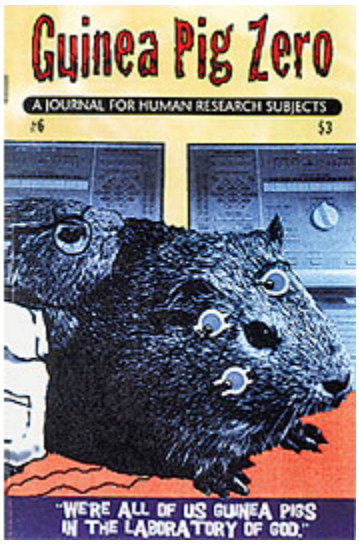
How did he do that? Mr. Dial isn't telling. "I remember all of my art," he said, "but I can't talk about all of it, because I did it 20 or 30 years ago. You ain't going to think about all you done did in life either."

But pressed to explain why he makes art in the first place, he finally found an answer: "I make it for people to love."

http://www.nytimes.com/2011/02/20/arts/design/20dial.html

Irreverence You Can Almost Touch

By STEVEN HELLER



From "Fanzines: The DIY Revolution"

Some of the fanzines included in Teal Triggs's history of the form

I recently subscribed to a well-known magazine that offers an interactive digital edition for my iPad. I was utterly disappointed. As a magazine geek for many decades, I looked forward to complaining about how nothing is better than turning real pages, smelling real ink and caressing real paper. But sadly, I have finally come to recognize that after all that turning, smelling and caressing, what remains are piles of old magazines collecting dust. The new digital version may seem less substantial, but it doesn't have those annoying loose subscription cards or peel-and-sniff perfume ads that induce headaches (and depressing sensory memories). What's more, I don't have to tie up digital magazines for disposal on recycling day. So I canceled all but one print subscription, and now I get my periodical enjoyment from an iPad. Which is actually why I am pleased to see new books devoted to printed magazines. Just in case the end of print comes tomorrow, we'll never forget what we had.

The most disposable yet fascinating of all magazines are the small do-it-yourself, photocopied or offset-printed fanzines. Before Web sites and blogs, these zines were a bridge between mainstream magazines and personal newsletters. Well, maybe not a bridge per se, but an alternative to slicks, one that could be produced with minimal cost and by virtually anyone with a mind to publish. Spiritually related to Dadaist and Surrealist art journals of the 1920s, yet born of the '60s underground press, these limited-run, nonprofessionally produced zines, when seen in light of today's digital culture, were, and in some cases still are, the last stop on the road to print's predicted extinction.

FANZINES: The DIY Revolution (Chronicle, paper, $40), by Teal Triggs, an American graphic-design educator and historian who now lives in London, is an exceptional resource for anyone looking to get an eyeful of these "oppositional or subcultural" publications in all their carelessly shoddy glory. The book, handsomely designed by Therese Vandling, is both a fanzine of fanzines and a scholarly record. Vandling's restrained yet stylish typography unobtrusively frames the fanzines' characteristically chaotic covers and discordant interiors, accentuating the various design eccentricities. Triggs's text is equally respectful and illuminating. Although it sometimes sounds like an academic paper ("It is not until the early 20th century that

we begin to see the formalization of some of these early visual characteristics, which help to establish a readily identifiable form"), her well-researched narrative nonetheless significantly contributes to an understanding of this otherwise ephemeral publishing phenomenon.

Fanzines are extremely diverse and intensely personal — some filled with rant, some with reason — and their adherents use the form much like a blog, to communicate and interact with like-minded people. "The term 'fanzine,' " Triggs explains, "is the conflation of 'fan' and 'magazine,' and was coined by the American sci-fi enthusiast and zine producer Louis Russell Chauvenet in 1940 in his hectographed fanzine Detours . . . when he declared his preference for the term 'fanzine' rather than 'fanmag.' " Other producers adopted the term "to describe a mimeographed publication . . . devoted primarily to science fiction and superhero enthusiasts." The word became so popular, Triggs adds, that it was soon included in the Oxford English Dictionary.

Fanzines became a critical outlet for those interested in rock music, comics, fashion and politics, not to mention fetishes (in the early '70s, I used to see a zine called The Razor's Edge, for women who shaved their heads). There have been zines like Guinea Pig Zero, "an occupational jobzine for people who are used as medical or pharmaceutical research subjects"; The TV Collector, a bimonthly publication "for collectors of television films, videotapes and memorabilia"; Drop Babies, which includes " 'hunky' male pinups and various 'domestic bliss' scenes from British Ladybird children's early-reader books"; Ker Boom, an anti-police state and anti-capitalist zine; and Junk Food, a confessional "perzine" (personal zine) that examines the author's relationship with food. One specimen in the book, Holiday in the Sun: A Zine About Surviving Exposure to the Mainstream, questioned the selling out of fanzine publishers to the mainstream culture.

The line between '60s underground papers and zines can be pretty thin: both circumvented traditional means of publishing and distribution, often ignored other people's copyright ownership and were usually not rigorously edited. But as Triggs writes: "While fanzines sit comfortably within the domain of the underground they are not considered part of the underground press movement. . . . The relationship between private and public spaces helps to differentiate the two types of publications." The underground was public, and the fanzines were "essentially 'private' in that they were produced by fans for fans." Early zine creators nonetheless borrowed the graphic language of the undergrounds, including collage and montage, pickup artwork and transfer type. "New technologies such as the I.B.M. Golfball typewriter and the more cost-effective printing method of offset lithography," Triggs writes, "gave designers and printers a newfound freedom."

Zines knew no boundaries. Any group or personal obsession could be zine-ified, and with a few tweaks some zines could become mainstream. Today, naturally, some zines have gone digital. But there are still plenty of printed ones, enough to fill at least a quarter of this book. "Fanzines are intimate graphic objects," Triggs explains, "holding meaning through their form and content but at the same time functioning to communicate. Zines are defined by their materiality." Most are unabashedly D.I.Y., while others are as professional-looking as a mainstream magazine. All are now nicely chronicled in this book, a must-have for magazine geeks.

Fanzines began as an offshoot of sci-fi and horror books, magazines and comics — some of the images used in the zines were "borrowed" from these sources. And the horror genre itself has its own distinct history. In **THE WEIRD WORLD OF EERIE PUBLICATIONS: Comic Gore That Warped Millions of Young Minds! (Feral House, $32.95),** Mike Howlett resurrects both Eerie Publications, publisher of many of the post-pulp newsstand magazines, and the grotesque stories and images that filled adolescent minds a decade after the crackdown in 1954, when the Comics Code placed strict puritanical limits on the amount of gore, crime and sex in comic books. Former comic-book publishers took refuge in the unregulated realm of magazines, though Eerie Publications was not the first.

Creepy magazine was released in 1964 by James Warren's company, Warren Publishing. It featured the work of great comics artists, including Jack Davis and Wally Wood, and fantasy painters like Frank Frazetta, along

with tales of mystery, suspense and the weird, of werewolves, zombies and vampires. “Horror comics had finally risen from the grave,” Howlett writes.

And they did with another horror entrepreneur too, Myron Fass, “one of the most successful independent publishers in history.” This book is in part an *hommage* to Fass, whom I met when I was 17 years old. (My name was used by one of his authors in a fake story that appeared in the “blood and guts” tabloid National Mirror; it was about cannibalism, and I was dessert.) “The road to Eerie Publications,” Howlett says, “is paved with Fass’s smarts, tenacity and never letting morals get in the way of a good publication.”

After the Comics Code was instituted, Fass found shelter in the pulp genre, publishing Foto-Rama, True or False and Shock Tales, each serving up a generous helping of gore, sex and sundry other taboos. Other magazines of his, like Quick, Ogle and Pic, were full of pinups and “manly sensationalism.” Fass also took advantage of teenage trends. In 1964, when the Dave Clark Five grabbed the No. 1 spot from the Beatles on the British music charts, Fass rushed out two “Dave Clark 5 vs. the Beatles” special-edition magazines, with articles about a “vicious battle” between the bands. Of course, it was all hyperbole.

In 1965, Fass wanted to publish a horror magazine titled Eerie, but so did James Warren. Both publishers were distributed by the Publishers Distributing Corporation, which had the power to decide who would get the title, and which leaned toward Fass. Seeing that his plan to have Eerie in his stable was about to be thwarted, Warren “cobbled together a small, digest-sized . . . issue of three horror stories,” Howlett writes about this proto-fanzine, “putting their . . . Eerie logo across the top of the cover. . . . They printed up 200 copies overnight and rushed them to newsstands in four different states, as well as to the U.S. Copyright Office in Washington.” Fass, realizing he had been trumped, had to surrender and settle for the title Weird for his own horror magazine.

This colorful book follows the evolution and devolution of these and other horror and novelty magazines and their artists. Even if you’re not a fan of this genre, it is a curiously wonderful, weird and eerie tale of magazine history.

The censorious Comics Code Authority was similar to the film industry’s Hays Office. After 1954, all the comics in **THE HORROR! THE HORROR! Comic Books the Government Didn’t Want You to Read! (Abrams ComicArts, paper, $29.95),** edited by Jim Trombetta, were discontinued for fear of running afoul of the code.

If you were a God-fearing American, you might have said good riddance. Yet it was the acutely liberal-minded Fredric Wertham, author of “Seduction of the Innocent,” who made it his mission to have certain comics banned. Paradoxically, Trombetta reports: “Wertham’s credentials were excellent. He was a progressive and antiracist intellectual whose Lafargue Clinic in Harlem was unique in offering free psychological treatment to children. In fact, his work on the psychological damage of segregation was referenced in the landmark Brown v. Board of Education decision.”

Actually, there is a school of thought that argues he wasn’t really a censor; he wanted only to restrict comic-book sales so that children would need a parent in tow to buy the questionable ones — much like what the movie code does today. But the response by the frightened industry was to overreact.

In addition to offering a generous helping of controversial comics — including Tomb of Terror, Dark Mysteries, Strange Fantasy and the equally gruesome War Fury and Battle, which showed bloodthirsty North Korean soldiers — Trombetta’s book provides insightful history. For example: “Hunger was as big a taboo in horror comics as sex. One of the most frequent images in these comics is the mouth of a starving predator, supernatural or otherwise, upper and lower lips linked by thick strands of saliva.” See how far we’ve come since then; now this scene is matter-of-fact in most teen movies.

The Italian shelter magazine Abitare (meaning “to dwell”), which began in 1961 under the title Casa Novità, was not entirely part of the mainstream at the time of its inception, but it certainly helped redefine Italian and, by proxy, American visual culture. It was far more alternative than any of the leading American shelter magazines of the period. And as the furniture designer Alessandro Mendini notes in his foreword to **ABITARE: 50 Years of Design (Rizzoli, $85),** edited by Mario Piazza, the magazine was legendary because of its founder, Piera Peroni, “whose inventive editorial direction was accessible, radical and completely Milanese.” What he means by “accessible, radical” is best described in an essay here by Paola Antonelli, the architecture and design curator at the Museum of Modern Art, who says that Abitare’s “focus on everyday life, on the mixture of great and not-so-great style,” is what made the magazine so very important in the ’60s, when Italy began influencing the furniture world with its revolutionary approaches.

For the past 50 years, Abitare has also been a model of conceptual art direction. From 1961 to 1974, Peroni oversaw a visual format that was elegant without being conservative. Instead, it was cut with generous amounts of wit and humor. A 1969 article on Italian-style dining, for instance, features “the cheerful photographs of Oliviero Toscani,” showing “how the Italian table is changing, as is the mutability of the conditions under which people eat.” A series of photos illustrates the period’s stereotypical meals. One shows diners with “red-checked tablecloths”: “Bowls for spaghetti replace immaculate plates. Plastic and colors take over.” In another, poker players at a green-felt table munch on chips and smoke cigars. This is not the typical shelter-magazine way of idealizing lifestyles. Likewise, for an article on modern office furniture, Toscani (who went on to be creative director for Benetton) photographed a bunch of live “puzzled chickens and hens” sitting in and on the rosewood desk and chairs.

Rather than an in-depth history like “Fanzines,” this book is a compendium of Abitare’s best layouts. Extended captions provide editorial context; personal essays by Piazza and others recall (in sometimes awkward translations) each of Abitare’s decades. Seeing the layouts photographed as objects directly from the pages of the magazine, with all the binding and printing imperfections intact, also allows the reader to experience the design in context. And what smart and often beautiful design it is. Rarely are the same techniques or conceits used more than once, and most important, there is an exemplary balance among conventional architectural photography, candid imagery and drawn illustration.

I became a reader (there is an English-language version) and hoarder of Abitare after 1992, when Italo Lupi became art director and editor in chief. Lupi’s art direction did not strictly follow that of his predecessors or that of the other leading Italian design magazines, Casa Bella and Domus. Staying contemporary and stylish while avoiding faddishness is a tough thing to do, and for many years Lupi maintained a neutral yet identifiable typography, allowing the startling photography and illustrations to dominate.

Unlike those shelter and style magazines that are basically promotions for the products they feature, Abitare never merely showcased the new. As evidenced in a 2005 portfolio by Michael Wolf, “Hives in Hong Kong” — which recorded that megalopolis’s gigantic apartment complexes as if they belonged to some dystopian world — the magazine chronicles the good, the bad and the ugly, placing design in the role of cultural provocateur. This is summed up in the caption: “Photography increasingly takes the form of a kind of universal writing that leaps over the hurdles of unknown alphabets and languages.”

“Abitare: 50 Years of Design” is not only a good record of half a century reduced to 430 pages, but a handbook on how a magazine can continue to inform and delight, even in the iPad era.

http://www.nytimes.com/2011/02/20/books/review/Heller-t.html?ref=design

Advanced NASA Instrument Gets Close-Up on Mars Rocks

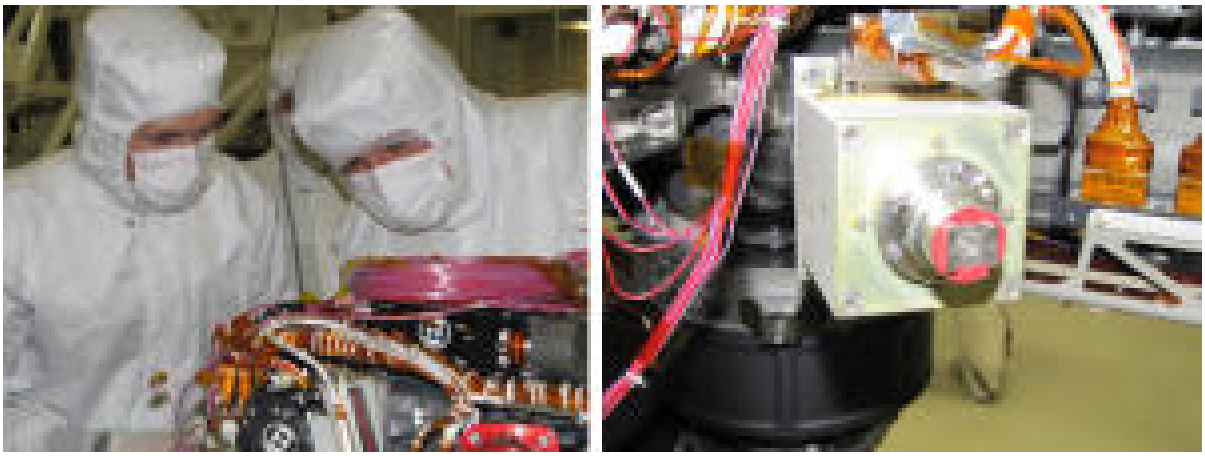


Image on the left shows Grad student Nicholas Boyd (left) and Principal Investigator Ralf Gellert, both of the University of Guelph, Ontario, Canada, preparing for the installation of the sensor head on the Alpha Particle X-ray Spectrometer instrument during testing at NASA's Jet Propulsion Laboratory.The instrument is part of the Curiosity rover, which will fly on NASA's Mars Science Laboratory mission. The sensor head is 7.8 centimeters, or about 3 inches tall. (Credit: NASA/JPL-Caltech)

ScienceDaily (Feb. 21, 2011) — NASA's Mars Science Laboratory rover, Curiosity, will carry a next generation, onboard "chemical element reader" to measure the chemical ingredients in Martian rocks and soil. The instrument is one of 10 that will help the rover in its upcoming mission to determine the past and present habitability of a specific area on the Red Planet. Launch is scheduled between Nov. 25 and Dec. 18, 2011, with landing in August 2012.

The Alpha Particle X-Ray Spectrometer (APXS) instrument, designed by physics professor Ralf Gellert of the University of Guelph in Ontario, Canada, uses the power of alpha particles, or helium nuclei, and X-rays to bombard a target, causing the target to give off its own characteristic alpha particles and X-ray radiation. This radiation is "read by" an X-ray detector inside the sensor head, which reveals which elements and how much of each are in the rock or soil.

Identifying the elemental composition of lighter elements such as sodium, magnesium or aluminum, as well as heavier elements like iron, nickel or zinc, will help scientists identify the building blocks of the Martian crust. By comparing these findings with those of previous Mars rover findings, scientists can determine if any weathering has taken place since the rock formed ages ago.

All NASA Mars rovers have carried a similar instrument -- Pathfinder's rover Sojourner, Spirit and Opportunity, and now Curiosity, too. Improvements have been made with each generation, but the basic design of the instrument has remained the same.

"APXS was modified for Mars Science Laboratory to be faster so it could make quicker measurements. On the Mars Exploration Rovers [Spirit and Opportunity] it took us five to 10 hours to get information that we will now collect in two to three hours," said Gellert, the instrument's principal investigator. "We hope this will help us to investigate more samples."

Another significant change to the next-generation APXS is the cooling system on the X-ray detector chip. The instruments used on Spirit and Opportunity were able to take measurements only at night. But the new cooling system will allow the instrument on Curiosity to take measurements during the day, too.

The main electronics portion of the tissue-box-sized instrument lives in the rover's body, while the sensor head, the size of a soft drink can, is mounted on the robotic arm. With the help of Curiosity's remote sensing instruments -- the Chemistry and Camera (ChemCam) instrument and the Mastcam -- the rover team will decide where to drive Curiosity for a closer look with the instruments, including APXS. Measurements are taken with the APXS by deploying the sensor head to make direct contact with the desired sample.

The rover's brush will be used to remove dust from rocks to prepare them for inspection by APXS and by MAHLI, the rover's arm-mounted, close-up camera. Whenever promising samples are found, the rover will then use its drill to extract a few grains and feed them into the rover's analytical instruments, SAM and CheMin, which will then make very detailed mineralogical and other investigations.

Scientists will use information from APXS and the other instruments to find the interesting spots and to figure out the present and past environmental conditions that are preserved in the rocks and soils.

"The rovers have answered a lot of questions, but they've also opened up new questions," said Gellert. "Curiosity was designed to pick up where Spirit and Opportunity left off."

JPL, a division of the California Institute of Technology in Pasadena, manages the Mars Science Laboratory mission for the NASA Science Mission Directorate, Washington.

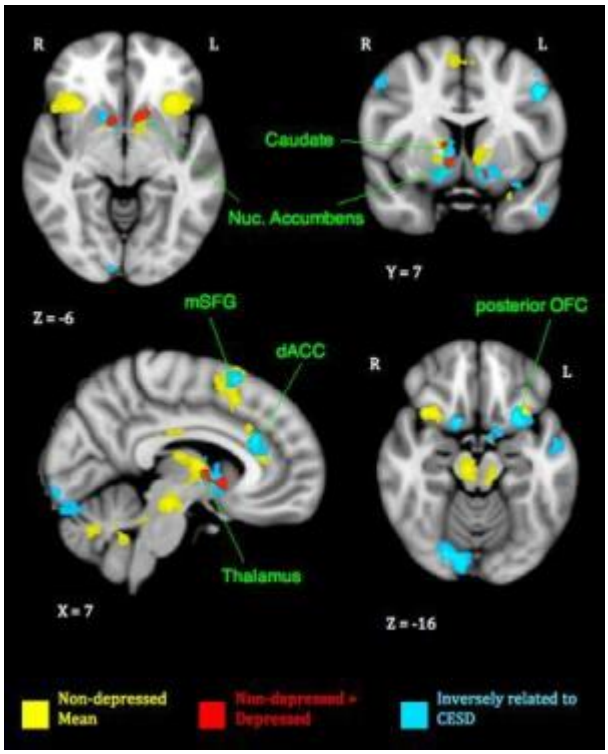
For more information about the mission, visit http://mars.jpl.nasa.gov/msl/ . To watch the spacecraft being assembled and tested, visit http://www.ustream.tv/nasajpl .

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **NASA/Jet Propulsion Laboratory**.

http://www.sciencedaily.com/releases/2011/02/110220204711.htm

Crying Baby Draws Blunted Response in Depressed Mom's Brain



Brain activity of depressed and non-depressed mothers as they listen to their crying infants is highlighted in these fMRI scans. (Credit: Courtesy of Heidemarie Laurent)

ScienceDaily (Feb. 22, 2011) — Mothers who are depressed respond differently to their crying babies than do non-depressed moms. In fact, their reaction, according to brain scans at the University of Oregon, is much more muted than the robust brain activity in non-depressed moms.

An infant crying is normal, but how mothers respond can affect a child's development, says Jennifer C. Ablow, professor of psychology. For years, Ablow has studied the relationship of behavior and physiological responses such as heart rate and respiration of mothers, both depressed and not, when they respond to their infants' crying.

A new study -- online in advance of publication in the journal *Social Cognitive and Affective Neuroscience* -- provides the first look at brain activity of depressed women responding to recordings of crying infants, either their own or someone else's. The brains of 22 women were scrutinized using functional magnetic resonance imaging (fMRI).

Non-invasive fMRI, when focused on the brain, measures blood flow changes using a magnetic field and radio frequency pulses, producing detailed images that provide scientists with information about brain activity or help medical staff diagnose disease.

Researchers considered both group differences between women with chronic histories of depression and those with no clinical diagnoses, and more subtle variations in the women's brain activity related to current levels of depressive symptoms. All were first time mothers whose babies were 18 months old.

"It looks as though depressed mothers are not responding in a more negative way than non-depressed mothers, which has been one hypothesis," said Heidemarie K. Laurent, assistant professor at the University of Wyoming, who led the study as a postdoctoral researcher in Ablow's lab. "What we saw was really more of a lack of responding in a positive way."

As a group, brain responses in non-depressed mothers responding to the sound of their own babies' cries were seen on both sides of the brain's lateral paralimbic areas and core limbic sub-cortical regions including the striatum, thalamus and midbrain; depressed mothers showed no unique response to their babies. Non-depressed mothers activated much more strongly than depressed mothers in a subcortical cluster involving the striatum -- specifically the caudate and nucleus accumbens -- and the medial thalamus. These areas are closely associated with the processing of rewards and motivation.

"In this context it was interesting to see that the non-depressed mothers were able to respond to this cry sound as a positive cue," Laurent said. "Their response was consistent with wanting to approach their infants. Depressed mothers were really lacking in that response. "

In a separate comparison, mothers who self-reported that they were more depressed at the time of their fMRI sessions displayed diminished prefrontal brain activity, particularly in the anterior cingulate cortex, when hearing their own baby's cries. This brain region, Laurent said, is associated with the abilities to evaluate information and to plan and regulate a response to emotional cues.

The important message of the study, Ablow and Laurent said, is that depression can exert long-lasting effects on mother-infant relationships by blunting the mother's response to her infant's emotional cues.

"A mother who is able to process and act upon relevant information will have more sensitive interactions with her infant, which, in turn, will allow the infant to develop its own regulation capacities," Ablow said. "Some mothers are unable to respond optimally to their infant's emotional cues. A mother's emotional response requires a coordination of multiple cortical and sub-cortical systems of the brain. How that plays out has not been well known."

The findings may suggest new implications for treating depression symptoms in mothers, Laurent said. "Some of these prefrontal problems may be changed more easily by addressing current symptoms, but there may be deeper, longer-lasting deficits at the motivational levels of the brain that will take more time to overcome," she said.

We regard the findings as a "jumping-off point" to better understand the neurobiology of the mothering brain, said Ablow, co-director of the UO's Developmental Sociobiology Lab. "In our next study, we plan to follow women from the prenatal period through their first-year of motherhood to get a fuller picture of how these brain responses shape mother-infant relationships during a critical period of their babies' development."

The National Science Foundation, through a grant to Ablow, and a National Institute of Mental Health postdoctoral fellowship to Laurent, funded the research. The project also received a pilot grant from the UO Brain Biology Machine Initiative through the Lewis Center for Neuroimaging.

Story Source:

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

Journal Reference:

1. H. K. Laurent, J. C. Ablow. **A cry in the dark: depressed mothers show reduced neural activation to their own infant's cry**. *Social Cognitive and Affective Neuroscience*, 2011; DOI: 10.1093/scan/nsq091

http://www.sciencedaily.com/releases/2011/02/110222140556.htm

Links Between Longer Ragweed Season and Climate Change Confirmed

Ragweed. (Credit: Photo courtesy of Lou Ziska, ARS)

ScienceDaily (Feb. 22, 2011) — Studies by a U.S. Department of Agriculture (USDA) scientist and cooperators have confirmed what many pollen-sensitive people already suspected: In some parts of North America, ragweed season now lasts longer and ends later.

Ragweed pollen in some parts of the northern United States and Canada now lingers almost a month longer than it did in 1995, and these increases are correlated to seasonal warming shifts linked to climate change dynamics in the higher latitudes, according to a study published on February 22 in the *Proceedings of the National Academy of Sciences*.

"One of the biggest challenges in studying climate change is finding out how the plant kingdom is adapting to increases in air temperature and other meteorological phenomena," said Agricultural Research Service (ARS) Administrator Edward B. Knipling. "Studies like this also show us that these ecological shifts don't stop at crop production. They can also have a significant impact on public health."

ARS is USDA's principal intramural scientific research agency, and this research supports the USDA priority of responding to climate change.

Assessments by the Intergovernmental Panel on Climate Change suggest that current and future increases in land-surface temperatures are more likely to occur at higher elevations and at higher latitudes. But definitive studies correlating warming temperatures, longer growing seasons, and increased plant pollination have been lacking.

Lewis Ziska, a plant physiologist with the ARS Crop Systems and Global Change Research Unit in Beltsville, Md., led a scientific team that identified 10 locations that had at least 15 years of data, from 1995 to 2009, on local ragweed pollen counts. These locations were along a north-south transect from Austin, Texas, to

Saskatoon, Canada. The researchers compared the pollen data at each site to other site data, including latitude, the number of frost-free days, and delays in the onset of the first fall frost.

The researchers found that from 1995 to 2009, the number of frost-free days at higher-latitude study sites had increased, and so had the length of the ragweed pollen season. During that period, the pollen season lasted from 13 to 27 days longer than in 1995. They also found that a longer ragweed pollen season was strongly correlated with a delay in the onset of the first fall frost.

Other collaborators included researchers from the Natural Resources Defense Council; the University of Massachusetts at Amherst.; the Allergy and Asthma Care Center in Fargo, N.D.; Allergy & Asthma Specialists in Minneapolis, Minn.; the Oklahoma Allergy and Asthma Clinic in Oklahoma City, Okla.; the Asthma and Allergy Center in Omaha, Neb.; the Hedberg Allergy and Asthma Center in Rogers, Ark.; Children's Mercy Hospitals and Clinics in Kansas City, Mo.; the Allergy, Asthma, and Immunology Clinic of Georgetown in Georgetown, Texas.; Allergy Associates of La Crosse, Wis.; the University of Wisconsin-Madison; Aerobiology Research Laboratories in Ontario, Canada; Rutgers University; and HealthEast Care System in St. Paul, Minn.

Story Source:

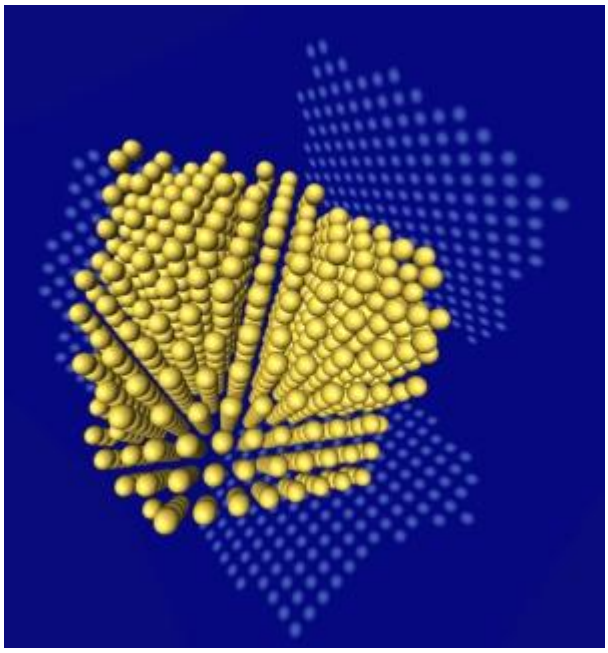
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **USDA/Agricultural Research Service**. The original article was written by Ann Perry.

Journal Reference:

1. Lewis Ziska, Kim Knowlton, Christine Rogers, Dan Dalan, Nicole Tierney, Mary Ann Elder, Warren Filley, Jeanne Shropshire, Linda B. Ford, Curtis Hedberg, Pamela Fleetwood, Kim T. Hovanky, Tony Kavanaugh, George Fulford, Rose F. Vrtis, Jonathan A. Patz, Jay Portnoy, Frances Coates, Leonard Bielory, and David Frenz. **Recent warming by latitude associated with increased length of ragweed pollen season in central North America**. *PNAS*, February 22, 2011 DOI: 10.1073/pnas.1014107108

http://www.sciencedaily.com/releases/2011/02/110222140552.htm

3-D Nanoparticle in Atomic Resolution



For the first time scientists succeeded in determining the exact spatial arrangement of each single atom in a nanoparticle. The yellow spheres are the graphically depicted atoms that form the silver nanoparticle, which is about two nanometres in diameter. (Credit: EMPA)

ScienceDaily (Feb. 22, 2011) — In chemical terms, nanoparticles have different properties from their "big brothers and sisters:" They have a large surface area in relation to their tiny mass and at the same time a small number of atoms. This can produce quantum effects that lead to altered material properties. Ceramics made of nanomaterials can suddenly become bendy, for instance, or a gold nugget is gold-coloured while a nanosliver of it is reddish.

New method developed

The chemical and physical properties of nanoparticles are determined by their exact three-dimensional morphology, atomic structure and especially their surface composition. In a study initiated by ETH Zurich scientist Marta Rossell and Empa researcher Rolf Erni, the 3D structure of individual nanoparticles has now successfully been determined on the atomic level. The new technique could help improve our understanding of the characteristic of nanoparticles, including their reactivity and toxicity.

Gentle imaging processing

For their electron-microscopic study, which was published recently in the journal *Nature*, Rossell and Erni prepared silver nanoparticles in an aluminium matrix. The matrix makes it easier to tilt the nanoparticles under the electron beam in different crystallographic orientations whilst protecting the particles from damage by the electron beam. The basic prerequisite for the study was a special electron microscope that reaches a maximum resolution of less than 50 picometres. By way of comparison: the diameter of an atom measures about one Ångström, i.e. 100 picometres.

To protect the sample further, the electron microscope was set up in such a way as to also yield images at an atomic resolution with a lower accelerating voltage, namely 80 kilovolts. Normally, this kind of microscope --

of which there are only a few in the world -- works at 200 -- 300 kilovolts. The two scientists used a microscope at the Lawrence Berkeley National Laboratory in California for their experiments. The experimental data was complemented with additional electron-microscopic measurements carried out at Empa.

Sharper images

On the basis of these microscopic images, Sandra Van Aert from the University of Antwerp created models that "sharpened" the images and enabled them to be quantified: the refined images made it possible to count the individual silver atoms along different crystallographic directions.

For the three-dimensional reconstruction of the atomic arrangement in the nanoparticle, Rossell and Erni eventually enlisted the help of the tomography specialist Joost Batenburg from Amsterdam, who used the data to tomographically reconstruct the atomic structure of the nanoparticle based on a special mathematical algorithm. Only two images were sufficient to reconstruct the nanoparticle, which consists of 784 atoms. "Up until now, only the rough outlines of nanoparticles could be illustrated using many images from different perspectives," says Marta Rossell. Atomic structures, on the other hand, could only be simulated on the computer without an experimental basis.

"Applications for the method, such as characterising doped nanoparticles, are now on the cards," says Rolf Erni. For instance, the method could one day be used to determine which atom configurations become active on the surface of the nanoparticles if they have a toxic or catalytic effect. Rossell stresses that in principle the study can be applied to any type of nanoparticle. The prerequisite, however, is experimental data like that obtained in the study.

Story Source:

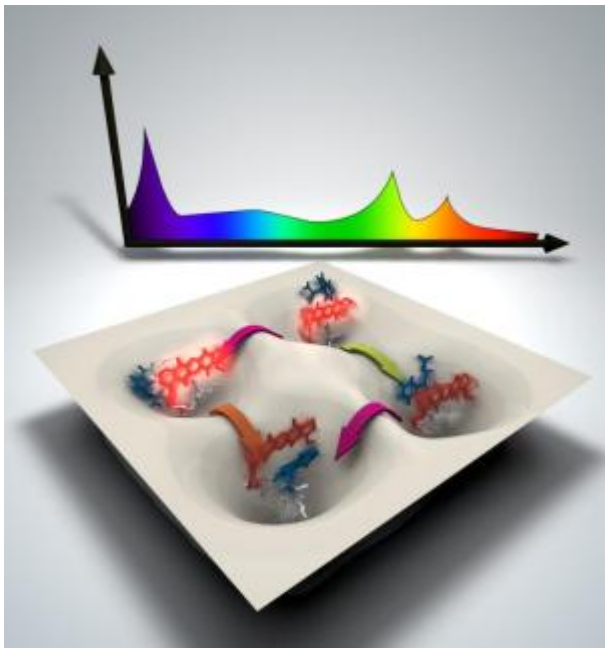
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Swiss Federal Laboratories for Materials Science and Technology (EMPA)**. The original article was written by Simone Ulmer/ETH Life.

Journal Reference:

1. Sandra Van Aert, Kees J. Batenburg, Marta D. Rossell, Rolf Erni, Gustaaf Van Tendeloo. **Three-dimensional atomic imaging of crystalline nanoparticles**. *Nature*, 2011; 470 (7334): 374 DOI: 10.1038/nature09741

http://www.sciencedaily.com/releases/2011/02/110222122353.htm

'Fingerprints' Match Molecular Simulations With Reality



As a molecule jumps between structural states (below), it creates "dynamical fingerprints" (top spectra) that can tie together high-performance simulation and experiments. (Credit: Image courtesy of DOE/Oak Ridge National Laboratory)

ScienceDaily (Feb. 22, 2011) — A theoretical technique developed at the Department of Energy's Oak Ridge National Laboratory is bringing supercomputer simulations and experimental results closer together by identifying common "fingerprints."

ORNL's Jeremy Smith collaborated on devising a method -- dynamical fingerprints --that reconciles the different signals between experiments and computer simulations to strengthen analyses of molecules in motion. The research will be published in the *Proceedings of the National Academy of Sciences.*

"Experiments tend to produce relatively simple and smooth-looking signals, as they only 'see' a molecule's motions at low resolution," said Smith, who directs ORNL's Center for Molecular Biophysics and holds a Governor's Chair at the University of Tennessee. "In contrast, data from a supercomputer simulation are complex and difficult to analyze, as the atoms move around in the simulation in a multitude of jumps, wiggles and jiggles. How to reconcile these different views of the same phenomenon has been a long-standing problem."

The new method solves the problem by calculating peaks within the simulated and experimental data, creating distinct "dynamical fingerprints." The technique, conceived by Smith's former graduate student Frank Noe, now at the Free University of Berlin, can then link the two datasets.

Supercomputer simulations and modeling capabilities can add a layer of complexity missing from many types of molecular experiments.

"When we started the research, we had hoped to find a way to use computer simulation to tell us which molecular motions the experiment actually sees," Smith said. "When we were finished we got much more -- a method that could also tell us which other experiments should be done to see all the other motions present in

the simulation. This method should allow major facilities like the ORNL's Spallation Neutron Source to be used more efficiently."

Combining the power of simulations and experiments will help researchers tackle scientific challenges in areas like biofuels, drug development, materials design and fundamental biological processes, which require a thorough understanding of how molecules move and interact.

"Many important things in science depend on atoms and molecules moving," Smith said. "We want to create movies of molecules in motion and check experimentally if these motions are actually happening."

"The aim is to seamlessly integrate supercomputing with the Spallation Neutron Source so as to make full use of the major facilities we have here at ORNL for bioenergy and materials science development," Smith said.

The collaborative work included researchers from L'Aquila, Italy, Wuerzburg and Bielefeld, Germany, and the University of California at Berkeley. The research was funded in part by a Scientific Discovery through Advanced Computing grant from the DOE Office of Science.

Story Source:

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

http://www.sciencedaily.com/releases/2011/02/110222122210.htm

Groundbreaking Technology Will Revolutionize Blood Pressure Measurement

This is the CASPro blood pressure measurement device. (Credit: University of Leicester)

ScienceDaily (Feb. 21, 2011) — In a scientific breakthrough, a new blood pressure measurement device is set to revolutionise the way patients' blood pressure is measured. The new approach, invented by scientists at the University of Leicester and in Singapore, has the potential to enable doctors to treat their patients more effectively because it gives a more accurate reading than the current method used. It does this by measuring the pressure close to the heart -- the central aortic systolic pressure or CASP.

Blood pressure is currently measured in the arm because it is convenient however this may not always accurately reflect what the pressure is in the larger arteries close to the heart.

The new technology uses a sensor on the wrist to record the pulse wave and then, using computerised mathematical modelling of the pulse wave, scientists are able to accurately read the pressure close to the heart. Patients who have tested the new device found it easier and more comfortable, as it can be worn like a watch.

Being able to measure blood pressure in the aorta which is closer to the heart and brain is important because this is where high blood pressure can cause damage. In addition, the pressure in the aorta can be quite different from that traditionally measured in the arm. The new technology will hopefully lead to better identification of those who will most likely benefit from treatment by identifying those who have a high central aortic systolic pressure value. This will be especially important for younger people in whom the pressure measured in the arm can sometimes be quite exaggerated compared to the pressure in the aorta.

A key question is whether measurement of central aortic pressure will become routine in clinical practice. Professor Williams said: "it is not going to replace what we do overnight but it is a big advance. Further work will define whether such measurements are preferred for everybody or whether there is a more defined role in

selective cases to better decide who needs treatment and who doesn't and whether the treatment is working optimally"

The University's close collaboration with the Singapore-based medical device company HealthSTATS International ("HealthSTATS") has led to the development of this world-first technique for more accurate blood pressure measurement.

The research work carried out by the University of Leicester was funded by the Department of Health's National Institute for Health Research (NIHR). The NIHR has invested £3.4million with a further £2.2million Capital funding from the Department of Health to establish a Biomedical Research Unit at Glenfield Hospital, Leicester, dedicated to translational research in cardiovascular research. The work, led by Professor Bryan Williams, Professor of Medicine at the University of Leicester and consultant physician at University Hospitals of Leicester NHS Trust, has the promise to change the way we measure blood pressure.

Professor Williams, who is based in the University of Leicester's Department of Cardiovascular Sciences at Glenfield Hospital, said: "I am under no illusion about the magnitude of the change this technique will bring about. It has been a fabulous scientific adventure to get to this point and it will change the way blood pressure has been monitored for more than a century. The beauty of all of this, is that it is difficult to argue against the proposition that the pressure near to your heart and brain is likely to be more relevant to your risk of stroke and heart disease than the pressure in your arm.

"Leicester is one of the UK's leading centres for cardiovascular research and is founded on the close working relationship between the University and the Hospitals which allows us to translate scientific research into patient care more efficiently. Key to our contribution to this work has been the support from the NIHR without which we would not have been able to contribute to this tremendous advance. The support of the NIHR has been invaluable in backing us to take this project from an idea to the bedside. Critical to the success of this project has been the synergies of combining clinical academic work here with HealthSTATS and their outstanding medical technology platform in Singapore. This has been the game-changer and I really do think this is going to change clinical practice."

Dr. Choon Meng Ting the Chairman and CEO of HealthSTATS said: "This study has resulted in a very significant translational impact worldwide as it will empower doctors and their patients to monitor their central aortic systolic pressure easily, even in their homes and modify the course of treatment for BP-related ailments. Pharmaceutical companies can also use CASP devices for clinical trials and drug therapy. All these will ultimately bring about more cost savings for patients, reduce the incidences of stroke and heart attacks, and save more lives."

Health Secretary Andrew Lansley said: "I saw this new technique in action in Leicester when I visited a few months ago. This is a great example of how research breakthroughs and innovation can make a real difference to patients' lives. We want the NHS to become one of the leading healthcare systems in the world and our financial commitment to the National Institute for Health Research reflects this.

"I believe patients deserve the best treatments available and science research like this helps us move closer to making that happen."

Professor Dame Sally Davies, Director General of Research and Development and Interim Chief Medical Officer at the Department of Health, said:

"This is fantastic work by Professor Williams and his team and I am delighted to welcome these findings. I am particularly pleased that the clinical research took place at the NIHR Biomedical Research Unit in Leicester. NIHR funding for Biomedical Research Centres and Units across England supports precisely this

type of translational research, aimed at pulling-through exciting scientific discoveries into benefits for patients and the NHS by contributing to improved diagnostics and treatments."

Story Source:

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

Journal Reference:

1. Bryan Williams, Peter S. Lacy, Peter Yan, Chua-Ngak Hwee, Chen Liang, Choon-Meng Ting. **Development and Validation of a Novel Method to Derive Central Aortic Systolic Pressure From the Radial Pressure Waveform Using an N-Point Moving Average Method**. *Journal of the American College of Cardiology*, 2011; 57 (8): 951 DOI: 10.1016/j.jacc.2010.09.054

http://www.sciencedaily.com/releases/2011/02/110220193022.htm

Physicists Build Bigger 'Bottles' of Antimatter to Unlock Nature's Secrets

UCSD physicists James Danielson, Clifford Surko and Craig Schallhorn (left to right) inspect the apparatus they are using to develop the world's largest trap for low-energy positrons, which is expected to hold a trillion or more antiparticles. (Credit: Kim McDonald, UCSD)

ScienceDaily (Feb. 20, 2011) — Once regarded as the stuff of science fiction, antimatter -- the mirror image of the ordinary matter in our observable universe -- is now the focus of laboratory studies around the world.

While physicists routinely produce antimatter with radioisotopes and particle colliders, cooling these antiparticles and containing them for any length of time is another story. Once antimatter comes into contact with ordinary matter it "annihilates" -- or disappears in a flash of gamma radiation.

Clifford Surko, a professor of physics at UC San Diego who is constructing what he hopes will be the world's largest antimatter container, said physicists have recently developed new methods to make special states of antimatter in which they can create large clouds of antiparticles, compress them and make specially tailored beams for a variety of uses.

He described the progress made in this area, including his own efforts, at the annual meeting in Washington, DC, of the American Association for the Advancement of Science. His talk, "Taming Dirac's Particle," led off the session entitled "Through the Looking Glass: Recent Adventures in Antimatter," at 1:30 pm on February 18.

Surko said that since "positrons" -- the anti-electrons predicted by English physicist Paul Dirac some 80 years ago -- disappear in a burst of gamma rays whenever they come in contact with ordinary matter, accumulating and storing these antimatter particles is no small feat. But over the past few years, he added, researchers have developed new techniques to store billions of positrons for hours or more and cool them to low temperatures in order to slow their movements so they can be studied.

Surko said physicists are now able to slow positrons from radioactive sources to low energy and accumulate and store them for days in specially designed "bottles" that have magnetic and electric fields as walls rather than matter. They have also developed methods to cool them to temperatures as low as that of liquid helium and to compress them to high densities.

"One can then carefully push them out of the bottle in a thin stream, a beam, much like squeezing a tube of toothpaste," said Surko, adding that there are a variety of uses for such positrons.

A familiar positron technique that does not use this new technology is the PET scan, also known as Positron Emission Tomography, which is now used routinely to study human metabolic processes and help design new drugs.

In the new methods being developed by physicists, beams of positrons will be used in other ways. "These beams provide new ways to study how antiparticles interact or react with ordinary matter," said Surko. "They are very useful, for example, in understanding the properties of material surfaces."

Surko and his collaborators at UC San Diego are studying how positrons bind to ordinary matter, such as atoms and molecules. "While these complexes only last a billionth of a second or so," he said, "the 'stickiness' of the positron is an important facet of the chemistry of matter and antimatter."

Surko and his colleagues are building the world's largest trap for low-energy positrons in his laboratory at UC San Diego, capable of storing more than a trillion antimatter particles at one time.

"We are now working to accumulate trillions of positrons or more in a novel 'multi-cell' trap -- an array of magnetic bottles akin to a hotel with many rooms, with each room containing tens of billions of antiparticles," he said.

"These developments are enabling many new studies of nature. Examples include the formation and study of antihydrogen, the antimatter counterpart of hydrogen; the investigation of electron-positron plasmas, similar to those believed to be present at the magnetic poles of neutron stars, using a device now being developed at Columbia University; and the creation of much larger bursts of positrons which could eventually enable the creation of an annihilation gamma ray laser."

"An exciting long-term goal of the work is the creation of portable traps for antimatter," added Surko. "This would increase greatly the ability to use and exploit antiparticles in our matter world in situations where radioisotope- or accelerator-based positron sources are inconvenient to arrange."

Professor Surko's work is funded by the National Science Foundation, the U.S. Department of Energy and the Defense Threat Reduction Agency.

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **University of California - San Diego**. The original article was written by Kim McDonald.

http://www.sciencedaily.com/releases/2011/02/110218142438.htm

Why Innocent Suspects May Confess to a Crime

Iowa State psychologists Stephanie Madon (far right) and Max Guyll (middle right) have been overseeing experiments -- like this one by ISU students Shelby Wuebker and Lee Casavant -- on the consequences that drive a person's confession decisions. (Credit: Photo by Bob Elbert, News Service)

ScienceDaily (Feb. 20, 2011) — Why would anyone falsely confess to a crime they didn't commit? It seems illogical, but according to The Innocence Project, there have been 266 post-conviction DNA exonerations since 1989 -- 25 percent of which involved a false confession.

A new Iowa State University study may shed light on one reason for those false confessions. In two experiments simulating choices suspects face in police interrogations, undergraduate subjects altered their behavior to confess to illegal activities in order to relieve short-term distress (the proximal consequence) while discounting potential long-term (distal) consequences.

"The thing about these exoneration cases is that they all pertained to heinous crimes; that's why there was DNA evidence available. And so we wanted to determine why someone may be willing to falsely confess to one of those crimes," said Stephanie Madon, an ISU associate professor of psychology and the study's lead author. "We thought it might have to do with the pay-off structure of police interrogations. Some interrogation methods -- like physical isolation and the presentation of false evidence -- have immediate consequences for suspects that encourage them to confess. Though they also face consequences that encourage them to deny guilt -- such as the possibility of conviction and incarceration -- these consequences are more distal.

"So the suspect is weighing these two consequences at once and that's going to shape their behavior," she continued. "That's what we were interested in understanding. Which of these consequences is going to influence confession decisions -- those that are happening right now, or the ones that may happen in the future?"

ISU study published in Law and Human Behavior

Iowa State researchers Max Guyll, an assistant professor of psychology; Kyle Scherr, a psychology graduate student; Sarah Greathouse, a former assistant professor of psychology; and Gary Wells, Distinguished Professor of psychology; collaborated with Madon on the study. It appears online in the journal *Law and Human Behavior*.

In the first experiment, 81 (38 women, 43 men) ISU psychology undergraduates were interviewed about their prior criminal and unethical behaviors, with their admissions and denials each paired with proximal or distal consequences. The proximal consequence was having to answer a long set of repetitive questions. The distal consequence was having to meet with a police officer in several weeks to discuss their answers in detail.

Researchers found that participants shifted their admissions to avoid the short-term consequence of repetitive questions.

"What we found is that our participants clearly made admission decisions on the basis of the proximal consequence," Madon said. "They would admit to having done some criminal or unethical behavior in order to avoid answering repetitive questions. And they did that even though they knew that it increased the likelihood that they would have to meet with the police officer in several weeks to discuss their answers in more detail."

In the second experiment, 143 (93 women, 50 men) ISU psychology undergraduates were again interviewed about their prior criminal and unethical behaviors. This time, the proximal and distal consequences were reversed from the first experiment. So the proximal consequence was meeting with the police officer immediately after the interview, while the distal consequence was to return to the lab in several weeks to answer the repetitive questions.

"Once again, the participants' admissions were shaped by the proximal consequences. They did not want to meet with the police officer," Madon said. "And so, they responded in a way that got them out of doing that -- even though it increased their likelihood of coming back in several weeks to answer repetitive questions."

Suspects confess to avoid a police interrogation

The researchers say these results may help explain why some suspects confess to crimes in order to avoid a police interrogation -- even though they increase their risk of conviction and severe penalties by doing so. The study's authors theorize that innocent suspects so strongly believe that the truth will eventually be borne out, they may perceive the distal consequences facing them -- conviction, prison, or even a death sentence -- to be remote and unlikely.

"One of the things we wanted to do in this research was to identify an underlying process at play during interrogations, so it can apply to a variety of police interrogation methods," Madon said. "Our findings have implications for any [police interrogation] method that causes suspects to focus on immediate consequences over future consequences."

Madon sees the results underscoring the need to limit the use of police interrogation methods that may exploit suspects' vulnerabilities and encourage them into making confession decisions on the basis of short-term gains.

Story Source:

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

Journal Reference:

1. Stephanie Madon, Max Guyll, Kyle C. Scherr, Sarah Greathouse, Gary L. Wells. **Temporal Discounting: The Differential Effect of Proximal and Distal Consequences on Confession Decisions**. *Law and Human Behavior*, 2011; DOI: 10.1007/s10979-011-9267-3

http://www.sciencedaily.com/releases/2011/02/110218111825.htm

Continent-Wide Telescope Extends Cosmic 'Yardstick' Three Times Farther Into Universe

Artist's conception of Milky Way, showing locations of star-forming regions whose distances were recently measured. (Credit: M. Reid, Harvard-Smithsonian CfA; R. Hurt, SSC/JPL/Caltech, NRAO/AUI/NSF)

ScienceDaily (Feb. 20, 2011) — Using the super-sharp radio "vision" of astronomy's most precise telescope, scientists have extended a directly-measured "yardstick" three times farther into the cosmos than ever before, an achievement with important implications for numerous areas of astrophysics, including determining the nature of Dark Energy, which constitutes 70 percent of the Universe. The continent-wide Very Long Baseline Array (VLBA) also is redrawing the map of our home Galaxy and is poised to yield tantalizing new information about extrasolar planets, among many other cutting-edge research projects.

The VLBA provides the greatest ability to see fine detail, called resolving power, of any telescope in the world. It can produce images hundreds of times more detailed than those from the Hubble Space Telescope -- power equivalent to sitting in New York and reading a newspaper in Los Angeles. This power allows astronomers to make precise cosmic measurements with far-ranging implications for research within our own Galaxy and far beyond.

New measurements with the VLBA have placed a galaxy called NGC 6264 at a distance of 450 million light-years from Earth, with an uncertainty of no more than 9 percent. This is the farthest distance ever directly measured, surpassing a measurement of 160 million light-years to another galaxy in 2009.

Previously, distances beyond our own Galaxy have been estimated through indirect methods. "Our direct, geometric measurements are independent of the assumptions and complications inherent in other techniques," said James Braatz, of the National Radio Astronomy Observatory (NRAO), who worked with Cheng-Yu Kuo, of the University of Virginia and NRAO.

Fine-tuning the measurement of ever-greater distances is vital to determining the expansion rate of the Universe, which helps theorists narrow down possible explanations for the nature of Dark Energy. Different models of Dark Energy predict different values for the expansion rate, known as the Hubble Constant.

"Solving the Dark Energy problem requires advancing the precision of cosmic distance measurements, and we are working to refine our observations and extend our methods to more galaxies," Braatz said. Measuring more-distant galaxies is vital, because the farther a galaxy is, the more of its motion is due to the expansion of the Universe rather than to random motions.

Redrawing the Map of Our Galaxy

Another ongoing project uses the VLBA to redraw the map of our own home Galaxy. Recent work has added dozens of new measurements to star-forming regions in the Milky Way, The direct VLBA measurements improve on earlier estimates by as much as a factor of two.

This improvement significantly aids in understanding the physics of the young stars and their environments. It also has changed the map of the Milky Way, indicating that our Galaxy has four spiral arms, not two, as previously thought.

"Because we sit inside our Galaxy, it's difficult to actually map it. These precision distance measurements are our most effective tool for learning about the structure of the Milky Way," said Mark Reid, of the Harvard-Smithsonian Center for Astrophysics.

Earlier work by Reid and his colleagues showed that the Milky Way is rotating faster than previous estimates had indicated. That measurement in turn showed our Galaxy to be more massive, equaling our neighbor, the Andromeda Galaxy, in mass.

Reid's team also is observing the Andromeda Galaxy in a long-term project to determine the direction and speed of its movement through space. "The standard prediction is that the Milky Way and Andromeda will collide in a few billion years. By measuring Andromeda's actual motion, we can determine with much greater accuracy if and when that will happen," Reid said.

Tiny Wobbles Will Reveal Planets

A long-term, sensitive search of 30 stars seeks to find the subtle gravitational tug that will reveal planets orbiting those stars. The VLBA's precision can reveal a "wobble" in the star's motion through space caused by the planet's gravity. A four-year program, started in 2007, is nearing its completion.

"This study tracks stars smaller than our Sun, seeking evidence of planets the size of Jupiter or smaller," said Geoffrey Bower, of the University of California, Berkeley. "We want to learn how common it is for these low-mass stars to have planets orbiting them at relatively large distances," he added.

The project uses the VLBA along with NRAO's Green Bank Telescope in West Virginia, the largest fully-steerable dish antenna in the world. Together, these telescopes can detect the faint radio emission from the stars to track their motion over time.

Early results have ruled out any companions the size of brown dwarfs for three of the stars, and the astronomers are analyzing their data as the observations continue.

The VLBA -- A System of Superlatives

The VLBA, dedicated in 1993, uses ten, 25-meter-diameter dish antennas distributed from Hawaii to St. Croix in the Caribbean. It is operated from the NRAO's Domenici Science Operations Center in Socorro, NM. All ten antennas work together as a single telescope with the greatest resolving power available to astronomy.

This unique capability has produced landmark contributions to numerous scientific fields, ranging from Earth tectonics, climate research, and spacecraft navigation to cosmology.

Ongoing upgrades in electronics and computing have enhanced the VLBA's capabilities. With improvements now nearing completion, the VLBA will be as much as 5,000 times more powerful as a scientific tool than the original VLBA of 1993.

"The VLBA has unmatched capabilities for making unique contributions to many fundamental areas of science. It has a proven track record of enabling transformational research and its new technical enhancements promise a rich harvest of discovery in the coming years," said NRAO Director Fred K.Y. Lo.

Astronomers reported on the new measurements and ongoing projects at the American Association for the Advancement of Science meeting in Washington, D.C.

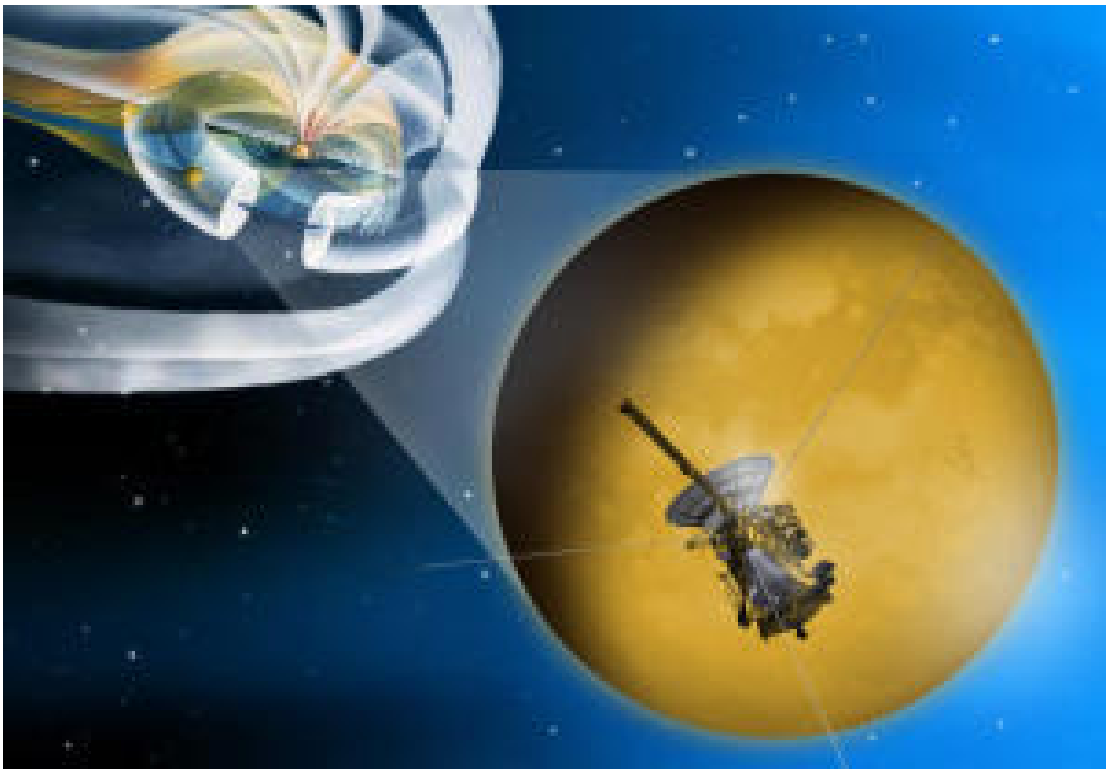
The National Radio Astronomy Observatory is a facility of the National Science Foundation, operated under cooperative agreement by Associated Universities, Inc.

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **National Radio Astronomy Observatory**.

http://www.sciencedaily.com/releases/2011/02/110219160007.htm

Cassini to Sample Magnetic Environment Around Saturn's Moon Titan



Artist's concept of the Feb. 18, 2011, flyby of Saturn's moon Titan by NASA's Cassini spacecraft. (Credit: NASA/JPL-Caltech)

ScienceDaily (Feb. 20, 2011) — NASA's Cassini spacecraft is set to skim close to Saturn's moon Titan on Friday, Feb. 18, to learn about the interaction between Titan and Saturn's magnetosphere, the magnetic bubble around the planet.

The closest approach will take place at 8:04 a.m. PST (4:04 p.m. UTC) and bring Cassini within about 3,650 kilometers (2,270 miles) of Titan's surface.

As Titan makes a complete 360-degree orbit around Saturn, the relative influence of the sun's illumination and the hot ionized gas trapped in the magnetic bubble changes. These factors are important for understanding the relationship between Titan and Saturn's magnetosphere. It is important to make measurements at a variety of locations in the Saturn magnetosphere, so this flyby will occur in a part of the magnetosphere that has been poorly sampled so far.

Previous flybys have shown the magnetic environment near Titan to be rather variable and unpredictable. For 12 hours before and after closest approach, the Cassini plasma spectrometer instrument will be pointing in a direction to capture ionized gas in the region.

At the same time, Cassini's radio science subsystem will be gathering sensitive gravity data from Titan to improve understanding of the structure of the interior. Collecting data like these will eventually enable scientists to determine whether Titan has an ocean under its crust.

Other instruments will also be collecting data, much of it pertaining to seasonal change. Titan is currently in northern spring, approaching northern summer, and scientists want to know what has changed with the north polar winter vortex weather pattern. The composite infrared spectrometer, for instance, will be mapping temperatures in Titan's stratosphere. The imaging science subsystem will also be monitoring the lakes, clouds and transport of aerosols in the Titan atmosphere.

This latest flyby is dubbed "T74," though planning changes early in the orbital tour have made this the 75th targeted flyby of Titan.

The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. NASA's Jet Propulsion Laboratory, Pasadena, Calif., a division of the California Institute of Technology in Pasadena, manages the mission for NASA's Science Mission Directorate, Washington, D.C. The Cassini orbiter was designed, developed and assembled at JPL.

More information about the flyby is available at: http://saturn.jpl.nasa.gov/mission/flybys/titan20110218/

More information about the Cassini-Huygens mission is at: http://www.nasa.gov/cassini and http://saturn.jpl.nasa.gov.

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **NASA/Jet Propulsion Laboratory**.

http://www.sciencedaily.com/releases/2011/02/110218083859.htm

New High-Resolution Method for Imaging Below the Skin Using a Liquid Lens

This prototype device developed by University of Rochester Professor of Optical Engineering Jannick Rolland can take high-resolution images under the skin's surface without removing the skin. Researchers say that in the future it may eliminate the need for many biopsies to detect skin cancer. (Credit: J. Adam Fenster)

ScienceDaily (Feb. 20, 2011) — University of Rochester optics professor Jannick Rolland has developed an optical technology that provides unprecedented images under the skin's surface. The aim of the technology is to detect and examine skin lesions to determine whether they are benign or cancerous without having to cut the suspected tumor out of the skin and analyze it in the lab. Instead, the tip of a roughly one-foot-long cylindrical probe is placed in contact with the tissue, and within seconds a clear, high-resolution, 3D image of what lies below the surface emerges.

Rolland presented her findings at the 2011 annual meeting of the American Association for the Advancement of Science in Washington, D.C., on Feb. 19.

"My hope is that, in the future, this technology could remove significant inconvenience and expense from the process of skin lesion diagnosis," Rolland says. "When a patient walks into a clinic with a suspicious mole, for instance, they wouldn't have to have it necessarily surgically cut out of their skin or be forced to have a costly and time-consuming MRI done. Instead, a relatively small, portable device could take an image that will assist in the classification of the lesion right in the doctor's office."

The device accomplishes this using a unique liquid lens setup developed by Rolland and her team for a process known as Optical Coherence Microscopy. In a liquid lens, a droplet of water takes the place of the glass in a standard lens. As the electrical field around the water droplet changes, the droplet changes its shape and therefore changes the focus of the lens. This allows the device to take thousands of pictures focused at different depths below the skin's surface. Combining these images creates a fully in-focus image of all of the tissue up to 1 millimeter deep in human skin, which includes important skin tissue structures. Because the device uses near infrared light instead of ultrasounds, the images have a precise, micron-scale resolution instead of a millimeter-scale resolution.

The process has been successfully tested in in-vivo human skin and several papers on it have been published in peer-reviewed journals. Rolland says that the next step is to start using it in a clinical research environment so its ability to discriminate between different types of lesions may be assessed.

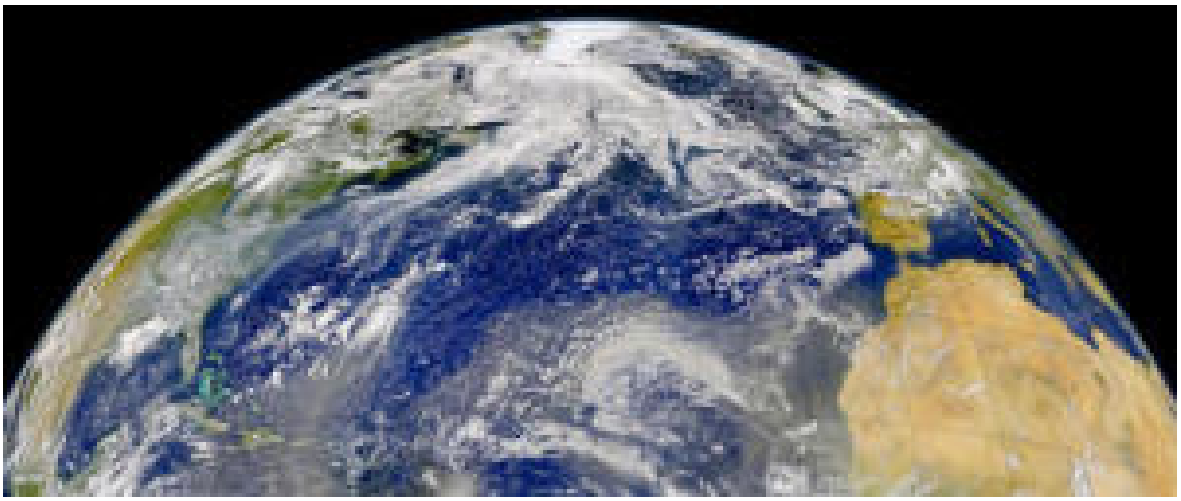
Rolland joined the faculty of the Hajim School of Engineering and Applied Science's Institute of Optics in 2009. She is the Brian J. Thompson Professor of Optical Engineering and is also a professor of biomedical engineering and associate director of the R.E. Hopkins Center for Optical Design and Engineering.

Story Source:

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

http://www.sciencedaily.com/releases/2011/02/110219160003.htm

Climate Projections Show Human Health Impacts Possible Within 30 Years: Potential Increases in Waterborne Toxins and Microbes



Aerosolized dust is clearly visible in the satellite image and stretches across the Atlantic Ocean nearly continuously from Western Africa into the Caribbean and Gulf of Mexico. (Credit: SeaWIFS Project, NASA/Goddard Space Flight Center and ORBIMAGE)

ScienceDaily (Feb. 20, 2011) — A panel of scientists speaking Feb. 19 at the annual meeting of the American Association for the Advancement of Science (AAAS) unveiled new research and models demonstrating how climate change could increase exposure and risk of human illness originating from ocean, coastal and Great Lakes ecosystems, with some studies projecting impacts to be felt within 30 years.

"With 2010 the wettest year on record and third warmest for sea surface temperatures, NOAA and our partners are working to uncover how a changing climate can affect our health and our prosperity," said Jane Lubchenco, Ph.D., under secretary of commerce for oceans and atmosphere and NOAA administrator. "These studies and others like it will better equip officials with the necessary information and tools they need to prepare for and prevent risks associated with changing oceans and coasts."

In several studies funded by NOAA's Oceans and Human Health Initiative, findings shed light on how complex interactions and climate change alterations in sea, land and sky make ocean and freshwater environments more susceptible to toxic algal blooms and proliferation of harmful microbes and bacteria.

Climate change could prolong toxic algal outbreaks by 2040 or sooner

Using cutting-edge technologies to model future ocean and weather patterns, Stephanie Moore, Ph.D., with NOAA's West Coast Center for Oceans and Human Health and her partners at the University of Washington, are predicting longer seasons of harmful algal bloom outbreaks in Washington State's Puget Sound.

The team looked at blooms of Alexandrium catenella, more commonly known as "red tide," which produces saxitoxin, a poison that can accumulate in shellfish. If consumed by humans, it can cause gastrointestinal and neurological symptoms including vomiting and muscle paralysis or even death in extreme cases.

Longer harmful algal bloom seasons could translate to more days the shellfish fishery is closed, threatening the vitality of the $108 million shellfish industry in Washington state.

"Changes in the harmful algal bloom season appear to be imminent and we expect a significant increase in Puget Sound and similar at-risk environments within 30 years, possibly by the next decade," said Moore. "Our projections indicate that by the end of the 21st century, blooms may begin up to two months earlier in the year and persist for one month later compared to the present-day time period of July to October."

Natural climate variability also plays a role in the length of the bloom season from one year to the next. Thus, in any single year, the change in bloom season could be more or less severe than implied by the long-term warming trend from climate change.

Moore and the research team indicate that the extended lead time offered by these projections will allow managers to put mitigation measures in place and sharpen their targets for monitoring to more quickly and effectively open and close shellfish beds instead of issuing a blanket closure for a larger swath of coast or be caught off guard by an unexpected bloom. The same model can be applied to other coastal areas around the world increasingly affected by harmful algal blooms and improve protection of human health against toxic outbreaks.

More atmospheric dust from global desertification could lead to increases of harmful bacteria in oceans, seafood

Researchers at the University of Georgia, a NOAA Oceans and Human Health Initiative Consortium for Graduate Training site, looked at how global desertification -- and the resulting increase in atmospheric dust based on some climate change scenarios -- could fuel the presence of harmful bacteria in the ocean and seafood.

Desert dust deposition from the atmosphere is considered one of the main contributors of iron in the ocean, has increased over the last 30 years and is expected to rise based on precipitation trends in western Africa. Iron is limited in ocean environments and is essential to most forms of life. In a study conducted in collaboration with the U.S. Geological Survey, Erin Lipp, Ph.D. and graduate student Jason Westrich demonstrated that the sole addition of desert dust and its associated iron into seawater significantly stimulates growth and persistence of Vibrios, a group of ocean bacteria that occur worldwide and can cause gastroenteritis and infectious diseases in humans.

"Within 24 hours of mixing weathered desert dust from Morocco with seawater samples, we saw a 10-1000-fold growth in Vibrios, including one strain that could cause eye, ear, and open wound infections, and another strain that could cause cholera ," said Lipp. "Our next round of experiments will examine the response of the strains associated with seafood-related infections."

Since 1996 Vibrio cases have jumped 85 percent in the United States based on reports that primarily track seafood-illnesses. It is possible this additional input of iron, along with rising sea surface temperatures, will affect these bacterial populations and may help to explain both current and future increases in human illnesses from exposure to contaminated seafood and seawater.

Increased rainfall and dated sewers could affect water quality in Great Lakes

A changing climate with more rainstorms on the horizon could increase the risk of overflows of dated sewage systems, causing the release of disease-causing bacteria, viruses and protozoa into drinking water and onto beaches. In the past 10 years there have been more severe storms that trigger overflows. While there is some question whether this is due to natural variability or to climate change, these events provide another example as to how vulnerable urban areas are to climate.

Using fine-tuned climate models developed for Wisconsin, Sandra McLellan, Ph.D., at the University of Wisconsin-Milwaukee School of Freshwater Sciences, found spring rains are expected to increase in the next 50 years and areas with dated sewer systems are more likely to overflow because the ground is frozen and rainwater can't be absorbed. As little as 1.7 inches of rain in 24 hours can cause an overflow in spring and the combination of increased temperatures -- changing snowfall to rainfall and increased precipitation -- can act synergistically to magnify the impact.

McLellan and colleagues showed that under worst case scenarios there could be an average 20 percent increase in volume of overflows, and they expect the overflows to last longer. In Milwaukee, infrastructure investments have reduced sewage overflows to an average of three times per year, but other cities around the Great Lakes still experience overflows up to 40 times per year.

"Hundreds of millions of dollars are spent on urban infrastructure, and these investments need to be directed to problems that have the largest impact on our water quality," said McLellan. "Our research can shed light on this dilemma for cities with aging sewer systems throughout the Great Lakes and even around the world."

"Understanding climate change on a local level and what it means to county beach managers or water quality safety officers has been a struggle," said Juli Trtanj, director of NOAA's Oceans and Human Health Initiative and co-author of the interagency report A Human Health Perspective on Climate Change. "These new studies and models enable managers to better cope and prepare for real and anticipated changes in their cities, and keep their citizens, seafood and economy safe."

Story Source:

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http://www.sciencedaily.com/releases/2011/02/110219165225.htm

The Computer Made Me Do It

By WILLIAM SALETAN

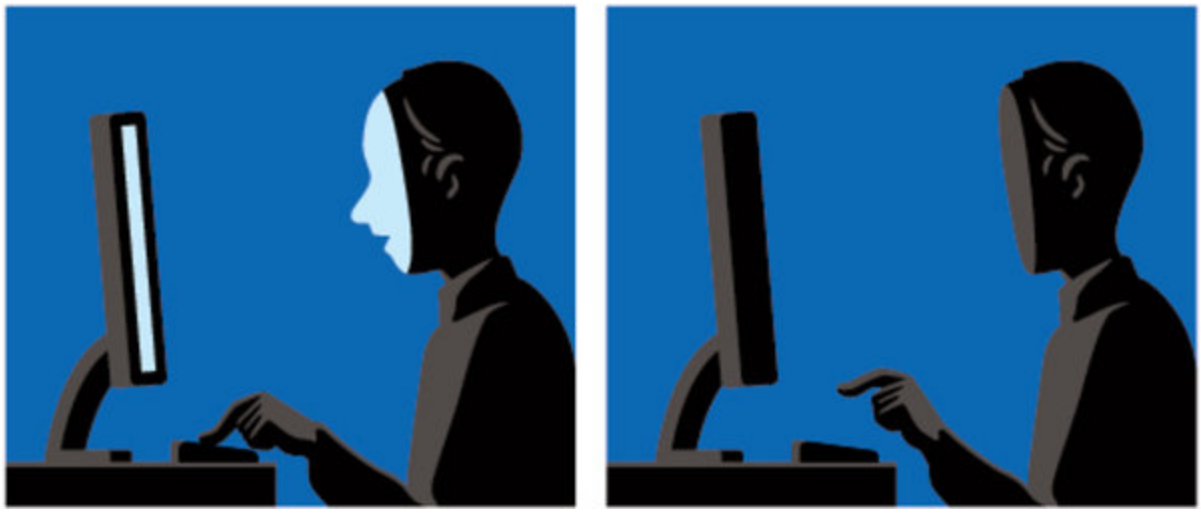

Illustration by Christoph Niemann

VIRTUALLY YOU

The Dangerous Powers of the E-Personality

By Elias Aboujaoude

349 pp. W. W. Norton & Company. $26.95.

REALITY IS BROKEN

Why Games Make Us Better and How They Can Change the World

By Jane McGonigal

Illustrated. 388 pp. The Penguin Press. $26.95.

Humanity is migrating to cyberspace. In the past five years, Americans have doubled the hours they spend online, exceeding their television time and more than tripling the time they spend reading newspapers or magazines. Most now play computer or video games regularly, about 13 hours a week on average. By age 21, the average young American has spent at least three times as many hours playing virtual games as reading. It took humankind eight years to spend 100 million hours building Wikipedia. We now spend at least 200 million hours a week playing World of Warcraft.

Elias Aboujaoude, a Silicon Valley psychiatrist, finds this alarming. In “Virtually You,” he argues that the Internet is unleashing our worst instincts. It connects you to whatever you want: gambling, overspending, sex with strangers. It speeds transactions, facilitating impulse purchases and luring you away from the difficulties of real life. It lets you customize your fantasies and select a date from millions of profiles, sapping your patience for imperfect partners. It lets you pick congenial news sources and avoid contrary views and

information. It conceals your identity, freeing you to be vitriolic or dishonest. It shields you from detection and disapproval, emboldening you to download test answers and term papers. It hides the pain of others, liberating your cruelty in games and forums. It rewards self-promotion on blogs and Facebook. It teaches you how to induce bulimic vomiting or kill yourself.

In short, everything you thought was good about the Internet — information, access, personalization — is bad. Aboujaoude isn't shy in his indictment. He links the Internet to consumer debt, the housing crash, eating disorders, sexually transmitted infections, psychopathy, racism, terrorism, child sexual abuse, suicide and murder. Everything online worries him: ads, hyperlinks, even emoticons. The Internet makes us too quarrelsome. It makes us too like-minded. It makes us work too little. It makes us work too much.

In part, this grim view stems from Aboujaoude's work. He sees patients with online compulsions. He believes in the Freudian id — a shadowy swirl of infantile impulses — and perceives its modern incarnation in what he calls the "e-personality," a parallel identity that hijacks your mind online. In the physical world, your superego restrains your id. But in the virtual world, where you can instantly fulfill your whims, the narcissism and grandiosity of the e-personality run wild.

To Aboujaoude, the Internet is a mechanical alien, "a new type of machine . . . that can efficiently prey on our basic instincts." It converts children into bullies "almost automatically." It turned Philip Markoff, the accused "Craigslist killer," who committed suicide in jail, into a serial assailant. Lori Drew, the woman whose online impersonation of a teenage boy supposedly drove a girl to suicide, seemed normal until "the Internet made her fleeting dark wish . . . take on a life of its own." Again and again, computers get the blame.

Jane McGonigal, the author of "Reality Is Broken," sees the Internet differently. She's a game designer. To her, the virtual world isn't a foreign contraption. It's our own evolving creation. She agrees that bad online games can addict people, make them belligerent, distract them from reality and leave them empty. But this is our fault, not the Internet's. When virtual life brings out the worst in us, redesign it.

If Aboujaoude is the Internet's Hobbes, McGonigal is its Rousseau. In the rise of multiplayer games, she sees a happier picture of human nature — a thirst for community, a craving for hard work and a love of rules. This, she argues, is the essence of games: rules, a challenge and a shared objective. The trick is to design games that reward good behavior. The Internet's unprecedented power, its ability to envelop and interact with us, is a blessing, not a threat. We can build worlds in which nice guys finish first.

The point isn't just to enhance virtual reality. It's to fix the real world, too. McGonigal offers several examples, some of which she helped create. Chore Wars, an alternate-reality game, builds positive attitudes toward housework by rewarding virtual housework. Cruel 2 B Kind invites players to "kill" competitors with smiles or compliments. The Extraordinaries hands out missions like one in which the player must GPS-tag a defibrillator so its location can be registered for later use. Groundcrew assigns players to help people with transportation, shopping or housekeeping.

The premise is that since games motivate us more effectively than real life, making them altruistic and bringing them into the physical world will promote altruistic behavior. But is this motivating power transferable? What draws us to virtual worlds, McGonigal notes, is their "carefully designed pleasures" and "thrilling challenges" customized to our strengths. They're never boring. They let us choose our missions and control our work flow. They make us feel powerful. They offer "a guarantee of productivity" in every quest. And when we fail, they make our failure entertaining.

Reality doesn't work this way. Floors need scrubbing. Garbage needs hauling. Invalids need their bedpans washed. This work isn't designed for your pleasure or stimulation. It just needs to be done.

McGonigal points to studies suggesting that games that reward socially constructive behavior promote such behavior in real life. But the only outputs measured by these studies are self-reported values, self-reported behavior in the real world, and objectively measured behavior in games. Where's the reliable evidence that this data translates to people's doing more real work? Projects like Groundcrew, McGonigal concedes, have produced "modest if any results so far." Hundreds of thousands of people play Free Rice, a game designed to feed the hungry, but the rice comes from advertisers, not players. Thousands sign up every day for Folding@home, a game to cure diseases, but all these players contribute is processing power on game consoles.

If reality is inherently less attractive than games, then the virtual world won't save the physical world. It will empty it. Millions of gamers, in McGonigal's words, are "opting out" of the bummer of real life. And they aren't coming back. Halo 3, for example, has become a complete virtual world, with its own history documented in an online museum and Ken Burns-style videos. McGonigal calls this war game a model for inspiring mass cooperation. Two years ago, its 15 million players reached a long-sought objective: They killed their 10 billionth alien. "Fresh off one collective achievement, Halo players were ready to tackle an even more monumental goal," McGonigal writes. And what goal did they choose? Feeding the hungry? Clothing the poor? No. The new goal was to kill 100 billion aliens.

Game designers can't be counted on to arrest this trend. McGonigal says the game industry wants to help users avoid addiction so that they'll remain functional and keep buying its products. But we've heard that argument before from the tobacco industry. Addiction, as a business model, is too addictive to give up. She says Foursquare, a game that rewards you for going out with friends and "checking in" at restaurants, promotes sociability. That would be nice, but the game's Web site devotes a whole section ("Foursquare for Business") to commercial exploitation.

The Internet isn't heaven. It isn't hell, either. It's just another new world. Like other worlds, it can be civilized. It will need rules, monitoring and benevolent designers who understand the flaws of its inhabitants. If Aboujaoude is right about our weakness for virtual vice, we'll need all the McGonigals we can get.

William Saletan writes the Human Nature column for Slate and is the author of "Bearing Right: How Conservatives Won the Abortion War."

http://www.nytimes.com/2011/02/13/books/review/Saletan-t.html?_r=2&partner=rss&emc=rss