Infoteca's E-Journal

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The Uncluttered Look Has Its Day
By KEN JOHNSON

Debra Force
Charles Burchfield's "Sparrow hawk weather" (1960), at Debra Force.

The Art Show is the Benjamin Button of art fairs. The annual production of the Art Dealers Association of America, it is still the most conservative of the three major and several smaller fairs happening this weekend, but it has gotten younger in spirit over the past decade. If it keeps aging in reverse, it may one day replace the Armory Fair and the Independent as the go-to place for connoisseurs of the hip.

It has a long way to go before that happens, as it still focuses on the relatively traditional handmade object; don't look for video here. But with at least a third of the 70 participating dealers offering works by living artists and well over half presenting art of the past half-century, it tips decidedly to the modern and the new if not the cutting edge.

In this year's most notable development, the show's directors asked dealers to mount more cohesive displays this time around. Many complied by offering solo or two-person presentations, while others assembled small theme shows. The days when dealers simply stocked their booths with as much of their inventory as they could cram in are evidently almost over, which may disappoint the assiduous treasure hunter but allows the casual art lover a less exhausting experience.

Many galleries have chosen an uncluttered, less-is-more strategy. Robert Miller, for example, has an elegant, near-Minimalist show of Diane Arbus's best known but still mysterious photographs of offbeat people, including a nudist family relaxing in a field, a gorgeous topless dancer and a set of young triplet sisters in their New Jersey bedroom. Even more spare is Luhring Augustine's show of small boxes and fragments of foam packing material cast in plaster, colored resin and metal and displayed like books on bookshelves by Rachel Whiteread.

Other shows that are as rewarding as they are spare include David Zwirner's selection of portraits by Alice Neel, each a marvel of psychological acuity and painterly verve, and an array of Kathy Butterly's lovely little

ceramic objects at Tibor de Nagy. Displayed atop two big, white adjoined cubes, a baker's dozen of her finely made, eccentrically ornamental improvisations on the vase archetype delights the eye and the mind.
More contemporary idiosyncrasy can be found at David Nolan in the form of colorful recent landscape drawings by Richard Artschwager. Made in oil pastel, they play knowingly with pattern and perspective but look as if they were created by a self-taught hobbyist. The more you look, the stranger they seem.
Like Mr. Artschwager, the Austrian artist Maria Lassnig has been producing art since the 1950s, and she has similarly followed her own inimitable path. Painted with wide brushes in high-keyed hues, her expressionistically distorted pictures of partly unclothed people project existential angst with happy exuberance. They are at Friedrich Petzel.
Projecting its own mischievous spirit but more soberly is a series of handsome, quasi-Minimalist works produced by Franz Erhard Walther in 1992 (at Peter Freeman). Each piece consists of seven boxy, differently shaped and sized parts made of painted canvas. Lacking rigid infrastructure, these rectilinear elements have a slightly rumpled aspect; they resemble used furniture cushions. The title, German for "Song of the Storage," hints at what to do with them. Like puzzle pieces, the parts of each fit together into a single rectangle suitable for storage. When displayed on the wall they are separated into different arrangements, which is when they "sing" as art.
One of the fair's youngest soloists — in spirit as well as chronological age — is David Opdyke, whose expansive, extraordinarily detailed sculpture of a post-apocalyptic landscape is on view at Ronald Feldman. Made as if by an obsessive teenage sci-fi fan, it depicts a towering rocky prominence crawling with pipes, ladders and other kinds of industrial superstructure coming from oil processing installations on the ground level. Grimy gray, sprinkled in places with lichenlike green stuff, it pictures a technological future run amok.
Other worthy solo shows include abstracted, flattened paintings of people by Milton Avery at Knoedler; funky, geometrically painted assemblages of found objects by Jessica Stockholder at Mitchell-Innes & Nash; a fine selection of small sculptures and drawings by Auguste Rodin at Jill Newhouse; and, most impressively, a terrific show of magical, boxed assemblages and collages by that great poet of reverie and nostalgia, Joseph Cornell, at L&M Arts.
Shows that set up dialogues between two artists of similar or different places and times offer another kind of engagement. At Fraenkel, large black-and- white photographs of landscapes shot in the American West when it was still wide open and virginal to the occidental perspective are presented in a fascinating dialogue with pictures by the contemporary photographer Robert Adams, whose landscapes document the creep of industry and residential populations across the same territory after World War II.
Debra Force is showing big, radiantly transcendental watercolor landscapes by Charles Burchfield along with paintings by his perennially underappreciated contemporary Oscar Bluemner.
As for group shows don't miss the wonderfully direct 1959 self portrait of Marie-Louise von Motesiczky at the center of Galerie St. Etienne's excellent presentation of drawings and watercolors by Klimt, Schiele, Grosz and Nolde. Motesiczky's early study and lifelong friendship with Max Beckmann shows in her own vigorously brushy style, smoldering color and personal candor.
Among the few galleries showing centuries-old works, David Tunick offers a rich and diverse array of prints and drawings, including one of Rembrandt's great etchings depicting the crucifixion of Jesus and the two thieves, and a copy of "The Three Trees," his most ambitious landscape etching. Here also is a heretofore unknown imprint of Edvard Munch's femme-fatale "Madonna" and, most curiously, a study for a painting of Lancelot and Guinevere in a bedroom with an attacking horde outside the window, rendered in light blue watercolor by the founder of the Pre-Raphaelites, Dante Gabriel Rossetti.
The Art Show continues through Sunday at the Park Avenue Armory, 643 Park Avenue, at 67th Street; (212) 616-3930, artdealers.org.

http://www.nytimes.com/2011/03/04/arts/design/04dealers.html?ref=design

When the Dead Arise and Head to Times Square

By EDWARD ROTHSTEIN

Ruth Fremson/The New York Times
Plaster casts made from hollowed-out molds of rock, where bodies had been captured a moment before they ceased to be

There is a lot of traffic these days in well-preserved bodies, human and otherwise. They are sliced and pickled for artistic effect or uncannily dissected and plasticized, with every blood vessel visible. They have toured the world, wrapped and mummified in the manner of ancient Egypt, or have been displayed, more modestly preserved by the dry desert sands of the Silk Road. And there are many, many more mummies yet to come.
Why this onslaught of the almost-living dead in museums? Are we latter-day Ezekiels seeking prophetic messages from ancient skeletal remnants? Has the technology used to prepare the dead for world travel suddenly advanced? Or has the need for income by the overseers of mummies suddenly increased?
Perhaps all are true. But "Pompeii the Exhibit: Life and Death in the Shadow of Vesuvius," which opens on Friday at Discovery Times Square, is unusual because its dead bodies are not really dead, and they are not really bodies. They are, however, often more affecting, and they form the fulcrum of an absorbing show about a place more widely heard of than thoroughly understood.
The bodies are made of white plaster, and their rough surfaces allow only vague outlines. But, like death masks, they capture a moment when their subjects ceased to be. A man sits crouched, his legs pulled up to his chest, covering his face, as if in despair. A girl desperately thrusts herself at her mother, grasping for comfort. A man, prostrate, begins to pull himself up a staircase but can go no farther. These bodies are writhing, groping, reaching, protecting. And their white forms are starkly displayed on black platforms in a dimly lighted gallery, looking like otherworldly figures enduring infernal agonies.
They are plaster casts from Pompeii — more, we are told, than have ever been gathered together for an exhibition. Pompeii, of course, was the Roman village near Naples that was entirely wiped out in the year 79, when Mount Vesuvius erupted, engorging the town with its ash and lava, preserving it as if it were a bug caught in sap that would turn to amber.
Waves of volcanic ash, heat and poisonous gases trapped the fleeing remnants of the town's population, often in midstride, some carrying keys and valuables. Others cowered in basements or clung to family. The plaster is rough, but we can see touching detail, including the delicate folds of a dead child's tunic. And there are suggestions of bronze studs in a collar on a chained dog's neck: did it strangle itself as it strained to escape, its body rolled into a contorted ball?
Volcanic detritus swept over these beings, liquid eventually solidifying into tombs of stone. Flesh and muscle decayed, leaving for later archaeological study hollowed-out molds of rock. A 19th-century archaeologist had

the brilliant idea of pouring plaster into those hollows, then shattering the rock. What remained were life-size reproductions of animals and humans caught in the final moments of life.

These images also confirm the account of the eruption by Pliny the Younger, who was a safe-enough distance away to observe, but close enough to want to flee: "You could hear women shrieking, children screaming, men shouting," he wrote. (The words are cited on the exhibition walls.) "Some called for their children, others for their parents or husbands."

Some, he continued, "raised their hands to the gods, but most of them thought there were no gods at all."

One room here is devoted to casts of 32 skeletal remains found four miles away from Pompeii, in Herculaneum, which was also destroyed. Nine of the skeletons were of children younger than 12. Another was accompanied by a complete set of surgical instruments, suggesting, perhaps, preparation and precaution, but no recognition of the forces unleashed.

These scenes are all the more stark because the exhibition — deftly designed and planned by Ralph Appelbaum Associates — makes sure that we encounter them only after we have come to know something about Pompeii as a thriving town. The volcanic debris that destroyed it also preserved it, along with elaborately painted frescoes, exquisite mosaics, tools of business and trade, gladiators' armor, and artifacts and murals that this exhibition associates with bordellos. The show provides a brief glimpse of that world. It decorously places erotically explicit items in a nearly private space, prefaced by a warning and tucked away inside the main galleries.

Since the ruins of Pompeii were discovered and recognized in the 18th century, there have been debates over how to interpret these and other objects. (The classicist Mary Beard is particularly evocative and provocatively irreverent in her 2008 book, "The Fires of Vesuvius.") But the selection of artifacts here suggests that Pompeii was an earthy, cosmopolitan society, thriving on trade that came through Naples, seeded with influences from the Etruscans, the Greeks, the Romans and local mountain tribes.

The statues of Dionysus and the brass miniatures of hybrid deities (including some allusions to Eastern religions) are as sybaritic as they are refined. The frescoes, whose colors still amaze, would have graced fine dining rooms and villas; omitted here are examples of the iconoclastic and comic first-century graffiti found in public places.

At least as portrayed here, this was a culture preoccupied with vitality, almost devoted to the life force until confronting its opposite. We are given some suggestion of what happened when we enter a bare room, and the doors close. On a screen a computer simulation chronicles what inhabitants of Pompeii might have seen during the day and a half of destruction. As the tumult grows, the walls and floor vibrate. Images of volcanic activity become more apocalyptic, and after the climactic devastation, the room's panels open, and we face the darkened gallery of ghostly figures.

After passing through that realm, we are led into Pompeii's afterlife. A timeline maps the history of the site, something that is traced in more detail in the book "Pompeii Awakened," by Judith Harris, a consultant for the exhibition.

The story is ripe with carelessness, dishonesty and political jockeying. It would have been good to find even more of this material here, along with a sense of how Pompeii's exploration led to the development of modern archaeology. The discoveries also, as the exhibition suggests, fed the 19th-century Romantic fascination with Nature's wild powers. Pompeii became a site of international pilgrimage.

Here too are the intriguing artifacts of daily life: carbonized olives, figs and a walnut; burnished glazed bowls; Roman-inspired plumbing; an enormous glass funerary jar miraculously unshattered; and jewelry, including a winding gold snake bracelet inscribed by a master to his slave.

This exhibition was created by the Soprintendenza Archeologica di Napoli e Pompei, which oversees Pompeii, in conjunction with Discovery Times Square and Running Subway Productions. The $25 adult ticket price will, no doubt, help provide some support for the archaeological site, which has long suffered from poor maintenance, low budgets, large crowds and plunder.

But the best evidence of the show's success is that though touch screens provide some glimpses of Pompeii, no one can see this exhibition's small fraction of the site's relics and not also wish to see them all.

http://www.nytimes.com/2011/03/04/arts/design/04vesuvius.html?ref=design

The Inside Story on Outsiderness

By CAROL VOGEL

Fred R. Conrad/The New York Times
The artist Glenn Ligon in his Brooklyn studio.

A STARTLING sight will soon be hanging in midair in the Madison Avenue window of the Whitney Museum of American Art, just a few blocks from Ralph Lauren, Prada and Gucci: a 22-foot-long neon sign spelling out the words "negro sunshine."
It's the work of the New York Conceptual artist Glenn Ligon, whose midcareer retrospective, "Glenn Ligon: America," opens at the Whitney on March 10. Taken from "Melanctha," a 1909 novella by Gertrude Stein about a mixed-race woman, "negro sunshine" is the kind of ambiguous phrase that Mr. Ligon, who is black, uses to speak of the history of African-Americans. "I find her language fascinating," he said of Stein. "It's a phrase that stuck in my head."
Are those two words, installed in such a prominent manner, meant to shock?
"Shock," repeated Mr. Ligon, a bit surprised at the question. "It's not provocative, it's Gertrude Stein."
"Even my Richard Pryor paintings," he went on, referring to a series of work based on jokes told by that black comedian, use a common racial epithet. "Turn on the radio," he said. "A word like that is so archaic, it's not of this time. It's about language."
Since the late 1980s Mr. Ligon, 51, who is gay, has been creating paintings, prints and drawings using phrases written or uttered by personalities like Mary Shelley, James Baldwin and Malcolm X. Sometimes the words appear as a line floating in the middle of a canvas; other times are they are repeated over and over in a way that makes them abstract and illegible.
These phrases are often oblique — "I do not always feel colored"; "I lost my voice I found my voice"; "I was somebody"; "I am somebody" — raising a controversial or mysterious question and leaving the viewer to work for the answers. Mr. Ligon generally deals with race, gayness or simply what he calls "outsiderness," and his paintings, drawings, sculptures and videos have captured the attention of the Museum of Modern Art in New York, the Tate Modern in London and the Hirshhorn Museum and Sculpture Garden in Washington, which all have his work in their permanent collections. He's also been noticed by President and Mrs. Obama,

who chose Mr. Ligon's 1992 painting "Black Like Me #2" for their private quarters at the White House, on loan from the Hirshhorn.

"Glenn is someone who has figured out how to give Conceptualism some grit," said Robert Storr, dean of the Yale School of Art, who bought an early painting by Mr. Ligon for himself and later another for MoMA when he was a curator there. "He's influenced a younger generation, perhaps because he is a political artist but not a protest artist. He has an unwillingness to be boxed in."

His retrospective feels particularly timely because it comes at a moment when glaring polemics are no longer fashionable. Artists these days raise social and historical issues but usually keep them at a distance. Yet the underlying messages of works like "Hands," a photograph from the Million Man March, speak to the urgency of change. "His work captures political moments en masse, which seem quite compelling now when you consider the Middle East and the protests of collective bargaining in the Midwest as a form of democracy," said the artist Lorna Simpson.

Since Mr. Ligon's work draws heavily on written sources, one might expect his Brooklyn studio to resemble the Collyer Brothers' apartment, a haphazard pile-up of books, magazines and papers. But instead, his sunny space is spotless, with only one neatly arranged bookshelf and crisp white walls where a few of his painting hang. (Others are carefully propped up on the floor, leaning against one another.)

On a recent wintry afternoon less than a month before the show Mr. Ligon greeted a visitor in a down jacket, apologizing because there was barely any heat in the building. When asked about his looming deadline, he could still manage his trademark throaty laugh. "I've become very Zen," he said. "I've gone through all the stages: anger, bargaining, acceptance. These days I spend so much time at the Whitney, all the guards know me."

Mr. Ligon is the kind of guy who could fit in anywhere. With his shaved head, black glasses and wide smile, he has an unassuming yet welcoming face, one that has appeared in J. Crew catalogs and Gap ads. He has a dry wit and can talk as easily about serious fiction as popular movies and television shows. "There was a time when I was a huge TV addict," he confessed. "I used to race home from school to watch 'Dark Shadows.' " More recently he has been hooked on the British soap opera "Downton Abbey," which he enjoys partly because it's about class.

Mr. Ligon himself grew up in a working-class family in the Bronx, his father a line foreman for General Motors and his mother a nurse's aide. Weekdays he would commute to Manhattan, to Walden, a West Side private school, now defunct, where he and his older brother had scholarships. ("I don't think my mother knew it was one of the most liberal schools in America," he recalled.)

When he first thought he wanted to be an artist, his mother told him that "the only artists I ever heard of are dead," but she enrolled him in pottery classes and made sure he got any book he wanted. "We didn't have a lot of extra money, but there was an attitude that if it was educational, it was O.K.," Mr. Ligon said. "Books, yes. Trips to the Met, yes. Hundred-dollar sneakers, no." That, he said, may account for his love of literature. He reads voraciously — on paper, not on a screen — marking phrases that jump out at him.

Mr. Ligon went on to Wesleyan University with thoughts of becoming an architect, "but I realized I was more interested in how people live in buildings rather than making them," he said. After college he became a proofreader in a law firm and painted at night and on weekends.

His big break came in 1989, when he got a grant from the National Endowment for the Arts. "I thought if the government thinks I'm an artist, then I must be one," he said. He started making art full time.

Now, although his studio is in Park Slope, he lives in Manhattan, near Chinatown. "I like having a studio to go to," he said. "It's like having a job."

Although an urbanite at heart, Mr. Ligon also has a house in Hudson, N.Y., chosen for all the antiques shops and restaurants within walking distance. "In high school driver's ed was at the same time as drama class," he said, laughing. "And I had to take drama class. Now I can sing the lead in 'Oklahoma!,' but I can't drive. 'Oklahoma!' was my destiny."

So, it seems, is the Whitney. He joined its Independent Study Program in the mid-1980s and over the years has been part of many exhibitions, including two Biennials, the first in 1991 with three works for which he stenciled passages taken from the Harlem Renaissance writer Zora Neale Hurston on abandoned hollow-core doors. For the 1993 Biennial he produced an elaborate installation of photographs and texts examining the social implications of Robert Mapplethorpe's homoerotic pictures of black men.

His work was also in the Whitney's controversial "Black Male" exhibition the following year, where he showed a series of eight paintings in which newspaper profiles of the teenage black and Hispanic defendants in the Central Park jogger case were stenciled in oil stick on canvas. The results had the handmade look of early Jasper Johns, a hero of Mr. Ligon's.

In 1996, when he had a show of drawings at the Brooklyn Museum, Holland Cotter, wrote in The New York Times: "Mr. Ligon's drawn words have their own mystery. Seen through a haze of charcoal or in raking gallery light, they're hard to read, but their ideas are big."

Mr. Ligon slowly started gaining prominence in the early '90s along with a generation of artists like Ms. Simpson, Gary Simmons and Janine Antoni. But he hit a kind of artistic jackpot when the Obamas chose "Black Like Me #2" for their private living space at the White House. It came as a total surprise to Mr. Ligon, who said he was "very flattered."

"It's not an easy piece, which is why I'm so thrilled," said Mr. Ligon, who has never met the Obamas. The painting's title echoes John Howard Griffin's 1961 memoir, in which Griffin, who was white, traveled in the South posing as a black man.

In trying to capture the sweep of Mr. Ligon's career, Scott Rothkopf, the Whitney curator who organized the retrospective, said he had tried to show him in a way that went beyond the obvious. "Although people think they know his work — the black and white text paintings in particular — I've tried to tease out the distinctions of one painting from another so that people can appreciate their specificity," he said.

Mr. Ligon forms letters with stencils because "it's a way to be semi-mechanical, to make letters that are not handwriting but have personality," he said. "Handwriting would make these quotations too much mine, and stencils give it a bit more distance. They also allow me to keep being painterly but also have the kind of content I want a painting to have." And rather than use oil paint, which can get messy, he uses oil stick, so that each letter has a more defined quality. For some works he has also flocked the canvas with coal dust to give it a textured, glittering feeling.

Neon sculptures create yet another message, a kind of 21st-century signage that hints at advertising but is quite the opposite of promotional. On the first floor of Mr. Ligon's studio building is Lite Brite Neon, a custom lighting fabrication studio where, on a recent visit, the "negro sunshine" sculpture was being made for the Whitney's window. On a long work table the perfectly made letters spelling out "negro" rested against a white metal backing. As Mr. Ligon inspected the progress, he explained that the front of the letters will be painted black, for a shadow play between light and dark. In the show there will also be neon wall reliefs that spell out just one word — "America" — from which the retrospective's title was taken.

Mr. Rothkopf said the decision to call the show "Glenn Ligon: America" was a very conscious one. "Although he emerged amidst a generation of artists who deal with race and sexual identity, his work speaks more broadly," Mr. Rothkopf said. "Not just to African-Americans or gay Americans, but to all Americans."

Even children. There will be work Mr. Ligon made in 2000, for an exhibition at the Walker Art Center in Minneapolis, where he gave kids black-history coloring books from the 1970s to crayon. What particularly fascinated him was how totally oblivious the children were to the political agenda behind the images. "One of the kids looked at the Malcom X picture and asked if it was me," he said.

The retrospective will also include paintings based on "Stranger in the Village," a 1953 essay by Baldwin. "I keep returning to it over and over again," Mr. Ligon said. "It's panoramic. Baldwin is in Switzerland, he's working on a novel, and he's thinking about what it means to be a stranger somewhere, literally and metaphorically. You have to be a bit outside of something to see it. I think any artist does that. It's an artist's job to always have their antennas up."

http://www.nytimes.com/2011/02/27/arts/design/27ligon.html?ref=design

Nightshade Is Growing Like Weeds

By MARK DERY

Walt Disney Pictures
A scene from the film "Alice in Wonderland," which owes a debt to Edward Gorey.

NEWS bulletin from the spirit world: The specter of Edward Gorey, who died in 2000 at the age of 75, is haunting our collective unconscious.

In a sense that's as it should be; Gorey was born to be posthumous. His poisonously funny little picture books — deadpan accounts of murder, disaster and discreet depravity, narrated in a voice that affects the world-weary tone of British novelists like Ronald Firbank and Ivy Compton-Burnett — established him as the master of high-camp macabre.

Told in verse and illustrated in a style that crosses Surrealism with the Victorian true-crime gazette, Gorey stories are set in some unmistakably British place, in a time that is vaguely Victorian, Edwardian and Jazz Age all at once. Though Gorey was a 20th-century American, he conjured a world of gramophones and cars that start with cranks, of boater-hatted men in Eton collars knocking croquet balls across the lawn while sloe-eyed vamps in cloches look on, and sinister things sink, bubbling, into the reflecting pond. His titles are instructive: "The Fatal Lozenge," "The Deadly Blotter," "The Hapless Child," "The Haunted Tea-Cosy."

A wide audience has long known Gorey's work from the 31-year-old animations used to introduce the PBS series "Mystery!" (now "Masterpiece Mystery"). The playfully perverse vignettes include a skulking villain in a cape and a swooning ingénue.

Before "Mystery!" Gorey's set for the 1977 Broadway production of "Dracula" — large-scale versions of his black-and-white drawings, each melodramatically highlighted with a single, blood-red detail — spread his fame far beyond theatergoers.

But until the last few years true Gorey devotees were a secret society, wearing Gorey-philia like a Masonic ring. Now, however, their numbers have swelled. The writer Daniel Handler, better known as Lemony Snicket, said, "When I was first writing 'A Series of Unfortunate Events,' I was wandering around everywhere saying, 'I am a complete rip-off of Edward Gorey,' and everyone said, 'Who's that?' Now, everyone says, 'That's right, you are a complete rip-off of Edward Gorey.' "

Tim Burton owes an obvious debt to Gorey, as do Rob Reger, creator of the goth gamine Emily the Strange, and Neil Gaiman, the author of the novella "Coraline." Mr. Gaiman has an original Gorey drawing of

"children gathered around a sickbed" hanging on his bedroom wall; he wanted Gorey to illustrate "Coraline," he said, but he "died the day I finished it."

Gorey illustrations are even becoming voguish as tattoos. Last year the ninth-season "American Idol" finalist Siobhan Magnus had a biceps tattoo of Death playing nanny to a flock of soon-to-be-doomed children, from "The Gashlycrumb Tinies," Gorey's grimly funny alphabet book.

The market for Gorey books and merchandise buoys indie publishers like Pomegranate, which brings some of Gorey's books back into print each year, and Fantagraphics, which is releasing a third edition of "The Strange Case of Edward Gorey," a portrait by the novelist and longtime Gorey friend Alexander Theroux. Attendance has been climbing steadily at the Edward Gorey House in Yarmouth Port, Mass., and curators of the first major traveling exhibition of Gorey's original art, "Elegant Enigmas" — originally shown at the Brandywine River Museum in Chadds Ford, Pa., and now on view at the Boston Athenaeum — have been stunned by the enthusiasm surrounding the show.

"I knew Gorey had a wide following, but I had no idea of the mania," said David Dearinger, an Athenaeum curator, before the exhibition opened there in February. News media inquiries and calls from the public had been coming in for months, he said then, "and the show isn't even here yet." Since the opening, he said last month, "the response has been phenomenal."

Opinions differ about why Gorey — whose name increasingly serves as shorthand for a postmodern twist on the gothic that crosses irony, high camp and black comedy — is casting a longer shadow these days. Mr. Handler attributes Gorey's growing popularity partly to the sophisticated understatement of his hand-cranked world, a sensibility that stands out sharply against the exuberant vulgarity of our age of jeggings, "Bridalplasty" and "Jackass 3D." "That worldview — that a well-timed scathing remark might shame an uncouth person into acting better — seems worthy to me," Mr. Handler said.

Undoubtedly such romanticized visions of a more decorous, dapper past, which also inform the neo-Victorian and neo-Edwardian street styles of goths and steampunks, have as much to do with escapism as historical fact. But accurately or not, such subcultures see in Gorey's work an invitation "to return to a time of gentility," to quote the promoters of the annual Edwardian Ball, a celebration of Gorey.

In contrast, some fashion designers see Gorey's anachronistic use of historical references as perfect for our age of mash-ups and remixes. The neo-Victorian couturier Kambriel, whose shows have featured Gorey-inspired sets and models reciting Gorey limericks, said that in her designs, as in Gorey's tales, "the propriety of the past" is infused with the "playful mischief and irreverence" of the present.

Even a more established designer like Anna Sui has drawn inspiration from him. "My big attraction to Edward Gorey is that he picked up on all those cultures and was inspired by them but kind of spun them in his own brain and made his own world," she said. Similarly, Martyn Jacques, the singer for the British "dark cabaret" act the Tiger Lillies — whose Grammy-nominated collaboration with the Kronos Quartet, "The Gorey End" (2003), set unpublished Gorey tales to the band's seasick accordion and castrato vocals — celebrates Gorey's refusal to bow to a boomer-dominated culture.

"When I was growing up you'd hear all these musicians, and they were all inspired by the Rolling Stones or Jimi Hendrix," said Mr. Jacques, 51. "I thought to myself: 'Why only be inspired by the 1960s? Why can't you be inspired by the 1860s?' "

Mr. Dearinger attributes Gorey's appeal to what he sees as the rise of cynicism in America since the '60s. "I don't mean cynicism in a totally negative way," he said. "It's the same kind of attitude that would look back and enjoy Jane Austen but enjoy Trollope even more. There wouldn't be a Gorey, if there hadn't been this late-20th-century fascination with camp and irony and cynicism."

Gorey was an early adopter of this sensibility. At Harvard from 1946 to '50, where he roomed with the poet Frank O'Hara, Gorey borrowed a page from the bourgeois-mocking wit of writers like Firbank and Oscar Wilde to create a deadpan, ironic worldview, one that appears strikingly contemporary in retrospect.

Such historically minded analyses can lose sight of the straightforward delights of Gorey's art — his astonishing draftsmanship and pitch-perfect composition, informed by a lifelong love of film, theater and ballet. Many of the images "look like theater sets, so there's that dramatic appeal to it," Mr. Dearinger said. "They're very well composed, easy to read, yet there's enough detail in them that every time you look at them you'll see something you hadn't seen before." Dizzily crosshatched or stippled, Gorey's exquisitely rendered images reveal an encyclopedic knowledge of period architecture, wallpaper, fashion and interior design. They

rejoice in repeated patterns, which contribute to what Mr. Dearinger called their "wonderfully decorative quality."

Gorey-philes who take in the Boston Athenaeum show may be amazed to learn that Gorey's original illustrations were no larger than their reproductions in books, typically just a few inches on a side. "You can picture him with his nose right on the paper, practically, and the pen just making tiny, tiny little strokes, each one where it's supposed to be," Mr. Dearinger said. "The amazing thing is that the mind that's creating this already knows what it's going to look like when you step back from it."

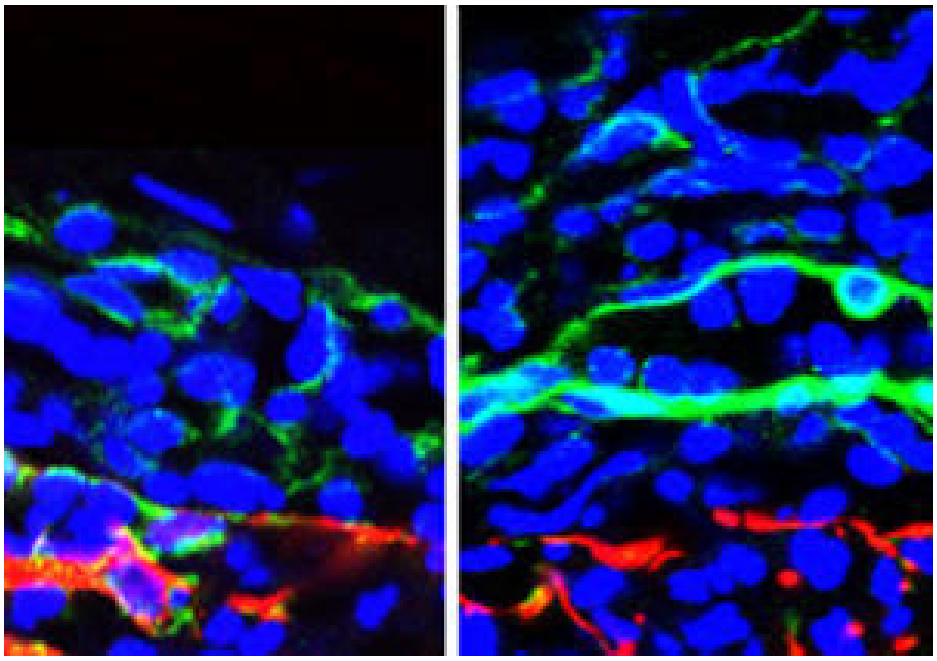
Intriguingly, explanations for the mounting popularity of Gorey's art rarely touch on its air of hidden, maybe even unknowable meaning. Whatever Gorey's work appears to be about, it's forever insinuating, in its poker-faced way, that it's really, truly about something else. The philosopher Jacques Derrida might have said it is this very elusiveness — the sense that meaning can never be pinned down by language — that is Gorey's overarching point.

For his part, Gorey, who rolled his eyes at anyone looking for deep meaning in his work, would doubtless have groaned (theatrically) at any attempt to make intellectual sense of his posthumous popularity.

As he liked to say, "When people are finding meaning in things — beware."

http://www.nytimes.com/2011/03/06/arts/design/06gorey.html

Multiple Sclerosis Blocked in Mouse Model: Barring Immune Cells from Brain Prevents Symptoms



New insights into how the brain and spine regulate immune cell entry have allowed scientists at Washington University School of Medicine to block the development of multiple sclerosis-like symptoms using a mouse model of the disease. When scientists gave mice a drug that suppressed the activity of a key molecule, immune cells (stained green in these images) lined up at the boundaries of the spine (right) instead of going in (left). (Credit: Robyn Klein, MD, PhD)

ScienceDaily (Mar. 7, 2011) — Scientists have blocked harmful immune cells from entering the brain in mice with a condition similar to multiple sclerosis (MS).

According to researchers from Washington University School of Medicine in St. Louis, this is important because MS is believed to be caused by misdirected immune cells that enter the brain and damage myelin, an insulating material on the branches of neurons that conduct nerve impulses.

New insights into how the brain regulates immune cell entry made the accomplishment possible. Washington University scientists had borrowed an anti-cancer drug in development by the company ChemoCentryx simply to test their theories.

"The results were so dramatic that we ended up producing early evidence that this compound might be helpful as a drug for MS," says Robyn Klein, MD, PhD, associate professor of pathology and immunology, of medicine and of neurobiology. "The harmful immune cells were unable to gain access to the brain tissue, and the mice that received the highest dosage were protected from disease."

ChemoCentryx is now testing the drug in Phase I safety trials. The study is published in *The Journal of Experimental Medicine.*

Klein and her colleagues discovered a chemical stairway that immune cells have to climb down to enter the brain. Immune cells that exit the blood remain along the vessels on the tissue side, climbing down from the meninges into the brain where they can then cross additional barriers and attack myelin on the branches of neurons.

"The effect of immune cell entry into the brain depends on context," Klein says. "In the case of viral infection, immune cell entry is required to clear the virus. But in autoimmune diseases like multiple sclerosis, their entry is associated with damage so we need to find ways to keep them out."

The stairway is located on the tissue side of the microvasculature, tiny vessels that carry blood into the central nervous system. The steps are made of a molecule called CXCL12 that localizes immune cells, acting like stairs that slow them down so that they can be evaluated to determine if they are allowed to enter the brain.

Klein's lab previously discovered that the blood vessel cells of the microvasculature display copies of this molecule on their surfaces.
Klein also found that MS causes CXCL12 to be pulled inside blood vessel cells in humans and mice, removing the stairway's steps and the checkpoints they provide. In the new paper, she showed that blocking the internalization of the molecule prevented immune cells from getting into the brain and doing harm.
Work by another lab called Klein's attention to CXCR7, a receptor that binds to CXCL12. She showed that the receptor is made by the same cells in the microvasculature that display CXCL12. They watched the receptor take copies of CXCL12 and dump them in the cells' lysosomes, pockets for breakdown and recycling of molecules the cell no longer needs.
"After it dumps its cargo in the lysosome, the receptor can go right back to the cell surface to pull in another copy of CXCL12," Klein says. "There likely exists an equilibrium between expression and disposal of CXCL12. Some of the proteins expressed by the immune cells in MS patients affect CXCR7 expression and activity, disrupting the equilibrium and stripping the steps from this immune cell stairway we're studying."
Klein contacted researchers at ChemoCentryx, who were developing a blocker of the CXCR7 receptor as a cancer treatment. When they gave it to the mouse model of MS, immune cells stopped at the meninges.
Klein also found that immune factors could cause microvasculature cells to make more or less of CXCR7, ramping up or down the number of steps on the chemical stairway. She is currently investigating additional immune factors that impact on CXCR7 activity within the blood vessel cell. Whether a given factor promotes or suppresses the receptor may also differ depending upon what part of the brain is being considered.
"One of the biggest questions in MS has been why the location, severity and progression of disease varies so much from patient to patient," Klein says. "Getting a better understanding of how these factors regulate immune cell entry will be an important part of answering that question."

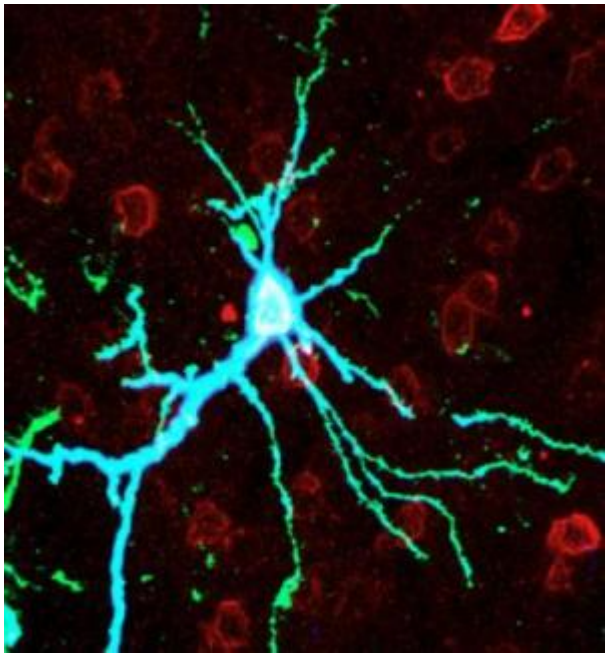
Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Washington University School of Medicine in St. Louis**. The original article was written by Michael C. Purdy.

Journal Reference:

1. L. Cruz-Orengo, D. W. Holman, D. Dorsey, L. Zhou, P. Zhang, M. Wright, E. E. McCandless, J. R. Patel, G. D. Luker, D. R. Littman, J. H. Russell, R. S. Klein. **CXCR7 influences leukocyte entry into the CNS parenchyma by controlling abluminal CXCL12 abundance during autoimmunity**. *Journal of Experimental Medicine*, 2011; 208 (2): 327 DOI: 10.1084/jem.20102010

http://www.sciencedaily.com/releases/2011/03/110307103652.htm

Enzyme Enhances, Erases Long-Term Memories in Rats; Can Restore Even Old, Fading Memories, Say Scientists



A neuron in a rat brain's cortex over-expresses PKMzeta (blue). (Credit: Todd Sacktor, M.D., SUNY Downstate Medical Center)

ScienceDaily (Mar. 3, 2011) — Even long after it is formed, a memory in rats can be enhanced or erased by increasing or decreasing the activity of a brain enzyme, say researchers supported, in part, by the National Institutes of Health.

"Our study is the first to demonstrate that, in the context of a functioning brain in a behaving animal, a single molecule, PKMzeta, is both necessary and sufficient for maintaining long-term memory," explained Todd Sacktor, of the SUNY Downstate Medical Center, New York City, a grantee of the NIH's National Institute of Mental Health.

Sacktor, Yadin Dudai, Ph.D., of the Weizmann Institute of Science, Rehovot, Israel, and colleagues, report of their discovery March 4, 2011 in the journal *Science*.

Unlike other recently discovered approaches to memory enhancement, the PKMzeta mechanism appears to work any time. It is not dependent on exploiting time-limited windows when a memory becomes temporarily fragile and changeable -- just after learning and upon retrieval -- which may expire as a memory grows older, says Sacktor.

"This pivotal mechanism could become a target for treatments to help manage debilitating emotional memories in anxiety disorders and for enhancing faltering memories in disorders of aging," said NIMH Director Thomas R. Insel, M.D.

In their earlier studies, Sacktor's team showed that even weeks after rats learned to associate a nauseating sensation with saccharin and shunned the sweet taste, their sweet tooth returned within a couple of hours after rats received a chemical that blocked the enzyme PKMzeta in the brain's outer mantle, or neocortex, where long-term memories are stored.

In the new study, they paired genetic engineering with the same aversive learning model to both confirm the earlier studies and to demonstrate, by increasing PKMzeta, the opposite effect. They harnessed a virus to infect the neocortex with the PKMzeta gene, resulting in overexpression of the enzyme and memory enhancement. Conversely, introducing a mutant inactive form of the enzyme, that replaced the naturally occurring one, erased the memory -- much as the chemical blocker did.

These effects applied generally to multiple memories stored in the targeted brain area -- raising questions about how specific memories might be targeted in any future therapeutic application.

The researchers turned up a clue that may hold the beginning of an answer.
"One explanation of the memory enhancement is that PKMzeta might go to some synapses, or connections between brain cells, and not others," said Sacktor. "Overexpressed PKMzeta may be selectively captured by molecular tags that mark just those brain connections where it's needed -- likely synapses that were holding the memory from the training."

Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **NIH/National Institute of Mental Health**.

Journal References:

1. Reut Shema, Sharon Haramati, Shiri Ron, Shoshi Hazvi, Alon Chen, Todd Charlton Sacktor, Yadin Dudai. **Enhancement of consolidated long-term memory by overexpression of protein kinase Mzeta in the neocortex**. *Science*, 2011; 331 (6021): 1207-1210 DOI: 10.1126/science.1200215
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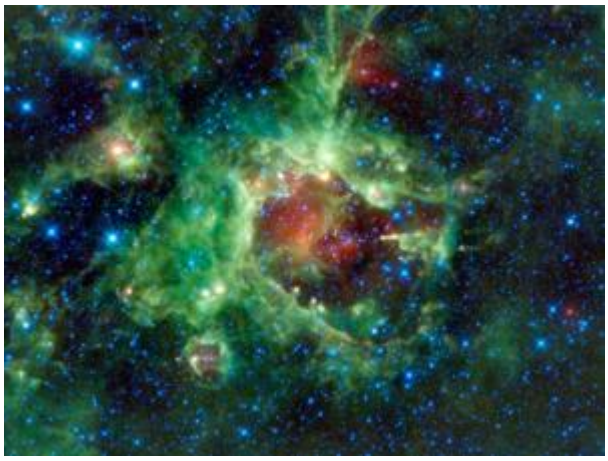
http://www.sciencedaily.com/releases/2011/03/110304092111.htm

'Elephant Trunks' in Space: WISE Captures Image of Star-Forming Cloud of Dust and Gas



NASA's Wide-field Infrared Survey Explorer, or WISE, captured this image of a star-forming cloud of dust and gas located in the constellation of Monoceros. (Credit: NASA/JPL-Caltech/UCLA)

ScienceDaily (Mar. 7, 2011) — NASA's Wide-field Infrared Survey Explorer, or WISE, captured this image of a star-forming cloud of dust and gas, called Sh2-284, located in the constellation of Monoceros. Lining up along the edges of a cosmic hole are several "elephant trunks" -- or monstrous pillars of dense gas and dust. The most famous examples of elephant trunks are the "Pillars of Creation" found in an iconic image of the Eagle nebula from NASA's Hubble Space Telescope. In this WISE image, the trunks are seen as small columns of gas stretching toward the center of the void in Sh2-284, The most notable one can be seen on the right side at about the 3 o'clock position. It appears as a closed hand with a finger pointing toward the center of the void. That elephant trunk is about 7 light-years long.

Deep inside Sh2-284 resides an open star cluster, called Dolidze 25, which is emitting vast amounts of radiation in all directions, along with stellar winds. These stellar winds and radiation are clearing out a cavern inside the surrounding gas and dust, creating the void seen in the center. The bright green wall surrounding the cavern shows how far out the gas has been eroded. However, some sections of the original gas cloud were much denser than others, and they were able to resist the erosive power of the radiation and stellar winds. These pockets of dense gas remained and protected the gas "downwind" from them, leaving behind the elephant trunks.

Sh2-284 is relatively isolated at the very end of an outer spiral arm of our Milky Way galaxy. In the night sky, it's located in the opposite direction from the center of the Milky Way.

NASA's Jet Propulsion Laboratory, Pasadena, Calif., 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.

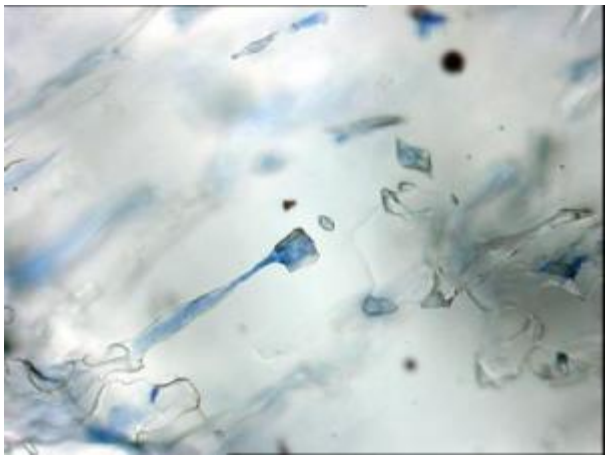
More information is online at http://www.nasa.gov/wise and http://wise.astro.ucla.edu and http://jpl.nasa.gov/wise

Story Source:

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

http://www.sciencedaily.com/releases/2011/03/110306152103.htm

Sea-Ice Algae Can Engineer Ice to Its Advantage Using Own Antifreeze



Gel-like mucus (stained blue) covers individual sea-ice algae clustered in a tiny box-shaped pore in the ice and fills the channel from the pore to the ocean. (Credit: Christopher Krembs)

ScienceDaily (Mar. 7, 2011) — Sea-ice algae -- the important first rung of the food web each spring in places like the Arctic Ocean -- can engineer ice to its advantage, according to the first published findings about this ability.

The same gel-like mucus secreted by sea-ice algae as a kind of antifreeze against temperatures well below minus 10 C is also allowing algae to sculpt microscopic channels and pores in ice that are hospitable to itself and other microorganisms.

Altering ice to their benefit should help sea-ice algae adapt to a warming world, which is good news for hungry fish and shellfish farther up the food web, but what it means for the integrity of the ice itself raises unanswered questions according to Jody Deming, University of Washington professor of oceanography and co-author of a paper appearing in the March 1 *Proceedings of the National Academy of Sciences*.

Ice riddled with more channels and pores will be weaker, yet such openings plugged with algal secretions actually hold more salty water and thus may slow melting in the spring and summer, she says. Scientists have yet to determine if the two processes cancel each other or if one will dominate, say Deming and co-authors Christopher Krembs, Washington State Department of Ecology, and Hajo Eicken, University of Alaska Fairbanks.

Sea ice is home to microscopic plants and animals, bacteria and viruses that stay alive in brine-filled openings in the ice. The gel-like mucus secreted by ice algae and other microorganisms, called extracellular polysaccharide substances, consists of complex sugar compounds. The mucus depresses the freezing point and keeps pore spaces in ice filled with at least some liquid.

The researchers focused on the algae that dominate the sea-ice biota across the Arctic each spring and in particular the variety *Melosira arctica*. Individually, *Melosira arctica* are about 50 micrometers long, or the width of a strand of human hair. Joined together, however, they form filaments that are meters long. Under-ice divers witness great forests of the algae hanging underwater from the sea ice each spring, Deming says.

Once considered minor contributors to the food web, sea-ice algae are gaining respect, Deming says. They bloom first in the spring and are responsible for nearly 60 percent of the primary production in ice-covered water at that time of year. As ice melts, creating open water, other microorganisms come to dominate primary production but *Melosira arctica* and brethren get credit for kick-starting the growing season.

Faced with a warming world, some scientists speculate that the importance of sea-ice algae, even in the spring, will diminish.

That may not be the case according to the new findings. In lab work, for instance, Deming and her co-authors found mucus from ice algae increased ice salinity by up to 59 percent and increased the number and complexity of channels. That means more places in the ice for algae to live where they can receive sunlight and avoid being eaten. The channels also retain more iron, nutrients and carbon dioxide needed for algal growth.

"Sea-ice primary productivity is expected to increase in a warming climate until the nutrient supply from below becomes limiting," the PNAS paper says. The work was funded by the National Science Foundation.

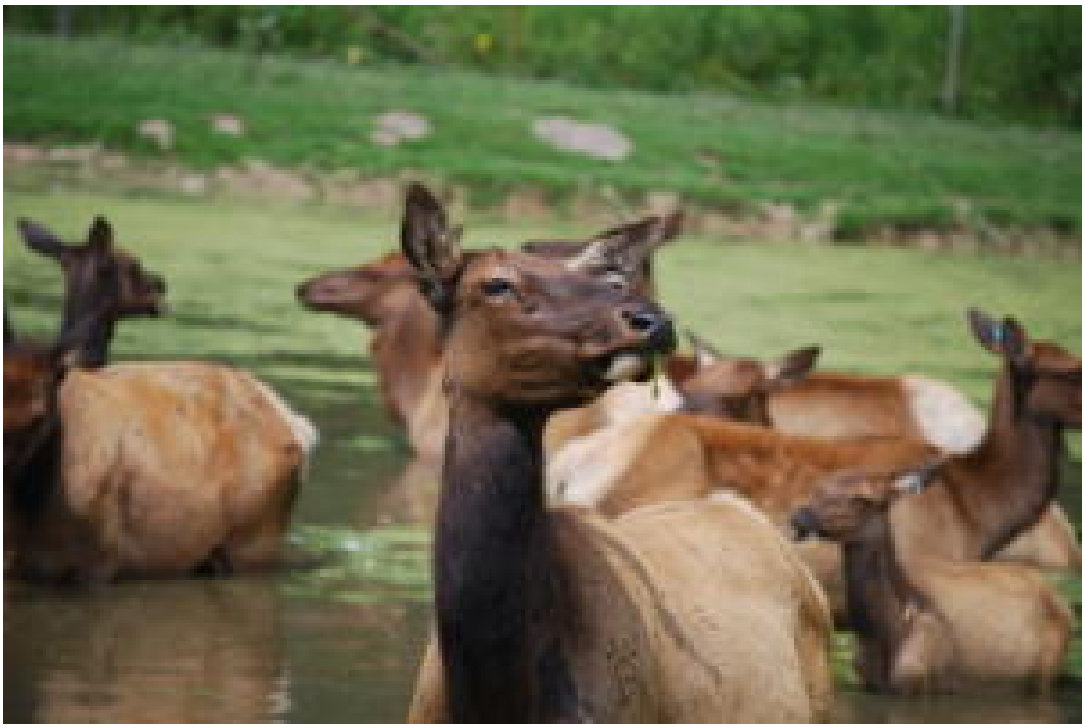
Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **University of Washington**. The original article was written by Sandra Hines.

Journal Reference:

1. C. Krembs, H. Eicken, J. W. Deming. **Exopolymer alteration of physical properties of sea ice and implications for ice habitability and biogeochemistry in a warmer Arctic**. *Proceedings of the National Academy of Sciences*, 2011; DOI: 10.1073/pnas.1100701108

http://www.sciencedaily.com/releases/2011/03/110303111810.htm

Human Activity Displaces Predators More Than Prey



Whitetail deer. Researchers found that prey were three times more abundant on roads and trails used by more than 32 humans a day, but predators were less abundant on roads and trails used by more than 18 humans a day. (Credit: iStockphoto)

ScienceDaily (Mar. 7, 2011) — A new paper by University of Calgary researchers, published March 4 in *PLoS ONE*, demonstrates the edge given to prey in the "space race" by human activity.

The research was conducted by two University of Calgary students, a University of Calgary Post-Doctoral Fellow and two University of Calgary professors from the Faculty of Environmental Design, Department of Geomatics in the Schulich School of Engineering and the Faculty of Veterinary Medicine. The research looked at how predator-prey interactions and use of space were influenced by human activity.

The team deployed 43 digital camera traps at randomly selected locations along roads and trails within a research area on the eastern slopes of the Rocky Mountains in southwest Alberta from April to November of 2008. Large predator animals in the study area consisted of wolves, black bears, grizzly bears and cougars. While the large herbivore species monitored were moose, elk, white-tailed deer, mule deer and cattle.

They found that humans and prey species co-occurred together more often than humans and predators at camera sites, and that predators and prey were less likely to be in the same area if there was heavy human traffic. Their results showed that prey were three times more abundant on roads and trails used by more than 32 humans a day, but predators were less abundant on roads and trails used by more than 18 humans a day.

"The research shows that humans might displace large mammalian predators," says Tyler Muhly, corresponding author of the paper and a PhD graduate from the Faculty of Environmental Design at the University of Calgary (currently with Alberta Innovates Technology Futures). "This provides a positive indirect effect on large mammalian prey species that are less sensitive to humans."

The research suggests that limiting human use of roads and trails in wildlife areas to less than 18 people a day might reduce the effects on the large mammalian food web, but a growing human population means that the effects on wildlife food webs will likely increase.

Story Source:

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

Journal Reference:

1. Tyler B. Muhly, Christina Semeniuk, Alessandro Massolo, Laura Hickman, Marco Musiani. **Human Activity Helps Prey Win the Predator-Prey Space Race**. *PLoS ONE*, 2011; 6 (3): e17050 DOI: 10.1371/journal.pone.0017050

http://www.sciencedaily.com/releases/2011/03/110303141555.htm

The Scars of Impacts on Mars

This elongated depression is about 78 km in length, opens from just under 10 km wide at one end to 25 km wide at the other, and reaches a depth of 2 km. It is located at about 21°S / 55°E, and was probably caused by the impact of a train of projectiles. The data were acquired during orbit 8433 on 4 August 2010 using the High Resolution Stereo Camera on Mars Express. (Credit: ESA/DLR/FU Berlin (G. Neukum))

ScienceDaily (Mar. 7, 2011) — ESA's Mars Express has returned new images of an elongated impact crater in the southern hemisphere of Mars. Located just south of the Huygens basin, it could have been carved out by a train of projectiles striking the planet at a shallow angle.

The large Huygens basin (not visible in the main image but seen in the wider contextual image) is about 450 km in diameter and lies in the heavily cratered southern highlands. In this area there are many impact scars but none perhaps are more intriguing than the 'elongated craters'.

One of these craters is seen in this new image, which covers an area of 133 x 53 km at 21°S / 55°E. The scene was captured on 4 August 2010 and the smallest objects distinguishable by the camera are about 15 m across.

This unnamed elongated crater sits just to the south of the much larger Huygens basin. It is about 78 km in length, opens from just under 10 km wide at one end to 25 km at the other, and reaches a depth of 2 km.

Impact craters are generally round because the projectiles that create them push into the ground before the shockwave of the impact can explode outwards. So why is this one elongated?

The clue comes from the surrounding blanket of material, thrown out in the initial impact. This 'ejecta blanket' is shaped like a butterfly's wings, with two distinct lobes. This hints that two projectiles, possibly halves of a once-intact body, slammed into the surface here.

In the crater itself, there are three deeper areas that could be evidence for more than two projectiles. In addition, a second elongated crater lies to the north-northwest. It can be seen in the wider contextual image and is in line with the one seen here, reinforcing the notion that these structures were the result of a train of projectiles.

In the early 1980s, scientists proposed that elongated impact craters were formed by incoming chains of orbital debris following trajectories that decayed with time. As the debris spiralled downwards, it eventually struck the planet at shallow angles, gouging out the elongated craters.

This particular ejecta blanket contains many smaller craters, indicating that the original formed a relatively long time ago and then itself become a target.

In addition, there are several small channels on the blanket, suggesting that the strike took place into a surface rich in volatiles, perhaps even water, that were melted by the heat of impact and flowed away.
Below the eastern crater rim are two well-formed and relatively deep craters. They have punched through the ejecta blanket and so must have appeared after the formation of the large crater. Despite their sizes of 4 km and 5 km, these smaller craters show no indication of the presence of water.
To the north there is another crater that must be older because the butterfly-ejecta blanket has partially flowed into it.
Several landslides have modified the steep crater rim. This can be most clearly seen on the two smaller craters on the rim, which are only partially preserved, parts of them having fallen away.
The formation of these elongated features is not over: the martian moon Phobos will plough into the planet in a few tens of millions of years, breaking up in the process, and likely creating new chains across the surface.

Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **European Space Agency**.

http://www.sciencedaily.com/releases/2011/03/110304091502.htm

No Such Thing as a Dormant Volcano? Magma Chambers Awake Sooner Than Thought

Crater of Mount Pinatubo in the Philippines. Is there no such thing as a dormant volcano? (Credit: iStockphoto/Arnel Manalang)

ScienceDaily (Mar. 6, 2011) — Until now it was thought that once a volcano's magma chamber had cooled down it remained dormant for centuries before it could be remobilized by fresh magma. A theoretical model developed by Alain Burgisser of the Orléans Institute of Earth Sciences (Institut des Sciences de la Terre d'Orléans -- CNRS/Universités d'Orléans et de Tours) together with a US researcher , was tested on two major eruptions and completely overturned this hypothesis: the reawakening of a chamber could take place in just a few months. This research should lead to a reassessment of the dangerousness of some dormant volcanoes. It is published in the journal *Nature* dated 3 March 2011.

A magma chamber is a large reservoir of molten rock (magma) located several kilometers beneath a volcano, which it feeds with magma. But what happens to the magma chamber when the volcano is not erupting? According to volcanologists, it cools down to an extremely viscous mush until fresh magma from deep inside Earth 'reawakens' it, in other words fluidizes it by heating it through thermal contact. The large size of magma chambers (ranging from a few tenths to a few hundred cubic kilometers) explains why, according to this theory, it takes several hundred or even thousand years for the heat to spread to the whole reservoir, awakening the volcano from its dormant state.

However, according to the mathematical model developed by Burgisser and his US colleague, reheating takes place in three stages. When fresh hot magma rises from below and arrives beneath the chamber, it melts the viscous magma at the base of the reservoir. This freshly molten magma therefore becomes less dense and starts to rise through the chamber, forcing the rest of the viscous mush to mix. It is this mixing process that enables the heat to spread through the chamber a hundred times faster than volcanologists had predicted. Depending on the size of the chamber and the viscosity of the magma it contains, a few months may be sufficient to rekindle its activity.

The two researchers tested the validity of their model against both the eruption of Mount Pinatubo in the Philippines in March 1991, which caused 1000 fatalities and the evacuation of two million people, and the ongoing eruption of the Soufriere Hills volcano in the British overseas territory of Montserrat, in the Caribbean. In both cases, seismic shocks preceding the eruption indicated the arrival of fresh magma beneath the cooling reservoir. By taking account of various known physical parameters of the two volcanoes (magma temperatures, size of the chamber, crystal concentration inferred from study of magmas, etc), the two

scientists succeeded in approximately reproducing the time intervals between these warning signals and the eruptions. For Pinatubo, for instance, the mathematical model predicted that 20 to 80 days were sufficient to remobilize the underlying chamber, whereas the conventional theory gave a figure of 500 years. In reality, there was a gap of two months between the tremors and the eruption of the volcano.
This research is likely to encourage the volcanology community to take a closer look at the physical parameters of magma chambers. By determining these parameters, it may one day be possible to use this new model to estimate the time lapse between the initial tremors of a volcano and its eruption.
(1) George Bergantz, of the Earth and Space Science Department, Seattle.

Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **CNRS (Délégation Paris Michel-Ange)**.

Journal Reference:

1. Alain Burgisser, George W. Bergantz. **A rapid mechanism to remobilize and homogenize highly crystalline magma bodies**. *Nature*, 2011; DOI: 10.1038/nature09799

http://www.sciencedaily.com/releases/2011/03/110304114856.htm

New Microscope Produces Dazzling 3-D Movies of Live Cells

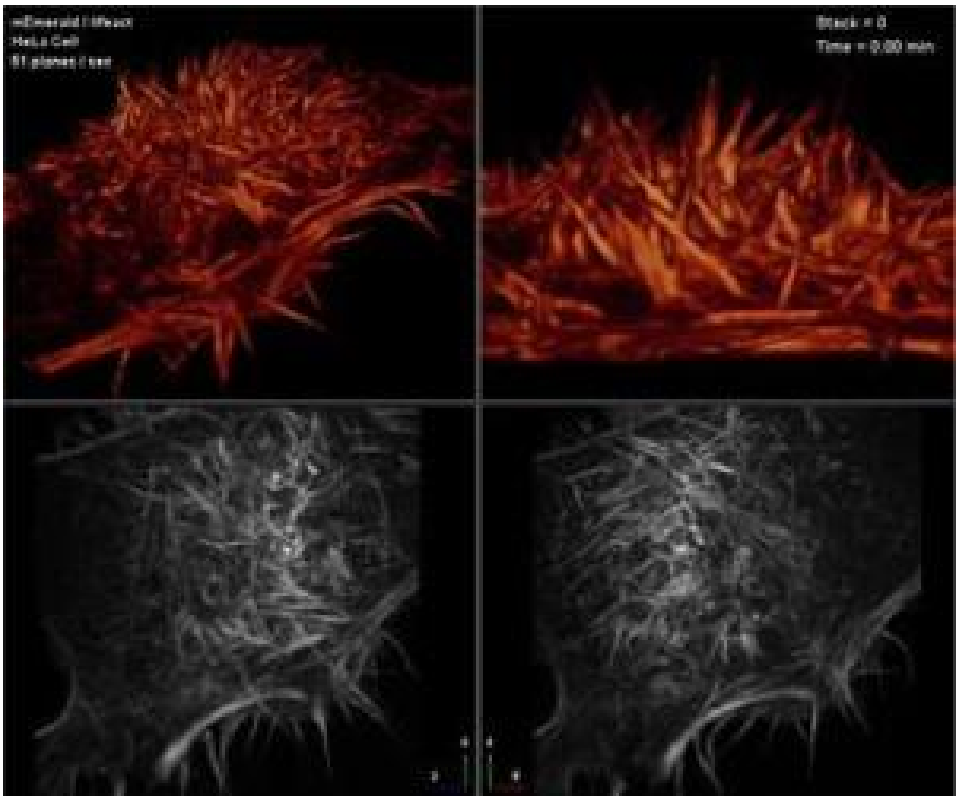


Image taken from a video made using the Bessel beam plane illumination microscope. The video reveals the ever-changing surface of a HeLa cell, with long, thin projections called filopodia continually extending and retracting. (Credit: Laboratory of Eric Betzig/Janelia Farm)

ScienceDaily (Mar. 6, 2011) — A new microscope invented by scientists at Howard Hughes Medical Institute's Janelia Farm Research Campus will let researchers use an exquisitely thin sheet of light -- similar to that used in supermarket bar-code scanners -- to peer inside single living cells, revealing the three-dimensional shapes of cellular landmarks in unprecedented detail. The microscopy technique images at high speed, so researchers can create dazzling movies that make biological processes, such as cell division, come alive.

The technique, called Bessel beam plane illumination microscopy, is described in a research article published online on March 4, 2011, in the journal *Nature Methods*.

A major goal of biologists is to understand the rules that control molecular processes inside a cell. If one is trying to learn the rules of a game, it is better to have a movie of people playing the game than it is to have still photos -- and the same is true for cells, says Janelia Farm group leader Eric Betzig. He has been inventing and improving microscopes for more than 30 years. Despite having seen huge advances in microscopy during that time, Betzig says the field is still hindered by the fact that many microscopy techniques require that cells be killed and fixed in position for imaging. There is only so much one can learn from studying dead cells -- the equivalent of still photos, he says.

Betzig wanted to create a microscope that would let researchers see the dynamic inner lives of living cells. The notion of studying live cells, stippled with fluorescently labeled proteins and other molecules, is not new. But live-cell techniques can be problematic because light produced by microscopes can damage the cell over time. Besides cell damage, light causes the fluorescent molecules --of which there are only so many -- to wink out over time. In other words, the longer you study the cell to uncover its properties, the more damage you do to the cell and the more likely you are to spend your "photon budget," Betzig says.

What's more, the light of a microscope exposes more of the sample than just the small portion that is in focus. Illuminating the out-of-focus regions produces blur, making small intracellular features appear as lengthened

blobs rather than sharp dots. "The question was, is there a way of minimizing the amount of damage you're doing so that you can then study cells in a physiological manner while also studying them at high spatial and temporal resolution for a long time?" Betzig says.

Long before arriving at Janelia Farm in 2006, Betzig began thinking about ways to improve live-cell microscopy. He put those thoughts on hold while he focused on designing new microscopy techniques that would ultimately shatter the limits of spatial resolution (imposed by the laws of diffraction). Until recently, microscopes could see objects no smaller than 200 nanometers in size. Several years ago, Betzig and his Janelia Farm colleague Harald Hess invented photoactivated localization microscopy, PALM, which can produce images of objects only 10-20 nanometers in size.

PALM and most other microscopes -- even the ones college students use in their biology classes -- work by exposing the sample through one objective lens and then collecting the light that comes back through that same lens. That approach causes light to damage the sample and induces blur, making it difficult to observe live cells.

In 2008, Betzig began working on ways to overcome these challenges. One idea he had was to use plane illumination microscopy. First proposed about 100 years ago, plane illumination involves shining a sheet of light through the side of the sample rather than the top. To do that, microscopists use two different objective lenses that are perpendicular to one another. "Because you come from the side, plane illumination confines the excitation much closer to the part that's in focus," Betzig says.

Although other researchers, including Janelia Farm Fellow Philipp Keller, have used plane illumination to great effect to study multicellular organisms hundreds of microns in size, the light sheets were still too thick to work effectively for imaging within single cells only tens of microns in size. The main problem is that the wide swath of light used in plane illumination exposed more of the cell than Betzig's group wanted. This caused excessive blur and light toxicity. To circumvent this problem, his group used a Bessel beam, a special type of non-diffracting light beam studied by physicists in the late 1980s, and used today in applications including bar-code scanners in supermarkets. Sweeping the beam across the sample creates a thinner light sheet, his group found.

Bessel beams behave a bit strangely, though, and this is what has kept Betzig's postdoctoral researchers -- Thomas Planchon and Liang Gao -- busy over the past few years. Although they produce a very narrow light beam, Bessel beams also create somewhat weaker light that flanks the focal point, making the pattern of illumination look like a bull's eye. The extra light lobes are a hindrance because they excite too much of the sample. To compensate for this problem, Betzig's group used two tricks. The first is a concept called structured illumination, where instead of sweeping the beam continuously, they turned it on and off rapidly, like firing a machine gun. This creates a periodic grating of excitation that can be used to eliminate any out-of-focus blur. (Structured illumination, used by Janelia Farm Group Leader Mats Gustafsson, is also one way of achieving super-resolution.)

Another strategy Betzig's group used is two-photon microscopy, a method commonly used in neuroscience to visualize thick pieces of brain tissue. One of the advantages of two-photon microscopes is that very little fluorescence signal is generated from weakly exposed regions. Thus, when they applied two-photon methods, the background from the Bessel side lobes was eliminated, and all that remained was the light from the narrow central part of the Bessel beam.

They then set out to image as fast as possible. The Bessel beam sweeps quickly through the sample, allowing the group to take nearly 200 images/second and build three-dimensional stacks from hundreds of two-dimensional images in one to 10 seconds. As they had hoped, they found that they could take hundreds of such three-dimensional image sets without harming the cell, generating amazing movies of cellular processes such as mitosis, where chromosomes divide as one cell becomes two. "There's no other technique that comes close to imaging as long with such high spatial and temporal detail," Betzig says.

Last summer, as soon as they got their first live cell images, Betzig, Planchon and Gao packed up the new instrument in a rented sport utility vehicle and took it to the Woods Hole Marine Biological Laboratory in Massachusetts for a physiology course, where they worked with co-authors Jim and Cathy Galbraith from the National Institutes of Health. "We learned a lot about what works and what doesn't and ways to treat the cells in a way that maintains their physiological state while we're doing the imaging," he says. "Like every microscope, the instrumentation is only part of the puzzle. A lot of it is finding the right samples, and right preparation methods to make it work."

The new microscope is also exciting because it may be used in the future to improve super-resolution microscopy. PALM and other super-resolution techniques are limited to looking at thin, dead samples, and can be very damaging when looking at live ones. "That's what's really great about the Bessel -- we can confine that excitation and really start to think about applying super-resolution microscopy to study structure or dynamics in thicker cells," says Betzig. Even without super-resolution, Bessel beam plane illumination microscopy will be a powerful tool for cell biologists, Betzig says, since it noninvasively images the rapidly evolving three-dimensional complexity of cells.
The videos can be viewed at: http://www.hhmi.org/news/betzig20110304.html

Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Howard Hughes Medical Institute**.

Journal Reference:

1. Thomas A Planchon, Liang Gao, Daniel E Milkie, Michael W Davidson, James A Galbraith, Catherine G Galbraith, Eric Betzig. **Rapid three-dimensional isotropic imaging of living cells using Bessel beam plane illumination**. *Nature Methods*, 2011; DOI: 10.1038/nmeth.1586

http://www.sciencedaily.com/releases/2011/03/110304151010.htm

Has Earth's Sixth Mass Extinction Already Arrived?

Tigers are one of Earth's most critically endangered species. Extinction of the majority of such species would indicate the sixth mass extinction is in our near future. (Credit: Anthony Barnosky, UC Berkeley)

ScienceDaily (Mar. 5, 2011) — With the steep decline in populations of many animal species, from frogs and fish to tigers, some scientists have warned that Earth is on the brink of a mass extinction like those that occurred only five times before during the past 540 million years.

Each of these 'Big Five' saw three-quarters or more of all animal species go extinct.

In a study to be published in the March 3 issue of the journal *Nature*, University of California, Berkeley, paleobiologists assess where mammals and other species stand today in terms of possible extinction, compared with the past 540 million years, and they find cause for hope as well as alarm.

"If you look only at the critically endangered mammals -- those where the risk of extinction is at least 50 percent within three of their generations -- and assume that their time will run out, and they will be extinct in 1,000 years, that puts us clearly outside any range of normal, and tells us that we are moving into the mass extinction realm," said principal author Anthony D. Barnosky, UC Berkeley professor of integrative biology, a curator in the Museum of Paleontology and a research paleontologist in the Museum of Vertebrate Zoology.

"If currently threatened species -- those officially classed as critically endangered, endangered and vulnerable -- actually went extinct, and that rate of extinction continued, the sixth mass extinction could arrive within as little as 3 to 22 centuries," he said.

Nevertheless, Barnosky added, it's not too late to save these critically endangered mammals and other such species and stop short of the tipping point. That would require dealing with a perfect storm of threats, including habitat fragmentation, invasive species, disease and global warming,

"So far, only 1 to 2 percent of all species have gone extinct in the groups we can look at clearly, so by those numbers, it looks like we are not far down the road to extinction. We still have a lot of Earth's biota to save," Barnosky said. "It's very important to devote resources and legislation toward species conservation if we don't want to be the species whose activity caused a mass extinction."

Coauthor Charles Marshall, UC Berkeley professor of integrative biology and director of the campus's Museum of Paleontology, emphasized that the small number of recorded extinctions to date does not mean we are not in a crisis.

"Just because the magnitude is low compared to the biggest mass extinctions we've seen in a half a billion years doesn't mean to say that they aren't significant," he said. "Even though the magnitude is fairly low, present rates are higher than during most past mass extinctions."

"The modern global mass extinction is a largely unaddressed hazard of climate change and human activities," said H. Richard Lane, program director in the National Science Foundation's Division of Earth Sciences, which funded the research. "Its continued progression, as this paper shows, could result in unforeseen -- and irreversible -- negative consequences to the environment and to humanity."

The study originated in a graduate seminar Barnosky organized in 2009 to bring biologists and paleontologists together in an attempt to compare the extinction rate seen in the fossil record with today's extinction record. These are "like comparing apples and oranges," Barnosky said. For one thing, the fossil record goes back 3.5

billion years, while the historical record goes back only a few thousand years. In addition, the fossil record has many holes, making it is impossible to count every species that evolved and subsequently disappeared, which probably amounts to 99 percent of all species that have ever existed. A different set of data problems complicates counting modern extinctions.

Dating of the fossil record also is not very precise, Marshall said.

"If we find a mass extinction, we have great difficulty determining whether it was a bad weekend or it occurred over a decade or 10,000 years," he said. "But without the fossil record, we really have no scale to measure the significance of the impact we are having."

To get around this limitation, Marshall said, "This paper, instead of calculating a single death rate, estimates the range of plausible rates for the mass extinctions from the fossil record and then compares these rates to where we are now."

Barnosky's team chose mammals as a starting point because they are well studied today and are well represented in the fossil record going back some 65 million years. Biologists estimate that within the past 500 years, at least 80 mammal species have gone extinct out of a starting total of 5,570 species.

The team's estimate for the average extinction rate for mammals is less than two extinctions every million years, far lower than the current extinction rate for mammals.

"It looks like modern extinction rates resemble mass extinction rates, even after setting a high bar for defining 'mass extinction,'" Barnosky said.

After looking at the list of threatened species maintained by the International Union for Conservation of Nature (IUCN), the team concluded that if all mammals now listed as "critically endangered," "endangered" and "threatened" go extinct, whether that takes several hundred years or 1,000 years, Earth will be in a true mass extinction.

"Obviously there are caveats," Barnosky said. "What we know is based on observations from just a very few twigs plucked from the enormous number of branches that make up the tree of life."

He urges similar studies of groups other than mammals in order to confirm the findings, as well as action to combat the loss of animal and plant species.

"Our findings highlight how essential it is to save critically endangered, endangered and vulnerable species," Barnosky added. "With them, Earth's biodiversity remains in pretty good shape compared to the long-term biodiversity baseline. If most of them die, even if their disappearance is stretched out over the next 1,000 years, the sixth mass extinction will have arrived."

Coauthors with Barnosky and Marshall are UC Berkeley integrative biology graduate students Nicholas Matzke, Susumu Tomiya, Guinevere Wogan, Brian Swartz, Emily L. Lindsey, Kaitlin C. Maguire, Ben Mersey and Elizabeth A. Ferrer; post-doctoral fellow Tiago B. Quental, now at the University of Sao Paulo, Brazil; and recent Ph.D. Jenny McGuire, now a post-doctoral fellow with the National Evolutionary Synthesis Center at Duke University in Durham, North Carolina.

Story Source:

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1. Anthony D. Barnosky, Nicholas Matzke, Susumu Tomiya, Guinevere O. U. Wogan, Brian Swartz, Tiago B. Quental, Charles Marshall, Jenny L. McGuire, Emily L. Lindsey, Kaitlin C. Maguire, et al. **Has the Earth's sixth mass extinction already arrived?** *Nature*, 471, 51-57 (2 March 2011) DOI: 10.1038/nature09678

http://www.sciencedaily.com/releases/2011/03/110302131844.htm

Mutations Found in Human Induced Pluripotent Stem Cells

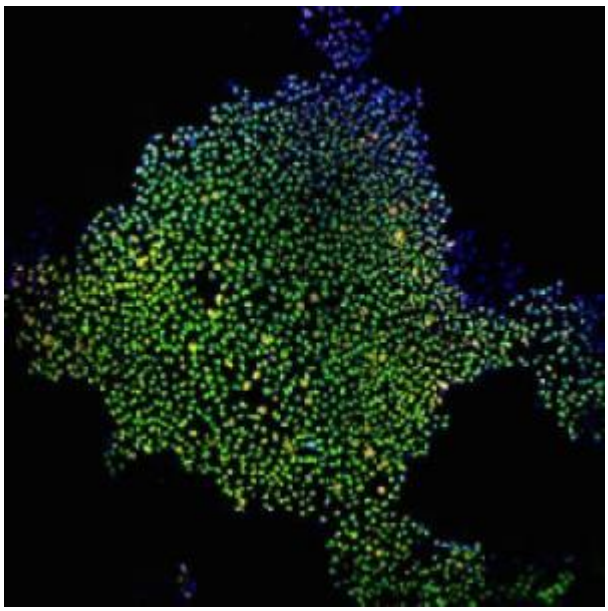

Image of induced stem cells. (Credit: James Thomson at University of Wisconsin-Madison)

ScienceDaily (Mar. 5, 2011) — Ordinary human cells reprogrammed as induced pluripotent stem cells (hiPSCs) may ultimately revolutionize personalized medicine by creating new and diverse therapies unique to individual patients. But important and unanswered questions have persisted about the safety of these cells, in particular whether their genetic material is altered during the reprogramming process.

A new study -- published in the March 3 issue of the journal *Nature* and led by scientists at the University of California, San Diego in collaboration with other leading stem cell research groups -- finds that the genetic material of reprogrammed cells may in fact be compromised, and suggests that extensive genetic screening of hiPSCs become standard practice before these stem cells are used clinically.

A national team of researchers, co-directed by Kun Zhang, PhD, an assistant professor of bioengineering in the UC San Diego Jacobs School of Engineering, examined 22 different hiPSC lines obtained from seven research groups that employed different methods to reprogram skin cells into pluripotent stem cells. In all of these cell lines, the researchers found protein-coding point mutations, an estimated six mutations per exome. The exome is the part of the genome that contains the genetic instructions for making proteins and other gene products.

"Every single stem cell line we looked at had mutations. Based on our best knowledge, we expected to see 10 times fewer mutations than we actually observed," said Zhang, a faculty member of the Institute for Genomic Medicine and the Institute of Engineering in Medicine, both at UC San Diego.

The findings help answer the question of whether reprogramming adult mammalian cells into hiPSCs affects the overall genome at the fundamental level of single nucleotides. They do. Zhang called the mutations "permanent genome scars."

The scientists said while some of the mutations appeared to be silent, the majority did change specific protein functions, including those in genes associated with causative effects in cancers.

"Reprogrammed stem cells provide an important new tool in the fight against human disease, but to use these cells directly in the clinic, we must ensure that they are safe and that we are able to define their structure and behavior in the most precise terms," said Lawrence S.B. Goldstein, PhD, professor in the Department of Cellular and Molecular Medicine at the UCSD School of Medicine and co-director of the study with Zhang. Goldstein is also director of the UC San Diego Stem Cell Program.

"Our studies open a new window into the genetic behavior of these important types of stem cells and begin to define some new and straightforward safety standards that may help accelerate their use in clinical settings," Goldstein added.

The study examined stem cell lines from many of the leading stem cell research groups in the United States, including lines from the laboratories of James Thomson at the University of Wisconsin-Madison and George Daley at the Children's Hospital Boston, the first U.S.-based labs to reprogram human cells.

"We covered cell lines derived from seven different labs because we wanted to make sure our conclusions are general enough to make realistic extrapolations," said Zhang.

The interdisciplinary team at UC San Diego developed a new, highly sensitive assay to identify mutations that occur at very low frequencies in the starting cells of cell lines. They discovered that roughly half of the mutations found in stem cell lines were present in starting cells at very low levels. That is, they occurred in a

few cells sometime during the person's life or during cell culture in the lab, and were somatic or not inherited. The other half of the mutations were too rare to detect in starting cells, meaning they could have occurred during or after reprogramming.

The mutations, which the scientists dubbed "reprogramming-associated mutations," came from three different sources: a first group that included mutations already present in skin cells before reprogramming; a second group of mutations that occurred during reprogramming; and a third group of mutations that occurred after reprogramming, when pluripotent cells began proliferating.

The work is complementary to research published in *Cell Stem Cell* in January 2011 by another team of scientists at UC San Diego and elsewhere that documented other types of genetic abnormalities in both human embryonic and hiPSC lines after reprogramming and extended culture. That paper reported that human pluripotent and induced pluripotent cells had higher frequencies of genomic aberrations than other cell types.

The latest work presents new findings about a different type of important genetic damage: changes occurring during reprogramming in single nucleotides or base pairs that alter the crucial protein building blocks of cells.

"These studies look at two different aspects of stem cell mutations," said Zhang, "but their take-home message is the same -- things can go wrong at the genome level when reprogramming and growing reprogrammed cells. So, to maximize safety, before we put these cells back in the human body for therapeutic purposes, we must be sure that the cells contain the same genome as the recipient, with no cancer-causing or other serious types of mutations."

Additional authors to the paper include Athurva Gore, Zhe Li and Ho-Lim Fung of the Department of Bioengineering, Institute for Genomic Medicine and Institute of Engineering in Medicine, UC San Diego; Jessica E. Young, Isabel Canto, Mason A. Israel and Melissa L. Wilbert, Department of Cellular and Molecular Medicine and Howard Hughes Medical Institute, UC San Diego; Suneet Agarwal, Yuin-Han Loh, Philip D. Manos and George Q. Daley, Division of Pediatric Hematology/Oncology, Children's Hospital Boston and Dana Farber Cancer Institute, Boston; Jessica Antosiewicz-Bourget, Junying Yu and James A. Thomson, Department of Anatomy, University of Wisconsin-Madison; Alessandra Giorgetti, Nuria Montserrat of the Center of Regenerative Medicine, Barcelona, Spain; Juan Carlos Izpisua Belmonte of the Center of Regenerative Medicine, Barcelona, Spain and the Salk Institute for Biological Studies; Evangelos Kiskinis and Kevin Eggan, Howard Hughes Medical Institute, Harvard Stem Cell Institute, Department of Stem Cell and Regenerative Biology, Harvard University; Je-Hyuk Lee, Department of Genetics, Harvard Medical School; Athanasia D. Panopoulos and Sergio Ruiz, Salk Institute for Biological Studies; Ewen F. Kirkness, J. Craig Venter Institute; Derrick J. Rossi, Immune Disease Institute, Children's Hospital Boston.

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Journal Reference:

1. Athurva Gore, Zhe Li, Ho-Lim Fung, Jessica E. Young, Suneet Agarwal, Jessica Antosiewicz-Bourget, Isabel Canto, Alessandra Giorgetti, Mason A. Israel, Evangelos Kiskinis, et al. **Somatic coding mutations in human induced pluripotent stem cells**. *Nature*, 471, 63-67 2 March 2011 DOI: 10.1038/nature09805

http://www.sciencedaily.com/releases/2011/03/110302131849.htm

NASA Light Technology Successfully Reduces Cancer Patients Painful Side Effects from Radiation and Chemotherapy

A nurse in the Bone Marrow Transplant and Cellular Therapy Unit at the University of Alabama at Birmingham Hospital demonstrates use of a WARP 75 device. (Credit: NASA/David Higginbotham)

ScienceDaily (Mar. 7, 2011) — A NASA technology originally developed for plant growth experiments on space shuttle missions has successfully reduced the painful side effects resulting from chemotherapy and radiation treatment in bone marrow and stem cell transplant patients.

In a two-year clinical trial, cancer patients undergoing bone marrow or stem cell transplants were given a far red/near infrared Light Emitting Diode treatment called High Emissivity Aluminiferous Luminescent Substrate, or HEALS, to treat oral mucositis -- a common and extremely painful side effect of chemotherapy and radiation treatment. The trial concluded that there is a 96 percent chance that the improvement in pain of those in the high-risk patient group was the result of the HEALS treatment.

"Using this technology as a healing agent was phenomenal," said Dr. Donna Salzman, clinical trial principal investigator and director of clinical services and education at the Bone Marrow Transplant and Cellular Therapy Unit at the University of Alabama at Birmingham Hospital. "The HEALS device was well tolerated with no adverse affects to our bone marrow and stem cell transplant patients."

The HEALS device, known as the WARP 75 light delivery system, can provide a cost-effective therapy since the device itself is less expensive than a day at the hospital and a proactive therapy for symptoms of mucositis that are currently difficult to treat without additional, negative side effects.

The device could offer patients several benefits: better nutrition since eating can be difficult with painful mouth and throat sores; less narcotic use to treat mouth and throat pain; and an increase in patient morale -- all of which can contribute to shorter hospital stays and less potential for infection, added Salzman.

LEDs are light sources releasing energy in the form of photons. They release long wavelengths of light that stimulate cells to aid in healing. HEALS technology allows LED chips to function at their maximum irradiancy without emitting heat. NASA is interested in using HEALS technology for medical uses to improve healing in space and for long-term human spaceflight.

Ron Ignatius, founder and chairman of Quantum Devices Inc., of Barneveld Wis., developed the WARP 75 light delivery system for use in the trial. The device uses the HEALS technology to provide intense light energy: the equivalent light energy of 12 suns from each of the 288 LED chips -- each the size of a grain of salt. It is one of many devices using HEALS technology, developed in collaboration with NASA.

In the early 1990s, Quantum teamed with the Wisconsin Center for Space Automation and Robotics -- a NASA-sponsored research center at the University of Wisconsin-Madison -- to develop Astroculture 3, a plant growth chamber using near infrared HEALS technology for plant growth experiments on shuttle missions. Over the years, Quantum has worked to develop HEALS technology for use in medical fields, specifically with pediatric brain tumors and hard-to-heal wounds such as diabetic skin ulcers, serious burns and oral mucositis.

"With the help of NASA's Innovative Partnerships Program, Quantum Devices and its medical partners have been able to take a space technology and adapt it for an entirely different application to significantly help people here on Earth," said Glenn Ignatius, president of Quantum Devices. "This collaboration between

NASA and commercial companies has spurred innovation that is touching millions of lives on Earth -- for the better."

The clinical trial was funded by NASA's Innovative Partnerships Program at the Marshall Space Flight Center in Huntsville, Ala. It included 20 cancer patients from Children's Hospital of Wisconsin and 60 cancer patients from the University of Alabama at Birmingham Hospital and the Children's Hospital of Alabama, also in Birmingham. The trial was the brainchild of Brian Hodgson, DDS, a pediatric dentist at Marquette University and Children's Hospital of Wisconsin -- both in Milwaukee, Wis. Dr. Harry T. Whelan, Bleser Professor of Neurology at the Medical College of Wisconsin, served as the clinical trial principal investigator at Medical College of Wisconsin and Children's Hospital of Wisconsin.

Patients participated in the multi-center, double-blind, placebo-controlled research study -- a way of testing a medical therapy where some groups receive treatment and others receive a placebo treatment that is designed to have no real effect. Participants were randomly placed in one of four study groups: low- and high-risk patients receiving the experimental light therapy through the WARP 75 device, and other low- and high-risk patients receiving light through a similar device without therapeutic effects. The low-risk patients were those whose chemotherapy and radiation treatment tended to cause mild or no mucositis and the high-risk patients were those whose therapy treatment tended to cause severe cases of mucositis.

Patients received the light therapy by a nurse holding the WARP 75 device -- about the size of an adult human hand -- in close proximity to the outside of the patient's left and right cheek and neck area for 88 seconds each, daily for 14 days at the start of the patient's bone marrow or stem cell transplant. During that time, trained clinicians assessed the patient's mouth and patients completed a simple form to indicate their level of pain.

"NASA is proud to be a part of the HEALS technology medical advancements that are improving the lives of cancer patients and providing new, innovative medical applications," said Helen Stinson, technical monitor for the NASA HEALS contract. "It's exciting to see the spinoffs from NASA's science and technology initiatives continually improve the quality of life for people here on Earth."

The WARP 75 device is currently undergoing Food and Drug Administration premarket approval.

Story Source:

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

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Spitzer Captures Infrared Rays from 'Sunflower' Galaxy

This image from NASA's Spitzer Space Telescope shows infrared light from the Sunflower galaxy, otherwise known as Messier 63. Spitzer's view highlights the galaxy's dusty spiral arms. (Credit: NASA/JPL-Caltech)

ScienceDaily (Mar. 7, 2011) — The various spiral arm segments of the Sunflower galaxy, also known as Messier 63, show up vividly in this image taken in infrared light by NASA's Spitzer Space Telescope. Infrared light is sensitive to the dust lanes in spiral galaxies, which appear dark in visible-light images. Spitzer's view reveals complex structures that trace the galaxy's spiral arm pattern.

Messier 63 lies 37 million-light years away -- not far from the well-known Whirlpool galaxy and the associated Messier 51 group of galaxies.

The dust, glowing red in this image, can be traced all the way down into the galaxy's nucleus, forming a ring around the densest region of stars at its center.

The short, diagonal line seen on the lower right side of the galaxy's disk is actually a much more distant galaxy, oriented with its edge facing toward us.

Blue shows infrared light with wavelengths of 3.6 microns, green represents 4.5-micron light, and red, 8.0-micron light. The contribution from starlight measured at 3.6 microns has been subtracted from the 8.0-micron image to enhance the visibility of the dust features.

Story Source:

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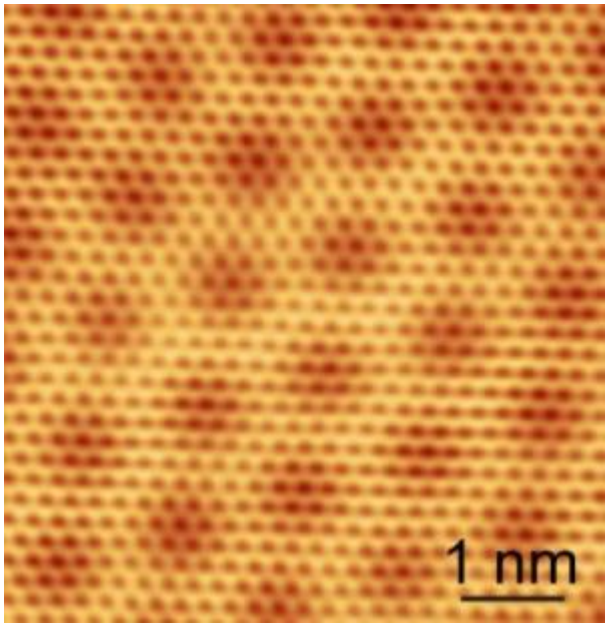
Probing Atomic Chicken Wire: Mounting Graphene on Boron Nitride Dramatically Improves Electronic Properties



Under the scanning tunneling microscope, graphene reveals its honeycomb structure made up of rings of carbon atom, visible as small hexagons. The larger hexagons result from an interference process occurring between the graphene and the underlying boron nitride. The scale bar measures one nanometer, or one billionth of a meter. (Credit: Brian LeRoy/University of Arizona)

ScienceDaily (Mar. 3, 2011) — Graphene -- a sheet of carbon atoms linked in a hexagonal, chicken wire structure -- holds great promise for microelectronics. Only one atom thick and highly conductive, graphene may one day replace conventional silicon microchips, making devices smaller, faster and more energy-efficient.

In addition to potential applications in integrated circuits, solar cells, miniaturized bio devices and gas molecule sensors, the material has attracted the attention of physicists for its unique properties in conducting electricity on an atomic level.

Graphene has very little resistance and allows electrons to behave as massless particles like photons, or light particles, while traveling through the hexagonal grid at very high speeds.

The study of the physical properties and potential applications of graphene, however, has suffered from a lack of suitable carrier materials that can support a flat graphene layer while not interfering with its electrical properties.

Researchers in the University of Arizona's physics department along with collaborators from the Massachusetts Institute of Technology and the National Materials Science Institute in Japan have now taken an important step forward toward overcoming those obstacles.

They found that by placing the graphene layer on a material almost identical in structure, instead of the commonly used silicon oxide found in microchips, they could significantly improve its electronic properties. Substituting silicon wafers with boron nitride, a graphene-like structure consisting of boron and nitrogen atoms in place of the carbon atoms, the group was the first to measure the topography and electrical properties of the resulting smooth graphene layer with atomic resolution.

The results are published in the advance online publication of *Nature Materials*.

"Structurally, boron nitride is basically the same as graphene, but electronically, it's completely different," said Brian LeRoy, an assistant professor of physics and senior author of the study. "Graphene is a conductor, boron nitride is an insulator."

"We want our graphene to sit on something insulating, because we are interested in studying the properties of the graphene alone. For example, if you want to measure its resistance, and you put it on metal, you're just going to measure the resistance of the metal because it's going to conduct better than the graphene."

Unlike silicon, which is traditionally used in electronics applications, graphene is a single sheet of atoms, making it a promising candidate in the quest for ever smaller electronic devices. Think going from a paperback to a credit card.

"It's as small as you can shrink it down," LeRoy said. "It's a single layer, you'll never get half a layer or something like that. You could say graphene is the ultimate in making it small, yet it 's still a good conductor."

Stacked upon each other, 3 million sheets of graphene would amount to only 1 millimeter. The thinnest material on Earth, graphene brought the 2010 Nobel Prize to Andre Geim and Konstantin Novoselov, who were able to demonstrate its exceptional properties with relation to quantum physics.

"Using a scanning tunneling microscope, we can look at atoms and study them," he added. "When we put graphene on silicon oxide and look at the atoms, we see bumps that are about a nanometer in height."

While a nanometer -- a billionth of a meter -- may not sound like much, to an electron whizzing along in a grid of atoms, it's quite a bump in the road.

"It's basically like a piece of paper that has little crinkles in it," LeRoy explains. "But if you put the paper, in this case the graphene, on boron nitride, it's much flatter. It smooths out the bumps by an order of magnitude."

LeRoy admits the second effect achieved by his research team is a bit harder to explain.

"When you have graphene sitting on silicon oxide, there are trapped electric charges inside the silicon oxide in some places, and these induce some charge in the overlying graphene. You get quite a bit of variation in the density of electrons. If graphene sits on boron nitride, the variation is two orders of magnitude less."

In his lab, LeRoy demonstrates the first -- and surprisingly low-tech -- step in characterizing the graphene samples: He places a tiny flake of graphite -- the stuff that makes up pencil "lead" -- on sticky tape, folds it back on itself and peels it apart again, in a process reminiscent of a Rorschach Test.

"You fold this in half," he explained, "and again, and again, until it gets thin. Graphene wants to peel off into these layers, because the bonds between the atoms in the horizontal layer are strong, but weak between atoms belonging to different layers. When you put this under an optical microscope, there will be regions with one, two, three, four or more layers. Then you just search for single-layer ones using the microscope."

"It's hard to find the sample because it's very, very small," said Jiamin Xue, a doctoral student in LeRoy's lab and the paper's leading author. "Once we find it, we put it between two gold electrodes so we can measure the conductance."

To measure the topography of the graphene surface, the team uses a scanning tunneling microscope, which has an ultrafine tip that can be moved around.

"We move the tip very close to the graphene, until electrons start tunneling to it," Xue explained. "That's how we can see the surface. If there is a bump, the tip moves up a bit."

For the spectroscopic measurement, Xue holds the tip at a fixed distance above the sample. He then changes the voltage and measures how much current flows as a function of that voltage and any given point across the sample. This allows him to map out different energy levels across the sample.

"You want as thin an insulator as possible," LeRoy added. "The initial idea was to pick something flat but insulating. Because boron nitride essentially has the same structure as graphene, you can peel it into layers in the same way. Therefore, we use a metal as a base, put a thin layer of boron nitride on it and then graphene on top."

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Journal Reference:

1. Jiamin Xue, Javier Sanchez-Yamagishi, Danny Bulmash, Philippe Jacquod, Aparna Deshpande, K. Watanabe, T. Taniguchi, Pablo Jarillo-Herrero, Brian J. LeRoy. **Scanning tunnelling microscopy and spectroscopy of ultra-flat graphene on hexagonal boron nitride**. *Nature Materials*, 2011; DOI: 10.1038/nmat2968

http://www.sciencedaily.com/releases/2011/03/110304092115.htm

Hawaiian Volcano Crater Floor Collapse Followed by Eruption in Fissue Along Kilauea's East Rift Zone

At 5:15 p.m. local time on March 5, 2011 an HVO geologist flying over Kīlauea's middle east zone reported an eruption near Napau Crater. Subsequent observations put the location at approximately 2 km WSW of Pu`u `O`o. This photo shows a close-up of a spattering fissure with lava reaching 10 meters (30 feet) into the air. (Credit: Tim Orr, USGS)

ScienceDaily (Mar. 6, 2011) — A fissure that opened on Kilauea's east rift zone after the March 5 collapse of the Pu'u 'O'o crater floor continues to erupt lava. Activity along the fissure was sporadic overnight and throughout March 6, with periods of quiet punctuated by episodes of lava spattering up to 25 m (80 ft) high. The fissure is located west-southwest of Pu'u 'O'o in a remote area of Hawai'i Volcanoes National Park. Due to the ongoing volcanic activity, Park closures remain in effect in this area.

Live views of Kilauea's fissure eruption are now possible via a Webcam installed by the USGS Hawaiian Volcano Observatory (HVO) this afternoon. The Webcam images, which are updated every five minutes, can be accessed at http://volcanoes.usgs.gov/hvo/cams/NCcam/.

Measurements made by HVO scientists show that the Pu'u 'O'o crater floor dropped at least 115 m (377 ft) during Saturday's collapse. The only signs of activity within the crater Sundaywere infrequent cascades of rock fragments falling from collapse blocks. This activity is visible when Pu'u 'O'o Webcam views, accessible at http://volcanoes.usgs.gov/hvo/cams/POcam/, are not obscured by volcanic fume.

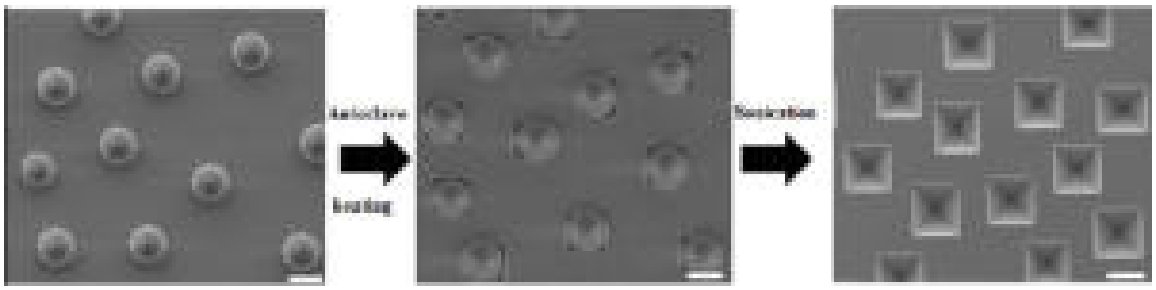
Lava flows on the pali and coastal plain are still active, but sluggish. Whether these flows are residual lava draining through the tube system or outbreaks that continue to be fed by lava from the east rift zone vent is not yet known. Based on similar events in past years, it will take a day or two to see if the lava supply has been cut off by the uprift fissure eruption.

At Kilauea's summit, the lava lake has receded deep within the vent in Halema'uma'u Crater and is now barely visible in HVO's Webcam images (http://volcanoes.usgs.gov/hvo/cams/HMcam/). Small collapses of the vent walls occasionally produce dusty-brown plumes that can be seen from Park visitor overlooks.
Earthquakes are occurring at lower rates in the Napau Crater area adjacent to the new fissure eruption and beneath the summit caldera, but seismic tremor is significantly elevated in both areas. Summit deflation continues, but began to slow this afternoon. Deflation of the Pu'u 'O'o area has slowed throughout the day.
Daily updates about Kilauea's ongoing eruptions, recent images and videos of summit and east rift zone volcanic activity, and data about recent earthquakes are posted on the HVO Web site at http://hvo.wr.usgs.gov. Additional status reports will be posted as warranted.
The Hawaiian Volcano Observatory is one of five volcano observatories within the U.S. Geological Survey and is responsible for monitoring volcanoes and earthquakes in Hawai`i.

Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **U.S. Geological Survey/Hawaiian Volcano Observatory**.

http://www.sciencedaily.com/releases/2011/03/110306234145.htm

A Misunderstanding Leads to Method for Making Nanowells



Localized etching of a silicon (100) wafer upon hydrolysis of amidine-functionalized polystyrene latex colloids. The nanowell size can be precisely controlled with the size of the APSL colloids. No etch mask is needed and the region outside the nanowells is not etched at all. Scale Bar = 500 nm. (Credit: Erik Hsiao)

ScienceDaily (Mar. 7, 2011) — A safe, simple, and cheap method of creating perfectly etched micron and smaller size wells in a variety of substrates has been developed by researchers in Penn State's Department of Chemical Engineering. Similar patterned surfaces are currently made using complex and expensive photolithography methods and etch processes under clean room conditions and used in the fabrication of many optical, electrical, and mechanical devices.

The nanowell discovery was made in the labs of Darrell Velegol and Seong Kim by Velegol's graduate student, Neetu Chaturvedi, and Kim's graduate student, Erik Hsiao. An article detailing their research, "Maskless Fabrication of Nanowells Using Chemically Reactive Colloids," appeared in the online edition of the journal *Nano Letters* in January 2011. In collaboration with Chaturvedi, Hsiao was working on a project to adhere polystyrene on a silicon wafer to create nanostructures with known dimensions. When Hsiao asked her to heat one of his samples, a miscommunication led her to heat the polystyrene and silicon wafer at low temperature in water in the autoclave normally used for biological samples rather than in the vacuum furnace. When they looked at the samples under the atomic force microscope (AFM), they noticed holes had formed beneath the polystyrene particles. Further examination under the scanning electron microscope (SEM) showed them perfectly etched, pyramidal shaped holes in the substrate below the places where the amidine-functionalized polystyrene latex colloid particles had adhered to the silicon dioxide on the surface of the silicon wafer.

"We saw three holes in the sample at the first AFM imaging and didn't know what it meant since we expected pancake-like polymer patches on the sample," said Hsiao. They took the sample to their advisers, who were both surprised by the etched wafer. By going over the steps the students had taken, the researchers realized that the wells were produced when the water hydrolized the amidine group in the particle, and through a series of chemical reactions, created a hydroxide ion that etched the well into the silicon wafer. The holes were uniform and their size and depth were totally dependent on the size of the original polystyrene particle, although the orientation of the silicon crystal affected the shape of the wells. In one orientation (100), the wells were perfect four-sided inverted pyramids. In the other orientation (111), the wells were perfect hexagons. The four researchers called them nanowells, because the bottom dimension of the wells was only a couple of nanometers across. They soon realized that they had discovered a new maskless method for creating structures in silicon without the elaborate steps normally required in the clean room.

"We're delivering hydroxide ions directly to where we want to etch," Velegol explained. "It's much safer and cheaper than electron beam and X-ray lithography. It's so safe that you could practically eat these particles without any harm."

"We think this is a quite general discovery," Kim added. "It's a way to deliver chemistry locally rather than in bulk. Many metals, ceramics, and other materials can be etched with this technique."

Another potential benefit of the discovery is the ability to create patterns on curved surfaces, something that is difficult to do with conventional photolithography. Since the particles are suspended in water, they can adhere to the surface of any shape and space themselves evenly over the surface. The researchers are just beginning to come up with intriguing ideas for how to use the simple technique.

Many breakthroughs come from accidents, Velegol remarked, because once something is known, people work on it very rapidly until they have filled in all the pieces and there is less to discover. Accidents are out of the

pattern. "It's one of those situations like Pasteur said where chance favors the prepared mind. We would never even have thought to try this kind of chemistry. But Neetu had been working with these colloids for several years, and Erik had experience with the AFM, so they were well prepared to take advantage of the accident," Velegol concluded.

This work was supported by the National Science Foundation (Grant Nos. IDR-1014673 and CMMI-1000021).

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Penn State Materials Research Institute**, via Newswise.

Journal Reference:

1. Neetu Chaturvedi, Erik Hsiao, Darrell Velegol, Seong H. Kim. **Maskless Fabrication of Nanowells Using Chemically Reactive Colloids**. *Nano Letters*, 2011; 11 (2): 672 DOI: 10.1021/nl1037984

http://www.sciencedaily.com/releases/2011/03/110305103650.htm

Life-Saving Blood Test for Fungal Meningitis, a Leading Cause of AIDS-Related Deaths in Developing Countries

This is Tom Kozel, professor of microbiology in the University of Nevada School of Medicine, in one of his labs in the University's Center for Molecular Medicine. Kozel and the University have signed a licensing agreement with Immuno-Mycologics (IMMY) in Oklahoma to develop a point-of-care product that will allow rapid in-the-field diagnosis of the fungal meningitis Cryptococcosis, which kills millions of AIDS patients in developing countries. (Credit: Photo by Mike Wolterbeek, University of Nevada, Reno.)

ScienceDaily (Mar. 7, 2011) — A new, rapid blood test that could lead to early diagnosis and potentially save the lives of hundreds of thousands of people stricken with fungal meningitis, a leading cause of AIDS-related deaths in developing countries, is getting closer to market with a recent collaboration between the University of Nevada, Reno and Immuno-Mycologics (IMMY) in Oklahoma.

"The ability to quickly identify yeast infection in patients is expected to help in significantly reducing cryptococcal meningitis deaths in resource-limited countries such as those in sub-Saharan Africa," said Tom Kozel, professor of microbiology at the University of Nevada School of Medicine. "Cryptococcosis is a rare form of meningitis among otherwise healthy individuals, but an estimated 600,000 lives are lost to this infection each year in patients with AIDS. Many of these lives could be saved through early diagnosis."

If successful, the new field test to detect cryptococcal antigen will use a drop of blood from a finger-stick or a urine sample to immediately identify the presence of the disease so treatment can begin instantly, rather than having to wait for results to be processed at a lab. The point-of-care product is the result of a collaboration between Kozel and Sean Bauman, president and CEO of IMMY. The product is being developed under a licensing agreement established through the University's Technology Transfer Office and IMMY.

"We developed several antibodies to the fungus with the support of research funded by the National Institutes of Health," Kozel said. "IMMY needed an antibody that worked well with their idea for this new noninvasive

procedure to introduce in developing countries where deaths are skyrocketing from HIV-related cryptococcal meningitis. We found fairly quickly that one of ours works very well."
Kozel developed the antibody used for the *Cryptococcus* test in his lab at the University of Nevada, Reno. Bauman commercialized the technology to make it available at low cost to patients in developing countries through IMMY, a market leader in diagnostics for fungal infections.
"One of the stipulations in our agreement for the licensing of the product with IMMY is to have this crucial test available at low cost," Ryan Heck, director of the University's Technology Transfer Office, said. "Dr. Bauman had already begun to make this happen on several avenues."
IMMY is using the antibody now for testing in Africa, but only through the traditional, time-consuming and expensive methods of venipuncture (blood draw) or spinal tap for cerebrospinal fluid. The team is working to get additional funding for studies needed to further develop and validate the new point-of-care product to make it readily available to patients.
We have submitted a version of the test that is designed for use with serum from a venipuncture or cerebrospinal fluid to the FDA for approval. We have received the CE mark, which allows sales in EU countries and many developing world countries," Bauman said. "We are already manufacturing and distributing the diagnostic for this use."
Modification of the test to a point-of-care format and clinical validation will be a major step toward meeting the World Health Organization's Global Access health requirements.
"With the point-of-care product, a health-care provider can give the test, observe the results and administer the first dose of oral medication, all within a few minutes," Kozel, who has been conducting AIDS research for more than 25 years, said. "Studies have shown early identification and treatment are essential to beat the disease; a late diagnosis means antifungal therapy will likely fail in resource-limited countries. Most patients in that setting are not diagnosed until they are very sick, and then it's too late."
Antifungals used to treat cryptococcosis are available for free or at low cost in regions such as sub-Saharan Africa. However, early diagnosis is crucial for successful drug therapy. Bauman saw this need and the staggering numbers of preventable deaths occurring in third-world countries, particularly in Africa, and decided to do something about it.
"As many as one in 10 AIDS patients in countries with limited infrastructure or resources may develop cryptococcal meningitis," Kozel said. "If we can diagnose early and begin treatment, we can save an amazing number of lives."

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

http://www.sciencedaily.com/releases/2011/03/110304092117.htm

Large Forest Animals Contribute to Plant Diversity

Wild boar (Sus scrofa) with piglets. Due to its morphology and behaviour, the wild boar is a champion seed disperser. (Credit: iStockphoto/Warwick Lister-Kaye)

ScienceDaily (Mar. 7, 2011) — Over several decades, the growth in deer, roe deer and wild boar populations has spread to all of France. Cemagref researchers have shown that in spite of the damage caused, notably to bushes and young trees in forests and to crops, these animals also help in increasing plant diversity.

They studied the floristic surveys carried out from 1976 to 2006 at Arc-en-Barrois (Haute-Marne department), a unique observation site in France due to its long-term monitoring data. A plant, the gypsy flower (Cynoglossum officinale), was not found during the first survey, but then appeared in 1981 and has since spread widely. It is now present in the zones where large, forest mammals are most frequently found.

How did this plant, though threatened by predators, make such great strides? By hanging on tight! Its seeds can latch on to the fur of animals thus ensuring dissemination (epizoochory) and it is also a plant with a circular arrangement of leaves (rosette) that is not consumed by fauna because it contains toxic substances. These characteristics provide significant advantages enabling the plant to settle far and wide.

A brush with the boars

Wild boars are an excellent dispersal agent. Their fur comprises two strata, an undercoat of often curly hair and stiff bristles, that can easily lock in and transport seeds over many kilometres, contrary to deer and roe deer with their shorter hair.

Their behaviour is also a decisive factor in seed dispersal. When wallowing, their fur picks up seeds in the mud that are then transported to dryer ground when the boars scratch themselves, rub against trees or dig up the topsoil looking for food.

After brushing boars killed by hunters, scientists counted a total of almost 40 different seed species. Thanks to its morphology and behaviour, the wild boar is a champion seed disperser.

Cemagref is the coordinator of the Diplo project to quantify the role of common low-land ungulates (deer, roe deer and wild boar) as long-distance seed-dispersal agents. The researchers evaluate the impact of animal movements on the success of seeds from the time they are picked up to their release to the soil.

The project is funded by the Water and biodiversity department at the Ecology ministry for the period 2009 to 2011. Partners include the National veterinary school in Maisons-Alfort, INRA in Toulouse, the National agency for hunting and wildlife (ONCFS) and Animal contact (Loiret department).

Further information: http://cemadoc.cemagref.fr/cemoa/PUB00029836

Story Source:

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

http://www.sciencedaily.com/releases/2011/02/110225091011.htm

Evolution Drives Many Plants and Animals to Be Bigger, Faster

Flamingos. Researchers working at the National Evolutionary Synthesis Center compiled and reviewed nearly 150 published estimates of natural selection, representing more than 100 species of birds, lizards, snakes, insects and plants. The results confirm that for most plants and animals, larger body size and earlier seasonal timing -- such as earlier breeding, blooming or hatching -- confer significant survival advantages. (Credit: Copyright Michele Hogan)

ScienceDaily (Mar. 7, 2011) — For the vast majority of plants and animals, the 'bigger is better' view of evolution may not be far off the mark, says a new broad-scale study of natural selection. Organisms with bigger bodies or faster growth rates tend to live longer, mate more and produce more offspring, whether they are deer or damselflies, the authors report.

Researchers working at the National Evolutionary Synthesis Center compiled and reviewed nearly 150 published estimates of natural selection, representing more than 100 species of birds, lizards, snakes, insects and plants. The results confirm that for most plants and animals, larger body size and earlier seasonal timing -- such as earlier breeding, blooming or hatching -- confer significant survival advantages.

"It's a very widespread pattern," said co-author Joel Kingsolver of the University of North Carolina at Chapel Hill.

What's puzzling, the authors say, is not why the 'bigger is better' model of evolution is so common, but why the 'Goldilocks' model is so rare: If organisms are supposedly well-adapted to their particular circumstances, then why is it so seldom the case that the individuals that survive and reproduce the best are the ones that are not too small, nor too big, but just right?

A classic example is human birth weight. Newborns of intermediate size are more likely to survive than newborns that are extremely large or extremely small. In lieu of driving organisms to be bigger and faster over time, the 'Goldilocks' model -- also known as stabilizing selection -- favors moderation, the authors explained. But for the vast majority of organismal traits, this pattern is the exception, not the rule. "Rarely is it the case that the individuals that survive and reproduce the best are the ones in the middle," Kingsolver said.

The result is puzzling because the conventional wisdom is that most creatures are well adapted to the environments in which they live. "When we look at nature, we see all these amazing ways species are well-adapted to their lifestyles and habitats," Kingsolver said. "Yet the organisms that are bigger, faster, still do the best in terms of survival and reproduction. Why aren't they already just the right size or speed, or pretty close to it?" he asked.

The authors explored three possible explanations. One possibility, they explained, is that evolving to be bigger, faster, or flashier comes at a cost. "A trait that's good for reproduction or fertility may be bad for survival -- there may be a tradeoff," Kingsolver said. "In guppies, for example, brightly colored males have greater mating success, but they're also more likely to be eaten by predators," said co-author Sarah Diamond, currently a postdoctoral researcher at North Carolina State University.

Another possibility is that environments simply change from one season to the next, such that the traits that confer the greatest advantage change over time. "In Darwin's finches, for example, there are years where large-beaked birds have an advantage because large seeds are more abundant, and years where smaller-beaked birds do better because small seeds are more abundant," Diamond said.

A third possibility is that natural selection drives one trait in one direction, while simultaneously driving another, genetically correlated trait in the opposite direction. "For example it may be good for flying insects to evolve larger wings and smaller bodies for more efficient flight," Kingsolver said, "but if insects with larger wings also have larger bodies, they can't evolve both."

The third explanation frequently limits the evolution of body size, the authors found, but not traits related to timing, or body shape, or coloration. "Size is the one case where correlated selection is important," Kingsolver said.

The findings appear in the March 2011 issue of *American Naturalist*.

Story Source:

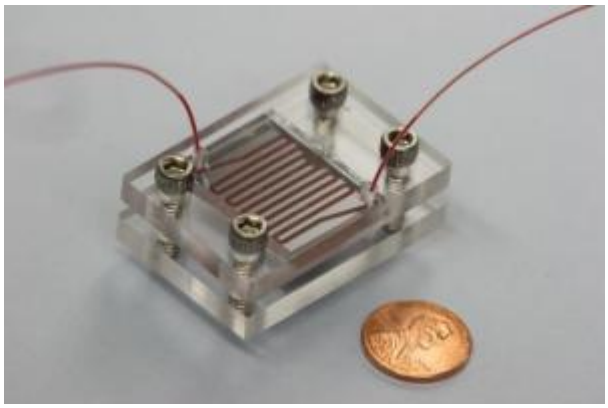
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **National Evolutionary Synthesis Center (NESCent)**, via EurekAlert!, a service of AAAS.

Journal Reference:

1. Joel G. Kingsolver, Sarah E. Diamond. **Phenotypic Selection in Natural Populations: What Limits Directional Selection?** *The American Naturalist*, 2011; 177 (3): 346 DOI: 10.1086/658341

http://www.sciencedaily.com/releases/2011/03/110307142240.htm

'Nano-Velcro' Technology Used to Improve Capture of Circulating Cancer Cells



Nano-Velcro 2 'Nano-Velcro' microfluidic chip. An integrated chip for detecting circulating tumor cells in blood collected from prostate cancer patients. (Credit: Dr. Libi Zhao and Xiaowen Xu)

ScienceDaily (Mar. 7, 2011) — Circulating tumor cells, which play a crucial role in cancer metastasis, have been known to science for more than 100 years, and researchers have long endeavored to track and capture them. Now, a UCLA research team has developed an innovative device based on Velcro-like nanoscale technology to efficiently identify and "grab" these circulating tumor cells, or CTCs, in the blood.

Metastasis is the most common cause of cancer-related death in patients with solid tumors and occurs when these marauding tumor cells leave the primary tumor site and travel through the blood stream to set up colonies in other parts of the body.

The current gold standard for determining the disease status of tumors involves the invasive biopsy of tumor samples, but in the early stages of metastasis, it is often difficult to identify a biopsy site. By capturing CTCs in blood samples, doctors can essentially perform a "liquid" biopsy, allowing for early detection and diagnosis, as well as improved monitoring of cancer progression and treatment responses.

In a study published this month and featured on the cover of the journal *Angewandte Chemie,* the UCLA researchers announce the successful demonstration of this "nano-Velcro" technology, which they engineered into a 2.5-by-5-centimeter microfluidic chip. This second-generation CTC-capture technology was shown to be capable of highly efficient enrichment of rare CTCs captured in blood samples collected from prostate cancer patients.

The new approach could be even faster and cheaper than existing methods, and it captures a greater number of CTCs, the researchers said.

The prostate cancer patients were recruited with the help of a clinical team led by physicians Dr. Matthew Rettig, of the UCLA Department of Urology, and Dr. Jiaoti Huang, of the UCLA Department of Pathology and Laboratory Medicine.

The new CTC enrichment technology is based on the research team's earlier development of 'fly-paper' technology, outlined in a 2009 paper in Angewandte Chemie. The technology involves a nanopillar-covered silicon chip whose "stickiness" resulted from the interaction between the nanopillars and nanostructures on CTCs known as microvilli, creating an effect much like the top and bottom of Velcro.

The new, second-generation device adds an overlaid microfluidic channel to create a fluid flow path that increases mixing. In addition to the Velcro-like effect from the nanopillars, the mixing produced by the microfluidic channel's architecture causes the CTCs to have greater contact with the nanopillar-covered floor, further enhancing the device's efficiency.

"The device features high flow of the blood samples, which travel at increased (lightning) speed," said senior study author Dr. Hsian-Rong Tseng, an associate professor of molecular and medical pharmacology at the UCLA Crump Institute for Molecular Imaging and the California NanoSystems Institute at UCLA.

"The cells bounce up and down inside the channel and get slammed against the surface and get caught," explained Dr. Clifton Shen, another study author.

The advantages of the new device are significant. The CTC-capture rate is much higher, and the device is easier to handle than its first-generation counterpart. It also features a more user-friendly, semi-automated interface that improves upon the earlier device's purely manual operation.
"This new CTC technology has the potential to be a powerful new tool for cancer researchers, allowing them to study cancer evolution by comparing CTCs with the primary tumor and the distant metastases that are most often lethal," said Dr. Kumaran Duraiswamy, a graduate of UCLA Anderson School of Management who became involved in the project while in school. "When it reaches the clinic in the future, this CTC-analysis technology could help bring truly personalized cancer treatment and management."

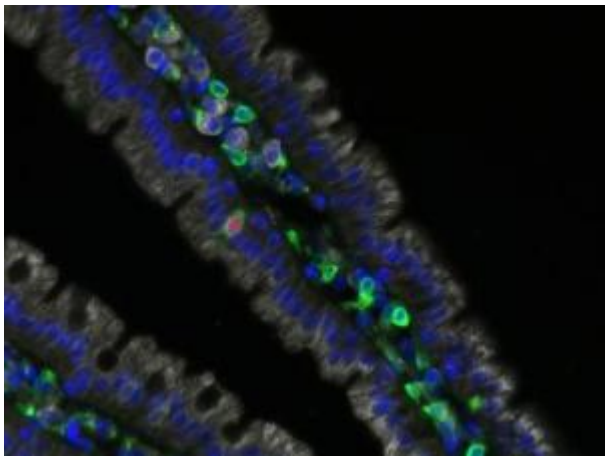
Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **University of California - Los Angeles**.

Journal Reference:

1. Shutao Wang, Kan Liu, Jian Liu, Zeta T.-F. Yu, Xiaowen Xu, Libo Zhao, Tom Lee, Eun Kyung Lee, Jean Reiss, Yi-Kuen Lee, Leland W. K. Chung, Jiaoti Huang, Matthew Rettig, David Seligson, Kumaran N. Duraiswamy, Clifton K.-F. Shen, Hsian-Rong Tseng. **Highly Efficient Capture of Circulating Tumor Cells by Using Nanostructured Silicon Substrates with Integrated Chaotic Micromixers**. *Angewandte Chemie International Edition*, 2011; DOI: 10.1002/anie.201100624

http://www.sciencedaily.com/releases/2011/03/110307151924.htm

New Type of Secretory Cell in the Intestine



Gerbe et al. define tuft cells as a new secretory lineage in the intestine. These rare cells can be distinguished from the four other main cell types of the intestinal epithelium by their co-expression of SOX9 (red) and COX1 (green). Microtubules are shown in white. (Credit: François Gerbe)

ScienceDaily (Mar. 7, 2011) — The intestinal epithelium consists of four main specialized cell lineages: absorptive enterocytes and three secretory cell types known as enteroendocrine, Paneth, and goblet cells. But a rare, fifth type of intestinal cell called tuft cells also exists. Defined by the thick brush of long microvilli that project from their apical surface, tuft cells are seen in several epithelial tissues, yet little is known about their function due to a lack of tuft cell-specific markers.

In the March 7 issue of The *Journal of Cell Biology*, a team of French researchers led by Philippe Jay identified a unique "signature" of proteins expressed by tuft cells. Like other intestinal cell types, tuft cells turned over rapidly and were replaced by the differentiation of proliferative stem cells' progeny in the intestinal crypts. This differentiation was blocked in the absence of ATOH1 -- a transcription factor required for the development of all intestinal secretory lineages. Yet tuft cell differentiation didn't require other transcription factors that specify enteroendocrine, Paneth, and goblet cells, suggesting that tuft cells represent a distinct lineage of intestinal secretory cells.

The team found that tuft cells secrete opioids and produce enzymes that synthesize prostaglandins. The latter observation suggests that tuft cells may promote inflammation and tumorigenesis. Indeed, the researchers identified tuft cell-like cells in several early stage intestinal tumors. To really understand tuft cells' function, however, Jay hopes to identify transcription factors uniquely required for their development in order to generate mice that specifically lack tuft cells from their intestinal epithelium.

Story Source:

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

Journal Reference:

1. Gerbe, F., et al. **Distinct ATOH1 and Neurog3 requirements define tuft cells as a new secretory cell type in the intestinal epithelium**. *J. Cell Biol.*, vol. 192 no. 5 767-780 DOI: 10.1083/jcb.201010127

http://www.sciencedaily.com/releases/2011/03/110307124516.htm

DNA Better Than Eyes When Counting Endangered Species

Andrew DeWoody, at left, used DNA from eagle feathers to get more accurate counts of eagle populations that may be used for better conservation of the birds. (Credit: Purdue University file photo)

ScienceDaily (Mar. 7, 2011) — Using genetic methods to count endangered eagles, a group of scientists showed that traditional counting methods can lead to significantly incorrect totals that they believe could adversely affect conservation efforts.

Andrew DeWoody, a professor of genetics at Purdue University; Jamie Ivy, population manager at the San Diego Zoo; and Todd Katzner, a research assistant professor at the University of West Virginia, found that visual counts of imperial and white-tailed sea eagles in the Narzum National Nature Reserve of Kazakhstan significantly underestimated the imperial eagle population there. Using DNA from eagle feathers gathered in the area, the researchers were able to identify individual DNA fingerprints for each bird.

The technique showed that there were 414 eagles, more than three times as many as had been visually observed, and more than two and a half times more than modeling suggested would be there.

"A biologist doesn't always see them coming and going," said DeWoody, whose findings were published in the early online version of the journal *Animal Conservation*. "Eagles are difficult to capture, mark and resight. Biologists in the field can't differentiate individuals, whereas by a genetic fingerprint geneticists can differentiate among individuals that have visited a site."

DeWoody, Ivy and Katzner, with collaborator Evgeny Bragin of the Narzum Natural Nature Reserve collected thousands of eagle feathers around roosts and nesting sites. DeWoody's team at Purdue was able to extract DNA from those feathers and determine that there were hundreds of eagles that had recently visited the site.

"Generally we say 'what you see is what you get,' but in this case it's the complete opposite," said Katzner, who used the data to model more accurate estimates of eagle populations. "When your field data are off by that much, it's difficult to build accurate models because your starting point is just so far off."

DeWoody and Katzner said accurate animal counts are an important part of conservation practices. If populations are underestimated, it could signal to decision makers that a habitat isn't important when, in reality, more animals are using it than thought. Conversely, if a population is more abundant than once thought, resources may need to be reallocated.

"We don't want to spend a lot of effort protecting a species that doesn't need that much protection," DeWoody said. "This is a science-based approach to conservation."

In the case of eagles in Kazakhstan, Katzner said the new population estimates show that the Narzum National Nature Reserve is a more important site than previously thought.

"We knew it was an important site for eagles, but we seriously underestimated its importance," Katzner said. "We used to think this was only an important site for breeders, but now we know this is an important site for birds from several life stages."

The data will be used to begin discussions about managing resources for eagles in Kazakhstan. DeWoody hopes that the findings will increase funding to use the technique on other threatened or endangered species. He said of particular interest to him is the Steller's sea eagle, a bird native to northeast Asia and thought to have a population of only a few thousand.

A National Science Foundation fellowship, the National Geographic Society, National Birds of Prey Trust and Wildlife Conservation Society funded the study.

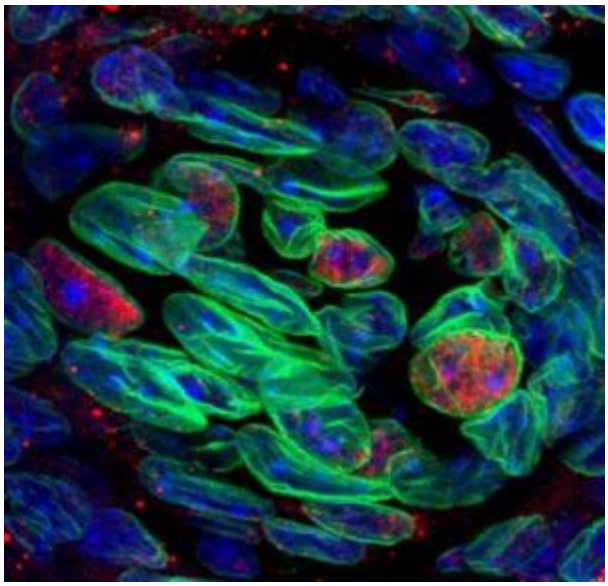
Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Purdue University**.

Journal Reference:

1. T. E. Katzner, J. A.R. Ivy, E. A. Bragin, E.J. Milner-Gulland, J. A. DeWoody. **Conservation implications of inaccurate estimation of cryptic population size**. *Animal Conservation*, 2011; DOI: 10.1111/j.1469-1795.2011.00444.x

http://www.sciencedaily.com/releases/2011/03/110307151920.htm

Multiple Taste Cell Sensors Contribute to Detecting Sugars



Some of the green cell nuclei in this taste bud contain the KATP sugar sensor, indicated in red. One of several sugar sensors recently shown by Monell scientists to be present in sweet-sensing taste cells, KATP may help regulate sensitivity to sweet taste under different nutritional conditions. (Credit: Karen Yee, Monell Center)

ScienceDaily (Mar. 7, 2011) — A new research study dramatically increases knowledge of how taste cells detect sugars, a key step in developing strategies to limit overconsumption. Scientists from the Monell Center and collaborators have discovered that taste cells have several additional sugar detectors other than the previously known sweet receptor.

"Detecting the sweetness of nutritive sugars is one of the most important tasks of our taste cells," said senior author Robert F. Margolskee, M.D., Ph.D., a molecular neurobiologist at Monell. "Many of us eat too much sugar and to help limit overconsumption, we need to better understand how a sweet taste cell 'knows' something is sweet."

Scientists have known for some time that the T1r2+T1r3 receptor is the primary mechanism that allows taste cells to detect many sweet compounds, including sugars such as glucose and sucrose and also artificial sweeteners, including saccharin and aspartame.

However, some aspects of sweet taste could not be explained by the T1r2+T1r3 receptor. For example, although the receptor contains two subunits that must join together for it to work properly, Margolskee's team had previously found that mice engineered to be missing the T1r3 subunit were still able to taste glucose and other sugars normally.

Knowing that sugar sensors in the intestine are important to how dietary sugars are detected and absorbed, and that metabolic sensors in the pancreas are key to regulating blood levels of glucose, the Monell scientists used advanced molecular and cellular techniques to see if these same sensors are also found in taste cells.

The results, published in the *Proceedings of the National Academy of Sciences*, indicate that several sugar sensors from intestine and pancreas also are present in exactly those same sweet-sensing taste cells that have the T1r2+T1r3 sweet receptor.

"The taste system continues to amaze me at how smart it is and how it serves to integrate taste sensation with digestive processes," said Margolskee.

The different sugar taste sensors may have varied roles. An intestinal glucose sensor also found to be located in the sweet-sensitive taste cells may provide an explanation for another mystery of sweet taste: why just a pinch of table salt tastes sweet or salt added to baked goods enhances sweet taste. Known as SGLT1, this sensor is a transporter that moves glucose into the sweet taste cell when sodium is present, thus triggering the cell to register sweetness.

In pancreas, the sugar sensor known as the KATP channel, monitors glucose levels and triggers insulin release when they rise. The authors speculate that KATP may function in sweet taste cells to modulate taste

cell sensitivity to sugars according to metabolic needs. For example, this sensor may respond to hormonal signals from the gut or pancreas to make taste cells less responsive to sweets after we have just eaten a sugary piece of pecan pie and do not need additional energy.
"Sweet taste cells have turned out to be quite complex. The presence of the KATP channel suggests that taste cells may play a role in regulating our sensitivity to sweet taste under different nutritional conditions," said first author Karen K. Yee, Ph.D., a cellular physiologist at Monell. "This knowledge may someday help us understand how to limit overconsumption of sweet foods."
Future studies will focus on understanding the complex connections between taste cells and the digestive and endocrine systems.
Also contributing to the study were Sunil Sukumaran, Ph.D. and Ramana Kotha of Monell and Timothy Gilbertson, Ph.D. of Utah State University.

Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Monell Chemical Senses Center**, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2011/03/110307151909.htm

Student Innovation at Rensselaer Transmits Data and Power Wirelessly Through Submarine Hulls

Tristan Lawry. (Credit: Image courtesy of Rensselaer Polytechnic Institute)

ScienceDaily (Mar. 7, 2011) — Steel walls are no match for Tristan Lawry. The doctoral student at Rensselaer Polytechnic Institute has developed and demonstrated an innovative new system that uses ultrasound to simultaneously transmit large quantities of data and power wirelessly through thick metal walls, like the hulls of ships and submarines.

Lawry, a student in the Department of Electrical, Computer, and Systems Engineering at Rensselaer, is one of three finalists for the 2011 $30,000 Lemelson-MIT Rensselaer Student Prize.

Lawry's project is titled "A High-Performance System for Wireless Transmission of Power and Data Through Solid Metallic Enclosures," and his faculty adviser is Gary Saulnier, professor of electrical, computer, and systems engineering at Rensselaer.

In our increasingly tetherless world, wires have been all but replaced by more convenient wireless connections in homes and offices -- everything from phones and accessing the Internet to keyboards and printers. In the area of defense, a progression from wired to wireless systems presents an opportunity to improve the safety of naval vessels. Presently, to install critical safety sensors on the exterior of ships and submarines, the U.S. Navy is forced to drill holes in the hull through which cables for data and power transmission are run. Each hole increases the risk of potentially serious issues, including leaks and structural failure. Additionally, installing these sensors on commissioned vessels requires the use of a drydock or cofferdam, which can take months and cost millions of dollars.

Lawry's invention solves this problem. Unlike conventional electromagnetic wireless systems, which are ineffective at transmitting power and data through vessel hulls because of the "Faraday cage" shielding effects they present, his patent-pending system uses ultrasound -- high-frequency acoustic waves -to easily propagate signals through thick metals and other solids. Piezoelectric transducers are used to convert electrical signals into acoustic signals and vice versa, allowing his system to form wireless electrical bridges across these barriers. Lawry's clever design features separate non-interfering ultrasonic channels for independent data and power transmission.

With this new system, Lawry has demonstrated the simultaneous, continuous delivery of 50 watts of power and 12.4 megabytes per second (Mbps) of data through a 2.5-inch-thick solid steel block in real time. These results far surpass all known previously published systems capable of simultaneous data and power transmission through metal. With only minor modifications, Lawry said he's confident his design will have the capacity to support much higher power levels and data rates. His invention uses a powerful communication technology that allows the transmission system to adapt to non-ideal conditions and mechanical variations over time. This is critical for ensuring successful operation of the system in real-world conditions outside of a controlled laboratory environment.

Lawry's complex combination of electronic and acoustic hardware, signal generation and detection technology, and power generation and collection equipment shares many characteristics with a state-of-the-art communications system such as a cellular phone. Using the three main building blocks of electrical engineering -- power, communications, and computing -- Lawry has developed a system that can communicate through a thick metal wall without the need for a battery or any supplemental power source.

This means sensors on the outer hull of submarines can be made to work with systems on the other side of the wall for many years without the need for human intervention.
In addition to the hulls of ships and submarines, Lawry said his wireless data and power system could benefit many other applications where it is necessary or advantageous to continually power and monitor sensor networks in isolated environments. For example, his system could be used to power and communicate with sensors in nuclear reactors, chemical processing equipment, oil drilling equipment and pipelines, armored vehicles, un-manned underwater deep-sea exploration vehicles, or even space shuttles and satellites.

Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Rensselaer Polytechnic Institute**.

http://www.sciencedaily.com/releases/2011/03/110307142226.htm

Fossil Bird Study Describes Ripple Effect of Extinction in Animal Kingdom

Nurse shark (Ginglymostoma cirratum) cruising the boundary between spur and groove reef habitat and sand flats at Mona Island, Puerto Rico. Nurse sharks feed primarily on invertebrates, including crustaceans and mollusks they "sift" out of the sediment. (Credit: Image courtesy of Ron Hill, NOAA Fisheries, SEFSC-Galveston.)

ScienceDaily (Mar. 7, 2011) — A University of Florida study demonstrates extinction's ripple effect through the animal kingdom, including how the demise of large mammals 20,000 years ago led to the disappearance of one species of cowbird.

The study shows the trickle-down effect the loss of large mammals has on other species, and researchers say it is a lesson from the past that should be remembered when making conservation, game and land-use decisions today.

"There's nothing worse for a terrestrial ecosystem than the loss of large mammals -- and the loss of apex predators like sharks, tuna and other large fish will have the same negative impact on the oceans," said study co-author David Steadman, ornithology curator at the Florida Museum of Natural History on the UF campus. "We're seeing it with the loss of lions and elephants in parts of Africa, as well as in Florida with the decline of panthers. There's no question these losses will have a negative domino effect on our ecosystems."

The fossil study of eight songbird species from northern Mexico by Florida Museum ornithologists is currently available online and will appear in the March 8th print edition of the journal *Palaeogeography, Palaeoclimatology, Palaeocology*.

An extinct cowbird, *Pandanaris convexa*, is the most common bird found at the fossil site called Térapa, in Sonora, Mexico, about 150 miles south of Arizona. This is the first time fossils of the large bird, a member of the blackbird family, have been found in Mexico.

Finding the extinct cowbird at the fossil site was unpredictable and unexpected, according to Jim Mead, chair of the department of geosciences at East Tennessee State University, who has collected a variety of fossils at the site, including the birds used in the study. Mead described the findings at Térapa as "bizarre and exciting."

"The tropical environment is unusual because the site is so far from the coast," Mead said. "The fossil record also provides evidence animals migrated from north to south and, unexpectedly, from south to north."

The cowbird has previously only been found at the Rancho La Brea fossil site in California and a site in Reddick, between Gainesville and Ocala in North Central Florida. The study expands the bird's known range and creates new questions about whether it may have lived across the southern U.S.

"The extinct cowbird needed grasslands and these big mammals to survive," said lead author Jessica Oswald, a National Science Foundation predoctoral fellow at the Florida Museum. "Those two things play into each other because mega mammals maintain grasslands. They keep big trees from coming in and colonizing the areas because they graze, stomp and trample little saplings."

Like modern cowbirds, this species probably fed on seeds and insects large mammals exposed, Oswald said. The mammals included extinct species of ground sloth, mammoth, horse, tapir, camel and bison.

About 20,000 years ago, most of these large mammals went extinct, which lead to the extinction of scavengers like condors and vultures, as well as cowbirds, Steadman said. Extinctions, especially mass extinctions, can cause radical species loss and changes in species distribution.
"Big species can't exist in a vacuum, nor can smaller species," Steadman said. "When one piece of the puzzle goes extinct, there is no good way of predicting what sort of trickle-down effect, what kind of cascade effect that will have."
The study also confirms the area was once marshy grassland, possibly surrounded by a savanna near a river. Fossils of plants, reptiles and mammals of all sizes, and 31 species of birds other than songbirds have been recovered from the Térapa site over the past 10 years. Most of these species are found today in grasslands or wetlands, Steadman said.
Steadman and Oswald used the Florida Museum's more than 24,000 skeletal specimens of birds to identify the Mexican fossils.
Songbirds make up more than 50 percent of the world's living bird species, but the fossil record is poorly developed, especially in Central and South America. Oswald said this study helps build the fossil record of songbirds in Mexico.
Finding bird fossils, as well as bones of other small animals, is a time-consuming and labor-intensive process. Sediment is placed in a fine mesh sieve and water is used to remove dirt and debris from the bones.

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

Journal Reference:

1. Jessica A. Oswald, David W. Steadman. **Late pleistocene passerine birds from Sonora, Mexico**. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 2011; 301 (1-4): 56 DOI: 10.1016/j.palaeo.2010.12.020

http://www.sciencedaily.com/releases/2011/03/110307124959.htm

Teaching Robots to Move Like Humans

Simon is involved in a host of projects designed to look at the interaction of robots and humans. Simon is housed in the Socially Intelligent Machines Lab at Georgia Tech, directed by Andrea Thomaz, assistant professor in the School of Interactive Computing in Tech's College of Computing. (Credit: Rob Felt/Georgia Tech)

ScienceDaily (Mar. 7, 2011) — When people communicate, the way they move has as much to do with what they're saying as the words that come out of their mouths. But what about when robots communicate with people? How can robots use non-verbal communication to interact more naturally with humans? Researchers at the Georgia Institute of Technology found that when robots move in a more human-like fashion, with one movement leading into the next, that people can not only better recognize what the robot is doing, but they can also better mimic it themselves.

The research was presented March 7 at the Human-Robot Interaction conference in Lausanne, Switzerland.

"It's important to build robots that meet people's social expectations because we think that will make it easier for people to understand how to approach them and how to interact with them," said Andrea Thomaz, assistant professor in the School of Interactive Computing at Georgia Tech's College of Computing.

Thomaz, along with Ph.D. student Michael Gielniak, conducted a study in which they asked how easily people can recognize what a robot is doing by watching its movements.

"Robot motion is typically characterized by jerky movements, with a lot of stops and starts, unlike human movement which is more fluid and dynamic," said Gielniak. "We want humans to interact with robots just as they might interact with other humans, so that it's intuitive."

Using a series of human movements taken in a motion-capture lab, they programmed the robot, Simon, to perform the movements. They also optimized that motion to allow for more joints to move at the same time and for the movements to flow into each other in an attempt to be more human-like. They asked their human subjects to watch Simon and identify the movements he made.

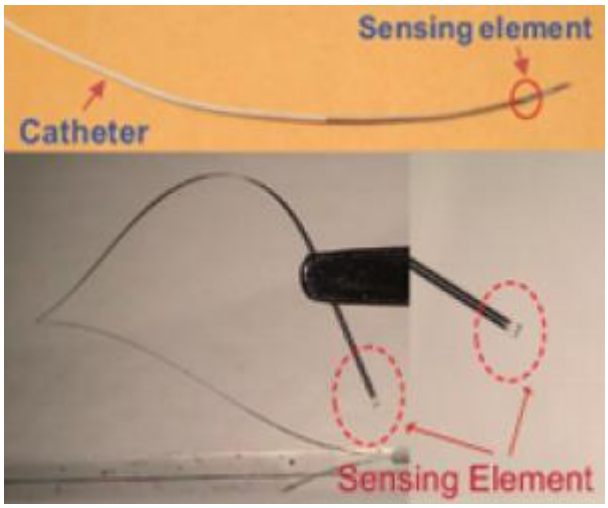
"When the motion was more human-like, human beings were able to watch the motion and perceive what the robot was doing more easily," said Gielniak.

In addition, they tested the algorithm they used to create the optimized motion by asking humans to perform the movements they saw Simon making. The thinking was that if the movement created by the algorithm was indeed more human-like, then the subjects should have an easier time mimicking it. Turns out they did.
"We found that this optimization we do to create more life-like motion allows people to identify the motion more easily and mimic it more exactly," said Thomaz.
The research that Thomaz and Gielniak are doing is part of a theme in getting robots to move more like humans move. In future work, the pair plan on looking at how to get Simon to perform the same movements in various ways.
"So, instead of having the robot move the exact same way every single time you want the robot to perform a similar action like waving, you always want to see a different wave so that people forget that this is a robot they're interacting with," said Gielniak.

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/2011/03/110307124810.htm

MEMS Thermal Sensor Detects Pre-Atherosclerotic Lesions



MEMS Thermal Sensor. (Credit: Dr. Tzung Hsiai,USC)

ScienceDaily (Mar. 7, 2011) — A new study published in the *Annals of Biomedical Engineering* shows that a MEMS thermal sensor deployed by an angiogram catheter can detect the earliest stages of atherosclerosis. The MEMS thermal sensor used convective heat transfer to detect pre-atherosclerotic regions of arteries that otherwise showed no clinical signs of atherosclerosis. Although diet and lifestyle changes can often reverse atherosclerosis in its earliest stages, no real-time means of detecting pre-atherosclerotic regions exists. The MEMS sensor method has the advantage of being both minimally invasive and sensitive. The technology has the potential for widespread and rapid application during diagnostic angiograms.

The study's lead author, Dr. Tzung Hsiai, an Associate Professor of Biomedical Engineering and Cardiology at the University of Southern California, said, "The innovation of this study lies in the convective heat transfer strategy to detect changes in output voltage signals in the non-obstructive, albeit inflammatory and otherwise considered normal arterial regions."

Scientists have demonstrated that frictional force acting on the walls of vessels by blood flow, known as shear stress, is intimately involved in oxidative stress and inflammatory responses that lead to atherosclerosis. In athero-prone regions, the flow is disturbed, yet detection of changing flow patterns in real-time remains a challenge.

Dr. Hsiai's group developed a micro-electro-mechanical system (MEMS) by depositing titanium and platinum on a flexible polymer membrane and patterning them to form the sensing elements. They deployed the sensor via an angiogram catheter into the aortic and abdominal arteries of rabbits that had eaten a high fat, high cholesterol diet, and a control group that had eaten a normal diet.

An electric current passed through the sensing element and generated a thermal layer in the flow field, from which convective heat transfer was measured as a function of the voltage signals. In the regions of atherosclerotic lesions, blood flow is disturbed. This causes changes in convective heat transfer from the sensing element to the flow field, and thus, changes in voltage signals. The sensor measured a high voltage upstream from the part of the blood vessel that harbored the atherosclerotic plaque, and a low voltage downstream.

The scientists concluded that the MEMS thermal sensor method could sensitively detect pre-atherosclerotic regions that otherwise showed no clinical signs of atherosclerosis. The authors integrated mathematical simulations, fluoroscopic images, and dissection of the aortas to verify their results.

Once the MEMS thermal sensors have identified the atherosclerotic lesion, doctors can identify whether this lesion is a vulnerable or stable plaque. A vulnerable plaque could rupture, which blocks the arteries and causes heart attacks and strokes. Doctors perform angioplasty and implant stents to prevent blockage of vessels. However, lifestyle changes and medication can manage stable plaque. According to Dr. Hsiai, "Despite imaging modalities, we have yet to develop a means to differentiate vulnerable from stable plaque. If we can differentiate vulnerable from stable plaque during a diagnostic angiogram, we can avoid unnecessary

complications from angioplasty and stenting, and deliver an enhanced risk-to-benefit profile for our patients. It could also reduce health costs by eliminating unnecessary procedures and for treating procedure-related complications."

Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Springer Science+Business Media**.

Journal Reference:

1. Fei Yu, Lisong Ai, Wangde Dai, Nora Rozengurt, Hongyu Yu, Tzung K. Hsiai. **MEMS Thermal Sensors to Detect Changes in Heat Transfer in the Pre-Atherosclerotic Regions of Fat-Fed New Zealand White Rabbits**. *Annals of Biomedical Engineering*, 2011; DOI: 10.1007/s10439-011-0283-8

http://www.sciencedaily.com/releases/2011/03/110307101448.htm

Snails' Complex Muscle Movements, Rather Than Mucous, Key to Locomotion

Snail. (Credit: UC3M)

ScienceDaily (Mar. 7, 2011) — New evidence suggests that the key to locomotion in snails stems from the animal's complex muscle movements, and not from its mucus, as had been previously thought. This finding could open the door to the construction of robots which could imitate this form of propulsion.

The main aim of this study, carried out in collaboration with the University of California at San Diego (UCSD) and Stanford University (both in the US) is to characterize some aspects of gastropod (snails and slugs) locomotion to basically respond to one question: To what extent do they depend on the physical properties of their mucus to propel themselves forward? This question is fundamental when applying the studied mechanism to the construction of biomimetic robots. "The aim is for the robot to be able to propel itself in any fluid mucus without having to carry its own reserve of mucus along," explained one of the authors of the research study, Javier Rodríguez, Professor at the UC3M Department of Thermal and Fluids Engineering. "Bear in mind," he stated, "that snail mucus has a very particular behaviour because it is a specific type of fluid with complex physical characteristics called non-Newtonian fluid."

Until now, it was known that snails and slugs move by propagating their body in a series of muscular wave motions to advance from their tail to their head, but the importance of their mucus in this process was not known. The conclusion obtained by these scientists is that this fluid's properties are not essential for propulsion. "Without a doubt, it could have other uses, such as climbing walls, moving upside down, or preserving moisture in the body when on a dry surface, but if we want to construct a robot that emulates a snail, the latter could move over fluid mucus with ordinary properties" pointed out Professor Rodríguez, who has recently published an article on this matter, together with his colleagues from the North American universities, in the scientific review, *Journal of Experimental Biology*.

To carry out this study, the researchers have characterized the propagation of these muscular waves which occur along the body of gastropods. For this purpose, they place the snails and slugs so that they move on transparent surfaces, illuminating their undersides in different ways so as to record images through digital cameras, subsequently analyzing this data by computer. "The ways to illuminate the body vary depending on what is being measured," stated María Vázquez, research fellow from the UC3M Fluid Mechanics Group where she has collaborated in experiments carried out in Spain and in the US. "For example," she explained further, "to measure the speed of the wave, we placed a light on the underneath part of the snail, while to measure the vertical deformation of the body we used a low power flat laser (so as not to harm the animal) projected at a given angle." Together, all of these measures have allowed the 3D reconstruction of the snail's underside during propulsion.

Very diverse applications

The most surprising thing about snail movement is summed up very well in a phrase from a biology professor from Stanford University, Mark W. Denny, written in the 1980's: "How can an animal with just one leg walk on glue?" And the mucus is highly adhesive, which offers some advantages such as walking on walls and moving on the ceiling. Furthermore, as anyone who has ever held a snail in their hand can testify, when snails

move, they do not use force over specific points, as animals with legs do, but rather they distribute a relatively low force over a relatively large area. "What also happens," Professor Rodríguez pointed out, "is that it is difficult to move over glue without exerting quite a bit of force while dragging fluid along." Snails, after millions of years of evolution, have succeeded in being able to move on a highly adhesive surface, avoiding these inconveniences "which is without a doubt of interest and worthy of study," he added

This type of research can help in the design of biomimetic robots that carry out functions which conventional devices cannot do. Some Japanese researchers, for example, propose using the snail propulsion mechanism to move an endoscope though a human body (the trachea, intestines, etc), taking advantage of the mucus film that usually covers these ducts. "This mechanism," Javier Rodríguez remarked, "generates a smooth distribution of force instead of supporting itself in concrete points, which would reduce the irritation caused by the movement of an endoscope, in this case."

At the moment, the results published by the UC3M, UCSD and Stanford scientists only deal with the experimental part of study carried out, although they are working on a second article that includes a simple theoretical model which explains these animals' movement. The preliminary results were presented last November at the Annual Conference of The American Physical Society. In addition, these researchers are interested in extending their analysis to situations in which the animal moves up slopes of varying angles.

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Universidad Carlos III de Madrid - Oficina de Información Científica**.

Journal Reference:

1. J. H. Lai, J. C. del Alamo, J. Rodriguez-Rodriguez, J. C. Lasheras. **The mechanics of the adhesive locomotion of terrestrial gastropods**. *Journal of Experimental Biology*, 2010; 213 (22): 3920 DOI: 10.1242/jeb.046706

http://www.sciencedaily.com/releases/2011/03/110307101442.htm

Faster Method to Study Plant Ecology

Pictured here is the clonal plant community developed in France to exactly match the simulation conditions from professor Marc Garbey's work at the University of Houston. (Credit: Marc Garbey)

ScienceDaily (Mar. 7, 2011) — Cleaning up pollution, protecting soil from erosion and maintaining species-rich ecosystems are some of the goals of a computational ecology project by a University of Houston (UH) scientist and his team. Published recently in a top journal, the work sheds light on a new method to speed up research in the ecology of plants.

Marc Garbey, a professor of computer science and mathematics at UH, and his fellow researchers describe these findings in a paper titled "Large scale parameter study of an individual-based model of clonal plant with volunteer computing," appearing in a recent issue of *Ecological Modelling*. The journal covers the use of mathematical models and systems analysis in ecological processes and sustainable resource management.

"Most plant communities outside of forests are dominated by clonal plants, which are basically genetic clones of one another," Garbey said. "These plants are able to colonize space by vegetative reproduction, and the clonal plant communities such as grasslands are of tremendous importance to humanity."

Underscoring their importance, Garbey says that prairies are used for raising cattle and may support biodiversity, as well as play an important role in regulating carbon emissions. These ecological functions will be increasingly important in the future framework of global change. Ecologists wish to better understand how clonal plant arrangements may have an effect on these functions. That's where Garbey's talents as a computational scientist come in.

His team's research looks at the interactions between plants and their dynamics, using a "virtual prairie" that involves trying to understand clonal strategies in complex ecological systems. His main collaborator is his daughter, Cendrine Mony, an assistant professor in ecology at the University of Rennes in France, and they published their first paper together on this topic five years ago. While Mony and her collaborators provide expertise in the ecology of plants, Garbey's group provides capabilities in computational science.

"We grow plants virtually, mimicking nature to try to get the fundamental mechanism of how a community changes in time and space, by comparing our computer simulation with a special series of live experiments done in France," Garbey said. "Once the model works, we manipulate the plant growth in our computers simulating a series of 'bad' scenarios, such as lack of water and nutrients, intensive grazing or mowing and adding virtual pollution. Our computer simulations dramatically increase our capability to test various scenarios or ideas."

Using this method, the researchers would ultimately be able to design the ideal prairies by combining the right species that would offer a variety of ecological benefits. Among these benefits are creating prairies able to clean up nitrate pollution so that it does not go back into the water system, providing stability where vulnerable species can coexist and preventing erosion by repairing the ground.

In addition to the various field experiments, a crucial element in this research is the thousands of volunteers around the world who donate time and space on their computers. To carry out these time- and space-intensive computer simulations efficiently, Garbey and his collaborators relied on their virtual prairie program's more than 10,000 volunteers in 90 countries. This is an arrangement where people volunteer to provide computing

resources on their personal PCs for information processing, problem solving and storage of the researchers' work. The virtual prairie project extensively uses the open-source software computing platform of David Anderson, a professor in the University of California, Berkeley's space sciences laboratory and adjunct professor in the computer science department at UH.

Beyond the help that it provides Garbey's project, benefits of volunteer computing include encouraging public interest in science and providing the public with a voice in determining the directions of scientific research. While volunteers are typically members of the general public who own Internet-connected PCs, organizations such as schools and businesses also may volunteer the use of their computers.

"Ecology of plants is important for us, as well as the next generation, and large-scale computer simulation with virtual prairies is going to change the way we do research and drive experiments," Garbey said. "It is a wonderful concept to engage volunteers all around the world in this new kind of science and also may be used to improve other types of ecosystems in the future."

The project has consistently been funded by top research agencies in France, including the National Agency for Research, the National Center for Scientific Research, the Institute for Research in Science and Technology for the Environment, and the National Institute for Research in Computer Science and Control. At UH, Garbey worked with Ph.D. candidates Malek Smaoui and Waree Rinsurongkawong. At the University of Rennes, Mony's team consisted of professor Bernard Clement and Ph.D. candidates Marie-Lise Benot and Anne-Kristel Bittebiere. Benot is now a post-doctoral researcher at the Laboratory of Alpine Ecology in Grenoble, France.

Story Source:

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

Journal Reference:

1. C. Mony, M. Garbey, M. Smaoui, M.-L. Benot. **Large scale parameter study of an individual-based model of clonal plant with volunteer computing**. *Ecological Modelling*, 2011; 222 (4): 935 DOI: 10.1016/j.ecolmodel.2010.10.014

http://www.sciencedaily.com/releases/2011/03/110307093025.htm

Unique Frog Helps Amphibian Conservation Efforts

The A.annae/A.moreletii hybrid frog. (Credit: Copyright A. Gray)

ScienceDaily (Mar. 7, 2011) — A tropical frog -- the only one of its kind in the world -- is providing conservationists with exclusive insights into the genetic make-up of its closest endangered relatives.

University of Manchester scientists have allowed two critically endangered species of Central American Leaf frogs to interbreed, producing the unique frog -- a hybrid of the two species. DNA tests using a harmless mouth swab showed that the two parent frogs were actually very closely related despite being different species.

The findings are important because DNA tests on frogs of the same species but from different geographical areas have revealed considerable genetic differences. The scientists therefore suggest that conservation efforts should not only focus on each endangered species of frog but also on different populations of the same frog species.

"Almost a third of the world's amphibians are threatened with extinction, so it is imperative that we identify distinct populations of critically endangered species before they are lost forever," said Andrew Gray, Curator of Herpetology at the University's Manchester Museum.

"Through allowing interbreeding, and using DNA samples taken from the frogs' mouth, this work investigates the amount of variation both between and within species. More importantly, it is helping determine where conservation efforts should be concentrated and highlighting that some populations of critically endangered amphibians are in desperate need of further protection."

In the past, an animal's appearance, including its coloration, defined it. But phylogenetics -- the study of evolutionary relatedness of species through genetics -- is becoming increasingly important in helping biologists identify separate species in need of conservation.

The unique Leaf frog, which is maintained at the Manchester Museum, was bred from the two species *Agalychnis annae*, from Costa Rica and Panama, and *Agalychnis moreletii*, which is found in humid highland tropical forests ranging from southern Mexico to central Guatemala, El Salvador, Honduras and Belize.

"Allowing the interbreeding of amphibians has proven particularly useful in providing evidence for the inheritance of genes, including certain color pattern traits," said Andrew. "The study has shown that the two

species used to produce the hybrid frog are extremely closely related. However, they should continue to be considered as separate, both for classification and conservation purposes.
"It is also important to recognize the levels of variation in distinct populations of other closely related species. If conservation is our prime objective, it follows that separate populations of the same species should also be conserved for the future as distinct entities and future studies should focus on assessing the levels of variation in the different populations of these wonderful creatures."

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

Journal Reference:

1. Andrew Gray. **Notes on Hybridization in Leaf frogs of the genus Agalychnis (Anura, Hylidae, Phyllomedusinae)**. *arXiv*, 2011; [link]

http://www.sciencedaily.com/releases/2011/03/110307065543.htm

Loss of Plant Diversity Threatens Earth's Life-Support Systems, Experts Say

Seagrass biodiversity: Because seagrass habitat depends on a few species of plants, lost species are often not replaced, and the effects may ripple up to fishery species. (Credit: Jonathan Lefcheck)

ScienceDaily (Mar. 7, 2011) — n international team of researchers including professor Emmett Duffy of the Virginia Institute of Marine Science has published a comprehensive new analysis showing that loss of plant biodiversity disrupts the fundamental services that ecosystems provide to humanity.

Plant communities -- threatened by development, invasive species, climate change, and other factors -- provide humans with food, help purify water supplies, generate oxygen, and supply raw materials for building, clothing, paper, and other products.

The 9-member research team, led by professor Brad Cardinale of the University of Michigan, analyzed the results of 574 field and laboratory studies -- conducted across 5 continents during the last 2 decades -- that measured the changes in productivity resulting from loss of plants species. This type of "meta-analysis" allows researchers to move beyond their own individual or collaborative studies to get a much more reliable global picture. Their study appears in the March special biodiversity issue of the *American Journal of Botany*.

"The idea that declining diversity compromises the functioning of ecosystems was controversial for many years," says Duffy, a marine ecologist who has studied the effects of biodiversity loss in seagrass beds. "This paper should be the final nail in the coffin of that controversy. It's the most rigorous and comprehensive analysis yet, and it clearly shows that extinction of plant species compromises the productivity that supports Earth's ecosystems."

The team's analysis shows that plant communities with many different species are nearly 1.5 times more productive than those with only one species (such as a cornfield or carefully tended lawn), and ongoing research finds even stronger benefits of diversity when the various other important natural services of ecosystems are considered. Diverse communities are also more efficient at capturing nutrients, light, and other limiting resources.

The analysis also suggests, based on laboratory studies of algae, that diverse plant communities generate oxygen -- and take-up carbon dioxide -- more than twice as fast as plant monocultures.

The team's findings are consistent for plant communities both on land and in fresh- and saltwater, suggesting that plant biodiversity is of general and fundamental importance to the functioning of Earth's entire biosphere.

Duffy, Loretta and Lewis Glucksman Professor of Marine Science at VIMS, says the team's findings are important locally because estuaries like Chesapeake Bay are naturally low in plant diversity, making them especially vulnerable to ecological surprises resulting from loss of species.

"Salt marshes and seagrass beds depend largely on one or a few species of plants that create the habitat structure," says Duffy. "When such species are lost, low diversity means there is often no one else to take their place and the effects can ripple out through the community of animals, potentially up to fishery species."

In addition to analyzing the general effects of biodiversity loss, the team also sought to determine the specific fraction of plant species needed to maintain the effective functioning of a particular ecosystem -- important information for resource managers with limited human and financial resources to manage forests, marine reserves, and other protected areas on land and sea. The results of this effort were mixed, and the team's ongoing research is tackling this question.

Data from the study did suggest, however, that biodiversity loss may follow a "tipping-point" model wherein some fraction of species can be lost with minimal change to ecological processes, followed by a sharp drop in ecosystem function as species loss continues.

Biodiversity loss in the real world

Recognizing that their findings mostly rest on analysis of short-term experiments (generally a few days, weeks, or months) in relatively small settings, the researchers also attempted to determine how diversity effects "scale-up" to longer time scales, bigger areas, or both. The authors note that these are the real-world scales "at which species extinctions actually matter and at which conservation and management efforts take place."

The team's findings suggest that scale does indeed matter, and that small laboratory and field experiments typically underestimate the effects of biodiversity loss. In the researchers' own words, "Data are generally consistent with the idea that the strength of diversity effects are stronger in experiments that run longer, and in experiments performed at larger spatial scales."

Duffy is now further testing this scaling issue with a 3-year grant from the U.S. National Science Foundation. He is using the grant to establish a global experimental network for studying how nutrient pollution and changes in biodiversity impact seagrass beds.

Study co-author Jarrett Byrnes, of the National Center for Ecological Analyses and Synthesis, says "Species extinction is happening now, and it's happening quickly. And unfortunately, our resources are limited. This means we're going to have to prioritize our conservation efforts, and to do that, scientists have to start providing concrete answers about the numbers and types of species that are needed to sustain human life. If we don't produce these estimates quickly, then we risk crossing a threshold that we can't come back from."

Story Source:

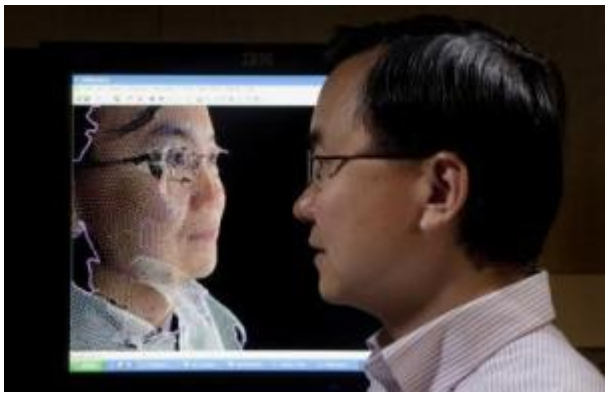
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Virginia Institute of Marine Science**.

Journal Reference:

1. B. J. Cardinale, K. L. Matulich, D. U. Hooper, J. E. Byrnes, E. Duffy, L. Gamfeldt, P. Balvanera, M. I. O'Connor, A. Gonzalez. **The functional role of producer diversity in ecosystems**. *American Journal of Botany*, 2011; DOI: 10.3732/ajb.1000364

http://www.sciencedaily.com/releases/2011/03/110303153116.htm

Human Cues Used to Improve Computer User-Friendliness



Binghamton University researcher Lijun Yin hopes that his work in computer graphics and computer vision will make computers easier to use. (Credit: Jonathan Cohen)

ScienceDaily (Mar. 6, 2011) — Lijun Yin wants computers to understand inputs from humans that go beyond the traditional keyboard and mouse.

"Our research in computer graphics and computer vision tries to make using computers easier," says the Binghamton University computer scientist. "Can we find a more comfortable, intuitive and intelligent way to use the computer? It should feel like you're talking to a friend. This could also help disabled people use computers the way everyone else does."

Yin's team has developed ways to provide information to the computer based on where a user is looking as well as through gestures or speech. One of the basic challenges in this area is "computer vision." That is, how can a simple webcam work more like the human eye? Can camera-captured data understand a real-world object? Can this data be used to "see" the user and "understand" what the user wants to do?

To some extent, that's already possible. Witness one of Yin's graduate students giving a PowerPoint presentation and using only his eyes to highlight content on various slides. When Yin demonstrated this technology for Air Force experts last year, the only hardware he brought was a webcam attached to a laptop computer.

Yin says the next step would be enabling the computer to recognize a user's emotional state. He works with a well-established set of six basic emotions -- anger, disgust, fear, joy, sadness, and surprise -- and is experimenting with different ways to allow the computer to distinguish among them. Is there enough data in the way the lines around the eyes change? Could focusing on the user's mouth provide sufficient clues? What happens if the user's face is only partially visible, perhaps turned to one side?

"Computers only understand zeroes and ones," Yin says. "Everything is about patterns. We want to find out how to recognize each emotion using only the most important features."

He's partnering with Binghamton University psychologist Peter Gerhardstein to explore ways this work could benefit children with autism. Many people with autism have difficulty interpreting others' emotions; therapists sometimes use photographs of people to teach children how to understand when someone is happy or sad and so forth. Yin could produce not just photographs, but three-dimensional avatars that are able to display a range of emotions. Given the right pictures, Yin could even produce avatars of people from a child's family for use in this type of therapy.

Yin and Gerhardstein's previous collaboration led to the creation of a 3D facial expression database, which includes 100 subjects with 2,500 facial expression models. The database is available at no cost to the nonprofit research community and has become a worldwide test bed for those working on related projects in fields such as biomedicine, law enforcement and computer science.

Once Yin became interested in human-computer interaction, he naturally grew more excited about the possibilities for artificial intelligence.

"We want not only to create a virtual-person model, we want to understand a real person's emotions and feelings," Yin says. "We want the computer to be able to understand how you feel, too. That's hard, even harder than my other work."

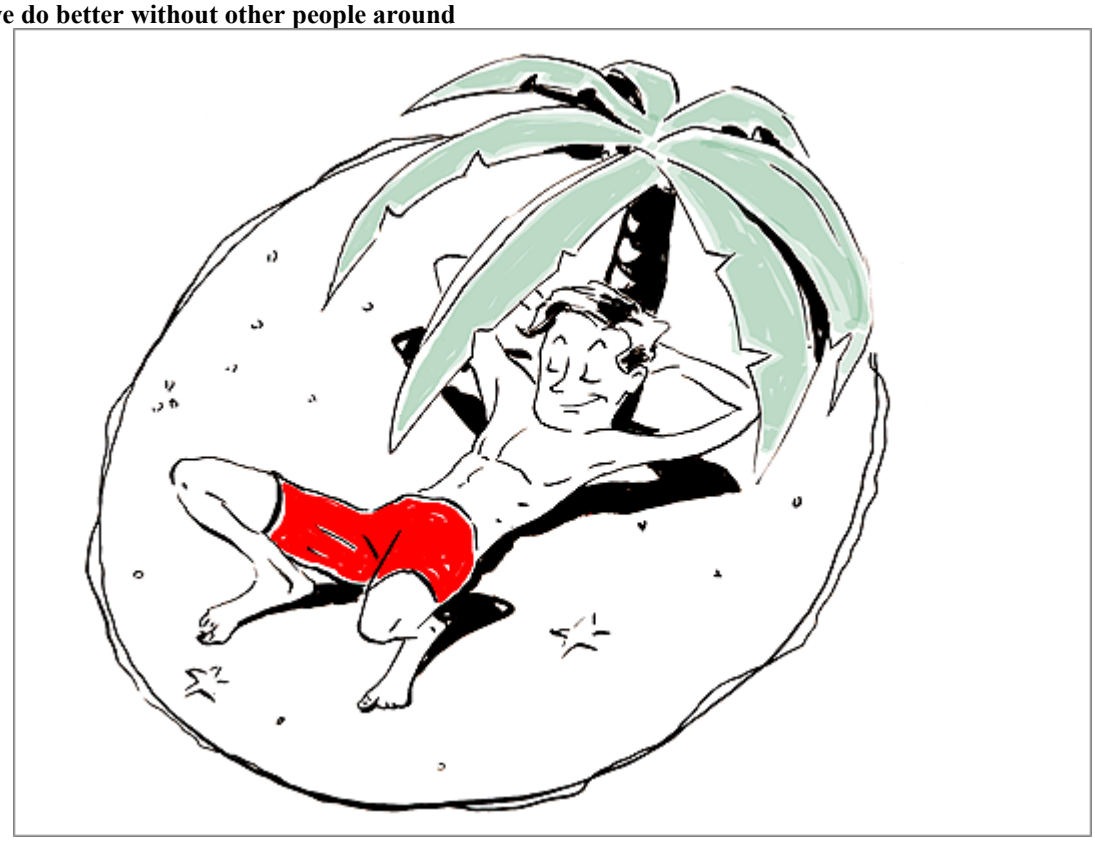
Imagine if a computer could understand when people are in pain. Some may ask a doctor for help. But others -- young children, for instance -- cannot express themselves or are unable to speak for some reason. Yin wants to develop an algorithm that would enable a computer to determine when someone is in pain based just on a photograph.
Yin describes that health-care application and, almost in the next breath, points out that the same system that could identify pain might also be used to figure out when someone is lying. Perhaps a computer could offer insights like the ones provided by Tim Roth's character, Dr. Cal Lightman, on the television show Lie to Me. The fictional character is a psychologist with an expertise in tracking deception who often partners with law-enforcement agencies.
"This technology," Yin says, "could help us to train the computer to do facial-recognition analysis in place of experts."

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

http://www.sciencedaily.com/releases/2011/03/110304151016.htm

The power of lonely

What we do better without other people around



(Tim Gabor for The Boston Globe)
By Leon Neyfakh March 6, 2011

You hear it all the time: We humans are social animals. We need to spend time together to be happy and functional, and we extract a vast array of benefits from maintaining intimate relationships and associating with groups. Collaborating on projects at work makes us smarter and more creative. Hanging out with friends makes us more emotionally mature and better able to deal with grief and stress.

Spending time alone, by contrast, can look a little suspect. In a world gone wild for wikis and interdisciplinary collaboration, those who prefer solitude and private noodling are seen as eccentric at best and defective at worst, and are often presumed to be suffering from social anxiety, boredom, and alienation.

But an emerging body of research is suggesting that spending time alone, if done right, can be good for us — that certain tasks and thought processes are best carried out without anyone else around, and that even the most socially motivated among us should regularly be taking time to ourselves if we want to have fully developed personalities, and be capable of focus and creative thinking. There is even research to suggest that blocking off enough alone time is an important component of a well-functioning social life — that if we want to get the most out of the time we spend with people, we should make sure we're spending enough of it away from them. Just as regular exercise and healthy eating make our minds and bodies work better, solitude experts say, so can being alone.

One ongoing Harvard study indicates that people form more lasting and accurate memories if they believe they're experiencing something alone. Another indicates that a certain amount of solitude can make a person more capable of empathy towards others. And while no one would dispute that too much isolation early in life can be unhealthy, a certain amount of solitude has been shown to help teenagers improve their moods and earn good grades in school.

"There's so much cultural anxiety about isolation in our country that we often fail to appreciate the benefits of solitude," said Eric Klinenberg, a sociologist at New York University whose book "Alone in America," in which he argues for a reevaluation of solitude, will be published next year. "There is something very liberating for people about being on their own. They're able to establish some control over the way they spend their time. They're able to decompress at the end of a busy day in a city...and experience a feeling of freedom."

Figuring out what solitude is and how it affects our thoughts and feelings has never been more crucial. The latest Census figures indicate there are some 31 million Americans living alone, which accounts for more than a quarter of all US households. And at the same time, the experience of being alone is being transformed dramatically, as more and more people spend their days and nights permanently connected to the outside world through cellphones and computers. In an age when no one is ever more than a text message or an e-mail away from other people, the distinction between "alone" and "together" has become hopelessly blurry, even as the potential benefits of true solitude are starting to become clearer.

Solitude has long been linked with creativity, spirituality, and intellectual might. The leaders of the world's great religions — Jesus, Buddha, Mohammed, Moses — all had crucial revelations during periods of solitude. The poet James Russell Lowell identified solitude as "needful to the imagination;" in the 1988 book "Solitude: A Return to the Self," the British psychiatrist Anthony Storr invoked Beethoven, Kafka, and Newton as examples of solitary genius.

But what actually happens to people's minds when they are alone? As much as it's been exalted, our understanding of how solitude actually works has remained rather abstract, and modern psychology — where you might expect the answers to lie — has tended to treat aloneness more as a problem than a solution. That was what Christopher Long found back in 1999, when as a graduate student at the University of Massachusetts Amherst he started working on a project to precisely define solitude and isolate ways in which it could be experienced constructively. The project's funding came from, of all places, the US Forest Service, an agency with a deep interest in figuring out once and for all what is meant by "solitude" and how the concept could be used to promote America's wilderness preserves.

With his graduate adviser and a researcher from the Forest Service at his side, Long identified a number of different ways a person might experience solitude and undertook a series of studies to measure how common they were and how much people valued them. A 2003 survey of 320 UMass undergraduates led Long and his coauthors to conclude that people felt good about being alone more often than they felt bad about it, and that psychology's conventional approach to solitude — an "almost exclusive emphasis on loneliness" — represented an artificially narrow view of what being alone was all about.

"Aloneness doesn't have to be bad," Long said by phone recently from Ouachita Baptist University, where he is an assistant professor. "There's all this research on solitary confinement and sensory deprivation and astronauts and people in Antarctica — and we wanted to say, look, it's not just about loneliness!"

Today other researchers are eagerly diving into that gap. Robert Coplan of Carleton University, who studies children who play alone, is so bullish on the emergence of solitude studies that he's hoping to collect the best contemporary research into a book. Harvard professor Daniel Gilbert, a leader in the world of positive psychology, has recently overseen an intriguing study that suggests memories are formed more effectively when people think they're experiencing something individually.

That study, led by graduate student Bethany Burum, started with a simple experiment: Burum placed two individuals in a room and had them spend a few minutes getting to know each other. They then sat back to back, each facing a computer screen the other could not see. In some cases they were told they'd both be doing the same task, in other cases they were told they'd be doing different things. The computer screen scrolled through a set of drawings of common objects, such as a guitar, a clock, and a log. A few days later the participants returned and were asked to recall which drawings they'd been shown. Burum found that the participants who had been told the person behind them was doing a different task — namely, identifying sounds rather than looking at pictures — did a better job of remembering the pictures. In other words, they formed more solid memories when they believed they were the only ones doing the task.

The results, which Burum cautions are preliminary, are now part of a paper on "the coexperiencing mind" that was recently presented at the Society for Personality and Social Psychology conference. In the paper, Burum offers two possible theories to explain what she and Gilbert found in the study. The first invokes a well-known concept from social psychology called "social loafing," which says that people tend not to try as hard

if they think they can rely on others to pick up their slack. (If two people are pulling a rope, for example, neither will pull quite as hard as they would if they were pulling it alone.) But Burum leans toward a different explanation, which is that sharing an experience with someone is inherently distracting, because it compels us to expend energy on imagining what the other person is going through and how they're reacting to it.
"People tend to engage quite automatically with thinking about the minds of other people," Burum said in an interview. "We're multitasking when we're with other people in a way that we're not when we just have an experience by ourselves."
Perhaps this explains why seeing a movie alone feels so radically different than seeing it with friends: Sitting there in the theater with nobody next to you, you're not wondering what anyone else thinks of it; you're not anticipating the discussion that you'll be having about it on the way home. All your mental energy can be directed at what's happening on the screen. According to Greg Feist, an associate professor of psychology at the San Jose State University who has written about the connection between creativity and solitude, some version of that principle may also be at work when we simply let our minds wander: When we let our focus shift away from the people and things around us, we are better able to engage in what's called meta-cognition, or the process of thinking critically and reflectively about our own thoughts.
Other psychologists have looked at what happens when other people's minds don't just take up our bandwidth, but actually influence our judgment. It's well known that we're prone to absorb or mimic the opinions and body language of others in all sorts of situations, including those that might seem the most intensely individual, such as who we're attracted to. While psychologists don't necessarily think of that sort of influence as "clouding" one's judgment — most would say it's a mechanism for learning, allowing us to benefit from information other people have access to that we don't — it's easy to see how being surrounded by other people could hamper a person's efforts to figure out what he or she really thinks of something.
Teenagers, especially, whose personalities have not yet fully formed, have been shown to benefit from time spent apart from others, in part because it allows for a kind of introspection — and freedom from self-consciousness — that strengthens their sense of identity. Reed Larson, a professor of human development at the University of Illinois, conducted a study in the 1990s in which adolescents outfitted with beepers were prompted at irregular intervals to write down answers to questions about who they were with, what they were doing, and how they were feeling. Perhaps not surprisingly, he found that when the teens in his sample were alone, they reported feeling a lot less self-conscious. "They want to be in their bedrooms because they want to get away from the gaze of other people," he said.
The teenagers weren't necessarily happier when they were alone; adolescence, after all, can be a particularly tough time to be separated from the group. But Larson found something interesting: On average, the kids in his sample felt better after they spent some time alone than they did before. Furthermore, he found that kids who spent between 25 and 45 percent of their nonclass time alone tended to have more positive emotions over the course of the weeklong study than their more socially active peers, were more successful in school and were less likely to self-report depression.
"The paradox was that being alone was not a particularly happy state," Larson said. "But there seemed to be kind of a rebound effect. It's kind of like a bitter medicine."
The nice thing about medicine is it comes with instructions. Not so with solitude, which may be tremendously good for one's health when taken in the right doses, but is about as user-friendly as an unmarked white pill. Too much solitude is unequivocally harmful and broadly debilitating, decades of research show. But one person's "too much" might be someone else's "just enough," and eyeballing the difference with any precision is next to impossible.
Research is still far from offering any concrete guidelines. Insofar as there is a consensus among solitude researchers, it's that in order to get anything positive out of spending time alone, solitude should be a choice: People must feel like they've actively decided to take time apart from people, rather than being forced into it against their will.
Overextended parents might not need any encouragement to see time alone as a desirable luxury; the question for them is only how to build it into their frenzied lives. But for the millions of people living by themselves, making time spent alone time productive may require a different kind of effort. Sherry Turkle, director of the MIT Initiative on Technology and Self, argues in her new book, "Alone, Together," that people should be mindfully setting aside chunks of every day when they are not engaged in so-called social snacking activities

like texting, g-chatting, and talking on the phone. For teenagers, it may help to understand that feeling a little lonely at times may simply be the price of forging a clearer identity.

John Cacioppo of the University of Chicago, whose 2008 book "Loneliness" with William Patrick summarized a career's worth of research on all the negative things that happen to people who can't establish connections with others, said recently that as long as it's not motivated by fear or social anxiety, then spending time alone can be a crucially nourishing component of life. And it can have some counterintuitive effects: Adam Waytz in the Harvard psychology department, one of Cacioppo's former students, recently completed a study indicating that people who are socially connected with others can have a hard time identifying with people who are more distant from them. Spending a certain amount of time alone, the study suggests, can make us less closed off from others and more capable of empathy — in other words, better social animals.

"People make this error, thinking that being alone means being lonely, and not being alone means being with other people," Cacioppo said. "You need to be able to recharge on your own sometimes. Part of being able to connect is being available to other people, and no one can do that without a break."

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http://www.boston.com/bostonglobe/ideas/articles/2011/03/06/the_power_of_lonely/?page=full

New Switching Device Could Help Build an Ultrafast 'Quantum Internet'

A new switching device could be used to develop a 'quantum Internet,' where encrypted information would be completely secure, and networking superfast quantum computers. (Credit: iStockphoto/Andrey Prokhorov)

ScienceDaily (Mar. 10, 2011) — Northwestern University researchers have developed a new switching device that takes quantum communication to a new level. The device is a practical step toward creating a network that takes advantage of the mysterious and powerful world of quantum mechanics.

The researchers can route quantum bits, or entangled particles of light, at very high speeds along a shared network of fiber-optic cable without losing the entanglement information embedded in the quantum bits. The switch could be used toward achieving two goals of the information technology world: a quantum Internet, where encrypted information would be completely secure, and networking superfast quantum computers.

The device would enable a common transport mechanism, such as the ubiquitous fiber-optic infrastructure, to be shared among many users of quantum information. Such a system could route a quantum bit, such as a photon, to its final destination just like an e-mail is routed across the Internet today.

The research -- a demonstration of the first all-optical switch suitable for single-photon quantum communications -- is published by the journal *Physical Review Letters*.

"My goal is to make quantum communication devices very practical," said Prem Kumar, AT&T Professor of Information Technology in the McCormick School of Engineering and Applied Science and senior author of the paper. "We work in fiber optics so that as quantum communication matures it can easily be integrated into the existing telecommunication infrastructure."

The bits we all know through standard, or classical, communications only exist in one of two states, either "1" or "0." All classical information is encoded using these ones and zeros. What makes a quantum bit, or qubit, so attractive is it can be both one and zero simultaneously as well as being one or zero. Additionally, two or more qubits at different locations can be entangled -- a mysterious connection that is not possible with ordinary bits.

Researchers need to build an infrastructure that can transport this "superposition and entanglement" (being one and zero simultaneously) for quantum communications and computing to succeed.

The qubit Kumar works with is the photon, a particle of light. A photonic quantum network will require switches that don't disturb the physical characteristics (superposition and entanglement properties) of the photons being transmitted, Kumar says. He and his team built an all-optical, fiber-based switch that does just that while operating at very high speeds.

To demonstrate their switch, the researchers first produced pairs of entangled photons using another device developed by Kumar, called an Entangled Photon Source. "Entangled" means that some physical characteristic (such as polarization as used in 3-D TV) of each pair of photons emitted by this device are inextricably linked. If one photon assumes one state, its mate assumes a corresponding state; this holds even if the two photons are hundreds of kilometers apart.

The researchers used pairs of polarization-entangled photons emitted into standard telecom-grade fiber. One photon of the pair was transmitted through the all-optical switch. Using single-photon detectors, the

researchers found that the quantum state of the pair of photons was not disturbed; the encoded entanglement information was intact.
"Quantum communication can achieve things that are not possible with classical communication," said Kumar, director of Northwestern's Center for Photonic Communication and Computing. "This switch opens new doors for many applications, including distributed quantum processing where nodes of small-scale quantum processors are connected via quantum communication links."

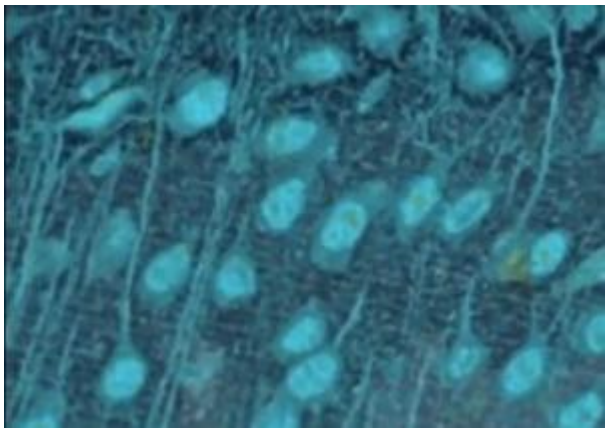
Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Northwestern University**, via EurekAlert!, a service of AAAS.

Journal Reference:

1. Matthew Hall, Joseph Altepeter, Prem Kumar. **Ultrafast Switching of Photonic Entanglement**. *Physical Review Letters*, 2011; 106 (5) DOI: 10.1103/PhysRevLett.106.053901

http://www.sciencedaily.com/releases/2011/03/110310131058.htm

Web-Crawling the Brain: 3-D Nanoscale Model of Neural Circuit Created



Researchers have created a three-dimensional nanoscale model of a neural circuit using electron microscopy. As a result, the researchers can crawl these vast neural networks much as Google crawls Web links. (Credit: Image courtesy of Harvard Medical School Office of Communications)

ScienceDaily (Mar. 10, 2011) — The brain is a black box. A complex circuitry of neurons fires information through channels, much like the inner workings of a computer chip. But while computer processors are regimented with the deft economy of an assembly line, neural circuits are impenetrable masses. Think tumbleweed.

Researchers in Harvard Medical School's Department of Neurobiology have developed a technique for unraveling these masses. Through a combination of microscopy platforms, researchers can crawl through the individual connections composing a neural network, much as Google crawls Web links.

"The questions that such a technique enables us to address are too numerous even to list," said Clay Reid, HMS professor of neurobiology and senior author on a paper reporting the findings in the March 10 edition of *Nature*.

The cerebral cortex is arguably the most important part of the mammalian brain. It processes sensory input, reasoning and, some say, even free will. For the past century, researchers have understood the broad outline of cerebral cortex anatomy. In the past decade, imaging technologies have allowed us to see neurons at work within a cortical circuit, to watch the brain process information.

But while these platforms can show us what a circuit does, they don't show us how it operates.

For many years, Reid's lab has been studying the cerebral cortex, adapting ways to hone the detail with which we can view the brain at work. Recently they and others have succeeded in isolating the activities of individual neurons, watching them fire in response to external stimuli.

The ultimate prize, however, would be to get inside a single cortical circuit and probe the architecture of its wiring.

Just one of these circuits, however, contains between 10,000 and 100,000 neurons, each of which makes about 10,000 interconnections, totaling upwards of 1 billion connections -- all within a single circuit. "This is a radically hard problem to address," Reid said.

Reid's team, which included Davi Bock, then a graduate student, and postdoctoral researcher Wei-Chung Allen Lee, embarked on a two-part study of the pinpoint-sized region of a mouse brain that is involved in processing vision. They first injected the brain with dyes that flashed whenever specific neurons fired and recorded the firings using a laser-scanning microscope. They then conducted a large anatomy experiment, using electron microscopy to see the same neurons and hundreds of others with nanometer resolution.

Using a new imaging system they developed, the team recorded more than 3 million high-resolution images. They sent them to the Pittsburgh Supercomputing Center at Carnegie Mellon University, where researchers stitched them into 3-D images. Using the resulting images, Bock, Lee and laboratory technician Hyon Suk Kim selected 10 individual neurons and painstakingly traced many of their connections, crawling through the brain's dense thicket to create a partial wiring diagram.

This model also yielded some interesting insights into how the brain functions. Reid's group found that neurons tasked with suppressing brain activity seem to be randomly wired, putting the lid on local groups of

neurons all at once rather than picking and choosing. Such findings are important because many neurological conditions, such as epilepsy, are the result of neural inhibition gone awry.
"This is just the iceberg's tip," said Reid. "Within ten years I'm convinced we'll be imaging the activity of thousands of neurons in a living brain. In a visual circuit, we'll interpret the data to reconstruct what an animal actually sees. By that time, with the anatomical imaging, we'll also know how it's all wired together."
For now, Reid and his colleagues are working to scale up this platform to generate larger data sets.
"How the brain works is one of the greatest mysteries in nature," Reid added, "and this research presents a new and powerful way for us to explore that mystery."
This research was funded by the Center for Brain Science at Harvard University, Microsoft Research, and the NIH though the National Eye Institute. Researchers report no conflicts of interest.

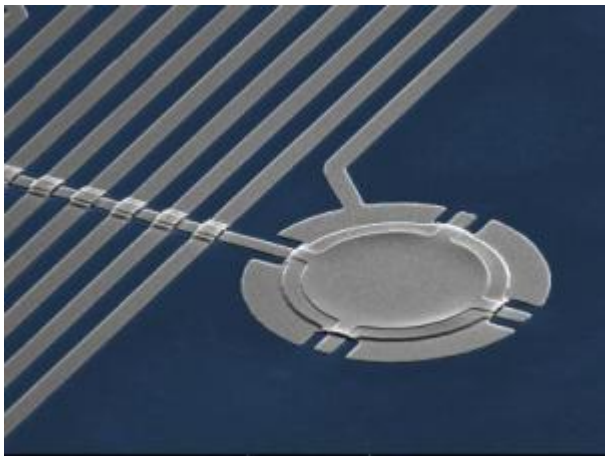
Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Harvard Medical School**. The original article was written by David Cameron.

Journal Reference:

1. Davi D. Bock et al. **Network anatomy and in vivo physiology from a group of visual cortical neurons**. *Nature*, March 11, 2011, Volume 471 Number 7337 DOI: 10.1038/nature09802

http://www.sciencedaily.com/releases/2011/03/110309131928.htm

Electromechanical Circuit Sets Record Beating Microscopic 'Drum'



This is a colorized micrograph of NIST's aluminum drum, which is 15 micrometers in diameter and 100 nanometers thick. The drum is used in quantum information experiments and ultraprecise measurements of mechanical motion. (Credit: A. Sanders/NIST)

ScienceDaily (Mar. 10, 2011) — Physicists at the National Institute of Standards and Technology (NIST) have demonstrated an electromechanical circuit in which microwaves communicate with a vibrating mechanical component 1,000 times more vigorously than ever achieved before in similar experiments. The microscopic apparatus is a new tool for processing information and potentially could control the motion of a relatively large object at the smallest possible, or quantum, scale.

Described in the March 10 issue of *Nature*, the NIST experiments created strong interactions between microwave light oscillating 7.5 billion times per second and a "micro drum" vibrating at radio frequencies 11 million times per second. Compared to previously reported experiments combining microscopic machines and electromagnetic radiation, the rate of energy exchange in the NIST device -- the "coupling" that reflects the strength of the connection -- is much stronger, the mechanical vibrations last longer, and the apparatus is much easier to make.

Similar in appearance to an Irish percussion instrument called a bodhrán, the NIST drum is a round aluminum membrane 100 nanometers thick and 15 micrometers wide, lightweight and flexible enough to vibrate freely yet larger and heavier than the nanowires typically used in similar experiments.

"The drum is so much larger than nanowires physically that you can make this coupling strength go through the roof," says first author John Teufel, a NIST research affiliate who designed the drum. "The drum hits a perfect compromise where it's still microscale but you can couple to it strongly."

The NIST experiments shifted the microwave energy by 56 megahertz (MHz, or million cycles per second) per nanometer of drum motion, 1,000 times more than the previous state of the art.

"We turned up the rate at which these two things talk to each other," Teufel says.

The drum is incorporated into a superconducting cavity cooled to 40 milliKelvin, a temperature at which aluminum allows electric current to flow without resistance -- a quantum property. Scientists apply microwaves to the cavity. Then, by applying a drive tone set at the difference between the frequencies of the microwave radiation particles (photons) and the drum, researchers dramatically increase the overall coupling strength to make the two systems communicate faster than their energy dissipates. The microwaves can be used to measure and control the drum vibrations, and vice versa. The drum motion will persist for hundreds of microseconds, according to the paper, a relatively long time in the fast-paced quantum world.

In engineering terms, the drum acts as a capacitor -- a device that holds electric charge. Its capacitance, or ability to hold charge, depends on the position of the drum about 50 nanometers above an aluminum electrode. When the drum vibrates, the capacitance changes and the mechanical motion modulates the properties of the electrical circuit. The same principle is at work with a microphone and FM radio, but here the natural drum motion, mostly at one frequency, is transmitted to the listener in the lab.

The experiment is a step towards entanglement -- a curious quantum state linking the properties of objects -- between the microwave photons and the drum motion, Teufel says. The apparatus has the high coupling

strength and low energy losses needed to generate entanglement, he says. Further experiments will address whether the mechanical drumbeats obey the rules of quantum mechanics, which govern the behavior of light and atoms.

The drum is a key achievement in NIST's effort to develop components for superconducting quantum computers and quantum simulations, while also working toward the widely sought scientific goal of making the most precise measurements possible of mechanical motion.

Quantum computers, if they can be built, could solve certain problems that are intractable today. The microwave and radiofrequency signals in the new electromechanical circuit could be used to represent quantum information. NIST scientists plan to combine the new circuit with superconducting quantum bits to create and manipulate motion of relatively large objects on the smallest (quantum) scales.

The experiment reported in *Nature* is a prelude to cooling the drum to its "ground state," or lowest-energy state. Starting from the ground state, the drum could be manipulated for the applications mentioned above. In addition, such control would enable tests of the boundary between the everyday classical and quantum worlds.

The drum also has possible practical applications such as measuring length and force with sensitivities at levels of attometers (billionths of a billionth of a meter) and attonewtons (billionths of a billionth of a newton), respectively.

As a non-regulatory agency, NIST promotes U.S. innovation and industrial competitiveness by advancing measurement science, standards and technology in ways that enhance economic security and improve our quality of life.

Story Source:

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

Journal Reference:

1. J. D. Teufel, Dale Li, M. S. Allman, K. Cicak, A. J. Sirois, J. D. Whittaker, R. W. Simmonds. **Circuit cavity electromechanics in the strong-coupling regime**. *Nature*, 2011; 471 (7337): 204 DOI: 10.1038/nature09898

http://www.sciencedaily.com/releases/2011/03/110309131926.htm

Cell Component Involved in Triggering Cat Allergy Identified

Cat. Cat dander consists of microscopic pieces of cat skin which easily become airborne. (Credit: Copyright Michele Hogan)

ScienceDaily (Mar. 9, 2011) — A breakthrough by scientists at The University of Nottingham could provide hope for any allergy sufferers who have ever had to choose between their health and their household pet.

The team of immunologists led by Drs Ghaem-Maghami and Martinez-Pomares in the University's School of Molecular Medical Sciences, and funded by the charity Asthma UK, have identified a cell component which plays a key role in triggering allergic responses to cat dander.

The discovery furthers our understanding of how the body's immune system identifies and reacts to allergens, which could pave the way in developing new ways of treating allergies.

The development is especially good news for the millions of people with asthma whose condition is often worsened by their allergy to airborne allergens from cat dander or house dust mite. Cat dander consists of microscopic pieces of cat skin which easily become airborne.

Dr Amir Ghaem-Maghami said: "There has been a sharp increase in the prevalence of allergies over the past few decades and allergic asthma among children has reached epidemic proportions in many industrialised countries, including the UK.

"Despite improvements in patient care, three people die every day in the UK from asthma, and most therapies target symptoms rather than curing the condition.

"Many people with asthma are highly sensitive to airborne allergens such as cat dander or house dust mite -- in fact many studies have shown that up to 40 per cent of children with asthma are allergic to cat allergens.

"A better understanding of how the interaction between allergens and the immune system leads to allergy is vital if we are to develop more effective and efficient treatments for this debilitating condition."

Dr Elaine Vickers, Research Relations Manager at Asthma UK, says: "We are delighted to see the rapid progress that Dr Ghaem-Maghami and his colleagues are making in such a complex area of research.

"This is a great example of where Asthma UK's research funding is leading to a better understanding of asthma which could ultimately benefit thousands of people with both asthma and allergies."

Allergy is a disorder caused by the body's immune system reacting to usually harmless substances found in the environment, known as allergens. Believing itself under attack, the immune system produces a molecule called IgE, which eventually leads to release of further chemicals (including histamine) by certain immune cells which together cause an inflammatory response and the classic symptoms of allergy -- itchy eyes, sneezing, runny nose and wheezing.

The Nottingham work, recently published in the *Journal of Biological Chemistry*, has focused on the role of the mannose receptor (MR), a receptor found on the surface of dendritic cells. These cells are among the first cells in the immune system that come into contact with allergens.

The team recently found that the MR binds to a wide range of allergens and plays an important role in the allergic response to house dust mite allergens. In their latest study they looked at the contribution of MR to allergy caused by a major cat allergen called Fel d 1.

They were able to prove that MR is needed for the body to recognise Fel d 1 as a potential foreign invader and for the production of IgE against Fel d 1. The discovery shows that MR plays a pivotal role not only in recognising allergens but also in provoking the body's allergic response to them.

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

Journal Reference:

1. M. Emara, P.-J. Royer, Z. Abbas, H. F. Sewell, G. Gebriel Mohamed, S. Singh, S. Peel, J. Fox, F. Shakib, L. Martinez-Pomares, A. M. Ghaemmaghami. **Recognition of the major cat allergen Fel d 1 through the cysteine-rich domain of the mannose receptor determines its allergenicity**. *Journal of Biological Chemistry*, 2011; DOI: 10.1074/jbc.M111.220657

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Foundations of Empathy in Chickens? Avian Maternal Response to Chick Distress Studied

In a new study, researchers have found that domestic hens show a clear physiological and behavioral response when their chicks are mildly distressed. (Credit: iStockphoto/Predrag Kolakovic)

ScienceDaily (Mar. 8, 2011) — Researchers in the UK have gained new insight into the minds of domestic hens, discovering, for the first time, that domestic hens show a clear physiological and behavioral response when their chicks are mildly distressed.

The research by academics at the University of Bristol's Animal Welfare and Behaviour research group, and funded by the BBSRC Animal Welfare Initiative, is published online in the *Proceedings of the Royal Society B*.

The study is the first to demonstrate that birds possess one of the important attributes that underpins empathy, and the first study to use both behavioral and physiological methods to measure these traits in birds.

Using a well controlled experimental procedure and making use of technical advances in non-invasive physiological monitoring, the researchers found that domestic hens show a clear physiological and behavioral response to their chicks' distress.

During one of the controlled procedures, when the chicks were exposed to a puff of air, the hens' heart rate increased and eye temperature decreased. The hens also changed their behavior, and reacted with increased alertness, decreased preening and increased vocalizations directed to their chicks.

Some of these responses have previously been used as indicators of an emotional response in animals. In domestic chickens, time spent standing alert is associated with higher levels of fear. Previous research carried out by the same group has shown that hens also selectively avoid surroundings associated with high levels of standing and low levels of preening.

Jo Edgar, Ph.D. student in the School of Veterinary Sciences, said: "The extent to which animals are affected by the distress of others is of high relevance to the welfare of farm and laboratory animals.

"Our research has addressed the fundamental question of whether birds have the capacity to show empathic responses. We found that adult female birds possess at least one of the essential underpinning attributes of 'empathy'; the ability to be affected by, and share, the emotional state of another."

The researchers used chickens as a model species because, under commercial conditions, chickens will regularly encounter other chickens showing signs of pain or distress due to routine husbandry practices or because of the high levels of conditions such as bone fractures or leg disorders.

Story Source:

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

Journal Reference:

1. J. L. Edgar, J. C. Lowe, E. S. Paul, C. J. Nicol. **Avian maternal response to chick distress**. *Proceedings of the Royal Society B: Biological Sciences*, 2011; DOI: 10.1098/rspb.2010.2701

http://www.sciencedaily.com/releases/2011/03/110309073724.htm

High-Volume Portable Music Players May Impair Ability to Clearly Discriminate Sounds

Listening to loud music through earphones for extended periods in noisy surroundings can cause neurophysiological changes related to clear discrimination of sounds, even if the hearing threshold is normal, new research suggests. (Credit: iStockphoto)

ScienceDaily (Mar. 10, 2011) — Growing numbers of people enjoy listening to music on portable music players or cell phones, and many tend to turn up the volume, especially in noisy surroundings. In a study published March 2, 2011 in the open-access journal *PLoS ONE*, researchers explore the potential effects of this behavior on hearing.

The study was a collaboration between Drs. Hidehiko Okamoto and Ryusuke Kakigi from the National Institute for Physiological Sciences, Japan, and Drs. Christo Pantev and Henning Teismann from the University of Muenster. The researchers demonstrated that listening to loud music through earphones for extended periods in noisy surroundings can cause neurophysiological changes related to clear discrimination of sounds, even if the hearing threshold is normal. This auditory abnormality concerns "the vividness of sounds" and cannot be recognized by the usual hearing test in which subjects are examined using a series of individual tones in a silent environment. These results may support a future auditory assessment plan for long-term portable music player users.

The research group examined the brain's response to sound using the biomagnetism measurement device MEG (magnetoencephalography), which makes it possible to measure the brain activity without any subject's behavioral response. They recorded the brain responses of two groups of 13 young adults; one group had regularly listened to music at full blast, and the other group had not. Subjects listened to a sound of a specific frequency contained in background noises while watching a movie. The inability to dissociate a sound from background noises was considerably more pronounced in the habitual portable music player users. This difficulty cannot be detected with the current standard hearing test, which yielded the same results in both groups.

According to Dr. Okamoto, "It can be said that listening to music at high volumes burdens the nerves of the brain and auditory system and can cause a decline in the ability to discriminate sounds, even if the usual hearing test results are normal and the subject is unaware of any changes." He also claims, "It would be better to suppress environmental noises by using devices such as noise cancellers instead of turning up the volume when enjoying a mobile music player in a noisy place."

Story Source:

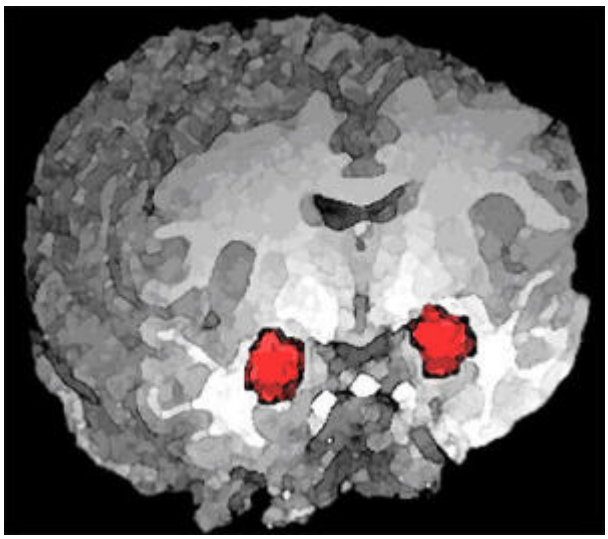
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **National Institute for Physiological Sciences**, via EurekAlert!, a service of AAAS.

Journal Reference:

1. Hidehiko Okamoto, Henning Teismann, Ryusuke Kakigi, Christo Pantev. **Broadened Population-Level Frequency Tuning in Human Auditory Cortex of Portable Music Player Users**. *PLoS ONE*, 2011; 6 (3): e17022 DOI: 10.1371/journal.pone.0017022

http://www.sciencedaily.com/releases/2011/03/110309102150.htm

Scientists Discover Anti-Anxiety Circuit in Brain Region Considered the Seat of Fear



A new study supports the role of a brain region called the amygdala in processing anxiety. In this 3-D magnetic resonance imaging (MRI) rendering of a human brain, functional MRI (fMRI) activation of the amygdala is highlighted in red. (Credit: NIMH Clinical Brain Disorders Branch)

ScienceDaily (Mar. 9, 2011) — Stimulation of a distinct brain circuit that lies within a brain structure typically associated with fearfulness produces the opposite effect: Its activity, instead of triggering or increasing anxiety, counters it.

That's the finding in a paper by Stanford University School of Medicine researchers to be published online March 9 in *Nature*. In the study, Karl Deisseroth, MD, PhD, and his colleagues employed a mouse model to show that stimulating activity exclusively in this circuit enhances animals' willingness to take risks, while inhibiting its activity renders them more risk-averse. This discovery could lead to new treatments for anxiety disorders, said Deisseroth, an associate professor of bioengineering and of psychiatry and behavioral science.

The investigators were able to pinpoint this particular circuit only by working with a state-of-the-art technology called optogenetics, pioneered by Deisseroth at Stanford, which allows brain scientists to tease apart the complex circuits that compose the brain so these can be studied one by one.

"Anxiety is a poorly understood but common psychiatric disease," said Deisseroth, who is also a practicing psychiatrist. More than one in four people, in the course of their lives, experience bouts of anxiety symptoms sufficiently enduring and intense to be classified as a full-blown psychiatric disorder. In addition, anxiety is a significant contributing factor in other major psychiatric disorders from depression to alcohol dependence, Deisseroth said.

Most current anti-anxiety medications work by suppressing activity in the brain circuitry that generates anxiety or increases anxiety levels. Many of these drugs are not very effective, and those that are have significant side effects such as addiction or respiratory suppression, Deisseroth said. "The discovery of a novel circuit whose action is to reduce anxiety, rather than increase it, could point to an entire strategy of anti-anxiety treatment," he added.

Ironically, the anti-anxiety circuit is nestled within a brain structure, the amygdala, long known to be associated with fear. Generally, stimulating nervous activity in the amygdala is best known to heighten anxiety. So the anti-anxiety circuit probably would have been difficult if not impossible to locate had it not been for optogenetics, a new technology in which nerve cells in living animals are rendered photosensitive so that action in these cells can be turned on or off by different wavelengths of light. The technique allows researchers to selectively photosensitize particular sets of nerve cells. Moreover, by delivering pulses of light via optical fibers to specific brain areas, scientists can target not only particular nerve-cell types but also particular cell-to-cell connections or nervous pathways leading from one brain region to another. The fiber-

optic hookup is both flexible and pain-free, so experimental animals' actual behavior as well as their brain activity can be monitored.
In contrast, older research approaches involve probing brain areas with electrodes to stimulate nerve cell firing. But an electrode stimulates not only all the nerve cells that happen to be in the neighborhood but even fibers that are just passing through on the way to somewhere else. Thus, any effect from stimulating the newly discovered anti-anxiety circuit would have been swamped by the anxiety-increasing effects of the dominant surrounding circuitry.
In December 2010, the journal *Nature Methods* bestowed its "Method of the Year" title on optogenetics.
In the new Nature study, the researchers photosensitized a set of fibers projecting from cells in one nervous "switchboard" to another one within the amygdala. By carefully positioning their light-delivery system, they were able to selectively target this projection, so that it alone was activated when light was pulsed into the mice's brains. Doing so led instantaneously to dramatic changes in the animals' behavior.
"The mice suddenly became much more comfortable in situations they would ordinarily perceive as dangerous and, therefore, be quite anxious in," said Deisseroth. For example, rodents ordinarily try to avoid wide-open spaces such as fields, because such places leave them exposed to predators. But in a standard setup simulating both open and covered areas, the mice's willingness to explore the open areas increased profoundly as soon as light was pulsed into the novel brain circuit. Pulsing that same circuit with a different, inhibitory frequency of light produced the opposite result: the mice instantly became more anxious. "They just hunkered down" in the relatively secluded areas of the test scenario, Deisseroth said.
Standard laboratory gauges of electrical activity in specific areas of the mice's amygdalas confirmed that the novel circuit's activation tracked the animals' increased risk-taking propensity.
Deisseroth said he believes his team's findings in mice will apply to humans as well. "We know that the amygdala is structured similarly in mice and humans," he said. And just over a year ago a Stanford team led by Deisseroth's associate, Amit Etkin, MD, PhD, assistant professor of psychiatry and behavioral science, used functional imaging techniques to show that human beings suffering from generalized anxiety disorder had altered connectivity in the same brain regions within the amygdala that Deisseroth's group has implicated optogenetically in mice.
The study was funded by the National Institutes of Health, the National Institute of Mental Health, the National Institute on Drug Abuse, the National Science Foundation, NARSAD, a Samsung Scholarship, and the McKnight, Woo, Snyder, and Yu foundations. Kay Tye, PhD, a postdoctoral researcher in the Deisseroth laboratory, and Rohit Prakash, Sung-Yon Kim and Lief Fenno, all graduate students in that lab, shared first authorship. Other co-authors are graduate student Logan Grosenick, undergraduate student Hosniya Zarabi, postdoctoral researcher Kimberly Thompson, PhD, and research associates Viviana Gradinaru and Charu Ramakrishnan, all of the Deisseroth lab.

Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Stanford University Medical Center**. The original article was written by Bruce Goldman.

Journal Reference:

1. Kay M. Tye, Rohit Prakash, Sung-Yon Kim, Lief E. Fenno, Logan Grosenick, Hosniya Zarabi, Kimberly R. Thompson, Viviana Gradinaru, Charu Ramakrishnan, Karl Deisseroth. **Amygdala circuitry mediating reversible and bidirectional control of anxiety**. *Nature*, 2011; DOI: 10.1038/nature09820

http://www.sciencedaily.com/releases/2011/03/110309131930.htm

Missing DNA Helps Make Us Human

Chimpanzees and humans are minimally different genetically, but the small differences are what make us human, according to a team of researchers who identified segments of non-coding DNA missing in humans that exist in chimpanzees and other animals. (Credit: iStockphoto/Gary Wales)

ScienceDaily (Mar. 9, 2011) — A new study demonstrates that specific traits that distinguish humans from their closest living relatives -- chimpanzees, with whom we share 96 percent of our DNA -- can be attributed to the loss of chunks of DNA that control when and where certain genes are turned on. The finding mirrors accumulating evidence from other species that changes to regulatory regions of DNA -- rather than to the genes themselves -- underlie many of the new features that organisms acquire through evolution.

Seeking specific genetic changes that might be responsible for the evolution of uniquely human traits, Howard Hughes Medical Institute investigator David Kingsley and colleagues at Stanford University scanned the human genome for features that set us apart from other mammals. The team found 510 segments that are present in chimps and other animals but missing from the human genome. Only one of the missing segments would actually disrupt a gene; the remaining 509 affect the DNA that surrounds genes, where regulatory sequences lie.

Careful analysis of a handful of these segments demonstrated that loss of regulatory DNA could explain how humans developed some features not found in other animals -- such as big brains -- as well as how they lost features common in other species, such as sensory whiskers and spiny penises. Their findings are published in the March 10, 2011, issue of the journal *Nature*.

Genes -- segments of DNA that carry the blueprints for proteins -- make up less than two percent of the human genome. Hidden within the remainder of our more than three billion base pairs of DNA are regulatory sequences that control when and where genes are expressed. Direct alterations to a gene can have dramatic effects, sometimes killing an organism or rendering it sterile. "In contrast, if you alter the way [a gene] turns on or off at a particular place in development, that can have a very large effect on a particular structure, but still preserve the other functions of the gene," Kingsley says. "That tends to be the sort of alternation that's favored when a new trait is evolving."

Kingsley's previous work with stickleback fish, a small spiny fish whose recent and rapid adaptation to a wide range of aquatic environments has made it ideal for evolutionary studies, have shown time and again that changes in regulatory DNA can have profound effects on an organism's traits. So when Kingsley and his colleagues searched for regions of the genome common to chimps, macaques, and mice but missing in the human genome, they weren't surprised that the sequence differences they found were almost exclusively outside of genes.

Collaborating with computational biologist Gill Bejerano's lab at Stanford, the team pinpointed 510 genetic sequences that appear in the genomes of chimps and other animals, but are "surprisingly missing" from the human genome, Kingsley says. To narrow the list so that they could focus on the changes most likely to have altered when and where particular genes were expressed, the researchers conducted a computer analysis to identify deletions that were clustered around particular genes. "We saw more changes than you would expect near genes involved in steroid hormone signaling," Kingsley says. A number of deletions also appeared near genes involved in neural development, their analysis revealed.

But technology could only take the team so far. To zero in on specific deletions that might control human traits, the team relied on manpower: neuroscientists, physical anthropologists, developmental geneticists, and more. "We had a team of interested graduate students, postdocs, and developmental biologists poring through this list," Kingsley says. The team searched for sequences near genes known to play key roles in development, especially those known to control traits that differ between humans and other animals. "It was a fun detective hunt that led to lots of interesting discussions," he says.

The team came up with a couple dozen deletions near genes they suspected might be involved in the evolution of particular human traits. But the researchers still didn't know the normal functional roles of the missing sequences. So Kingsley and his colleagues isolated those genetic sequences from organisms that still had them (chimps or mice), attached the sequences to a reporter gene that produces a simple blue color reaction in living cells, and injected the resulting sequences into fertilized mouse eggs. By monitoring the blue color reaction in developing mice, they could see exactly where and when the sequence was turning on gene expression during embryonic or postnatal development. This gave them a way to link "the biology of the gene, the molecular change that had happened in humans, and the specific anatomical place where it really was expressed during normal development," Kingsley explains.

These experiments highlighted two segments of DNA that humans lack, but that appear to play a particularly important role in development of mice and other non-human mammals. The first is a segment of DNA that, in most animals, occurs near the gene that codes for the androgen receptor, which is associated with a variety of male-specific traits. "Males have beards, females don't," Kingsley says. "That's an example of an androgen receptor-dependent process." When the researchers inserted this sequence into mouse eggs, "what we got were blue sensory whiskers and blue genitalia," Kingsley says, indicating that when present, the sequence causes the androgen receptor to be produced in those regions.

Tracing the expression of the protein through development, Kingsley and his colleagues concluded that the sequence contributes to the development of sensory whiskers found on the faces of many mammals, and prickly surface spines found on the penises of mice and many non-human primates. Previous studies show that complete inactivation of the androgen receptor gene lead to defects in whiskers and failure to form penile spines. Although humans still retain the androgen receptor gene, the loss of regulatory information for expression in whiskers and spines could help explain two human-specific anatomical traits: absence of sensory whiskers and lack of spines on human penises. Loss of penile spines is one of several traits thought to be related to evolution of pair-bonding and monogamy in the human lineage.

The second segment of regulatory DNA they tested appears, in non-humans, near a gene called GADD45g. GADD45g normally reins in cell growth. In fact, Kingsley said, "if the gene is missing entirely, unchecked cell growth can cause pituitary tumors." When they injected the sequence into mouse eggs, they found the tell-tale blue color in a key growth layer of the developing brain -- indicating that in most animals, the regulatory sequence that has disappeared in humans restricts brain growth.

The study describes some of the changes that have helped make humans human, but there are likely to be many more, Kingsley says. "By simply changing a single gene like GADD45g you're not going to be able to explain all of human brain evolution."

Still, he adds, the study shows that "it's now possible to begin identifying some of the particular molecular changes that contribute to the evolution of human traits." Human-specific traits include not only anatomical

and physiological differences, but also differences in our susceptibility to many diseases, such as arthritis, cancer, malaria, HIV, Alzheimer's, and Parkinson's. "We think that the same sorts of lists and approaches will eventually help illuminate human disease susceptibilities as well," he says. "It's a great time to be studying not only where we came from, but also how our genetic history shapes many aspects of current human biology."

Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Howard Hughes Medical Institute**, via EurekAlert!, a service of AAAS.

Journal Reference:

1. Cory Y. McLean, Philip L. Reno, Alex A. Pollen, Abraham I. Bassan, Terence D. Capellini, Catherine Guenther, Vahan B. Indjeian, Xinhong Lim, Douglas B. Menke, Bruce T. Schaar, et al. **Human-specific loss of regulatory DNA and the evolution of human-specific traits**. *Nature*, 471, 216-219 (9 March 2011) DOI: 10.1038/nature09774

http://www.sciencedaily.com/releases/2011/03/110309131934.htm

Scientists Discover Cause of Rare Skin Cancer That Heals Itself

ScienceDaily (Mar. 10, 2011) — Institute of Medical Biology (IMB) scientists under the Agency of Science, Technology and Research (A*STAR) in Singapore are part of an international team of researchers who became the first in the world to discover the gene behind a rare skin cancer which grows rapidly for a few weeks before healing spontaneously, according to research published in *Nature Genetics* on February 28.
The peculiar behaviour of this rare self-healing cancer, called multiple self-healing squamous epithelioma (MSSE), was discovered to be caused by a failure in the gene called TGFBR1, which is a key component of a signalling pathway that can also be impaired in other cancers. This pathway is widely regarded in the field as a potential target for therapeutic intervention in cancer treatment.
Dr David Goudie, a Clinical Genetics consultant at Dundee University and a long term specialist in MSSE, said: "The unusual behaviour of this tumour has baffled scientists for over 40 years, so we're excited to have discovered the genetic faults that cause the disease. Understanding how tumours that lack TGFBR1 behave will surely help us to predict the clinical effects of drugs that target these cancer-promoting or cancer-inhibiting signals."
However, Professor Birgit Lane cautioned, "The TGFBR1 gene is also part of a very important cell signalling system that is essential for many normal processes. Though it has been implicated in many other cancers before now, one cannot just go around blocking its function indiscriminately. We hope that this new found knowledge on an unusual self-healing tumour will open a door to new ways of tweaking the cell machinery more selectively in cancer therapy."

About TGFBR1 and MSSE

The TGFBR1 (Transforming Growth Factor (Beta), Receptor 1) gene makes a receptor protein through which healthy cells receive messages from their neighbours, instructing them to carry out processes essential to normal growth and development. Normally, TGFBR1 messages help block the growth of early tumours of various types. But cancer cells can interpret these messages very differently. For cancers that have managed to start growing, TGFBR1 actually promotes their growth and spread instead.
Interestingly, the reverse happens in the self-healing tumours that have an inherited fault in the TGFBR1 gene. MSSE patients with faulty TGFBR1 develop lots of small tumours -- but at some point there is a switch in behaviour and the tumours lacking TGFBR1 start to shrink and heal by themselves. Scientists do not yet fully understand how this happens but the result of this study has raised new approaches to studying this important signalling system and its relation to cancer.
MSSE is an extremely rare disease, with only a handful of new cases diagnosed each year. International translational collaborations between doctors and scientists, like the one underlying this study, are critical to allow for scientific breakthroughs to be made that could lead to possible cancer therapy.

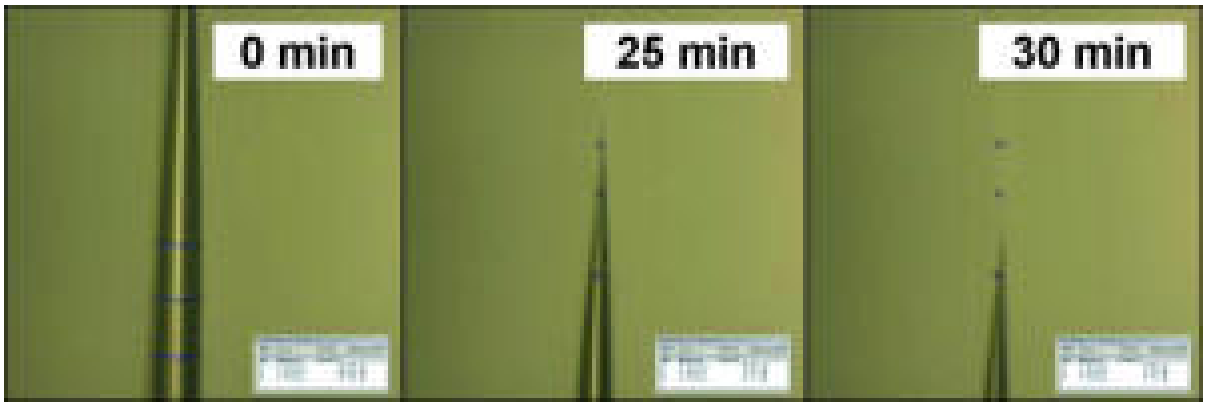
Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Agency for Science, Technology and Research (A*STAR), Singapore**.

Journal Reference:

1. David R Goudie, Mariella D'Alessandro, Barry Merriman, Hane Lee, Ildikó Szeverényi, Stuart Avery, Brian D O'Connor, Stanley F Nelson, Stephanie E Coats, Arlene Stewart, Lesley Christie, Gabriella Pichert, Jean Friedel, Ian Hayes, Nigel Burrows, Sean Whittaker, Anne-Marie Gerdes, Sigurd Broesby-Olsen, Malcolm A Ferguson-Smith, Chandra Verma, Declan P Lunny, Bruno Reversade, E Birgitte Lane. **Multiple self-healing squamous epithelioma is caused by a disease-specific spectrum of mutations in TGFBR1**. *Nature Genetics*, 2011; DOI: 10.1038/ng.780

http://www.sciencedaily.com/releases/2011/03/110310101345.htm

Defective Plastics Repair Themselves



Defective plastics repair themselves. (Credit: Image courtesy of Fraunhofer-Gesellschaft)
ScienceDaily (Mar. 9, 2011) — Indestructible things are a figment of the imagination of advertising. Even plastic components that have to stand up to major mechanical loads can break. The reason for this are microcracks that may be found in any component part. Researchers have now come up with elastic polymers that heal themselves to put an end to the growth of cracks.

It can be a total surprise: car tires burst, sealing rings fail and even your dearly beloved panton chair or your freely oscillating plastic chair develops cracks and the material gets fatigued. The reason for this often sudden and unforeseen material failure is triggered by microcracks that may be found in any component. You may hardly see these cracks and they may grow fast or slow. This also applies to fractures in components made of plastic that can be elastically formed. Sealing rings or tires are made of these elastomers and they can withstand mechanical loads especially well.

In the OSIRIS project of the German Federal Ministry of Education and Research BMBF, researchers at the Fraunhofer Institute for Environmental, Safety and Energy Technology UMSICHT in Oberhausen, Germany have come up with self-healing elastomers that can repair themselves autonomously, in order to put a stop to the growth of cracks already from the start while avoiding spontaneous material failure. The source of their inspiration was the caoutchouc tree hevea brasiliensis and plants that conduct latex, such as the Weeping Benjamin. This latex contains capsules that are filled with the protein hevein. If the caoutchouc tree is damaged, the latex escapes and the capsules break open to release hevein, which also links the latex particles in the latex to form a wound closure.

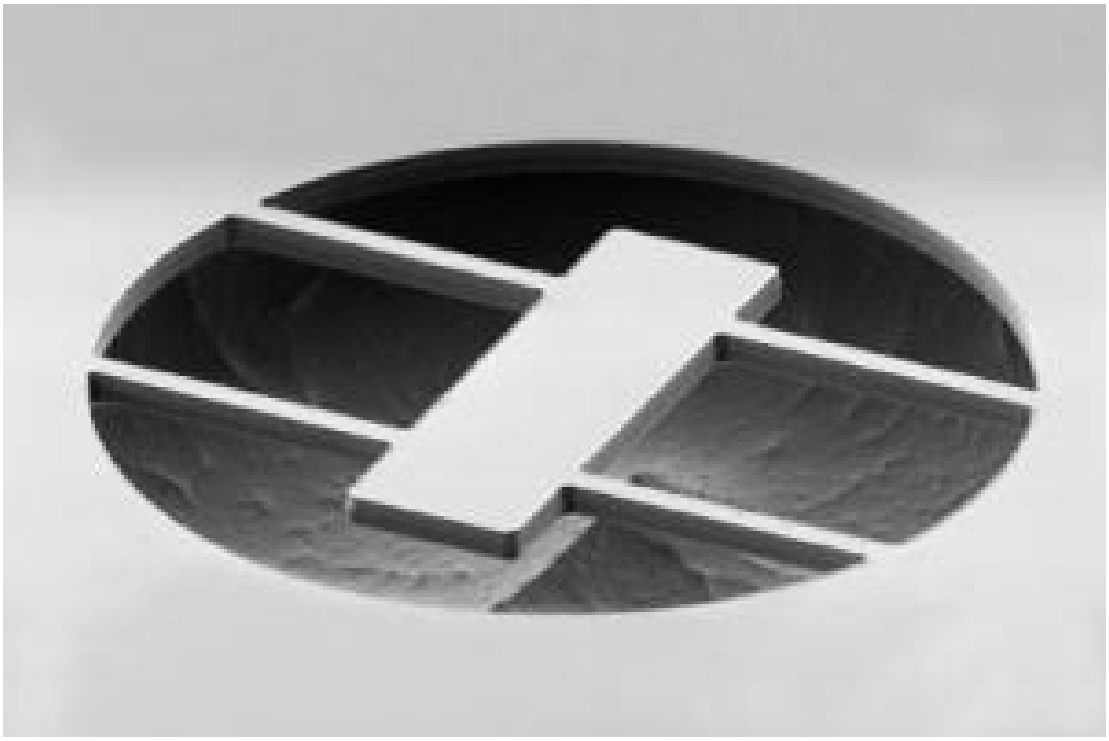
The scientists have applied this principle to elastomers. Dr. Anke Nellesen, who is a scientist at the Fraunhofer Institute for Environmental, Safety and Energy Technology, provides the explanation: "We loaded microcapsules with a one-component adhesive (polyisobutylene) and put it in elastomers made of synthetic caoutchouc to stimulate a self-healing process in plastics. If pressure is put on the capsules, they break open and separate this viscous material. Then this mixes with the polymer chains of the elastomers and closes the cracks. We were successful at making capsules stable to production, although they did not provide the self-healing effect we wanted." However, the researchers obtained good results by putting the self-healing component (i.e., the polyisobutylene) into the elastomer uncapsulised. Various test bodies from different synthetic caoutchoucs indicated clear self-healing properties, since the restored tension expansion was 40 percent after a healing period of 24 hours.

The experts even achieved better results by supplying elastomers with ions. Here, the caoutchouc tree also acted as the model for this method. The hevein proteins that are released when there is damage link up to each other through ions and stick in this process so that the crack closes. Therefore, if the elastomer material is damaged, the particles with opposite charges are looking for a new bonding partner -- in other words, a plus ion attracts a minus ion, which makes it adhere. Anke Nellesen points out the advantage in relation to the microcapsule process: "We make sure that the wound closure is stable by charging the elastomers with ions, which means that the healing process can take place as often as needed. The scientist remarks that "there are already duromers with self-healing functions in the form of self-repairing paints in cars. We still haven't developed elastomers that can close their cracks without interference from outside."

Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Fraunhofer-Gesellschaft**.

http://www.sciencedaily.com/releases/2011/03/110309091441.htm

How Long Does a Tuning Fork Ring?



Researchers at the University of Vienna and the Technische Universitaet Muenchen have solved a long-standing problem in the design of mechanical resonators: the numerical prediction of the design-limited damping. The electron microscopic picture shows one of their micro resonators with which they proved the performance of their calculations. (Credit: Garrett Cole, University Vienna)

ScienceDaily (Mar. 10, 2011) — Researchers at the University of Vienna and Technische Universitaet Muenchen (TUM) have solved a long-standing problem in the design of mechanical resonators: the numerical prediction of the design-limited damping. They report their achievement, which has a broad impact on diverse fields such as sensing and communications, in the forthcoming issue of *Nature Communications.* The article describes both a numerical method to calculate the mechanical damping as well as a stringent test of its performance on a set of mechanical microstructures.

From the wooden bars in a xylophone or the head of a drum, to the strings and sound box of a guitar or violin, musical instruments are the most familiar examples of mechanical resonators. The actual mechanical vibrations of these instruments create acoustic waves that we hear as sound. The purity of the emitted tone is intimately related to the decay of the vibration amplitude, that is, the mechanical losses of the system. A figure of merit for mechanical losses is the quality factor, simply called "Q," which describes the number of oscillations before the amplitude has decayed to a minute fraction of its starting value. The larger Q, the purer the tone and the longer the system will vibrate before the sound damps out.

In addition to the aesthetic examples found in a concert hall, mechanical resonators have become increasingly important for a wide variety of advanced technological applications, with such diverse uses as filtering elements in wireless communications systems, timing oscillators for commercial electronics, and cutting-edge research tools which include advanced biological sensors and emerging quantum electro- and optomechanical devices. Rather than producing pleasing acoustics, these applications rely on very "pure" vibrations for isolating a desired signal or for monitoring minute frequency shifts in order to probe external stimuli.

For many of these applications it is necessary to minimize the mechanical loss. However, it had previously remained a challenge to make numerical predictions of the attainable Q for even relatively straightforward geometries. Researchers from Vienna and Munich have now overcome this hurdle by developing a finite-element-based numerical solver that is capable of predicting the design-limited damping of almost arbitrary

mechanical resonators. "We calculate how elementary mechanical excitations, or phonons, radiate from the mechanical resonator into the supports of the device," says Garrett Cole, Senior Researcher in the Aspelmeyer group at the University of Vienna. "This represents a significant breakthrough in the design of such devices." The idea goes back to a previous work by Ignacio Wilson-Rae, physicist at the Technische Universitaet Muenchen. In collaboration with the Vienna group the team managed to come up with a numerical solution to compute this radiation in a simple manner that works on any standard PC. The predictive power of the numerical Q-solver removes the guesswork that is currently involved (e.g., trial and error prototype fabrication) in the design of resonant mechanical structures. The researchers point out that their "Q-solver" is scale independent and thus can be applied to a wide range of scenarios, from nanoscale devices all the way up to macroscopic systems.

This work was supported by the European Commission (Marie Curie Fellowship for G. D. Cole, projects MINOS, IQOS, QESSENCE), the European Research Council (ERC StG QOM), the Austrian Science Fund (projects START; L426; SFB Foundations and Applications of Quantum Science, FoQuS; Doctoral Program Complex Quantum Systems, CoQuS), the Austrian Research Promotion Agency (FFG), the German Research Foundation (Cluster of Excellence Nanosystems Initiative Munich, NIM). Microfabrication was carried out at the Zentrum für Mikro- und Nanostrukturen (ZMNS) of the Technische Universitaet Wien.

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Technische Universitaet Muenchen**.

Journal Reference:

1. Garrett D. Cole, Ignacio Wilson-Rae, Katharina Werbach, Michael R. Vanner, Markus Aspelmeyer. **Phonon-tunnelling dissipation in mechanical resonators**. *Nature Communications*, 2011; 2: 231 DOI: 10.1038/ncomms1212

http://www.sciencedaily.com/releases/2011/03/110308124914.htm

Voyager Seeks the Answer Blowin' in the Wind

This artist's concept shows NASA's two Voyager spacecraft exploring a turbulent region of space known as the heliosheath, the outer shell of the bubble of charged particles around our sun. (Credit: NASA/JPL-Caltech)

ScienceDaily (Mar. 10, 2011) — In which direction is the sun's stream of charged particles banking when it nears the edge of the solar system? The answer, scientists know, is blowing in the wind. It's just a matter of getting NASA's Voyager 1 spacecraft in the right orientation to detect it.

To enable Voyager 1's Low Energy Charged Particle instrument to gather these data, the spacecraft performed a maneuver on March 7 that it hadn't done for 21 years, except in a preparatory test last month.

At 9:10 a.m. PST (12:10 p.m. EST), humanity's most distant spacecraft rolled 70 degrees counterclockwise as seen from Earth from its normal orientation and held the position by spinning gyroscopes for two hours, 33 minutes. The last time either of the two Voyager spacecraft rolled and stopped in a gyro-controlled orientation was Feb. 14, 1990, when Voyager 1 snapped a family portrait of the planets strewn like tiny gems around our sun (http://photojournal.jpl.nasa.gov/catalog/PIA00451).

"Even though Voyager 1 has been traveling through the solar system for 33 years, it is still a limber enough gymnast to do acrobatics we haven't asked it to do in 21 years," said Suzanne Dodd, Voyager project manager, based at NASA's Jet Propulsion Laboratory in Pasadena, Calif. "It executed the maneuver without a hitch, and we look forward to doing it a few more times to allow the scientists to gather the data they need."

The two Voyager spacecraft are traveling through a turbulent area known as the heliosheath. The heliosheath is the outer shell of a bubble around our solar system created by the solar wind, a stream of ions blowing radially outward from the sun at a million miles per hour. The wind must turn as it approaches the outer edge of the bubble where it makes contact with the interstellar wind, which originates in the region between stars and blows by our solar bubble.

In June 2010, when Voyager 1 was about 17 billion kilometers (about 11 billion miles) away from the sun, data from the Low Energy Charged Particle instrument began to show that the net outward flow of the solar wind was zero. That zero reading has continued since. The Voyager science team doesn't think the wind has disappeared in that area. It has likely just turned a corner. But does it go up, down or to the side?

"Because the direction of the solar wind has changed and its radial speed has dropped to zero, we have to change the orientation of Voyager 1 so the Low Energy Charged Particle instrument can act like a kind of weather vane to see which way the wind is now blowing," said Edward Stone, Voyager project manager, based at the California Institute of Technology, Pasadena. "Knowing the strength and direction of the wind is critical to understanding the shape of our solar bubble and estimating how much farther it is to the edge of interstellar space." Voyager engineers performed a test roll and hold on Feb. 2 for two hours, 15 minutes. When data from Voyager 1 were received on Earth some 16 hours later, the mission team verified the test was successful and the spacecraft had no problem in reorienting itself and locking back onto its guide star, Alpha Centauri.

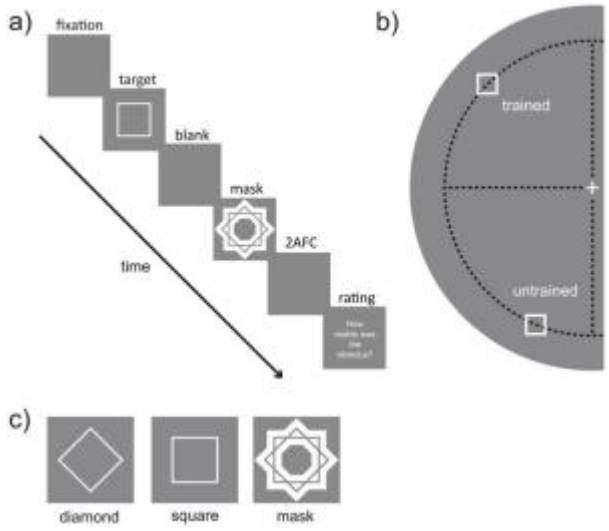
The Low Energy Charged Particle instrument science team confirmed that the spacecraft had acquired the kind of information it needed, and mission planners gave Voyager 1 the green light to do more rolls and

longer holds. There will be five more of these maneuvers over the next seven days, with the longest hold lasting three hours 50 minutes. The Voyager team plans to execute a series of weekly rolls for this purpose every three months.
The success of the March 7 roll and hold was received at JPL at 1:21 a.m. PST (4:21 a.m. EST) on March 8. But it will take a few months longer for scientists to analyze the data. "We do whatever we can to make sure the scientists get exactly the kinds of data they need, because only the Voyager spacecraft are still active in this exotic region of space," said Jefferson Hall, Voyager mission operations manager at JPL. "We were delighted to see Voyager still has the capability to acquire unique science data in an area that won't likely be traveled by other spacecraft for decades to come."
Voyager 2 was launched on Aug. 20, 1977. Voyager 1 was launched on Sept. 5, 1977. On March 7, Voyager 1 was 17.4 billion kilometers (10.8 billion miles) away from the sun. Voyager 2 was 14.2 billion kilometers (8.8 billion miles) away from the sun, on a different trajectory.
The solar wind's outward flow has not yet diminished to zero where Voyager 2 is exploring, but that may happen as the spacecraft approaches the edge of the bubble in the years ahead.
The Voyagers were built by NASA's Jet Propulsion Laboratory in Pasadena, Calif., which continues to operate both spacecraft. JPL is a division of the California Institute of Technology in Pasadena. The Voyager missions are a part of the NASA Heliophysics System Observatory, sponsored by the Heliophysics Division of the Science Mission Directorate. For more information about the Voyager spacecraft, visit: http://www.nasa.gov/voyager.

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/2011/03/110308144446.htm

Learning to See Consciously: Scientists Show How Flexibly the Brain Processes Images



Training for conscious perception: A. Subjects are presented with geometric forms in rapid succession. After 10 milliseconds the forms were masked to render them invisible. The task of the subjects was to judge their visibility. B. Location of form and mask on the screen. C. A square and a diamond serve as the visual cues, a star as a mask. (Credit: Copyright PNAS Early Edition, doi: 10.1073/pnas.1009147108)

ScienceDaily (Mar. 9, 2011) — Our brains process many more stimuli than we become aware of. Often images enter our brain without being noticed: visual information is being processed, but does not reach consciousness, that is, we do not have an impression of it. Then, what is the difference between conscious and unconscious perception, and can both forms of perception be changed through practice? These questions are important not only for basic research, but also for the treatment of patients with perceptual deficits due to brain lesions e.g. following a stroke. Scientists at the MPI for Brain Research in Frankfurt/Main could now show that seeing can be trained.

Their tests revealed that the brain regions underlying the learning effects on conscious perception are different than the ones underlying the learning effects on the mere processing of stimuli.

Visual stimuli undergo a series of processing stages on their journey from the eye to the brain. How conscious perception can arise from the activity of neurons is one of the mysteries that the neurophysiologists at the MPI for Brain Research seek to solve. "Today, we know that the processing of stimuli in the cortex remains extremely plastic, or malleable, even in adults," explains Caspar Schwiedrzik who investigates the neural mechanisms of visual perception with his Max Planck colleagues Wolf Singer and Lucia Melloni. In their current study, the scientists examined whether perception can be influenced by long-term and systematic training and whether such training does not only change the processing, but also affects whether the stimulus can be consciously perceived.

It is known from clinical studies that some stroke patients who suffer partial blindness as a result of damage to the visual cortex can discriminate between stimuli that fall into their blind visual field. This unconscious discrimination ability can be improved through training. Nevertheless, the patients report that they do not see the images. In a few cases, however, conscious perception of the stimuli could be improved with training. Is it maybe possible to learn to "see consciously"?

To investigate this question in healthy subjects, the Frankfurt scientists developed an experimental set up with which different learning effects on perception could be measured. The subjects were shown images of two different geometric forms -- a square and a diamond -- on a screen in rapid succession and in a random sequence, and were asked to discriminate between them. The visibility of the images was limited by presenting a mask shortly after each image, which rendered the shape invisible.

The experiment was designed such that the subjects could initially not discriminate between the images and that they were also subjectively invisible. The subjects were then trained for several days. Each round of the training involved the presentation of images followed by the mask. As soon as the subject indicated by pressing a button which form had been shown and how clearly he or she had seen the form, the next stimulus and the next mask were shown. This process was repeated 600 times per day. After several days, the subjects could better discriminate between the target stimuli. From the ratings of the visibility of the stimuli, the scientists could further conclude that the participants' subjective perception had increased as well: the images now entered consciousness. Thus, the scientists succeeded in demonstrating that it is also possible to learn to see consciously.
The question remained, however, as to how objective and not necessarily conscious processing of stimuli and their subjective, conscious perception are linked. To gain a better understanding of the individual processing steps and to localize them in the brain, the experiment was repeated once more. This time, the image and mask were shown on a different part of the screen, and were thus processed by a different part of the brain.
"The results were revealing," explains Lucia Melloni: "While the learning effect for the pure processing of the stimuli, that is the discrimination of the shape, was lost with the spatial rearrangement of the stimuli, the clearer visibility of the images, that is the learning effect in terms of conscious seeing, remained." Therefore, objective processing and subjective perception of the stimuli seem to be less closely linked than previously assumed. The two training effects appear to be based on two different areas of the brain.
"Our experiments have shown that the neuronal processes that underlie conscious perception are very flexible," Schwiedrzik concludes. The findings provide important insights for medical applications, in particular for the rehabilitation of people suffering from perceptual deficits caused by brain lesions.

Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Max-Planck-Gesellschaft**.

Journal Reference:

1. C. M. Schwiedrzik, W. Singer, L. Melloni. **Subjective and objective learning effects dissociate in space and in time**. *Proceedings of the National Academy of Sciences*, 2011; DOI: 10.1073/pnas.1009147108

http://www.sciencedaily.com/releases/2011/03/110309125031.htm

Surprisingly Few White Sharks Off California, First Census Finds

Great white shark. (Credit: iStockphoto/Chuck Babbitt)

ScienceDaily (Mar. 8, 2011) — In the first census of its kind, research led by UC Davis and Stanford University found that there are far fewer white sharks off central California than biologists had thought.

The study, published in the journal *Biology Letters*, is the first rigorous scientific estimate of white shark numbers in the northeast Pacific Ocean. It is also the best estimate among the world's three known white-shark populations (the others are in Australia/New Zealand and South Africa).

The researchers went out into the Pacific Ocean in small boats to places where white sharks congregate. They lured the sharks into photo range using a seal-shaped decoy on a fishing line. From 321 photographs of the uniquely jagged edges of white sharks' dorsal fins, they identified 131 individual sharks.

From these data they used statistical methods to estimate that there are 219 adult and sub-adult white sharks in the region. (White sharks are classed as sub-adults when they reach about 8-9 feet in length and their dietary focus shifts from eating fish to mostly marine mammals. They are adults when they reach sexual maturity -- for males, that is about 13 feet long; for females, it is about 15 feet.)

"This low number was a real surprise," said UC Davis doctoral student Taylor Chapple, the study's lead author. "It's lower than we expected, and also substantially smaller than populations of other large marine predators, such as killer whales and polar bears. However, this estimate only represents a single point in time; further research will tell us if this number represents a healthy, viable population, or one critically in danger of collapse, or something in-between."

"We've found that these white sharks return to the same regions of the coast year after year," said study co-author Barbara Block, a Stanford University marine biologist and a leading expert on sharks, tunas and billfishes. "It is this fact that makes it possible to estimate their numbers. Our goal is to keep track of our ocean predators."

Satellite tagging studies have demonstrated that white sharks in the northeast Pacific make annual migrations from coastal areas in Central California and Guadalupe Island, Mexico, out to the Hawaiian Islands or to the "White Shark Café," a region of the open ocean between the Baja Peninsula and Hawaii where white sharks have been found to congregate -- and then they return to the coastal areas.

In addition to Block and Chapple (who is now a postdoctoral researcher at the Max Planck Institute in Germany), the study's co-authors are Loo Botsford, professor, and Peter Klimley, adjunct associate professor, both of the UC Davis Department of Wildlife, Fish and Conservation Biology; postdoctoral researcher Salvador Jorgensen of Stanford University (who is now a research scientist with the Monterey Bay Aquarium); researcher Scot Anderson of Point Reyes National Seashore; and graduate student Paul Kanive of Montana State University in Bozeman.

The research was funded by the National Oceanic and Atmospheric Association (NOAA) Fisheries through the Partnership for Education in Marine Resource and Ecosystem Management (PEMREM) and the NOAA Fisheries/Sea Grant Fellowship Program; the Gordon and Betty Moore Foundation; the National Parks Service's Pacific Coast Science and Learning Center; Monterey Bay Aquarium; UC Davis Bodega Marine Laboratory; and Patricia King, a member of the Point Reyes National Seashore Association.

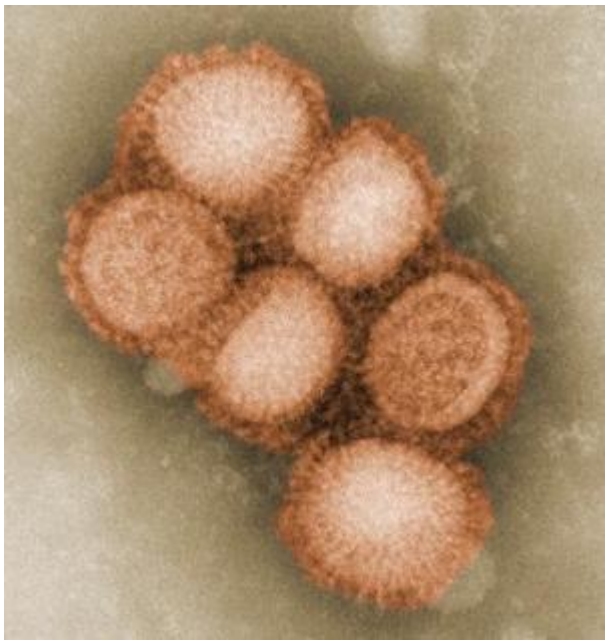
Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **University of California - Davis**.

Journal Reference:

1. T. K. Chapple, S. J. Jorgensen, S. D. Anderson, P. E. Kanive, A. P. Klimley, L. W. Botsford, B. A. Block. **A first estimate of white shark, Carcharodon carcharias, abundance off Central California**. *Biology Letters*, 2011; DOI: 10.1098/rsbl.2011.0124

http://www.sciencedaily.com/releases/2011/03/110309073728.htm

New H1N1 Mutation Could Allow Virus to Spread More Easily



H1N1 influenza virus. (Credit: CDC)

ScienceDaily (Mar. 10, 2011) — In the fall of 1917, a new strain of influenza swirled around the globe. At first, it resembled a typical flu epidemic: Most deaths occurred among the elderly, while younger people recovered quickly. However, in the summer of 1918, a deadlier version of the same virus began spreading, with disastrous consequence. In total, the pandemic killed at least 50 million people -- about 3 percent of the world's population at the time.

That two-wave pattern is typical of pandemic flu viruses, which is why many scientists worry that the 2009 H1N1 ("swine") flu virus might evolve into a deadlier form.

H1N1, first reported in March 2009 in Mexico, contains a mix of human, swine and avian flu genes, which prompted fears that it could prove deadlier than typical seasonal flu viruses. However, the death toll was much lower than initially feared, in large part because the virus turned out to be relatively inefficient at spreading from person to person.

In a new study from MIT, researchers have identified a single mutation in the H1N1 genetic makeup that would allow it to be much more easily transmitted between people. The finding, reported in the March 2 edition of the journal *Public Library of Science (PLoS) One*, should give the World Health Organization, which tracks influenza evolution, something to watch out for, says Ram Sasisekharan, senior author of the paper.

"There is a constant need to monitor the evolution of these viruses," says Sasisekharan, the Edward Hood Taplin Professor and director of the Harvard-MIT Division of Health Sciences and Technology. Some new H1N1 strains have already emerged, and the key question, Sasisekharan adds, is whether those strains will have greater ability to infect humans.

WHO labs around the world are collecting samples of human and avian flu strains, whose DNA is sequenced and analyzed for potential significant mutations. However, it's difficult, with current technology, to predict how a particular DNA sequence change will alter the structure of influenza proteins, including hemagglutinin (HA), which binds to receptors displayed by cells in the human respiratory tract. Now that this specific HA mutation has been identified as a potentially dangerous one, the WHO should be able to immediately flag any viruses with that mutation, if they appear.

Identifying this mutation is an important step because it is usually very difficult to identify which of the many possible mutations of the HA protein will have any impact on human health, says Qinghua Wang, assistant professor of biochemistry at Baylor College of Medicine. "These are exactly the types of mutations that we need to watch out for in order to safeguard humans from future disastrous flu pandemics," he says.

Pandemic

On June 11, 2009, about three months after the H1N1 virus first appeared, the World Health Organization declared a level 6 pandemic alert (the highest level). Nearly 5,000 H1N1 deaths were reported to the WHO, and more than 400,000 cases were confirmed, though the true number of cases is significantly higher because many countries stopped counting cases after the first few months of the outbreak, according to the WHO.

In July 2009, a team of researchers from MIT, led by Sasisekharan, and the Centers for Disease Control and Prevention reported in the journal *Science* that the H1N1 virus was much less easily passed from person to person than seasonal flu viruses and earlier pandemic flu viruses such as the second wave of the 1918 strain. Sasisekharan and CDC senior microbiologist Terrence Tumpey had previously shown that a major factor in flu-virus transmissibility is the structure of the HA protein, which is found on the viral surface. The tightness of fit between HA and the respiratory cell receptor determines how effectively the virus infects a host.

The 2009 H1N1 strain, like the first wave of 1918 (known as the NY18 strain), does not bind efficiently. However, it took only one mutation of the NY18 virus' HA protein to become the much more virulent SC18 strain, which caused the second wave.

Viral evolution

In the new *PLoS* study, the MIT researchers focused on a segment of the HA protein that they have shown affects its ability to bind to respiratory cells. They created a virus with a single mutation in that region, which replaced the amino acid isoleucine with another amino acid, lysine. That switch greatly increased the HA protein's binding strength. They also found that the new virus spread more rapidly in ferrets, which are commonly used to model human influenza infection.

If such a mutant virus evolved, it could generate a "second wave" like the ones seen in 1918 and in 1957 (known as the "Asian flu"). "If you look at the history, it takes a very small change to these viruses to have a dramatic effect," Sasisekharan says.

The amino acid in question is located in a part of the viral genome prone to mutate frequently, because it is near the so-called antigenic site -- the part of the HA protein that interacts with human antibodies. Antigenic sites tend to evolve rapidly to escape such antibodies, which is why flu vaccine makers have to use new formulas every year. This year's vaccine included a strain of H1N1, which is still circulating around the world.

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Massachusetts Institute of Technology**. The original article was written by Anne Trafton.

Journal Reference:

1. Akila Jayaraman, Claudia Pappas, Rahul Raman, Jessica A. Belser, Karthik Viswanathan, Zachary Shriver, Terrence M. Tumpey, Ram Sasisekharan. **A Single Base-Pair Change in 2009 H1N1 Hemagglutinin Increases Human Receptor Affinity and Leads to Efficient Airborne Viral Transmission in Ferrets**. *PLoS ONE*, 2011; 6 (3): e17616 DOI: 10.1371/journal.pone.0017616

http://www.sciencedaily.com/releases/2011/03/110309162119.htm

Toward Real Time Observation of Electron Dynamics in Atoms and Molecules

Another step has been taken in matter imaging. By using very short flashes of light produced by a technology developed at the national infrastructure Advanced Laser Light Source (ALLS) located at INRS University, researchers have obtained groundbreaking information on the electronic structure of atoms and molecules by observing for the first time ever electronic correlations using the method of high harmonic generation (HHG). (Credit: Image courtesy of INRS (Institut national de la recherche scientifique))

ScienceDaily (Mar. 9, 2011) — Another step has been taken in matter imaging. By using very short flashes of light produced by a technology developed at the national infrastructure Advanced Laser Light Source (ALLS) located at INRS University, researchers have obtained groundbreaking information on the electronic structure of atoms and molecules by observing for the first time ever electronic correlations using the method of high harmonic generation (HHG).

Made by a team of researchers from the Energy, Materials, and Telecommunications Center of INRS and the National Research Council Canada/University of Ottawa Joint Attosecond Science Laboratory, this scientific breakthrough opens new opportunities for investigating electron dynamics on the timescale of the attosecond (0.000,000,000,000,000,001 second).

Researchers used a new laser source developed at ALLS by Professor François Légaré's team from the Energy, Materials, and Telecommunications Center in collaboration with colleagues from INRS University, NRC Canada, and the University of Ottawa. This laser source proves to be an ideal tool for HHG from atoms and molecules. The HHG spectra obtained through interaction of the laser source with xenon atoms provide information on electronic correlations by highlighting the giant resonance of xenon. In addition, results obtained at ALLS show that the laser source is ideal for developing a soft X-ray beamline delivering ultrafast x-ray laser pulses down to the nanometer wavelength.

Built on national scientific collaboration, this study was conducted at ALLS by researchers Bruno E. Schmidt, Jean-Claude Kieffer, and François Légaré of the Energy, Materials, and Telecommunications Center of INRS and by Andrew D. Shiner, Carlos Trallero-Herrero, Hans J. Wörner, Serguei Patchkovskii, Paul B. Corkum, and David M. Villeneuve of the NRC Canada/University of Ottawa Joint Attosecond Science Laboratory. The project was funded by the Natural Sciences and Engineering Research Council of Canada, Fonds québécois de recherche sur la nature et les technologies, the Canadian Institute for Photonic Innovations, and the Canada Foundation for Innovation.

Research results have just been published in the journal *Nature Physics*.

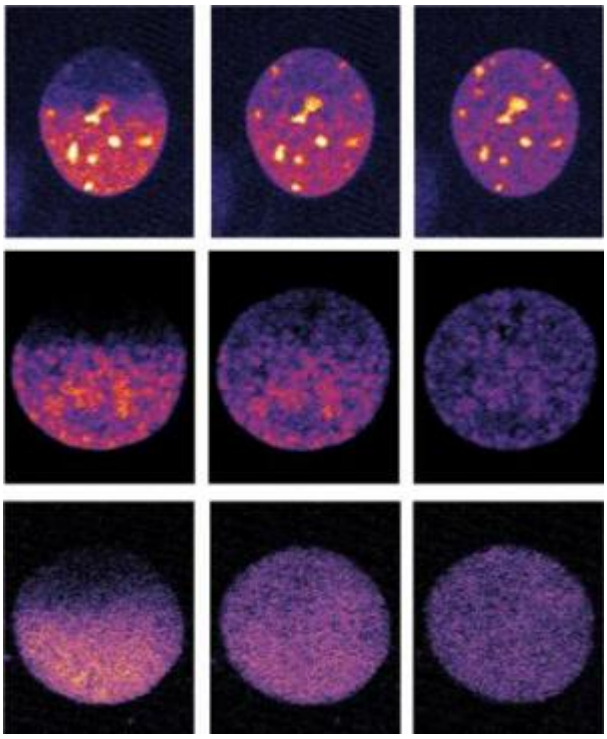
Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **INRS (Institut national de la recherche scientifique)**. The original article was written by Gisèle Bolduc.

Journal Reference:

1. A. D. Shiner, B. E. Schmidt, C. Trallero-Herrero, H. J. Wörner, S. Patchkovskii, P. B. Corkum, J-C. Kieffer, F. Légaré, D. M. Villeneuve. **Probing collective multi-electron dynamics in xenon with high-harmonic spectroscopy**. *Nature Physics*, 2011; DOI: 10.1038/nphys1940

http://www.sciencedaily.com/releases/2011/03/110309112908.htm

Intelligent Microscopy: Software Runs Experiments on Its Own



Micropilot detected cells at particular stages of cell division (each row shows one cell), and then instructed the microscope to remove fluorescent tags from proteins in half the cell's nucleus (left), and record what happened next (middle and right). (Credit: EMBL)

ScienceDaily (Mar. 10, 2011) — Scientists at EMBL Heidelberg created new software that rapidly learns what researchers are looking for and automatically performs complex microscopy experiments. The work is published in Nature Methods.

The sight of a researcher sitting at a microscope for hours, painstakingly searching for the right cells, may soon be a thing of the past, thanks to new software created by scientists at the European Molecular Biology Laboratory (EMBL) in Heidelberg, Germany. Presented in *Nature Methods*, the novel computer programme can rapidly learn what the scientist is looking for and then takes over this laborious and time-consuming task, automatically performing complex microscopy experiments when it detects cells with interesting features.

Called Micropilot, the software brings machine learning to microscopy. It analyses low-resolution images taken by a microscope and, once it has identified a cell or structure the scientists are interested in, it automatically instructs the microscope to start the experiment. This can be as simple as recording high-resolution time-lapse videos or as complex as using lasers to interfere with fluorescently tagged proteins and recording the results.

The software is a boon to systems biology studies, as it generates more data, faster. In a mere four nights of unattended microscope operation, Micropilot detected 232 cells in two particular stages of cell division and performed a complex imaging experiment on them, whereas an experienced microscopist would have to work full-time for at least a month just to find those cells among the many thousands in the sample. With such high throughput, Micropilot can easily and quickly generate enough data to obtain statistically reliable results, allowing scientists to probe the role of hundreds of different proteins in a particular biological process.

Jan Ellenberg and Rainer Pepperkok, whose teams at EMBL designed Micropilot, have used the software to deploy several different microscopy experiments, investigating various aspects of cell division. They determined when structures known as endoplasmic reticulum exit sites form, and uncovered the roles of two proteins, CBX1 and CENP-E, in condensing genetic material into tightly-wound chromosomes and in forming the spindle which helps align those chromosomes. This software will be a key tool for the European systems

biology projects Mitosys and SystemsMicroscopy, for which Ellenberg and Pepperkok are developing technology.
The Micropilot software is available as open source code at:
http://www.embl.de/almf/almf_services/hc_screeing/micropilot/.

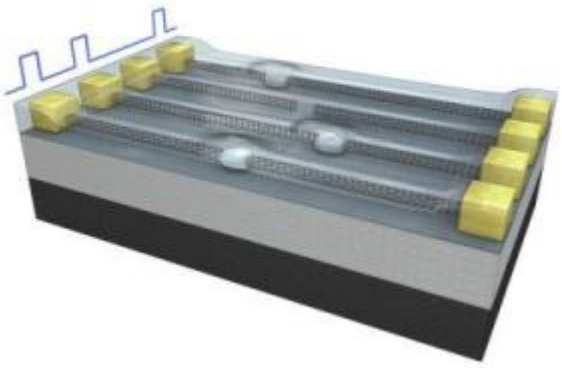
Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **European Molecular Biology Laboratory (EMBL)**, via AlphaGalileo.

Journal Reference:

1. Christian Conrad, Annelie Wünsche, Tze Heng Tan, Jutta Bulkescher, Frank Sieckmann, Fatima Verissimo, Arthur Edelstein, Thomas Walter, Urban Liebel, Rainer Pepperkok, Jan Ellenberg. **Micropilot: automation of fluorescence microscopy–based imaging for systems biology**. *Nature Methods*, 2011; DOI: 10.1038/NMETH.1558

http://www.sciencedaily.com/releases/2011/01/110124074011.htm

New Technology Would Dramatically Extend Battery Life for Mobile Devices



This is a schematic of four bits in various on/off states. The bit is made up of phase-change material with a size of about 10 nanometers with carbon nanotube electrodes. The programming current is 100 times lower than the present state-of-the-art memory. (Credit: Eric Pop, University of Illinois)

ScienceDaily (Mar. 10, 2011) — Technophiles who have been dreaming of mobile devices that run longer on lighter, slimmer batteries may soon find their wish has been granted.

University of Illinois engineers have developed a form of ultra-low-power digital memory that is faster and uses 100 times less energy than similar available memory. The technology could give future portable devices much longer battery life between charges.

Led by electrical and computer engineering professor Eric Pop, the team will publish its results in an upcoming issue of *Science* magazine and online in the March 10 *Science* Express.

"I think anyone who is dealing with a lot of chargers and plugging things in every night can relate to wanting a cell phone or laptop whose batteries can last for weeks or months," said Pop, who is also affiliated with the Beckman Institute for Advanced Science and Technology at Illinois.

The flash memory used in mobile devices today stores bits as charge, which requires high programming voltages and is relatively slow. Industry has been exploring faster, but higher power phase-change materials (PCM) as an alternative. In PCM memory a bit is stored in the resistance of the material, which is switchable. Pop's group lowered the power per bit to 100 times less than existing PCM memory by focusing on one simple, yet key factor: size.

Rather than the metal wires standard in industry, the group used carbon nanotubes, tiny tubes only a few nanometers in diameter -- 10,000 times smaller than a human hair.

"The energy consumption is essentially scaled with the volume of the memory bit," said graduate student Feng Xiong, the first author of the paper. "By using nanoscale contacts, we are able to achieve much smaller power consumption."

To create a bit, the researchers place a small amount of PCM in a nanoscale gap formed in the middle of a carbon nanotube. They can switch the bit "on" and "off" by passing small currents through the nanotube.

"Carbon nanotubes are the smallest known electronic conductors," Pop said. "They are better than any metal at delivering a little jolt of electricity to zap the PCM bit."

Nanotubes also boast an extraordinary stability, as they are not susceptible to the degradation that can plague metal wires. In addition, the PCM that functions as the actual bit is immune to accidental erasure from a passing scanner or magnet.

The low-power PCM bits could be used in existing devices with a significant increase in battery life. Right now, a smart phone uses about a watt of energy and a laptop runs on more than 25 watts. Some of that energy goes to the display, but an increasing percentage is dedicated to memory.

"Anytime you're running an app, or storing MP3s, or streaming videos, it's draining the battery," said Albert Liao, a graduate student and co-author. "The memory and the processor are working hard retrieving data. As people use their phones to place calls less and use them for computing more, improving the data storage and retrieval operations is important."

Pop believes that, along with improvements in display technology, the nanotube PCM memory could increase an iPhone's energy efficiency so it could run for a longer time on a smaller battery, or even to the point where it could run simply by harvesting its own thermal, mechanical or solar energy -- no battery required.
And device junkies will not be the only beneficiaries.
"We're not just talking about lightening our pockets or purses," Pop said. "This is also important for anything that has to operate on a battery, such as satellites, telecommunications equipment in remote locations, or any number of scientific and military applications."
In addition, ultra-low-power memory could cut the energy consumption -- and thus the expense -- of data storage or supercomputing centers by a large percentage. The low-power memory could also enable three-dimensional integration, a stacking of chips that has eluded researchers because of fabrication and heat problems.
The team has made and tested a few hundred bits so far, and they want to scale up production to create arrays of memory bits that operate together. They also hope to achieve greater data density through clever programming such that each physical PCM bit can program two data bits, called multibit memory.
The team is continuing to work to reduce power consumption and increase energy efficiency even beyond the groundbreaking savings they've already demonstrated.
"Even though we've taken one technology and shown that it can be improved by a factor of 100, we have not yet reached what is physically possible. We have not even tested the limits yet. I think we could lower power by at least another factor of 10," Pop said.
The work was supported in part by the Marco Focus Center Research Program, a Semiconductor Research Corporation entity, and by the Office of Naval Research. Graduate student David Estrada was also a co-author.

Story Source:

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **University of Illinois at Urbana-Champaign**.

Journal Reference:

1. Feng Xiong, Albert Liao, David Estrada, Eric Pop. **Low-Power Switching of Phase-Change Materials with Carbon Nanotube Electrodes**. *Science*, 2011; DOI: 10.1126/science.1201938

http://www.sciencedaily.com/releases/2011/03/110310141433.htm

Anthropologists Link Human Uniqueness to Hunter-Gatherer Group Structure

This 1965 photo by Thomas Headland shows the Agta sitting in the shade of dried-leaf-thatched huts. The Agta, an indigenous Philippine group, are one of the hunter-gatherer societies whose co-residence patterns were studied by an international team of anthropologists led by Arizona State University professor Kim Hill. By examining census data on recent hunter-gatherers, the researchers determined that the biological success of humans likely stems from the species' ancestral social structure. These findings are reported in the March 11 edition of the journal Science. (Credit: Photo courtesy of Thomas Headland)

ScienceDaily (Mar. 10, 2011) — One of the most complex human mysteries involves how and why we became an outlier species in terms of biological success.

Research findings published in the March 11 edition of the journal *Science* by an international team of noted anthropologists, including several from Arizona State University, who study hunter-gatherer societies, are informing the issue by suggesting that human ancestral social structure may be the root of cumulative culture and cooperation and, ultimately, human uniqueness.

Because humans lived as hunter-gatherers for 95 percent of their species' history, current foraging societies provide the best window for viewing human social evolution, according to the authors. Given that, the researchers focused on co-residence patterns among more than 5,000 individuals from 32 present-day foraging societies around the globe, including the Gunwinggu, Labrador Inuit, Mbuti, Apache, Aka, Ache, Agta and Vedda. Their findings identify human hunter-gatherer group structure as unique among primates.

Professor Kim Hill of ASU's School of Human Evolution and Social Change in the College of Liberal Arts and Sciences, is the lead author, along with Robert Walker of the University of Missouri. The collaborative effort involved ASU professors James Eder and Ana Magdalena Hurtado; ASU anthropology graduate student Miran Božičević; and anthropologists from SIL International, Dallas; Southern Methodist University, Dallas; Hawassa University, Ethiopia; Washington State University; Durham University, UK; University of Utah; and Stanford University.

Their finding showed that across all groups, adult brothers and sisters frequently live together, making it common for male in-laws to co-reside. They also found that it was equally common for males or females to move from or remain with family units. This is in contrast to other primate species, where either males or females move to another group at puberty.

A major point in the study is that foraging bands contain several individuals completely unconnected by kinship or marriage ties, yet include males with a vested interest in the offspring of daughters, sisters and wives. This organization mitigates the group hostility frequently seen in other apes and also promotes interaction among residential groups, thereby leading to the development of a large social network.

"The increase in human network size over other primates may explain why humans evolved an emphasis on social learning that results in cultural transmission," said Hill. "Likewise, the unique composition of human ancestral groups promotes cooperation among large groups of non-kin, something extremely rare in nature."
The group's findings appear in the paper "Co-Residence Patterns in Hunter-Gatherer Societies Show Unique Human Social Structure." It is the first published analyses of adult co-residence patterns in hunter-gatherer societies based on census data rather than post-marital residence typologies, Hill noted.

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 Rebecca Howe, School of Human Evolution and Social Change.

Journal Reference:

1. Kim R. Hill, Robert S. Walker, Miran Božičević, James Eder, Thomas Headland, Barry Hewlett, A. Magdalena Hurtado, Frank Marlowe, Polly Wiessner, Brian Wood. **Co-Residence Patterns in Hunter-Gatherer Societies Show Unique Human Social Structure**. *Science*, 2011; 331 (6022): 1286-1289 DOI: 10.1126/science.1199071

http://www.sciencedaily.com/releases/2011/03/110310141422.htm

A Glove on Your Hand Can Change Your Mind

Participants wore a bulky ski glove on one hand, with the other glove dangling from the same wrist, while arranging dominoes on a table. Right-handers who wore the glove on their right hand became functionally left-handed, causing them to make good-bad judgements like natural left-handers. (Credit: Image courtesy of Max Planck Institute for Psycholinguistics)

ScienceDaily (Mar. 10, 2011) — Unconsciously, right-handers associate good with the right side of space and bad with the left. But this association can be rapidly changed, according to a study published online March 9, 2011 in Psychological Science, by MPI researcher Daniel Casasanto and Evangelia Chrysikou (University of Pennsylvania). Even a few minutes of using the left hand more fluently than the right can reverse right-handers' judgments of good and bad, making them think that the left is the 'right side' of space. Conceptions of good and bad are rooted in people's bodily experiences, and can change when patterns of bodily experience change.

In language, positive ideas are linked with the right side of space and negative ideas with the left. It is good to be "in the right," but bad to be "out in left field." Space and goodness are also associated in the unconscious mind, but not always in the same way that they are linked in language. For right-handers, right is good, but for left-handers, left is good.

Choosing sides

In experiments by MPI psychologist Daniel Casasanto, when people were asked which of two products to buy, which of two job applicants to hire, or which of two alien creatures looks more intelligent, right-handers tended to choose the product, person, or creature they saw on their right, but most left-handers chose the one on their left.

Why do righties and lefties think differently? Casasanto proposed that people's conceptions of good and bad depend, in part, on the way they use their hands. "People can act more fluently with their dominant hand, and come to unconsciously associate good things with their fluent side of space."

Handicapped hand

To test this theory, Casasanto and colleagues studied how natural right-handers think about good and bad when their right hand is handicapped, either due to brain injury or something much less extreme: wearing a ski glove. Stroke patients completed a task that reveals implicit associations between space and goodness in healthy participants. Patients who had lost the use of their left hand showed the usual right-is-good pattern. But patients who lost the use of their right hand following damage to the left-hemisphere of the brain associated good with left, like natural left-handers.

The same pattern was found in healthy university students who performed a motor fluency task while wearing a bulky glove on either their left hand (which preserved their right-handedness) or on their right hand, which turned them temporarily into left-handers. After about 12 minutes of lopsided motor experience, the right-gloved participants' judgements on an unrelated task showed a good-is-left bias, like natural left-handers.

Malleable mind

"People generally think their judgements are rational, and their concepts are stable," says Casasanto. "But if wearing a glove for a few minutes can reverse people's usual judgements of what's good and bad, perhaps the mind is more malleable than we thought."

Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Max Planck Institute for Psycholinguistics**, via AlphaGalileo.

Journal Reference:

1. D. Casasanto, E. G. Chrysikou. **When Left Is 'Right': Motor Fluency Shapes Abstract Concepts**. *Psychological Science*, 2011; DOI: 10.1177/0956797611401755

http://www.sciencedaily.com/releases/2011/03/110310131006.htm

Researchers Use Lasers, Custom Microscope to Show Gene Splicing Process in Real Time

The microscope developed in the Gelles laboratory uses lasers with different wavelengths (colors) to illuminate biomolecules in order to study how cellular micro-machines are assembled. Each fluorescent biomolecule is "turned on" by a different laser, allowing different molecules to be identified and studied simultaneously. (Credit: Photo by Diana Katherine Hunt)

ScienceDaily (Mar. 10, 2011) — From neurosurgery to bar code readers, lasers have been used in a myriad of applications since they were first introduced in the late 1950's. Now, with the work being done in Jeff Gelles' Lab at Brandeis University, researchers have developed a way to use lasers to study the splicing of pre-messenger RNA molecules, an essential process in creating proteins to sustain advanced organisms, including human life. This process of splicing is carried out by a cellular micro-machine called the spliceosome.

"Understanding how these micro-machines function inside the cell is important for many reasons," says Aaron A. Hoskins, a post-doctoral fellow who is a visiting scientist at Brandeis and first author of the paper "Ordered and Dynamic Assembly of Single Spliceosomes," which appears in the March 11, 2011 issue of *Science*.

"One is to further [decipher] basic biology -- what makes us humans -- and another is to understand how diseases related to these different machines come about," says Hoskins. By understanding how the process works, researchers may eventually be able to come up with therapies that fix the splicing process in cases where it is not working properly.

The paper reports on a five-year-long collaboration of three research laboratories with diverse expertise to study the splicing process. In addition to Hoskins, authors include: Gelles, the Aron and Imre Tauber professor of biochemistry and molecular pharmacology, whose lab developed the multi-laser imaging system used in the research; Larry Friedman a senior scientist in the biochemistry department who was a key contributor in building the elaborate microscope; Melissa J. Moore, a Howard Hughes Medical Institute Investigator and professor of biochemistry and molecular pharmacology at the University of Massachusetts Medical School and members of Virginia Cornish's laboratory in the Department of Chemistry at Columbia University whose lab synthesized the special dyes that were attached to the spliceosomal proteins so that the proteins could be viewed with the laser microscope.

"Genomic DNA is sort of like a zip file in that there's a lot of information occupying a very small space," explains Hoskins. "Splicing allows you to decompress the genetic information so the cell can read it before a particular protein is made."

There are certain regions that code for proteins, called exons, and regions that do not code for proteins, called introns. The regions that do not code for proteins often interrupt the regions that do, therefore they need to be removed -- and the remaining pieces must be spliced together -- to create appropriate proteins.

Friedman has spent more than five years developing specialized light microscopes to watch single protein molecules, while Hoskins has been developing the methodology to study these proteins in the complex environments necessary for spliceosome function.

To view the spliceosome in action -- how it assembles to actually do the splicing -- the single yeast components are tagged with florescent dyes then the sample is placed into the microscope. The lasers act as a light source that causes individual tagged molecules to light up so one can actually watch, in unprecedented detail, the splicing process through its various stages.

"If we have one component of the spliceosome that has a green dye on it and one that has a red dye on it, then we see a green spot and a red spot coming together on the RNA, we know that we are studying part of that assembly process," says Gelles. "By looking at individual molecules one at a time we can actually follow the stages of the assembly process. We can determine whether it happens in the same order on each molecule, or if some spliceosomes assemble differently than others."

Friedman says that there are easily a hundred or so components that comprise the microscope that he designed and built with his colleagues. There are so many parts, in fact, that it is housed on a platform that looks much like a billiard table, with small tower-like structures and glass lenses scattered throughout.

"Some pieces were custom made and some are commercial off-the-shelf components that were purchased and put together like an erector set," says Freidman.

The molecular process known as the "central dogma of molecular biology" concerns the flow of information from DNA to RNA to proteins. RNA contains the chemical information that tells the cells what proteins to make -- for instance, muscle cells use the genes that tell the cell how to make the proteins that are important for muscle, and blood cells use the genes that tell the cell how to make proteins that are important for blood cells.

With the methods to study the splicesome now at their fingertips, the Gelles lab is also researching the process by which the RNA copy is made, called transcription, and processes by which cells change their shape and move.

"The thing that's very exciting about this technology is that it's generally applicable to study a wide range of biological problems," says Gelles. "It really enables us to find things out that were very difficult to study using previously existing approaches."

Story Source:

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

Journal Reference:

1. Aaron A. Hoskins, Larry J. Friedman, Sarah S. Gallagher, Daniel J. Crawford, Eric G. Anderson, Richard Wombacher, Nicholas Ramirez, Virginia W. Cornish, Jeff Gelles and Melissa J. Moore. **Ordered and Dynamic Assembly of Single Spliceosomes**. *Science*, 11 March 2011: Vol. 331 no. 6022 pp. 1289-1295 DOI: 10.1126/science.1198830

http://www.sciencedaily.com/releases/2011/03/110310070309.htm

An Accelerated Grimace: On Cyber-Utopianism

Chris Lehmann | March 2, 2011

Gather round, netizens, for Clay Shirky has a story to tell. It's a simple yet stirring saga of self-organization online, and an extension of the paean to the spontaneous formation of digital groups he delivered three years ago in his breakout book, *Here Comes Everybody*. But where Shirky's earlier tract focused principally on the potential organizing power of the digital world, *Cognitive Surplus* asserts that the great Net social revolution has already arrived. The story goes likes this: once upon a time, we used to watch a lot of television, to spend down the new leisure we acquired during the automated postwar era, and to adjust to the vaguely defined social ills associated with atomized suburban life. That was a one-way channel of passive consumption, and it was bad.

Now, however, we have the World Wide Web, which has leveraged our free time into an enormous potential resource. This is very, very good. With the emergence of Web 2.0–style social media (things like Facebook, Twitter and text messaging), Shirky writes, we inhabit an unprecedented social reality, "a world where public and private media blend together, where professional and amateur production blur, and where voluntary public participation has moved from nonexistent to fundamental." This Valhalla of voluntary intellectual labor represents a stupendous crowdsourcing, or pooling, of the planet's mental resources, hence the idea of the "cognitive surplus." Citing one of the signature crowdsourced reference works on the Web, Shirky contends that

People who ask "Where do they find the time?" about those who work on Wikipedia don't understand how tiny that entire project is, relative to the aggregate free time we all possess. One thing that makes the current age remarkable is that we can now treat free time as a general social asset that can be harnessed for large, communally created projects, rather than as a set of individual minutes to be whiled away one person at a time.

For Shirky, producers and consumers of digital culture are mashed up into a vast, experimental quest to test the reaches of knowledge and social utility. Does it make for a cacophony of rival monologuing voices and a rapidly expanding market for rumor, pseudo-information and unrewarded intellectual work? Yes—*and so much the better!* Shirky cheers—for this new Internet is not stifled by old-media publishing standards and elitist gatekeepers. Shirky asks us to consider bloggy self-publishing, which is upending the decaying one-sender-to-many-receivers model of publication: "The ability for community members to speak to one another, out loud and in public, is a huge shift," he writes, "and one that has value even in the absence of a way to filter for quality. It has value, indeed, *because* there is no way to filter for quality in advance: the definition of quality becomes more variable, from one community to the next, than when there was broad consensus about mainstream writing (and music, and film, and so on)."

It's reasonable to ask if this sort of discursive world is one any sane citizen would choose to live in. Democratic culture—indeed, cultural activity of any kind—thrives on establishing standards and drawing distinctions; they furnish the elemental terms of debate for other equally crucial distinctions in civic life, beginning with the demarcation of the public and private spheres that Shirky announces the web has transformed into a dead letter.

By contrast, to hail a cascade of unrefereed digital content as a breakthrough in creativity and critical thought is roughly akin to greeting news of a massive national egg recall by laying off the country's food inspectors. This contradiction should be obvious in an age where the best-known persecutor of the media mainstream—excuse me, lamestream—is one Sarah Palin, who has also cannily harnessed the social media revolution to a classic one-to-many political broadcasting concern. (One might also gingerly suggest that Shirky's own blogging output could have benefited from a healthy dose of filtration, given the sexist character of his now notorious, if forthrightly titled, blog offering "A Rant About Women.")

The invocation, and ritual immolation, of straw-man claims gleefully culled from the venerable storehouse of old-media cliché is standard fare in digital evangelizing tracts such as *Cognitive Surplus*. On one level, Shirky's new book is just the latest, monotonous installment in the sturdy tradition of exuberant web yay-saying, from the overheated '90s boom reveries of George Gilder (*Telecosm*) and Jon Katz (*Virtuous Reality*) to the more ambitious, but no less empirically challenged, late-aughts divinations of *Wired* magazine digiterati such as Chris Anderson (*The Long Tail*, *Free*). It's more than a little disorienting—and not a little obscene—in a society of increasingly desperate financial distress and joblessness, to be marched one more

time by a beaming missionary through the key points of the New Economy catechism, which holds that the social achievements of the web are remaking the world as we know it remorselessly for the better, abolishing all the old distinctions not merely of intellectual and cultural quality but also of social class, national identity, government regulation and the fabric of public and private life itself. Shopworn as this vision is, there's no doubt that Shirky has continued plying it to great professional effect: he recently scored a full professorship at New York University's Arthur L. Carter Journalism Institute, and boasts a long résumé of consulting gigs, including Nokia, News Corp., Procter & Gamble, the BBC, the US Navy and Lego.

* * *

On another level, though, Shirky's new book is more than corporate-visionary hackwork. What's striking is how Shirky pursues the utopian drift of the cottage industry in web apologetics to its logical conclusions—beginning with the collective time evoked in his book's title. He estimates that this pooled global cache of time capital is a "buildup of well over a trillion hours of free time each year on the part of the world's educated population." Obviously, plenty of free time goes into all kinds of endeavors—from producing execrable reality television to composing crowdsourced fan fiction. To assign it all an aggregate value of potential hours of creative and generous activity is about as meaningful as computing one's velocity on a bicycle as a fraction of the speed of light: it tells us nothing about either the public value or the opportunity cost of any given web-based activity.

Why assign any special value to an hour spent online in the first place? Given the proven models of revenue on the web, it's reasonable to assume that a good chunk of those trillion-plus online hours are devoted to gambling and downloading porn. Yes, the networked web world does produce some appreciable social goods, such as the YouTubed "It Gets Better" appeals to bullied gay teens contemplating suicide. But there's nothing innate in the character of digital communication that favors feats of compassion and creativity; for every "It Gets Better" video that goes viral, there's an equally robust traffic in white nationalist, birther and jihadist content online. A "cognitive surplus" has meaning only if one can ensure a baseline value to all that dreary inconvenient time we "while away" in our individual lives, and establishing that baseline is inherently a political question, one that might be better phrased as either "Surplus for what?" or "Whose surplus, white man?"

Shirky's approach to contested public values and political organization is another example of acute web myopia. To be fair, he does recap the story of a group of activists fighting Hindu-fundamentalist attacks on women who patronize bars in the Indian city of Mangalore, who united under the banner of a Facebook group called the Association of Pub-going, Loose and Forward Women. But on the negative side of the ledger, the most baleful use of web-enabled resources he seems able to imagine is Lolcats, the signature cute-pets-with-captions of the "I Can Has Cheezburger?" franchise, which he adopts as a stand-in for "the stupidest possible creative act" perpetrated on the web, with nary a whisper about faked Obama birth certificates or the James O'Keefe YouTube videos. (O'Keefe, you may recall, produced a series of videos in which he and an associate posed as a pimp and hooker seeking legal advice at ACORN offices; using extremely selective and misleading video editing, O'Keefe made ACORN employees appear to be colluding in their scheme to evade the law.) For a man who spends his career explaining how the web works, Shirky doesn't seem to spend much time exploring the thing.

While Shirky clearly supports the formation of the Association of Pub-going, Loose and Forward Women (it was, he notes, partially inspired by *Here Comes Everybody*), he cautions that such exercises in "civic intervention" are rarities, even in the hypernetworked precincts of Web 2.0. Though "it's tempting to imagine a broad conversation about what we as a society should do with the possibilities and virtues of participation" online, Shirky claims that "such a conversation will never happen." The reason? "If you do a Web search for 'we as a society,' you will find a litany of failed causes, because society isn't the kind of unit that can have conversations, come to decisions, and take action…. It's from groups trying new things that the most profound uses of social media have hitherto come and will come in the future."

There you have it: the idea of public cooperation, if not social solidarity, rendered nugatory by a web search. (One can't help wondering whether Shirky would be equally cavalier about a search using the term "We the People," which I seem to recall has lodged a rather important model of public cooperation in the American civitas.) Shirky's conclusion—intended to champion the dynamism of small-group models of web activism—is, in reality, redolent of Margaret Thatcher's famous dictum, "There is no such thing as society." The idea of society as a terminally unresponsive, nonconversant entity would certainly be news to the generations of labor

and gender-equality advocates who persistently engaged the social order with demands for the ballot and the eight-hour workday. It would likewise ring strangely in the ears of the leaders of the civil rights movement, who used a concerted strategy of nonviolent protest as a means of addressing an abundance-obsessed white American public who couldn't find the time to regard racial inequality as a pressing social concern. The explicit content of such protests, meanwhile, indicted that same white American public on the basis of the civic and political standards—or rather double standards—of equality and opportunity that fueled the nation's chauvinist self-regard.

Skepticism, conflict and the attendant public goods that they may help to identify and redefine are mostly taboo on the Shirky-channeled web. As the subtitle of *Cognitive Surplus* indicates, Shirky thinks there is little about the content of our trillion-hour tidal wave of just-in-time web data that is not benign, and quite reliably melioristic. As digital media continue to spread their influence across the globe, they also come bearing the relentlessly tinkering, innovative spirit of social generosity. For techno-optimists like Shirky, most people online are donating their time to the heroic project of the digital commons, and that act alone is a sort of all-purpose social fixative—enforcing cultural standards of behavior online, rewarding crowdsourced contributions and punishing trespasses against agreed-upon digital decorum.

But what's different and exciting about the social-minded Web 2.0, Shirky insists, is that it seems to be well on its way toward abolishing the gray, divisive conceptions of cultural authority and labor that used to reign in the now discredited age of information scarcity. He argues that behavioral economic studies such as the so-called Ultimatum Game—in which one test subject offers to split $10 with another—point to the extra-material motivations most people share beneath the surface appearance of economic self-interest. As Shirky explains, neoclassical economic theory would hold that the subject who begins the game with the $10 in hand would always proffer a nine-to-one split, because that's the cheapest way for the divider to enlist the recipient's support—and because the latter subject is still up a dollar in the transaction. But in test after test, the exchanges cluster in the center spread, because a 50-50 split seems more intuitively fair—even when the stakes in the experiment are raised to hundreds of dollars. The inescapable conclusion, Shirky writes, is that, contra economic theory, markets and selfish behavior correlate "in the opposite way you might expect." Markets support generous interactions with strangers rather than undermining them. What this means is that the less integrated market transactions are in a given society, the less generous its members will be to one another in anonymous interactions…. Exposure to market logic actually increases our willingness to transact generously with strangers, in part because that's how markets work.

In the manner of Malcolm Gladwell, Shirky extends this dictum across a range of didactic vignettes drawn from digital culture. He offers the standard encomiums to open-source computer-engineering collaborations such as the Linux operating system and Apache server software. But he also finds stirring samples of digitally enabled generosity in a volunteer-run charity that sprang up on a Josh Groban fan discussion board, a vast online exchange of J.K. Rowling–inspired fan fiction and PickupPal.com, a site that began life dispensing contact information for would-be Canadian carpoolers (which, wouldn't you know, was the subject of an iron-fisted shutdown campaign from statist Ontario bus carriers).

What's common to these parables of the information marketplace is a vision of an uncoerced social order within the reach of any suitably wired and enterprising soul inclined to donate a microsliver of that unfathomably huge surplus of time to crowdsourced tasks. This being the general drift of our social destiny, Shirky waves away the old-school leftist critique of crowdsourced content as "digital sharecropping" as so much "professional jealousy—clearly professional media makers are upset about competition from amateurs." Such critics are also guilty of a category error, because "amateurs' motivations differ from those of professionals." What if the dispensers of free user-generated content "aren't workers?" Shirky asks. "What if they really are contributors, quite specifically intending their contributions to be acts of sharing rather than production? What if their labors are labors of love?"

* * *

And if not? Consider the study that is often the touchstone of Shirky's trippy speculations. The utility of the Ultimatum Game for a new market-enabled theory of human nature thins out considerably when one realizes that the players are bartering with unearned money. They aren't dividing proceeds that "belong" to either player in any meaningful sense. Consult virtually any news story following up on a lottery winner's post-windfall life—to say nothing of the well-chronicled implosion of the past decade's market in mortgage-

backed securities—and you'll get a quick education in how playing games with other people's money can have a deranging effect on human behavior.

In this respect, the Ultimatum Game is an all-too-apt case study to bring to bear on the digital economy—but to paraphrase Shirky, in the opposite of the way one might expect. Despite all the heady social theorizing of Shirky and the *Wired* set, the web has not, in fact, abolished the conventions of market value or rewritten the rules of productivity and worker reward. It has, rather, merely sent the rewards further down the fee stream to unscrupulous collectors like Chris Anderson, who plagiarized some of the content of *Free*, a celebration of the digital free-content revolution and its steady utopian progress toward uncompensated cultural production, from the generous crowdsourcing souls at Wikipedia. How egalitarian. It's a sad truth that in Shirky's idealized market order, some people's time remains more valuable than others', and as in that gray, old labor-based offline economy, the actual producers of content routinely get cheated, in the case of *Free* by the very charlatan who urges them on to ever greater feats of generosity.

As for crowdsourcing being a "labor of love" (Shirky primly reminds us that the term "amateur" "derives from the Latin *amare*—'to love'"), the governing metaphor here wouldn't seem to be digital sharecropping so much as the digital plantation. For all too transparent reasons of guilt sublimation, patrician apologists for antebellum slavery also insisted that their uncompensated workers loved their work, and likewise embraced their overseers as virtual family members. This is not, I should caution, to brand Shirky as a latter-day apologist for slavery but rather to note that it's an exceptionally arrogant tic of privilege to tell one's economic inferiors, online or off, what they do and do not love, and what the extra-material wellsprings of their motivation are supposed to be. To use an old-fashioned Enlightenment construct, it's at minimum an intrusion into a digital contributor's private life—even in the barrier-breaking world of Web 2.0 oversharing and friending. The just and proper rejoinder to any propagandist urging the virtues of uncompensated labor from an empyrean somewhere far above mere "society" is, "You try it, pal."

There's also the small matter of what, exactly, is being produced and exchanged in the social networks Shirky hails as the cutting edge of new-economy innovation. Services such as PickupPal and CouchSurfing—a site for tourists seeking overnight stays in the homes of natives—are mainly barter clearinghouses, enabling the informal swapping of already existing services and infrastructure support. Meanwhile, the Linux and Apache projects are the web equivalents of busmen's holidays, places where software designers can test-drive and implement innovations that overlap with day job or research duties where their services are, in fact, compensated.

The one hint of possible production for exchange value in *Cognitive Surplus* unwittingly shows just how far this brand of web boosterism can go in studied retreat from economic reality; it involves a study by Eric von Hippel, a "scholar of user-driven innovation," who found that a Chinese manufacturer of kites sought out a crowdsourced design from an outfit called Zeroprestige, which worked up shared kite designs using 3D software. The transaction, Shirky enthuses, meant that "the logic of outsourcing is turned on its head; it was possible only because the description of the kites, which was written in standard format for 3D software, was enough like a recipe for the manufacturer to be able to discover them online and to interpret them without help."

That is not the logic of outsourcing "turned on its head"—it is the logic of outsourcing metastasized. Like the sort of fee-shifting exploitation of content providers that prevails in online commerce on the Anderson model—and, I should stipulate, in underpaid "content farms" operated within the orbit of my own corporate parent, Yahoo—outsourcing is a cost-cutting race to the bottom. All that's achieved in the outreach of the Chinese kite maker is the elimination of another layer of production costs involving the successive prototypes of marketable kite designs. It's certainly not as if those lower costs will translate into higher wages for China's sweated, open-shop manufacturing workforce—the people who will end up making the kites in question.

But Shirky, like all true Net prophets, can't be detained by such crude concerns. The old social contracts of labor, presumably, are like the discredited habit of "getting news from a piece of paper"—part and parcel of the "twentieth-century beliefs about who could produce and consume public messages, about who could coordinate group action and how, and about the inherent and fundamental link between intrinsic motivations and private actions," which in his Olympian judgment turned out to be "nothing more than long-term accidents." It's little wonder that Shirky should show such fastidious disdain for recent history. *Cognitive Surplus* is already aging badly, with the WikiLeaks furor showing just how little web-based traffic in raw

information, no matter how revelatory or embarrassing, has upended the lumbering agendas of the old nation-state on the global chessboard of realpolitik—a place where everything has a price, often measured in human lives. More than that, though, Shirky's book inadvertently reminds us of the lesson we should have absorbed more fully with the 2000 collapse of the high-tech market: the utopian enthusiasms of our country's cyber-elite exemplify not merely what the historian E.P. Thompson called "the enormous condescension of posterity" but also a dangerous species of economic and civic illiteracy.

In *The Net Delusion*, by Evgeny Morozov, we finally have a long-overdue market correction to cyber-utopianism, which Morozov defines as "a naïve belief in the emancipatory nature of online communication that rests on a stubborn refusal to acknowledge its downside." Morozov, a Belarussian web activist who works with the New America Foundation, sizes up the social media web for what it is—a powerful tool for communication, which like most such tools in modern history is subject to grievous distortion and manipulation by antidemocratic regimes.

Since the remarkable popular protests that ousted Egyptian President Hosni Mubarak from power in February, Shirky's cyber-utopian vision of crowdsourced social virtue has gone viral. US media have devoted extensive coverage to Egypt's so-called Facebook and Twitter generation, the young anti-Mubarak activists who have been praised for using social media and cellphones to organize protesters in Tahrir Square and topple a tyrant. One activist ideally suited to this story line was 30-year-old Wael Ghonim, a Google executive detained by the Egyptian police for twelve days for acting as the anonymous administrator of a Facebook page that was facilitating the protests. Sure enough, the American media promptly adopted Ghonim as the face of Egypt's revolt shortly after his release from detention.

Social networking mattered in Egypt, but the root causes of the uprising were scarcity, official corruption and social conflict, none of which fit the cyber-utopian narrative or flatter America's technological vanity. The original scheduled protests of January 25 arose out of a past effort to organize an anti-Mubarak general strike, and it was the spread of the protests to the less wired workers in Egypt's long-pinched labor economy that helped furnish the telling last blows to the Mubarak order. According to many reports from Cairo, the protests continued to gain momentum not from tweets or Facebook posts but instead from the direct spectacle of the populace congregating, We the People style, in Tahrir Square. Most Egyptians were following events on state television, which was parroting the official propaganda approved by the Mubarak regime, holding that the protests were the handiwork of foreign agitators. Not being regular blog readers, ordinary Egyptians went into the streets and saw that the state media were lying, that the protesters were their neighbors, their family members, their co-workers. The effort to coax a new political order into being grew from the power of popular witness, filtered through the evidence of citizens' own eyes and ears.

Western cyber-utopian exuberance was disastrously projected onto the global stage during the 2009 protests over Iran's stolen presidential election. Shirky pronounced the Twitter-aided revolt "the big one…. the first revolution that has been catapulted onto a global stage and transformed by social media." Morozov patiently unpacks the ways that Shirky and other American Twitter champions overestimated the technology's impact. Just over 19,000 Twitter accounts were registered in Iran before the uprising, he notes—meaning that roughly 0.027 percent of Iran's population could have plugged into the Twitterfied protests. Many of the accounts reported on by the media belonged to sympathizers and Iranian diaspora, such as the blogger oxfordgirl, who supplied indispensable updates and aggregated news roundups on the protests from her perch in the British countryside.

Tapping into a digitally mediated experience of events in Iran felt extremely significant to Western Twitter clients, so much so that an Obama administration State Department official named Jared Cohen wrote to the social media company's executives requesting that they postpone a scheduled suspension in service for site maintenance so as to keep Iranian dissidents online at a critical juncture in the Tehran demonstrations. Leaders in rival authoritarian states didn't need to hear anything else in order to justify their own crackdowns on social media: Twitter may not have launched the anti-Ahmadinejad rebellion, but in one fell diplomatic swoop the world's dictators saw cause to repudiate Twitter as a tool of a meddling Obama White House. This, Morozov writes, was "globalization at its worst."

A simple email based on the premise that Twitter mattered in Iran, sent by an American diplomat in Washington to an American company in San Francisco, triggered a worldwide Internet panic and politicized all online activity, painting it in bright revolutionary colors, and threatening to tighten online spaces and opportunities that were previously unregulated…. The pundits were right: Iran's Twitter Revolution did have

global repercussions. Those were, however, extremely ambiguous, and they often strengthened rather than undermined the authoritarian rule.

The unfortunate propensity to log on to the web and pronounce it a global revolution in the offing is what Morozov dubs "the Google Doctrine"—the overconfident conviction, inherited from the West's cold war propaganda, that the simple transmission of information beyond the reach of state-sanctioned channels has the power to topple authoritarian regimes. But just as the Eastern bloc's downfall had far more to do with the internal stresses besieging the dying Soviet order, so does the Google Doctrine paper over a vast nexus of real-world causation in global affairs.

Nevertheless, the Google Doctrine remains central to American policy-making. Last year Secretary of State Hillary Clinton delivered a feverishly touted speech on the largely empty topic of "Internet freedom." Like cold war–era pronouncements touting Western virtues for global consumption, Clinton's broad-brush celebration of the Net's innate democratizing thrust alternated between the vacuous—"we stand for a single Internet where all of humanity has equal access to knowledge and ideas"—and the hypocritical, with Clinton touting cyber-enabled popular revolts in Iran and Moldova while remaining conspicuously silent about a web censorship measure enacted the week before in Jordan, a vital US ally in the Middle East. As Morozov observes, "translated into policies, the very concept of Internet freedom, much like 'the war on terror' before it, leads to intellectual mush in the heads of its promoters and breeds excessive paranoia in the heads of their adversaries."

Morozov's dogged reporting on how authoritarian regimes have nimbly adapted to the Internet age underlines what an empty gesture it is to treat "Internet" and "freedom" as synonyms. Much as US policy thinkers have clung to the naïve cold war faith in data transmission as revolution by other means, they have also propped up the outmoded image of the authoritarian state as a lumbering, clueless mass bureaucracy, easily toppled or terrified into submission before a well-timed hacker attack or a heroic blog post. Instead, today's strongmen are just as apt to be on the delivering as the receiving end of blog outbursts and denials of service.

Tomaar, a Saudi website promoting philosophical inquiry outside the confines of Muslim orthodoxy, attracted a mass following soon after it was launched, especially as its discussion boards expanded to include the question of politics and culture in the Arab world. In short order, though, the Saudi government denied access to the site on all servers used by its citizens. When Tomaar's webmasters devised a straightforward workaround via a third-party Internet connection, that stopped working as well—and the US-based service provider abruptly canceled the site's contract, condemning it to a series of improvised connectivity patches. Even so, it still suffers regular denial-of-service attacks—the same tools that have been used to disable the site for Julian Assange's WikiLeaks operation. Nothing in the battery of attacks on Tomaar points directly back to the Saudi government—another sign, in all likelihood, that authoritarian webmasters have grown as adept in covering their tracks as they are in disrupting web service. As Morozov notes, "cases like Tomaar's are increasingly common, especially among activist and human rights organizations. Burma's exiled media—Irrawaddy, Mizzima, and the Democratic Voice of Burma—all experienced major cyber-attacks…; ditto the Belarussian oppositional site Charter97, the Russian independent newspaper *Novaya Gazeta* (the one that employed the slain Russian journalist Anna Politkovskaya), the Kazakh oppositional newspaper *Respublika*, and even various local branches of Radio Free Europe / Radio Liberty."

* * *

It has never been the case that authoritarians are allergic to information technologies. Quite the contrary: as pioneers in the production of mass propaganda, they love mass media, and maintain an intense interest in later-generation digital technologies such as GPS and Twitter location that permit them to plot the real-time whereabouts of online dissidents. Yet one never encounters these uses of digital technologies in Shirky-style broadsides on cyber-liberation; in them, digital technology by definition unleashes and pools human creativity and generosity, because that's what we Western progenitors of these technologies like to imagine them doing. As the Tomaar episode also shows, American Net companies—hailed in State Department speeches as the vanguard of the freedom revolution—are often fleet of foot when political controversy threatens to roil their plans for overseas market expansion. It's not hard to see why that should be the case: their shareholders expect them to be profitable, and in many stops along the global marketplace, freedom and democratization stand directly athwart that prime directive. To take just one example, last year Facebook pulled the plug on a group maintained by an activist in Morocco named Kacem El Ghazzali, which promoted discussion about secular education in the theocratic country. When El Ghazzali e-mailed Facebook engineers in Palo Alto

requesting an explanation, they deleted his profile on the site for good measure. Eventually, Facebook relented and restored the education site, once the episode got press attention in the West, but El Ghazzali was left to rebuild his Facebook profile on his own. In Egypt, as the *New York Times* recently reported, Facebook shut down Wael Ghonim's page because he had violated the company's terms of service by using a pseudonym to create a profile as one of the page's administrators. Hence, as Morozov observes, "contrary to the expectations of many Western policymakers, Facebook is hardly ideal for promoting democracy; its own logic, driven by profits or ignorance of the increasingly global context in which it operates, is, at times, extremely antidemocratic."

This trend, too, runs counter to common wisdom on digital globalization, which has long held that authoritarian governments can't afford to crack down on Net freedom, because the collateral loss in trade and commerce would be prohibitive. That argument is also an extension of the classic "dollar diplomacy" that, during the cold war, was supposed to force the hands of strongmen who otherwise lacked enthusiasm for Western anticommunist initiatives. With Western companies beating a hasty retreat to the sidelines, foreign dictators can now be confident that the battle over free online expression will never be fully joined.

Meanwhile, plenty of equally unsavory nonstate actors have also adapted to the new networked web—most notoriously in the cellphone-enabled Mumbai terrorist attacks, in which jihadists used Google maps to identify their targets. Mexican crime gangs have used Facebook to compile lists of kidnapping targets, while Indonesians can use a Craigslist-style service to arrange the sale of children's organs. While Kenya has played host to a vital and influential site called Ushahidi, which helped modernize accurate citizen reporting of violence during the disputed 2007 elections, in that same episode ethnic leaders on both sides of the dispute used text messaging to spread violent attacks on their enemies. "The blood of innocent Kykuyus will cease to flow! We will massacre them right here in the capital," one such message read. "In the name of justice put down the names of all the Luos and Kaleos you know from work, your property, anywhere in Nairobi, not forgetting where and how their children go to school. We will give you a number on where to text these messages."

Morozov contends that the work of Ushahidi, while enormously valuable in certain ways, is decidedly ambiguous in others. While crowdsourcing is an indispensable good in responses to natural disasters, Ushahidi's tracking of political violence and election monitoring inevitably involves data that, in the absence of third-party oversight, is "impossible to verify and easy to manipulate," via false reports or rumors designed to foment panic in one camp or another. False reports are especially damaging to the documentation of human rights abuses, because just one falsifiable report can more or less permanently discredit an entire human rights operation. In addition, he writes, some details about such attacks should not be available online because, for example, "in many countries, there is still a significant social stigma associated with rape," and small but telling details about an attack's location "may reveal the victims, making their lives even more unbearable."

Ushahidi figures into *Cognitive Surplus*, but scrubbed of any ambiguity or unintended consequences. "Like all good stories," Shirky chirps in a Gladwellian key, "the story of Ushahidi holds several different lessons: People want to do something to make the world a better place. They will help when they are invited to. Access to cheap, flexible tools removes many of the barriers to trying new things."

Because Morozov is not an American web-booster, he's especially attuned to the plank-in-the-eye hypocrisies of US Net evangelists. When Hillary Clinton was still in the Senate, she co-sponsored legislation with fellow culture scold Sam Brownback to fund government research on how Internet use could stupefy and endanger America's youth. Such concerns never seem to arise in approving Net freedom for indiscriminate foreigners, though; as Morozov archly notes, "Chinese and Russian parents would never worry about such a thing! Or ask their governments to do something about it!" This contradiction, he adds, amounts to nothing less than Orientalism, and harms US critical thinking as much as it damages the Internet's image abroad. "While many in the West concede that the Internet has not solved and may have only aggravated many negative aspects of political culture," as is the case with James O'Keefe's gotcha YouTube videos, "they are the first to proclaim that when it comes to authoritarian states, the Internet enables their citizens to see through the propaganda. Why so many of their own fellow citizens—living in a free country with no controls on freedom of expression—still believe extremely simplistic and misleading narratives when all the facts are just a Google search away is a question that Western observers should be asking more often."

Morozov isn't a Luddite. In his activist career in Belarus, he has witnessed the dramatic gains that democratic movements can make online. But he's also seen—and chronicled, in this indispensable book—the many ways

that the digital world mirrors the inequities, perverse outcomes and unintended consequences that dog all human endeavors in nondigital human history. If only we had spent the past two decades reading books like *The Net Delusion* instead of embracing the Clay Shirkys of the world as serious public intellectuals, we could have a far more coherent view of our new media revolution—and probably a much saner set of policy options in the bargain.

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Messages That Conduct an Electric Charge
By HOLLAND COTTER

Librado Romero/The New York Times
A neon sculpture from 2008 is among the works by Glenn Ligon, including black-and-white text paintings, in this New York Conceptual artist's retrospective at the Whitney Museum.

Sometimes a career survey doubles as a scan of social history. This is true of Glenn Ligon's retrospective at the Whitney Museum of American Art, a tight but ample show that refers back to America's slave-holding past and forward to the Obama present but focuses on the late 1980s and 1990s, a too-seldom-revisited stretch of recent art.

Mr. Ligon, who is 50 and was born in the Bronx, did his first breakout work in 1985. At that point, halfway through Reaganomics and already well into the AIDS crisis, a tide of what would come to be called identity politics was building but had not yet penetrated the gated New York art world. The 1985 Whitney Biennial didn't have a single African-American among its 84 artists. Outside the gates, though, the cultural waters were stirring. A new generation of black artists was rewriting existing scripts about race. Young gay artists who'd seen the inside of a closet only long enough to pack up and get out were making art about the options ahead of them.

Mr. Ligon, just a few years out of college, was committed to painting in a brushy, romantic, abstract expressionist mode. But he was also acutely aware, as a gay black man, of the political ferment around him. His problem became how to make a traditional language of painting expressive of who, and what, he was. His initial solution was to keep painting, with de Kooningesque strokes, but to add new content in the form of words, specifically brief anecdotes lifted from gay pornographic literature and incised with a pencil point into his pigment-swiped surfaces. Like graffiti scrawled in wet cement, or the Latin phrases written on a Cy Twombly painting, the words were a defacement, but they were also a territorial marker, a tag that made his art really his. Four of these small paintings are among the earliest pieces in "Glenn Ligon: America" at the Whitney. And they are the first in what has become a long line of language-based works by an artist who is equally an object maker and a conceptualist, and as interested in the past as in the present.

He modeled another early painting, "Untitled (I Am a Man)" from 1988, on a historical artifact: the simple placard, with the words "I Am a Man" in black on a white ground, carried by striking black sanitation workers in Memphis in 1968, and documented in a famous photograph by Ernest C. Withers.

But Mr. Ligon's oil-on-canvas version isn't a copy of the placard; it's a reinvention of it — the words are differently spaced; the surface is differently textured — as a semi-abstract painting. It's a new kind of object, with an old history, and you perceive it in stages: first as words, a reading experience; then, as you get closer, as a looking-at-art experience; then, holistically, as a thinking experience. (If you linger over his work a little, give yourself to it, you'll get something from it. The temptation, with visually reticent art, is to breeze through the show, but that's like keeping your iPod on at a concert. You get a sense of what's going on, but you're preprogrammed and sticking with that.)

The shift back and forth between reading and looking, object and idea, is the basic dynamic emphasized by the show, which has been organized by Scott Rothkopf, a Whitney curator. And it represents an effort, very much of the current, formalist, post-'90s moment, to position Mr. Ligon as being as much a craft-conscious painter as a social commentator.

The positioning is valid, because the dynamic is demonstrable even early on. And it grows more complex and nuanced as the range of texts he uses expands to include fiction, autobiography, the popular press and oral history, and as his forms become more varied, moving into photography and sculpture.

Always, though, language is at the center. In 1988 Mr. Ligon made a series of paintings using epigrammatic passages taken from dream-interpretation guides popular among African-Americans when he was growing up. He stenciled the phrases, character by character, with oil stick, a thick, viscous medium that creates a slightly raised, braillelike relief, and used colors that suited the words. For example the phrase "Honeycomb: To suck honey from a honeycomb denotes pleasure" is stenciled in copper-colored letters on a brown-gold ground.

This series would be his last use of color in text painting for quite a while, with the exception of a group of pictures based on scabrous racial jokes by the comedian Richard Pryor done in eye-aching complementaries (electric blue on bright red, etc.). Black and white would become the norm, and stenciling a primary expressive medium.

In several paintings beginning in 1990 Mr. Ligon covered wooden doors or door-shaped canvases with stenciled sentences pulled from different sources: an autobiographical essay by Zora Neale Hurston ("I feel most colored when I am thrown against a sharp white background"); Genet's play "The Blacks" ("I'm Turning Into a Specter Before Your Very Eyes and I'm Going to Haunt You"); a poem by Jesse Jackson ("I Am Somebody").

In each painting the single line is repeated over and over, continuously, in black letters on a gessoed background, with a few paintings white on white, or ivory on ivory. As the words wind down from the top, the stencil becomes increasingly clogged with pigment so that individual characters turn smudgy, and words grow progressively less legible and the bottom of the painting is a kind of miasma.

The effect is most extreme in pictures that quote from James Baldwin's 1953 essay "Stranger in the Village," an account of his stay in a tiny Alpine hamlet where, he claimed, no one had ever seen a person with black skin. His tale of enforced visibility and vulnerability ends with a vision of social transformation, specifically in America: "The world is white no longer, and will never be white again." But Mr. Ligon makes Baldwin's words all but unreadably dark, by stenciling them with a mixture of black paint and coal dust that cakes and clots on the canvas surfaces like epidermal growth and gives off a spooky sheen.

If the use of stenciling inevitably brings Jasper Johns to mind, the sparkle effects recall Andy Warhol's diamond-dust silk-screened paintings of shoes and shadows. In the late 1990s Mr. Ligon borrowed Warhol's silk-screen-painting format in a set of large-scale photographic images of the 1995 Million Man March on Washington, an event that promoted black male solidarity but was pointedly unwelcoming to gay men.

And in two installations he leaves painting behind altogether. One, "To Disembark," from 1993, is based on a 19th-century account by a slave named Henry Brown, known as Box, of his escape from captivity by having himself mailed from Virginia to Philadelphia in a wooden crate.

Like a monument to Brown, four shipping crates sit in a Whitney gallery; from inside one comes the voice of Billie Holiday singing the anti-lynching anthem "Strange Fruit." On the walls hang a series of witty, sometimes chilling "wanted" posters for fugitive slaves, with Mr. Ligon himself the runaway subject, as if he couldn't, even now, be free and clear of the past.

The sound of Holiday's melismatic wail carries into a second installation, "Notes on the Margin of the 'Black Book,' " a mural-like display of Robert Mapplethorpe's eroticized photographs of black men from the late 1980s and early 1990s. Some viewers find the series deeply racist. Mr. Ligon indicates his own ambivalence

by annotating the pictures with printed commentary by theorists, artists, politicians, gay-bar patrons and so on.

The sheer range of informed opinion suggests that there is no "right" reaction. Mapplethorpe wanted to cause trouble, and he did. He was no hero but no villain either.

In any case, for Mr. Ligon, who embraces the logic of ambiguity, heroism is as contingent a category as history, race and gender. In 2000 for a commissioned community project in Minneapolis, he distributed copies of 1960s and '70s black pride coloring book to schoolchildren. He asked them to color the pictures, and he made silk-screens of the results. The child who colored in an African beauty named Salimu did a nice, respectful job. But Malcolm X came out looking like a clown — white skin, cherry-red lips, dots of rouge — and Frederick Douglass disappeared under a rain of scribbles.

The retrospective ends as it started, with words. A big one, "America" is spelled out three times in neon in the final gallery, each version slightly different, none quite right. One has backward letters, another flickers as if running out of power; the third is painted black and emits only pinpoints of light.

There's a fourth neon piece downstairs in the lobby, consisting of the words "Negro Sunshine" — the phrase is Gertrude Stein's (and a racial stereotype as she used it) — and facing the street. Like everything by Mr. Ligon, "Negro Sunshine" can be read in different ways. It can evoke the optimism that initially greeted the Obama presidency but that now can seem hard to sustain. Or it can refer to changes in American attitude — a real loosening up — toward race and gender since Mr. Ligon came on the scene in the mid-1980s. Or it can express a viewer's appreciation of the probity and plentitude of his art.

"This sober, tender-hearted, very searching history of a family's progress, comprehends in its picture of life which is distinctively American, a psychology which is universal."

The words are Marianne Moore's. She was writing about Stein's epic novel "The Making of Americans." I'll borrow and apply them to Mr. Ligon's work.

Glenn Ligon: America

ON VIEW Until June 5, Whitney Museum of American Art, 945 Madison Avenue, at 75th Street, (212) 570-3600, whitney.org.

UPPER EAST SIDE DINING Accademia di Vino, (212) 888-6333, accademiadivino.com; Gobo, (212) 288-4686, goborestaurant.com.

http://www.nytimes.com/2011/03/11/arts/design/messages-that-conduct-an-electric-charge.html?ref=design

A Unified Home for Arts Education, With a Split Right Down the Middle

By NICOLAI OUROUSSOFF

IWAN BAAN
The Perry and Marty Granoff Center, Brown University's new performing arts building

PROVIDENCE, R.I. — It's hard to know whether Brown University's latest experiment in interdisciplinary studies, the new Perry and Marty Granoff Center for the Creative Arts, will ever bear worthwhile artistic fruit. Cross-disciplinary programs have been around for decades, with dubious results. But at least the center has given rise to a handsome piece of architecture.

The building, which seems to have been sliced in half from the top to bottom by a gigantic blade, with its right side sunken half a story into the ground, adds a touch of contemporary glamour to a campus of solemn brick buildings and converted clapboard houses. And it does so without the over-the-top effects that could offend its aesthetically conservative neighbors.

Even better than how the building looks, however, is how it functions. Designed by Diller Scofidio & Renfro, its fractured form not only creates wonderful visual relationships among various parts of the interior, but it also should encourage the kind of social intermingling that the Granoff Center is supposedly all about. The building occupies a site framed by the quaint houses of Angell Street to the south and a small lawn to the west. Seen from Angell Street, the wide horizontal bands of corrugated zinc that make up its wall give the building the look of a stack of super elegant shipping containers. The bands are pried up on several floors at the back of the building to reveal floor-to-ceiling windows, giving the unsettling impression that someone is peeking at you through gigantic metal blinds.

The more time you spend with it, however, the less out of place the building feels. Its relatively modest scale — it is 76 feet tall at its highest point — fits nicely with both a row of brick academic buildings to the north and the houses to the south. And the zinc bands echo the genteel clapboard siding of those houses.

The calm, slightly eerie mood that the building casts along Angell Street is broken once you circle around to the front. The glass facade would look somewhat conventional, even corporate, if it weren't for the split down its middle and the sunken right half, which set the whole composition out of whack. (Wide grass-covered steps lead down from the lawn in front to a 218-seat glass-enclosed auditorium, and come spring will allow students to sprawl out on the grass and look in at lectures or performances.)

The disjointed facade conjures Gordon Matta-Clark's 1974 "Splitting," in which he used a power saw to cut a suburban house in half — a metaphor for the generational divide of the time. I also found myself thinking of the image from the Surrealist film "Un Chien Andalou," in which someone slices a woman's eyeball with a

razor. Like that image, the building is intended to create a tremor of anxiety, to unsettle accepted conventions and in doing so help lead people in new and unexpected directions.

The interior of the center comprises a series of loftlike spaces whose relationships are intended to foster collaborations among students across a range of creative disciplines, including visual arts, music, theater and dance. The lobby is set to the left of the split, so that as you walk toward the back of the building, you are able to look through a long glass wall on your right down into the auditorium or up at the feet of people working in one of the loft spaces above. The pattern is repeated farther up in the building, so that you can sometimes watch work taking place on three different floors at once, an effect that imbues the building with an unusually strong spirit of creative solidarity.

In the end, however, these visual connections work because people are allowed to break through the glass wall and mingle in the kind of cozy informal spaces where a more meaningful form of social exchange can take place. A soaring suspended steel staircase at the back of the building is equipped with over-scaled landings that the architects describe as “public living rooms.” Appointed with overstuffed chairs and sofas, these landings are places to hang out and relax. And because they are part of the main circulation route through the building, they should also encourage a lot of casual and unexpected encounters.

Whether this will make for better art is anyone’s guess. But the design’s insistence that curiosity — about different ways of thinking as well as different artistic mediums — is at the heart of any creative act is worth the building’s weight in concrete, steel and glass.

http://www.nytimes.com/2011/03/10/arts/design/brown-universitys-granoff-center-for-the-arts-review.html?ref=design

Heat Damages Colombia Coffee, Raising Prices

By ELISABETH ROSENTHAL

Paul Smith for The New York Times
Coffee farmer Luis Garzón inspecting leaves for signs of a devastating fungus that could not survive the previously cool mountain weather

TIMBÍO, Colombia — Like most of the small landowners in Colombia's lush mountainous Cauca region, Luis Garzón, 80, and his family have thrived for decades by supplying shade-grown, rainforest-friendly Arabica coffee for top foreign brands like Nespresso and Green Mountain. A sign in the center of a nearby town proclaims, "The coffee of Cauca is No. 1!"

But in the last few years, coffee yields have plummeted here and in many of Latin America's other premier coffee regions as a result of rising temperatures and more intense and unpredictable rains, phenomena that many scientists link partly to global warming.

Coffee plants require the right mix of temperature, rainfall and spells of dryness for beans to ripen properly and maintain their taste. Coffee pests thrive in the warmer, wetter weather.

Bean production at the Garzóns' farm is therefore down 70 percent from five years ago, leaving the family little money for clothing for toddlers and "thinking twice" about sending older children to college, said Mr. Garzon's 44-year-old son, Albeiro, interviewed in a yellow stucco house decorated with coffee posters and madonnas.

The shortage of high-end Arabica coffee beans is also being felt in New York supermarkets and Paris cafes, as customers blink at escalating prices. Purveyors fear that the Arabica coffee supply from Colombia may never rebound — that the world might, in effect, hit "peak coffee."

In 2006, Colombia produced more than 12 million 132-pound bags of coffee, and set a goal of 17 million for 2014. Last year the yield was nine million bags.

Brands like Maxwell, Yuban and Folgers have increased the retail prices of many grinds by 25 percent or more since the middle of last year in light of tight supply and higher wholesale prices.

Profits of high-end coffee chains like Starbucks and Green Mountain have been eroded. Coffee futures of Arabica, the high-end bean that comes predominantly from Latin America, have risen more than 85 percent since last June, to $2.95 a pound, partly over concerns about supply, extreme weather and future quality, said George Kopp, an analyst at the International Futures Group in Chicago.

Yet as stockpiles of some of the best coffee beans shrink, global demand is soaring as the rising middle classes of emerging economies like Brazil, India and China develop the coffee habit.
"Coffee production is under threat from global warming, and the outlook for Arabica in particular is not good," said Peter Baker, a coffee specialist with CABI, a research group in Britain that focuses on agriculture and the environment, noting that climate changes, including heavy rains and droughts, have harmed crops across many parts of Central and South America.
A top coffee scientist, he has rattled trade forums by warning, Cassandra-like, of the possibility of "peak coffee," meaning that, like oil supplies, coffee supplies might be headed for an inexorable decline unless growers make more concerted efforts to expand production globally.
The Specialty Coffee Association of America warned this year, "It is not too far-fetched to begin questioning the very existence of specialty coffee."
Arabica and Robusta coffee account for virtually all consumption. With its more delicate taste and lower caffeine content, Arabica is more popular and more expensive, though generally more finicky in its weather needs. Robusta production dominates in Asia and Africa.
Colombia is the No. 2 Arabica exporter after Brazil, where production is centered on larger, more mechanized farms and continues to grow.
The Colombian Coffee Growers Federation says high fertilizer prices have also dented yields. But it agrees with a 2009 report from the International Coffee Organization that concluded, "Climatic variability is the main factor responsible for changes in coffee yields all over the world."
Average temperatures in Colombia's coffee regions have risen nearly one degree in 30 years, and in some mountain areas the increase has been double that, says Cenicafé, the national coffee research center. Rain in this area was more than 25 percent above average in the last few years.
At the new, higher temperatures, the plants' buds abort or their fruit ripens too quickly for optimum quality. Heat also brings pests like coffee rust, a devastating fungus that could not survive the previously cool mountain weather. The heavy rains damage the fragile Arabica blossoms, and the two-week dry spells that prompt the plant to flower and produce beans occur less often, farmers say. Arabica beans take about seven months to mature.
"Half a degree can make a big difference for coffee — it is adapted to a very specific zone," said Néstor Riaño, a specialist in agroclimatology for Cenicafé. "If temperature rises even a bit, the growth is affected, and the plagues and diseases rise."
While climate scientists agree that the increase in temperature is a clear signal of global warming and high ocean temperatures are generally associated with more frequent storms, scientists are uncertain whether the peculiar weather patterns in the area are directly related to warming, said Stephen E. Zebiak, director general of the International Research Institute for Climate and Society at Columbia University.
"It is hard to know whether this severe weather represents natural fluctuations or is a climate change signal, though from a risk management sense, there is good reason to consider how to cope with these extreme events," Dr. Zebiak said.
In the hope of restoring coffee output, researchers at Cenicafé's labs are toiling on a mission that seems as pressing a priority for Colombia as curing cancer is for medical researchers.
Agronomists are teaching the farmers how to control the pests that arrived with the change in the weather. Climatologists are working to provide better local weather predictions. Geneticists are breeding plants that are more resistant to diseases or that can withstand torrential rains or a hotter environment.
The Coffee Growers Federation has advised farmers to switch to a newer, hardier strain of Arabica that has been developed by plant breeders at Cenicafé over the last two decades.
While the federation says it tastes the same as traditional variants, farmers have resisted because they can ill afford to forgo the income of a yearly crop as they wait for new plants to mature. They have also been wary that a switch could affect flavor.
Taste, quality and supply are delicate issues for an industry whose aficionados are notoriously picky. Coffee companies are "working with farmers across the region to address the impact of changing weather patterns that are a direct result of climate change," said Lisa Magnino, a spokeswoman for Starbucks,
Starbucks has already bought enough coffee to last until 2012, she added. Luis Fernando Samper, a spokesman for Colombian Coffee Growers Federation, said that the beans that do make it to breakfast tables

in the United States will yield coffee that is as good as ever. The problem is for Colombian farmers, who are producing far fewer beans over all and "more defective beans" that do not meet export standards.
For decades, said Luis Garzón, who started growing coffee at 7, it was dry from June 1 to Sept. 8 in Timbío. Several years ago, the perplexing weather arrived. "It can start raining at 6 a.m. and go on for 24 hours," he said.
First, yields declined. Then last year, the coffee rust fungus arrived at the Garzón farm, killing entire fields. "We learned our lesson," he said, stroking the mottled yellowed leaves of some damaged plants. Now, the family is planting the new, hardier Arabica variant, called castillo. The coffee federation hopes that such innovation will allow growers to keep expensive Arabica coffee on American tables.
Meanwhile, it is creating a "product origin" certification program for Colombian coffees, similar to the one that protects Italy's Parmesan cheese. That way importers will not be tempted to substitute beans from Brazil or Indonesia.

http://www.nytimes.com/2011/03/10/science/earth/10coffee.html?ref=science

A Bittersweet Finale for the Discovery
By WILLIAM HARWOOD

John Raoux/Associated Press
The space shuttle Discovery on Wednesday, touching down for the last time.

KENNEDY SPACE CENTER, Fla. — The shuttle Discovery braved the hellish fire of re-entry for the last time Wednesday and glided back to Earth to close out the space plane's 39th and final voyage, an emotion-charged milestone marking the beginning of the end for America's shuttle program.

Dropping through a partly cloudy sky, the commander, Steven W. Lindsey, and Col. Eric A. Boe of the Air Force guided Discovery through a sweeping left overhead turn, lined up on Runway 15 and floated to a picture-perfect touchdown at 11:57 a.m. Eastern time to wrap up an extended 13-day space station assembly mission.

As it coasted to a stop under a brilliant noon sun, Discovery had logged some 5,750 orbits covering nearly 150 million miles during 39 flights spanning a full year in space — a record unrivaled in the history of manned rockets.

"And Houston, Discovery, for the final time, wheels stopped," Mr. Lindsey radioed flight controllers in Houston.

"Discovery, Houston, great job by you and your crew," replied Charles Hobaugh, an astronaut in mission control. "That was a great landing in tough conditions, and it was an awesome docked mission you all had."

Mr. Lindsey and Colonel Boe were joined aboard Discovery by Benjamin Alvin Drew Jr.; Nicole P. Stott; Michael R. Barratt, a physician-astronaut; and Capt. Stephen G. Bowen of the Navy.

As support crews swarmed onto the broad runway, engineers in the nearby Vehicle Assembly Building were busy preparing the shuttle Endeavour for rollout. The target date for Endeavour's 25th and final flight is April 19.

NASA's remaining orbiter, the Atlantis, is scheduled for liftoff June 28 on the shuttle program's 135th flight, the final chapter in a post-Apollo initiative that produced what is arguably the most complex, capable and costly manned rockets ever built.

"We're seeing a program come to a close here, and to see these shuttles, these beautiful, magnificent flying machines, end their service life is obviously a little bit sad for us," Dr. Barratt said.

"But it is about time — they've lived a very long time, they've had a fabulous success record," he added. "We look forward to seeing them retire with dignity and bringing on the next line of spaceships."

What sort of spaceship might ultimately replace the shuttle is an open question, and it is not yet clear how NASA will fare in the budget debate.
But between Atlantis's landing this summer and the debut of whatever vehicle replaces it — several years from now at best — the only way for American astronauts to reach orbit will be to hitch rides aboard Russian Soyuz spacecraft at $55 million a seat.
That is a bitter pill for the thousands of men and women who have worked on the shuttle fleet over the past three decades, who now face layoffs and the prospect of seeing Discovery, Endeavour and Atlantis — the world's most sophisticated spacecraft — turned into museum displays.
"We won't do anything nearly as complex with another vehicle for a very long time," Mr. Drew said. "Five or 10 years from now, they're going to look back and say 'How did we ever build a vehicle that could do all these things?' "

http://www.nytimes.com/2011/03/10/science/space/10shuttle.html?ref=science

Armies of Expensive Lawyers, Replaced by Cheaper Software

By JOHN MARKOFF

Ramin Rahimian for The New York Times

"People get bored, people get headaches. Computers don't," said Bill Herr, a lawyer who used to work for a chemical company.

When five television studios became entangled in a Justice Department antitrust lawsuit against CBS, the cost was immense. As part of the obscure task of "discovery" — providing documents relevant to a lawsuit — the studios examined six million documents at a cost of more than $2.2 million, much of it to pay for a platoon of lawyers and paralegals who worked for months at high hourly rates.

But that was in 1978. Now, thanks to advances in artificial intelligence, "e-discovery" software can analyze documents in a fraction of the time for a fraction of the cost. In January, for example, Blackstone Discovery of Palo Alto, Calif., helped analyze 1.5 million documents for less than $100,000.

Some programs go beyond just finding documents with relevant terms at computer speeds. They can extract relevant concepts — like documents relevant to social protest in the Middle East — even in the absence of specific terms, and deduce patterns of behavior that would have eluded lawyers examining millions of documents.

"From a legal staffing viewpoint, it means that a lot of people who used to be allocated to conduct document review are no longer able to be billed out," said Bill Herr, who as a lawyer at a major chemical company used to muster auditoriums of lawyers to read documents for weeks on end. "People get bored, people get headaches. Computers don't."

Computers are getting better at mimicking human reasoning — as viewers of "Jeopardy!" found out when they saw Watson beat its human opponents — and they are claiming work once done by people in high-paying professions. The number of computer chip designers, for example, has largely stagnated because powerful software programs replace the work once done by legions of logic designers and draftsmen.

Software is also making its way into tasks that were the exclusive province of human decision makers, like loan and mortgage officers and tax accountants.

These new forms of automation have renewed the debate over the economic consequences of technological progress.

David H. Autor, an economics professor at the Massachusetts Institute of Technology, says the United States economy is being "hollowed out." New jobs, he says, are coming at the bottom of the economic pyramid, jobs

in the middle are being lost to automation and outsourcing, and now job growth at the top is slowing because of automation.

"There is no reason to think that technology creates unemployment," Professor Autor said. "Over the long run we find things for people to do. The harder question is, does changing technology always lead to better jobs? The answer is no."

Automation of higher-level jobs is accelerating because of progress in computer science and linguistics. Only recently have researchers been able to test and refine algorithms on vast data samples, including a huge trove of e-mail from the Enron Corporation.

"The economic impact will be huge," said Tom Mitchell, chairman of the machine learning department at Carnegie Mellon University in Pittsburgh. "We're at the beginning of a 10-year period where we're going to transition from computers that can't understand language to a point where computers can understand quite a bit about language."

Nowhere are these advances clearer than in the legal world.

E-discovery technologies generally fall into two broad categories that can be described as "linguistic" and "sociological."

The most basic linguistic approach uses specific search words to find and sort relevant documents. More advanced programs filter documents through a large web of word and phrase definitions. A user who types "dog" will also find documents that mention "man's best friend" and even the notion of a "walk."

The sociological approach adds an inferential layer of analysis, mimicking the deductive powers of a human Sherlock Holmes. Engineers and linguists at Cataphora, an information-sifting company based in Silicon Valley, have their software mine documents for the activities and interactions of people — who did what when, and who talks to whom. The software seeks to visualize chains of events. It identifies discussions that might have taken place across e-mail, instant messages and telephone calls.

Then the computer pounces, so to speak, capturing "digital anomalies" that white-collar criminals often create in trying to hide their activities.

For example, it finds "call me" moments — those incidents when an employee decides to hide a particular action by having a private conversation. This usually involves switching media, perhaps from an e-mail conversation to instant messaging, telephone or even a face-to-face encounter.

"It doesn't use keywords at all," said Elizabeth Charnock, Cataphora's founder. "But it's a means of showing who leaked information, who's influential in the organization or when a sensitive document like an S.E.C. filing is being edited an unusual number of times, or an unusual number of ways, by an unusual type or number of people."

The Cataphora software can also recognize the sentiment in an e-mail message — whether a person is positive or negative, or what the company calls "loud talking" — unusual emphasis that might give hints that a document is about a stressful situation. The software can also detect subtle changes in the style of an e-mail communication.

A shift in an author's e-mail style, from breezy to unusually formal, can raise a red flag about illegal activity.

"You tend to split a lot fewer infinitives when you think the F.B.I. might be reading your mail," said Steve Roberts, Cataphora's chief technology officer.

Another e-discovery company in Silicon Valley, Clearwell, has developed software that analyzes documents to find concepts rather than specific keywords, shortening the time required to locate relevant material in litigation.

Last year, Clearwell software was used by the law firm DLA Piper to search through a half-million documents under a court-imposed deadline of one week. Clearwell's software analyzed and sorted 570,000 documents (each document can be many pages) in two days. The law firm used just one more day to identify 3,070 documents that were relevant to the court-ordered discovery motion.

Clearwell's software uses language analysis and a visual way of representing general concepts found in documents to make it possible for a single lawyer to do work that might have once required hundreds.

"The catch here is information overload," said Aaref A. Hilaly, Clearwell's chief executive. "How do you zoom in to just the specific set of documents or facts that are relevant to the specific question? It's not about search; it's about sifting, and that's what e-discovery software enables."

For Neil Fraser, a lawyer at Milberg, a law firm based in New York, the Cataphora software provides a way to better understand the internal workings of corporations he sues, particularly when the real decision makers may be hidden from view.

He says the software allows him to find the ex-Pfc. Wintergreens in an organization — a reference to a lowly character in the novel "Catch-22" who wielded great power because he distributed mail to generals and was able to withhold it or dispatch it as he saw fit.

Such tools owe a debt to an unlikely, though appropriate, source: the electronic mail database known as the Enron Corpus.

In October 2003, Andrew McCallum, a computer scientist at the University of Massachusetts, Amherst, read that the federal government had a collection of more than five million messages from the prosecution of Enron.

He bought a copy of the database for $10,000 and made it freely available to academic and corporate researchers. Since then, it has become the foundation of a wealth of new science — and its value has endured, since privacy constraints usually keep large collections of e-mail out of reach. "It's made a massive difference in the research community," Dr. McCallum said.

The Enron Corpus has led to a better understanding of how language is used and how social networks function, and it has improved efforts to uncover social groups based on e-mail communication.

Now artificial intelligence software has taken a seat at the negotiating table.

Two months ago, Autonomy, an e-discovery company based in Britain, worked with defense lawyers in a lawsuit brought against a large oil and gas company. The plaintiffs showed up during a pretrial negotiation with a list of words intended to be used to help select documents for use in the lawsuit.

"The plaintiffs asked for 500 keywords to search on," said Mike Sullivan, chief executive of Autonomy Protect, the company's e-discovery division.

In response, he said, the defense lawyers used those words to analyze their own documents during the negotiations, and those results helped them bargain more effectively, Mr. Sullivan said.

Some specialists acknowledge that the technology has limits. "The documents that the process kicks out still have to be read by someone," said Herbert L. Roitblat of OrcaTec, a consulting firm in Altanta.

Quantifying the employment impact of these new technologies is difficult. Mike Lynch, the founder of Autonomy, is convinced that "legal is a sector that will likely employ fewer, not more, people in the U.S. in the future." He estimated that the shift from manual document discovery to e-discovery would lead to a manpower reduction in which one lawyer would suffice for work that once required 500 and that the newest generation of software, which can detect duplicates and find clusters of important documents on a particular topic, could cut the head count by another 50 percent.

The computers seem to be good at their new jobs. Mr. Herr, the former chemical company lawyer, used e-discovery software to reanalyze work his company's lawyers did in the 1980s and '90s. His human colleagues had been only 60 percent accurate, he found.

"Think about how much money had been spent to be slightly better than a coin toss," he said.

http://www.nytimes.com/2011/03/05/science/05legal.html?src=me&ref=science

In Pinedale, Wyo., Residents Adjust to Air Pollution

By KIRK JOHNSON

Matthew Staver for The New York Times
"If poor air quality is what I have to live with, then that's a choice I make. I can't imagine living anywhere else," said Dawn Mitchell, a day care teacher in Pinedale, Wyo.

PINEDALE, Wyo. — Strong sun, not too much wind, a good thick snow pack: sounds like a perfect late winter's day in a remote rural Western valley rimmed by snaggle-topped mountains.

But that has also been the stage set for the worst ozone pollution event here in three years — in one of the places people might least expect. The nearest metropolis, Salt Lake City, is 180 miles away, and the usual smog suspects — cars, trucks, factories, indeed people in general — are few and far between in a county of only 8,800 residents.

State environmental officials declared another ozone alert here on Wednesday, the second in less than a week, anticipating that air pollution would settle in starting Thursday.

"It's like a pot, with all the mountain ranges around it, and the inversion is like a lid," said Keith Guille, a spokesman for the Wyoming Department of Environmental Quality, describing the conditions for cooking pollutants and creating the atmospheric inversion that locks them in place.

The upper Green River basin in southwest Wyoming has polluted-air days for a combination of reasons: its geography, in a valley at 7,000 feet; its typical winter weather that produces sun on highly reflective snow; and its economy, heavily based on natural gas drilling, which scientists say produces smog's underlying chemical base.

"If poor air quality is what I have to live with, then that's a choice I make," said Dawn Mitchell, 43, a day care teacher who said she thought ozone or other pollutants here were not a particularly big deal, weighed against the benefits of an empty Western playground in one's backyard. "I can't imagine living anywhere else," she said.

How the factors come together to create, in this region, a problem more commonly associated with car-choked big cities — and how much each factor is to blame for the sometimes unsavory air — is where the human element jumps into the fray.

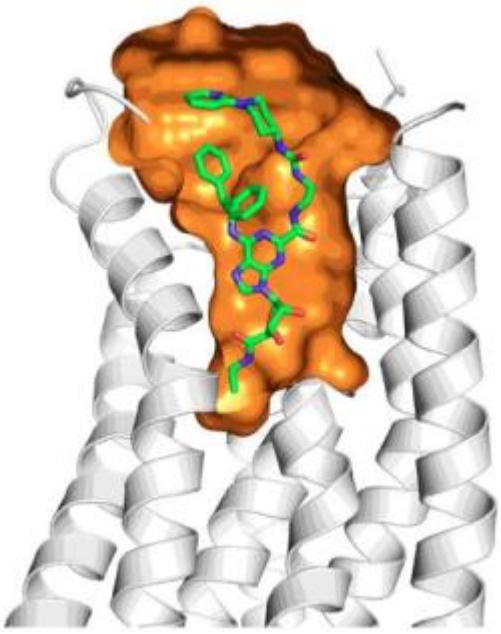
Some people here in Pinedale, the valley's largest community — about 1,400 people, according to the welcome sign on the edge of town — say that winds blowing bad air up from places like Salt Lake are a bigger factor than the drill rigs that dot the nearby high plateaus.

Others say population growth caused by the gas boom is a contributing factor — more people making pollution with trucks and snowmobiles. Still others say energy production is the lifeblood that has made this place survive and thrive when many other Western towns are moldering, so love it or leave it.
"It's our livelihood," said Jennifer Woolf, who can see a gas well about 300 yards from her house.
At the Pinedale Medical Clinic, a big new building of wood beams and tile, built with energy taxes, the director, Dr. James H. Quirk Jr., is not sure whether or how health and drill rigs intersect. The population is too small for a valid scientific study, he said, so it comes down to the personal and the anecdotal. "I got the flu last week," Dr. Quirk said. "And when I was out feeding my horses, throwing hay, I was doubled over coughing" and wondering, "do I feel this miserable because of just the flu?"
Energy companies say they have taken steps to reduce emissions that can contribute to ozone formation. Encana Oil and Gas, for example, which operates 1,200 wells south of Pinedale, has converted its rigs from diesel to natural gas and consolidated production facilities to reduce evaporation, said a company spokesman, Doug Hock.
But the industry's overall well count, Mr. Hock said, has continued to rise even as those changes were put into place over the last four or five years.
Some people have called for the federal Environmental Protection Agency to answer questions about how gas drilling might be contributing to air pollution. But the agency recently removed the topic from those it is considering for a national study of hydrofracking, a relatively new high-volume horizontal hydraulic fracturing method used in gas drilling in Wyoming and elsewhere.
Some residents said they thought ozone alerts and talk of pollution were part of an environmentalist plot to take down the oil and gas industry.
"It's the Greenpeace people who don't like it," said Teren Donley, 25, whose husband is a supervisor for a pump truck in the gas fields south of town.
Others said they had lived elsewhere and seen smog — real smog, California style — the kind that makes Pinedale's worst day look pristine.
"Pasadena in the 1950s," said Rod Rozier, 89, a retired pilot, talking about his standard of air pollution. Mr. Rozier moved here about three years ago to be near family and was bowling in a Wii league at the Rendezvous Point Senior Center. The center, as a plaque at the entrance proclaims, was built with the help of a natural gas company, the Questar Corporation.
But in large or small ways, residents say they adjust to bad air days as they come.
"Last year we had some bad spells and my eyes hurt, like I had a sunburn," said Vivian Watts, a waitress at Stockman's Restaurant, a wood- and antler-lined place on Pinedale's main drag. "This time, I've stayed inside."

http://www.nytimes.com/2011/03/10/us/10smog.html?ref=science

New Details About Medically Important Protein Family

The new study reveals the structure of the human A2A adenosine receptor, a member of the GPCR family sometimes referred to as the "caffeine receptor," bound to a full agonist. (Credit: Image courtesy of Scripps Research Institute)



ScienceDaily (Mar. 10, 2011) — Scientists from The Scripps Research Institute have determined a new structure from a medically important superfamily of proteins. The structure should help instruct the design of a new kind of therapeutics for conditions ranging from Parkinson's disease to inflammation.

The study, published on March 10, 2011, in *Science* Express, an advance, online publication of selected research from the journal *Science*, provides important insights into how this large family of proteins, called G protein-coupled receptors (GPCRs), can recognize and respond to a wide array of signals, including odors, hormones, neurotransmitters, and light.

Many drugs, including allergy and heart medication and drugs for Parkinson's and Huntington's disease, target GPCRs, a family of proteins that comprises some 700 to 1,000 members.

A Surprisingly Stable Active Form

GPCRs sit in the cell membrane and sense various molecules outside cells. When certain molecules bind to them, the receptor's structure shifts so that it transmits its signal within the cell. These receptor-activating molecules are referred to as agonists. But GPCRs can also bind "antagonists," compounds that block the receptors' activity by preventing agonists from binding.

Up until now, researchers had primarily been able to obtain the structures of GPCRs bound to antagonists -- in other words, in their inactive but more stable forms. Some scientists thought a receptor bound to an agonist would be too dynamic without stabilizing mutations or G-proteins bound for the receptor to be amenable to forming crystals, a critical step required for determining protein structures using the technique of X-ray crystallography.

In the new study, Fei Xu, a graduate student in the Stevens lab and the first author of the paper, proved these assumptions inaccurate.

The Stevens lab obtained the structure of the human A2A adenosine receptor, a member of the GPCR family sometimes referred to as the "caffeine receptor," bound to a full agonist. The team discovered that when the receptor bound to this particular agonist, it took on a new shape, as expected, but it then remained in that new conformation, rather than continuing to move.

"We were surprised to discover a super stabilizing agonist," said Stevens. "While dynamics is certainly a critical component of receptor signaling, it is not as extreme or the complete story as previously thought. The agonist we solved with the A2A structure highlights the fact that certain agonists can stabilize the receptor in a single conformation without the presence of an intracellular binding partner such as a G-protein. This is also teaching us that what we learn from one receptor or one agonist/antagonist interaction should not necessarily be a rule for all GPCRs at this early stage of GPCR structure discovery. We need to study multiple systems in-depth before we will really understand this receptor family."

The finding has important implications for drug design. In some diseases, such as Parkinson's disease, potential treatments involve blocking the functions of certain GPCRs using antagonists. But for treating other diseases such as COPD, researchers are trying to develop agonists that activate GPCRs. This new finding could facilitate the design of such agonist-based drugs.
Ward Smith, director of the National Institutes of Health (NIH) Protein Structure Initiative (PSI), which funded the study, said, "Determining the structure of the active form of the A2A adenosine receptor represents just the kind of significant accomplishment that the Protein Structure Initiative was intended to foster. Now that we know what the active form looks like, we have a much better idea of how this important class of cellular gatekeepers functions and how we might manipulate their activity in treating disease."

Decades-Long Vision Yields Results

Stevens began working on the structures of GPCRs more than two decades ago. His group in collaboration with researchers at Stanford University solved the first human GPCR structure, the β2 adrenergic receptor, in 2007 -- a project that took 17 years to complete. Since then the Scripps Research team has been successful in obtaining several other GPCR structures in collaboration with other laboratories around the world.
"The reason we have now solved several human GPCR structures is the strong and robust scientific platform we built at Scripps with NIH support," says Stevens, who is director of the NIH Common Fund Joint Center for Innovative Membrane Protein Technologies, focused on developing and disseminating technologies, and the National Institute of General Medical Sciences PSI:Biology GPCR Network, focused on increasing the knowledge of GPCR biology. "When the NIH funded this research they took a very big chance on high risk/high reward science and it is now paying off in multiple ways from new technologies to new biological insight."
Like all proteins, GPCRs consist of long chains of amino acids that assemble themselves in three-dimensional shapes. GPCRs consist of seven helices that span the membrane of a cell. Loops connecting the helices sit both outside the cell membrane and inside the cell.
In the new study, Stevens and colleagues found that when the agonist bound the A2A receptor, helices 5, 6 and 7 underwent a dramatic shift in their positions. In contrast, helices 1 to 4 tended to stay relatively still.
"GPCRs appear to be composed of two domains," he explained. "The first four helices appear more rigid than the last three."
In addition, the portions of the receptor sitting outside the cell membrane shifted their positions to accommodate the agonist binding, whereas the segments on the inside of the cell had smaller changes.
The greater flexibility for the outside portions may hold the key for understanding GPCRs' ability to recognize and respond to molecules of many different sizes and shapes. This is reminiscent of how the immune system uses the antibody architecture to recognize so many different ligands.
"You need receptor diversity on the outside to recognize all the different ligands, but inside the cell, you need less diversity since the receptor signals via a smaller number of binding partners," said Stevens.
Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Scripps Research Institute**.

Journal Reference:

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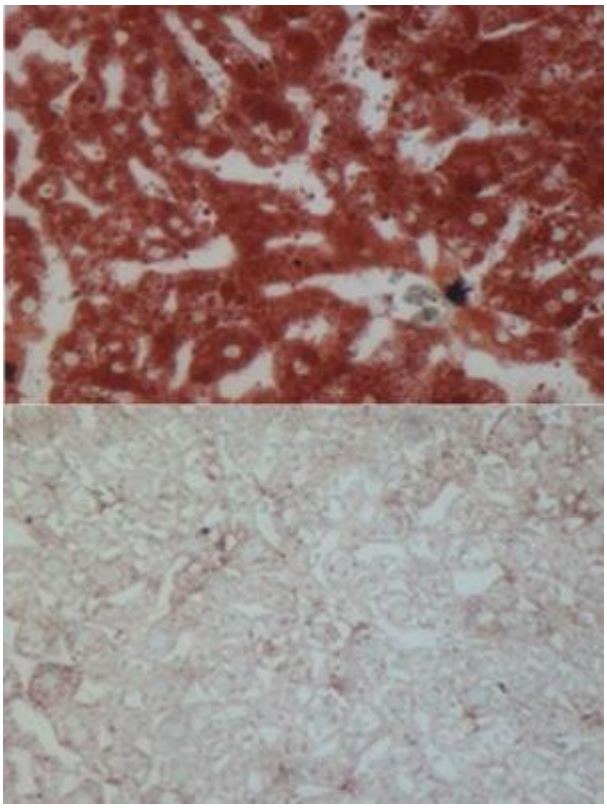
http://www.sciencedaily.com/releases/2011/03/110310151221.htm

Molecules Work the Day Shift to Protect the Liver from Accumulating Fat



Depletion of liver HDAC3 causes fatty liver in normal adult mice. Liver tissue lacking HDAC3 (top image; fat is stained red). Liver with normal HDAC3 levels (bottom image). (Credit: Zheng Sun, Ph.D.; University of Pennsylvania School of Medicine)

ScienceDaily (Mar. 10, 2011) — The liver normally makes and stores fat, which is required in moderation for normal body function. However, if the process goes awry, excess fat in the liver can cause major liver damage. In fact, fatty liver is a leading cause of liver failure in the United States, and is often brought on by obesity and diabetes. In turn, the increasing prevalence of these diseases has brought with it an epidemic of liver disease.

Abnormal sleep patterns, such as those of shift-workers, can be risk factors for obesity and diabetes. Investigators have known for decades that fat production by the liver runs on a 24-hour cycle, the circadian rhythm, and is similar to the sleep-wake cycle. A research team led by Mitchell Lazar, MD, PhD, director of the Institute for Diabetes, Obesity, and Metabolism at the University of Pennsylvania School of Medicine, has discovered molecules that act as "shift workers" to maintain the daily rhythm of fat metabolism. When those molecules do not do their jobs, the liver dramatically fills with fat. These findings are reported in this week's issue of *Science*.

Lazar and his colleagues, including Cell and Molecular Biology graduate student Dan Feng, found a team of molecules that, in normal mice, migrates to the genome of liver cells during the daytime. One of the team members, a protein called Rev-erb, delivers the molecular workers to thousands of specific locations in the liver genome, many of which are near genes involved in the production of fat. Another team member, called histone deacetylase 3 (HDAC3), does construction work on the protein scaffold (the epigenome) surrounding the genome to dampen the activity of the fat-related genes.

"This work shows that the epigenome, which is critical for regulating how genes are expressed, undergoes reversible remodeling every day," said Lazar. "This leads to a circadian rhythm of metabolism that is important, because disruption of this rhythm leads to fatty liver. This may explain in part why altered circadian rhythms in people who do shift work is associated with metabolic disorders."

Histones are proteins found in the nucleus that package and order DNA into structural units. Changes to these epigenetic structures alter how DNA folds in chromosomes, making genes less or more accessible to regulatory proteins and enzymes that copy genes into RNA messages.

Construction Team

During the night, the day shift molecules depart the liver genome, and fat production increases due to other regulatory molecules. The fat production is kept in check when the Rev-erb construction team returns to the genome the next day. However, if either Rev-erb or HDAC3 is prevented from doing its job, the cycles do not occur, and the liver fills with fat.
By sequencing the DNA associated with HDAC-3 in the liver the Penn team found HDAC in 100 places in the liver genome at 5:00am, but 12 hours later at 5:00pm, HDAC was present in 15,000 places in the liver genome, indicating that it had been brought to the liver during the day. They also found that Rev-erb follows the same daily pattern, because it is the protein that gives HDAC-3 a ride to work.
The Lazar lab is looking in other tissues -- fat cells, muscle, for example -- to see if the same team of molecules is at work, as well as delving deeper into human applications to see how the findings may help explain what goes wrong with fat production and storage in conditions such as metabolic syndrome, insulin resistance, and diabetes. These findings also raise the interesting question of whether certain drugs should be given at specific times of day, to have greater benefit with reduced side-effects.
In addition to Lazar and Feng, Penn co-authors are Zheng Sun, Shannon Mullican, and Theresa Alenghat. The study was a collaboration with Tao Liu and X. Shirley Liu, at the Dana-Farber Cancer Institute in Boston. The National Institute of Diabetes, Digestive, and Kidney Diseases provided funding for this research.

Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **University of Pennsylvania School of Medicine**.

Journal Reference:

1. Dan Feng, Tao Liu, Zheng Sun, Anne Bugge, Shannon E. Mullican, Theresa Alenghat, X. Shirley Liu, and Mitchell A. Lazar. **A Circadian Rhythm Orchestrated by Histone Deacetylase 3 Controls Hepatic Lipid Metabolism**. *Science*, 11 March 2011: 1315-1319. DOI: 10.1126/science.1198125

http://www.sciencedaily.com/releases/2011/03/110310141418.htm

'Lover's Lane' for Birds Found in Arctic

Pectoral Sandpiper -- one of the species found to be using the Arctic's Teshekpuk Lake as a "lover's lane." (Credit: Mark Maftei, WCS)

ScienceDaily (Mar. 10, 2011) — A new study by the Wildlife Conservation Society reveals the critical importance of western Arctic Alaska's Teshekpuk Lake region to tens of thousands of birds that breed in the area during the brief, but productive arctic summers, and makes clearer the case for permanent protection of the area.

Results of the four-year study -- the first to look at the full suite of bird species from around the world that descend on the Teshekpuk Lake region -- showed that the region contains some of the highest nesting bird densities and nest productivity across Alaska's Arctic.

The study appears in the March issue of the peer-reviewed journal *Arctic*. Authors include Joe Liebezeit and Steve Zack of the Wildlife Conservation Society; and Gary White, a statistician from Colorado State University.

"This is the first study to investigate breeding bird densities and measure how well birds are able to produce young in this remote and important region near Teshekpuk Lake," said the study's lead author, Joe Liebezeit. "We found that the density of nesting birds was markedly higher compared to many other sites in Arctic Alaska."

The Teshekpuk Lake Special Area (TLSA) in the National Petroleum Reserve -Alaska (NPR-A) has long been recognized as an important site for wildlife. Tens of thousands of geese migrate there to molt in summer and a 70,000-strong Caribou herd -- critical to North Slope natives for subsistence hunting -- calves its young in the TLSA.

The Teshekpuk study site exists within a portion of the TLSA that was temporarily withdrawn by the Bureau of Land Management (BLM) from oil and gas leasing consideration in July of 2010 over concerns for wildlife.

WCS North America Program Director Dr. Jodi Hilty said, "Given the results of this study, and previous studies conducted by WCS and other scientists, we recommend that the region of 10-year development deferral be granted permanent protection. "

During the study, WCS scientists calculated nest densities (number of nests per unit of area) at the remote Teshekpuk site. Those results were compared to six other areas (including both human impacted and remote sites) where nest densities were measured in previous studies. The results showed that Teshekpuk densities far exceeded those at the other locations.

Additionally, nests were periodically monitored every 3-6 days at Teshekpuk and at a site in the Prudhoe Bay region 150 miles to the east where oil extraction activities are occurring. Results showed that for some species, nest survivorship (production of young) was higher at Teshekpuk.

WCS's Conservation Zoologist Steve Zack said: "Teshekpuk Lake is in the middle of the world's biggest Arctic wetland, and thus at the heart of an international migration of shorebirds, waterfowl, loons, and songbirds that nest in this highly productive region during the short summer. This study makes clear how valuable this region is to breeding birds."

Currently, BLM is evaluating how best to balance wildlife protection and future energy development in the NPR-A. WCS has been engaged in the western Arctic for 10 years, identifying where wildlife protection would be most effective in the NPR-A in advance of development. The results of the study will help inform BLM's decision-making process.

Support for the study was provided by: grants of the Neotropical Migratory Bird Conservation Act (U.S. Fish and Wildlife Service), the Liz Claiborne and Art Ortenberg Foundation, Alcoa Foundation, and The Walt Disney Company. WCS is grateful to BP [exploration] Alaska, Inc. for in-kind support and to the North Slope Borough, specifically Robert Suydam, for assisting with the logistics and supply runs for the Teshekpuk field site.

Story Source:

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

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Do You Have Tiger Blood?

What it takes to keep cool under pressure.
By Taylor ClarkPosted Thursday, March 3, 2011, at 1:09 PM ET

In January, the shooting of Gabrielle Giffords produced a half dozen bona fide heroes, including Patricia Maisch, a 61-year-old woman who snatched ammunition out of alleged gunman Jared Loughner's hands as he tried to reload. For good reason, people like these earn our respect and adulation; their grace under pressure strikes us as almost superhuman. Yet as we marvel at their deeds, we're always left wondering about where, exactly, this composure comes from. Do these people emerge from the womb with sanguine looks on their faces, ready to perform life-saving surgery in the next room if necessary? Or is their coolness something they picked up through life experience?

When I was researching *Nerve*, my new book about how people deal best with fear, pressure, and stress, I got quizzed about this constantly. Is cool-headedness *born*, people wanted to know, or is it *made*? We've been arguing about this question since the days of Socrates, but until recently, psychologists had very little hard data about how genes and experience interact to determine how we respond under stress. We now have a far more solid idea of where cool comes from, however. Poise under pressure, it turns out, does indeed have a strong genetic component—yet our poise is mostly the result of what we do to build it up throughout our lives.

Let's start with the "nature" side of the equation. For every one of us, the starting point for cool-headedness comes bundled within our DNA: our innate disposition toward anxiety. It's never been a secret that anxiousness is partially inherited (my parents, for example, had me pegged as a future neurotic from the first time my brow furrowed), but no one knew how much influence our genes threw around until psychiatrist Kenneth Kendler came along. In a 2001 study, Kendler and his colleagues examined 1,200 pairs of male twins, some identical and some fraternal, probing into each brother's individual phobias. Because all of the twins shared the same upbringing, yet only the *identical* twins shared the same DNA, Kendler could filter out environmental factors altogether and calculate a pure figure for our genetic susceptibility to anxiety. The answer? Genes account for around 30 percent of our anxiousness.

"Aha!" we might exclaim. "Cool under pressure is 30 percent genetic, then." Well, not quite. After all, anxiety certainly influences our poise in stressful situations, but being anxious doesn't always lead to falling apart—far from it. Some of history's coolest customers have also been nervous wrecks. Boston Celtics center Bill Russell, who led his team to 11 NBA championships, was legendary among his teammates for his pre-game anxiety; until the end of his career, Russell grew so nervous that he threw up *before every single game*. When Laurence Olivier was delivering the most lauded theatrical performances of his life, he too suffered from such intense stage fright that he asked people to physically push him onstage. Feeling anxious and flopping while under fire, then, don't necessarily go hand in hand.

Advertisement

The first people to perform useful studies specifically on composure in crisis were World War II combat researchers, who could examine soldiers under *literal* fire. In 1943, one of these men, a British officer named Lionel Wigram, noticed a pattern in his studies of infantry units on the Italian front. Whenever a 22-man platoon encountered enemy fire, Wigram realized, the troops always responded in the same proportions: A few soldiers would go to pieces and try to escape, a few more would react valiantly, and the vast majority would enter a sheeplike state of bewilderment, unsure of what to do. Wigram wasn't a scientist, but his insight about our instinctive reactions to crisis was remarkably accurate. According to modern research by survival psychologist John Leach, when a random group of people finds itself in a sudden emergency like a fire or a natural disaster, 10 to 15 percent will consistently freak out, 10 to 20 percent will stay cool, and the rest will become dazed and hesitant sheep.

These aren't exactly inspiring figures for those of us who fantasize that we'd respond to a mugger with a heroic flurry of karate kicks—and the situation is about to get bleaker. When researchers have studied those who naturally stay composed in crisis, they've uncovered evidence that their poise has a biological underpinning. Yale psychiatrist Andy Morgan, for example, has studied elite Special Forces recruits as they undergo "Survival, Evasion, Resistance, and Escape" training, a three-week course designed to simulate the tortures of enemy capture. The program is brutally stressful, yet many recruits preserve an amazing amount of mental clarity in the midst of it. When Morgan examined the poised trainees' blood tests, he saw that they were producing significantly more of "a goofy little peptide called neuropeptide Y" than other, more rattled recruits. The extra NPY was like a layer of stress-deflecting mental Kevlar; its effects are so pronounced that Morgan can tell whether a soldier has made it into the Special Forces or not just by looking at a blood test.

At this point, the evidence appears to be stacking up against cool-headedness as something we can learn. Our anxiety is one-third predetermined? Less than one-fifth of us naturally react well to crisis? But not so fast! Before you start fretting about the size of your NPY endowment, consider this: While we may have a few coolness-thwarting tendencies encoded in our genes, these predispositions still don't even tell half of the story of how we become poised under pressure. Recent research overwhelmingly shows that with effort and smarts, we can more than counteract our natural inclinations and cultivate enduring cool.

Our first route to heightened poise is through training. Although the studies on WWII soldiers and disaster victims might seem grim, a vital caveat is in order: Virtually none of those people had been well-trained for the situations in which they found themselves. (These days, even recreational paintball players receive better live-fire preparation than WWII troops ever got.) Most of them reacted like dazed sheep not because they couldn't show composure, but because they simply didn't know what to do. Training changes this. Psychologist Anders Ericsson has shown that whether we want to keep cool amid machine gun fire or just stay poised in a presentation at work, the most effective single thing we can do is to practice the task under realistic conditions until it becomes second nature. As Ericsson's colleague David Eccles told me, even simple chores like fire drills can radically help to produce a better response when crisis strikes. Solid preparation "washes out" our natural dispositions, planting the seed for adaptive behavior in our brains well ahead of time.

Another, newer method for building coolness hinges on a different kind of training: teaching ourselves resilience-enhancing beliefs about stressors. If that idea sounds like Grade A psychobabble to you, then you obviously haven't been reading *Consulting Psychology Journal*. (What, you don't subscribe?) Study after study has shown that people who function well under stress share several core beliefs: They tend to see times of change and uncertainty not as dangerous but as exciting opportunities; they focus on what they can do to improve a stressful situation, rather than growing helpless; and they maintain a sense of commitment to the world around them, instead of withdrawing. Some people are simply born with these attitudes, but psychologists have demonstrated that they can be learned as well. One of them, University of California-Irvine's Salvatore Maddi, says kids who complete his "hardiness" course—in which students learn new coping behaviors and beliefs about stress—earn higher GPAs than those who don't. The U.S. Army is such a believer in these classes that it now puts all of its 1.1 million soldiers through its own stress resilience course.

And finally, we arrive at what may be the most crucial ingredient in composure, an idea that is simple to understand but tricky to master. In all of the hours I spent researching *Nerve*, I almost never came across a case in which a cool-headed hero didn't feel afraid; the vast majority dealt with plenty of fear, just like Russell and Olivier. What truly separated them from the pack was this: While many who fizzle under fire battle

against anxiety and vilify their nerves, these poised people understand that fear doesn't have to hold them back—it can even *help* them. This switch to a friendlier view of fear is more than mere sleight of hand. Studies of everyone from classical musicians to competitive swimmers have found no difference at all between elites and novices in the intensity of their pre-performance anxiety; the poised, top-flight performers, however, were far more likely to describe their fear as an aid to success than the nonelites. No matter what skill we're trying to improve under pressure—working on deadline, public speaking, staying cool on a first date—learning to work with fear instead of against it is a transformative shift.

Of course, following these tips won't make you into a paragon of poise overnight. (As Charlie Sheen has taught us, only people with tiger blood and Adonis DNA are capable of instantly achieving feats like that through the power of their minds.) Make no mistake, though: Regardless of what our genes have to say about it, smart training, building resilient attitudes, and developing a better working relationship with fear can help us achieve true grace under pressure. It takes effort to get there, but hey—after *you* become the next cool-headed hero in the news, it'll make a great story for your bestselling inspirational memoir.

http://www.slate.com/id/2287216/pagenum/all/#p2

Catherine Deneuve x 25

The ultimate in aloof beauty, coming soon to a theater near you.
By Troy PattersonPosted Thursday, March 10, 2011, at 6:30 PM ET

Catherine DeneuvePerhaps the most efficient sketch of the singular screen charm of Catherine Deneuve comes from the critic Michael Wood in his British Film Institute monograph about Luis Buñuel's *Belle de Jour*. This was the masterpiece in which, playing a lady (Séverine) playing at whoredom, she descends through the id with a soft fall and lands with a wet smack. "Séverine moves around her apartment like a person who thinks everything in sight is breakable, including the people," Wood writes of the "subtle and precise" sequences near the film's end. "We are as close to her as we shall ever be. This isn't a Bergman actress, it's Catherine Deneuve. She's good, but she specializes in distance rather than depth."
This year, my fellow Americans, the special ravishing remoteness of Mrs. Deneuve will be coming to a theater near you. A 25-film retrospective runs at Brooklyn Academy of Music through the end of the month and then travels the country, and if you live anywhere near Chicago or Boston or half a dozen other cities, you should seize the chance to see her projected on the big screen, as God and George Méliès intended, in her roles as a fairy-tale royal (in Jacques Demy's *Donkey Skin*) and a mail-order enigma (in François Truffaut's *Mississippi Mermaid*) and—archetypally—a bored bourgeois housewife.
The series is a tribute to a presence who remains so beautifully aloof and regally unselfconscious that, last week, introducing Roman Polanski's *Repulsion* in Brooklyn, she accidentally unloosed a tasteless joke: "I had a chance to meet Roman Polanski at an early age." She was trying to say that she was grateful to Polanski for having directed her "very precisely." This idea of precision turns up at every turn in analyses of this most French of French actresses, a concern with cold strictures and razor-sharp exactitude.
Not incidentally, Deneuve plays another of her alienated homemakers in a new film—her hundredth, roughly—titled *Potiche*. Last week in Manhattan, director Francois Ozon introduced the film at Lincoln Center's annual Rendezvous With French Cinema by explaining that the title was analogous to "trophy wife," with the difference being that where American grasp for a brass idol, the French expression refers to "a kind of vase." The value of fragile objects, including sex objects, is extricable from their fragility.

A cocktail of winking farce and sincerest romantic melodrama, *Potiche* also offers an in-joke about Deneuve's résumé: Her character grew up the daughter of an umbrella manufacturer, and now her weaselly husband runs the family business, and the situation brightly nods to her breakthrough film, Jacques Demy's *Umbrellas of Cherbourg*, wherein she sang in the rain. Forced to manage the factory, our heroine struggles against

obligations and tussles with obedience and, reinitiating an old romance with Gérard Depardieu's former union leader, melds issues of sex and gender with those about labor and capital.
You might say that the themes of *Potiche* are heavily Deneuvian, and you might be correct, with the exception that this classical beauty is more a creature of Freud than Marx. Someone must have articulated this law of aesthetics before Andy Warhol and ghostwriter Pat Hackett in *The Philosophy of Andy Warhol*, but no one has done it more economically: "Beauty in danger becomes more beautiful." And no one has demonstrated the principle more fully than Deneuve. On screen, in peril, she gives up a complete preciousness, especially when the source of the danger is the force of her own desire.
A highlight of the retrospective is *La Cagna*, directed by Manuel Ferreri and unavailable on DVD in the United States. The title translates as *Bitch*, which is why the U.S. edition goes by *Liza*, the character's proper name, Liza. Here—with her hair bleached beyond the pale of good taste, her skin luxuriantly broiled beneath her transparent shift, her irises the color of clover honey—she plays a brat who goes ashore on an island inhabited by Giorgio (Marcello Mastroianni, Deneuve's husband at the time) and enacts an allegory of sex and politics and sexual politics, which is all to say: power. The film offers three or four opportunities for Deneuve to play her best trick of lighting up from within to hint at an inward epiphany: Her remote soul surges to the front of her eyes in a pop of satisfaction, and she savors it as it dissolves again into insoluble mystery.
"Beauty doesn't have anything to do with sex," goes another of Warhol's semi-aphorisms. "Beauty has to do with beauty and sex has to do with sex." There's great truth to the distinction—and great sublimity in Deneuve's genius at erasing it.

http://www.slate.com/id/2287744/

Detroit Needs Robocop

Now more than ever. Why a proposed statue of the tragic hero is a good idea for the Motor City.
By Patrick CasselsPosted Tuesday, March 8, 2011, at 3:01 PM ET

Peter Weller as RoboCopRoboCop is many things to many people. To MT, the accidental city planner who originally proposed erecting a statue of the action hero in a tweet last month, he is "a GREAT ambassador for Detroit." (The tweet was directed at Detroit's mayor Dave Bing.) To the people at the public arts nonprofit Imagination Station, who raised the $50,000 needed to create the statue, he's a potential tourist attraction for the embattled city. To many Detroit residents, activists, and writers, a RoboCop statue is a tragic misuse of effort and resources in a city with nearly 20 percent unemployment.

As someone who has lost numerous hours to debating the merits of Paul Verhoeven's 1987 film with fellow sweaty sci-fi cultists, I quickly joined the ranks of those who donated money for the statue.* Now, with the funds raised and at least one potential site (on land owned by Imagination Station) confirmed, MT's humble suggestion is on its way to becoming bizarre reality. This is probably thrilling news for some, depressing news for others, but I'd like to make the case for why the statue should be welcomed. *RoboCop* (the cop and the movie) is a great ambassador for Detroit. And though a statue to him won't fix the city's problems, it does have something important to say about the place and its plight.

I admit, at first glance, a hard-R shoot-'em-up dripping with Verhoeven's trademark gory excess might be the last 102 minutes of film you'd want people to associate with your municipality. When a populace enshrines a pop-culture icon in metal, it's typically in an effort to tie their city with some positive value. In Minneapolis, a monument to Mary Tyler Moore's Mary Richards represents a thumbs-up to the progressive politics Mary personified as a woman working her way up in the boys' world of television news. The Rocky statue at the Philadelphia Museum of Art nods to the city's hardscrabble streets while celebrating the Stallion's triumph over adversity and poverty. But *RoboCop*'s wasteland of crumbling cinderblocks, warped chain-link fences, and skinheads with dilated pupils is unlikely to turn up in even the most avant-garde Detroit tourism ad.

And, it's true, RoboCop himself is far from a symbol of pure justice. The robot is actually the tragic personal prison of Alex Murphy (Peter Weller), a decorated Detroit police officer who runs afoul of some trigger-happy tweakers. Murphy's bullet-ridden body is brought back to life as the movie's titular cyborg by Omni Consumer Products, a soulless security firm that has privatized the police, is planning a corporate takeover of the city, and engages in back-alley deals with local gangsters. RoboCop's mission is to eradicate the "cancer" of crime in Motown, but he's also programmed never to arrest or attack the white collar crooks who built him. His mechanical adherence to protocol is thus not a virtue but a liability. A statue of him could fairly be interpreted as a statue to insidious corporate influence.

But behind the film's grim outlook, its insane levels of violence, its not-completely-necessary profanity, *RoboCop* addresses some of Detroit's most challenging issues, issues that were pressing in 1987 and remain so today.

For starters, Verhoeven's film is the big-screen's second-best critique of Reaganomics' devastating effects on the economy of southeastern Michigan (after Michael Moore's *Roger & Me*). As Carrie Rickey writes in an essay for the film's Criterion Collection DVD, the movie "gleefully satirizes The Great Communicator's pet doctrines of free enterprise and privatization." RoboCop is commissioned by OCP as part of a larger plan to bulldoze the crime-infested homes of Old Detroit and make way for Delta City, a "utopia" of glass high-rises "ideal for corporate growth." Never mind the low-income families Delta City will displace, or that a conniving OCP executive is the one providing the criminals with the weapons that have made the area crime-infested—and in need of robo-policing—in the first place. Delta City is originally the brainchild of OCP's idealist chief executive officer, and his intentions seem pure. But he is oblivious to the ways in which his subordinates exploit his project for their own gain. The CEO (referred to dismissively in the film only as "The Old Man") represents the inherent risks of corruption in even the most well-intentioned efforts at urban renewal.

As for Delta City, it is clearly a stand in for the Renaissance Center, a controversial grid of skyscrapers (nearly identical to those in *RoboCop*) that was undertaken a few years before *RoboCop* was released and now towers over downtown Detroit. To this day, the concrete walls of the Renaissance Center are viewed by some residents as "a barrier to protect the rich businesses inside from the poverty outside," as the *Detroit News* put it in a 2001 retrospective on the complex.

The Renaissance Center is just one example of Detroit's long, troubled history of trying to revive its streets. Earlier this year, Michigan Gov. Rick Snyder proposed tax reforms that threaten five major construction projects in Detroit's older neighborhoods, including the cleanup of a 41-acre contaminated former tire plant.

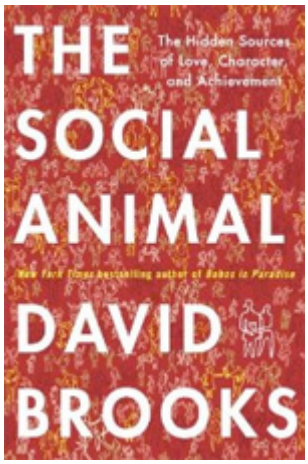
RoboCop thus shines a light on Detroit's failed attempts to recapture its lost glory. That may not sound like the most inspirational of messages to evoke in a piece of public art. But now consider RoboCop himself, a character who represents triumph over this sad landscape. Toward the end of the film, he recovers his humanity when memories of his modest, pre-robotic life surface and his partner, Lewis (Nancy Allen), appeals to the brain beneath the circuits. Robocop removes his mask, defies his corrupt programming, and seeks vengeance against the crooked millionaires bent on sacrificing the city for their personal gain. At the conclusion of the film, after RoboCop blasts his nemesis out an OCP window, The Old Man asks the cyborg his name. "Murphy," he replies. He may have been conceived as a corporate cog, but he turns out to be a good cop. (As such, a more appropriate statue would admittedly be Peter Weller's human face stretched over a sphere of circuitry and wires, but even the biggest *Robocop* fans would be unlikely to donate money to see that.)

RoboCop may not represent Detroit's happiest or proudest moments, and while Robocop himself is redeemed in the end, his city is still in rough shape. But he is a fundamentally good citizen trying to better his city while struggling against the larger forces of big business, corruption, and poverty—forces that he is sometimes helpless against, sometimes even an unwitting part of, but ultimately better than. (He's like a character from *The Wire*, with titanium skin.) RoboCop is thus the perfect symbol for Detroit, reflecting both the city's persistent will to revive itself and the dangers inherent in doing so.

http://www.slate.com/id/2287641/

The Opening of the American Unconscious

David Brooks solves all our problems in *The Social Animal*.
By Michael AggerPosted Monday, March 7, 2011, at 6:47 AM ET



David Brooks, the comic sociologist of our postwar meritocracy, has written a strange and strangely fascinating new book that partly refudiates the meritocratic view of life. We've all been busy seeking the laurels of advanced degrees, or the corner workspace, or the proper mix of antique and modern in our country houses, but this is a false path. In *The Social Animal* Brooks has concluded that we cannot willfully guide ourselves to contentment. Our big mistake has been to view the unconscious as the junk drawer of evolution. "The unconscious parts of the mind are not primitive vestiges that need to be conquered in order to make wise decisions," he writes. "They are not dark caverns of repressed sexual urges. Instead, the unconscious parts of the mind are most of the mind—where most of the decisions and many of the most impressive acts of thinking take place. These submerged processes are the seedbeds of accomplishment." In other words: Use the Force, Lucas!

To tell the story of the unconscious and its role in shaping our fate, Brooks invents a man and a woman, Harold and Erica. The two are like the Forrest Gumps of social science: From birth to death, they illuminate the major (and minor) discoveries that have emerged from applied psychology, behavioral economics, and similar fields over the past decades. Brooks' device is to have them age, though the year is always 2010, so the science is always up to date. Thus when Harold is a baby, we learn that he was securely attached to his mother and that these sorts of children "tend to cope with stressful situations well" and "have more friends at school and summer camp." Erica, who is being raised by a single mother in a poor neighborhood, goes to a charter school called The Academy, which gives Brooks a platform to discuss the strategies of "immersive schools" that inculcate lower-class kids into a college-bound, achievement ethos.

Onward: Erica defies the odds of her upbringing by graduating college and getting a job with a consulting firm. While her boss is demonstrably a genius, Brooks reminds us that scientists have found that "there is little relationship between more intelligence and better performance." Indeed, "studies have shown" (the most popular phrase in this book) that hard work is the key determinant of success. Harold, meanwhile, has embarked on a "new life phase" known as the Odyssey years, that period of not starting a family and not becoming financially independent. When Harold and Erica meet, Brooks plunges into the concept of limerence, the pleasure experienced when our inner models of the world match reality. This could be as simple as doing a crossword puzzle, or as complex as falling in love and starting to breathe like another person, talk like them, and see the world as they do.

And there's more. Erica joins an Enron-like corporation: cue several pages on studies that show how effective companies function and what leadership qualities make for a good CEO, unlike hers. Harold writes a book about the British Enlightenment, in the course of which he becomes enamored of the concept of epistemological modesty: "the knowledge of how little we know and can know." The reader quickly becomes accustomed to these sorts of swerves. There's a chapter that segues from Erica's extramarital affair to Rwandan genocide as Brooks explains the intuitionist view of morality. "The deep impulses treat conscious cognition as a plaything," writes Brooks. "They not only warp perception during sin; they invent justification

after it." Pity the poor Organization Kid whom Brooks introduced us to in the early 2000s. We can't solve the world's problems with a PowerPoint presentation. We can barely choose to eat a burrito for lunch. The unconscious is always nudging, prodding, and tugging us.

And wait, there's more! Erica joins a political campaign with an Obama-like candidate, glides through the inner circles of Davos, and lunches with a friend who is nuts about meditation. Harold joins a think tank, which studies how an information society requires an increased "cognitive load" and advocates for the merits of a Hamiltonian democracy that's dedicated to preserving America's rags-to-riches social mobility. Harold and Erica retire to Aspen. She tries art. He ruminates on the unpredictable flows of memory. They start a tour company for cultivated travelers!

Finally, and mercifully, Harold dies. Although he is constructed out of trends, studies, and limited conclusions, I found his final day to be moving. On his deathbed: "He was unable to wield the power of self-consciousness but also freed from its shackles." All along, Brooks has relentlessly etched his portrait of a mind in which all the culture, education, and wisdom we take such pride in ride atop a bucking bronco of the unconscious. Death is when our little lighthouse of reason snuffs out, and the unconscious drama of the human race continues without us.

As you can gather, *The Social Animal* is overstuffed with what seems like a lifetime of clippings, browser bookmarks, and favorite book passages. It also represents a highpoint of the current mania for brain science and all the fields that invoke it. How to account for Brooks' obsession? The simple and perhaps most facile answer is that much of this "new science" supports a conservative view of life: "People who have one recurrent sexual partner in a year are happier than people who have multiple partners in a year." Or: "The best parents provide their kids with stable and predictable rhythms." Married people tend to be happier, as are those who have close friends, as are those who have chosen a profession or calling. You don't want to be bodysurfing in Maui with your new masseuse girlfriend when you're 40, you want to be manning the grill on a Friday evening after your 10th work anniversary while your children play tetherball in the yard.

A classic conservatism also spurs Brooks' championing of the unconscious. If an individual's motivation is too shadowy to understand or predict, imagine the forces that propel an entire society. Government should be limited, modest, and aware that much is unknowable and unsolvable. Brooks hasn't completely given up on the meritocracy. He still believes that "a healthy society is a mobile society … in which everyone has a reason to strive." But he also believes that the current setup of things in America is unfair. If your conscious and unconscious aren't cultivated in an information-rich environment starting from birth, you can almost never join the cognitively adept class that runs the world. The role of government—somehow—should be to build a uniform intellectual and cultural foundation for all. Through schooling, I suppose, and policies that encourage community and strong moral fiber. It's all very …Greek.

We've wandered far from the unconscious and Harold and Erica. *The Social Animal*, in both its ambition and its occasional ear-shattering hectoring, resembles another product of the University of Chicago: Allan Bloom's *The Closing of the American Mind*. Bloom wanted higher education to instill core virtues based on classic texts, music, and art—in order to combat mushy moral relativism and the banal horror of MTV. Brooks has the same interest in character-building but he doesn't have Bloom's confidence in our ability to control ourselves. It's almost as if we have to construct society as a playpen for the unconscious: Don't leave any sharp objects around that will cause us to become despondent, make rash decisions, or place high value on the wrong things like money and real estate instead of friends and finding a calling.

I suspect that Brooks has found his own calling while writing *The Social Animal*—a new seriousness. In his previous books, he practiced what he called "comic sociology," writing things that were sort of true and sort of funny. And some of these riffs were sort of genius. In *On Paradise Drive*, Brooks goes on about how the "modern suburb enshrines the pursuit of par," which is a moderate life, a life without "tension, hurry, anxiety, and disorder." The state of par is one where "your DVD collection is organized, and so is your walk-in closet … your telephone plan is suited to your needs … your various gizmos interact without conflict." This isn't literally true, but it has the ring of truth, and it makes you laugh.

In *The Social Animal*, this point would have been made differently. Brooks would have cited a study that says that men's "pleasure receptors" light up when they are on the golf course, or that the layout of long par 5s brings up pleasing memories of our hunter-gatherer time on the savannah. (In fact, he does mention that oldie-but-goodie.) I liked it better when his insights were unencumbered by their nerd friends. Do I really need

brain science to tell me that women like men who seem empathetic? Or that people in long-lasting marriages tend to be happy?

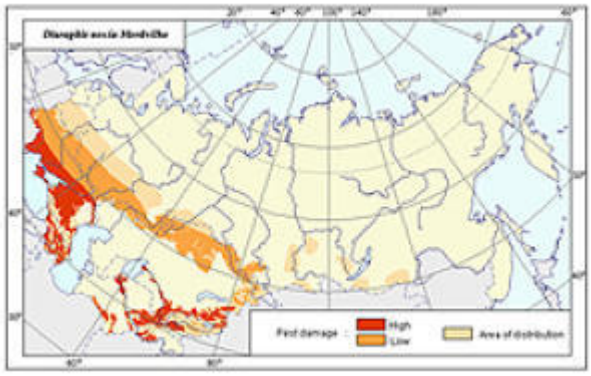
My favorite parts of *The Social Animal* are when the old Brooks peeks out. At one point Harold works as an associate editor at various Washington-based policy magazines, and Brooks has a great line: "The organizations and journals he worked for were run by paunchy middle-aged adults who had job security and a place in society. People in his cohort, on the other hand, were transient young things who seemed to be there mostly to provide factchecking and sexual tension." "Yes!" I wrote in the margin.

That moment did not have many sequels. *The Social Animal* is worth reading and debating, but it doesn't give a lot of pleasure. Brooks tries to embody the story of the "revolution in consciousness" in two characters, but they are rarely believable as such. The irony is that he doesn't trust the unconscious. The writing is not suggestive enough—too much is explained, spelled out, referenced, and enumerated. David, you've spent the last 200 pages telling us how puny the rational mind is when compared to unconscious drives and emotion! Where's the story, the heartfelt moments, the villains?

Which is all to say that *The Social Animal* is an apt reminder of why we need great social novelists. It's not easy to the capture the zeitgeist. You often have to sneak up on it, catch it unawares, or just sort of feel it in your gut. I did come away from the book intensely curious about Brooks' own path. How far will he go in listening to his unconscious desires and in acknowledging that the traditional markers of success—a prominent op-ed perch, say—don't necessarily lead to happiness? How much will he strive to balance his emotional core with his rational thoughts? I'll look forward to reading his novel, or joining his ashram.

http://www.slate.com/id/2287367/pagenum/all/#p2

Scientists Develop High-Tech Crop Map



ARS and St. Petersburg State University have partnered on AgroAtlas, a new website that offers geographic distributions of 100 crops; 640 crop diseases, pests, and weeds; and 560 wild crop relatives in Russia and neighboring countries such as this map showing the distribution of the Russian wheat aphid. (Credit: Image courtesy of USDA/Agricultural Research Service)

ScienceDaily (Mar. 10, 2011) — AgroAtlas is a new interactive website that shows the geographic distributions of 100 crops; 640 species of crop diseases, pests, and weeds; and 560 wild crop relatives growing in Russia and neighboring countries. Downloadable maps and geographic information system (GIS) software are also available, allowing layering of data, such as that relating major wheat production areas to concentrations of Russian wheat aphids.

According to U.S. Department of Agriculture (USDA) plant geneticist Stephanie Greene, the impetus behind developing AgroAtlas was to promote world food security, particularly in Newly Independent States -- countries of the former Soviet Union striving to broaden their agricultural base. Greene works in the National Temperate Forage Legume Genetic Resources Unit operated at Prosser, Wash., by the Agricultural Research Service (ARS), USDA's principal intramural scientific research agency.

Greene leads the AgroAtlas project with Alexandr N. Afonin, a senior scientist with St. Petersburg State University in Russia. The Internet-based map is the successful result of a proposal they submitted in 2003 for funding under a program coordinated by the ARS Office of International Research Programs (OIRP) in Beltsville, Md., and supported by the U.S. Department of State.

In September 2010, the two researchers joined their colleagues to host the first of a series of 10-day workshops in St. Petersburg teaching the use of GIS software to scientists and students from former Soviet states. OIRP also awarded scholarships supporting travel and lodging expenses for 20 students to learn about AgroAtlas and GIS software. They, in turn, were to return to their institutes to train others.

Demonstrations of AgroAtlas include showing where in Crimea, a major wine-producing region, U.S. wine grapes can be successfully grown, as well as the distribution of major wheat diseases in the North Caucasus region according to agroclimatic zones. Greene notes AgroAtlas also has potential to aid in the detection and identification of insect pests, pathogens or weeds that have entered -- or could enter -- the United States from Russia or neighboring countries.

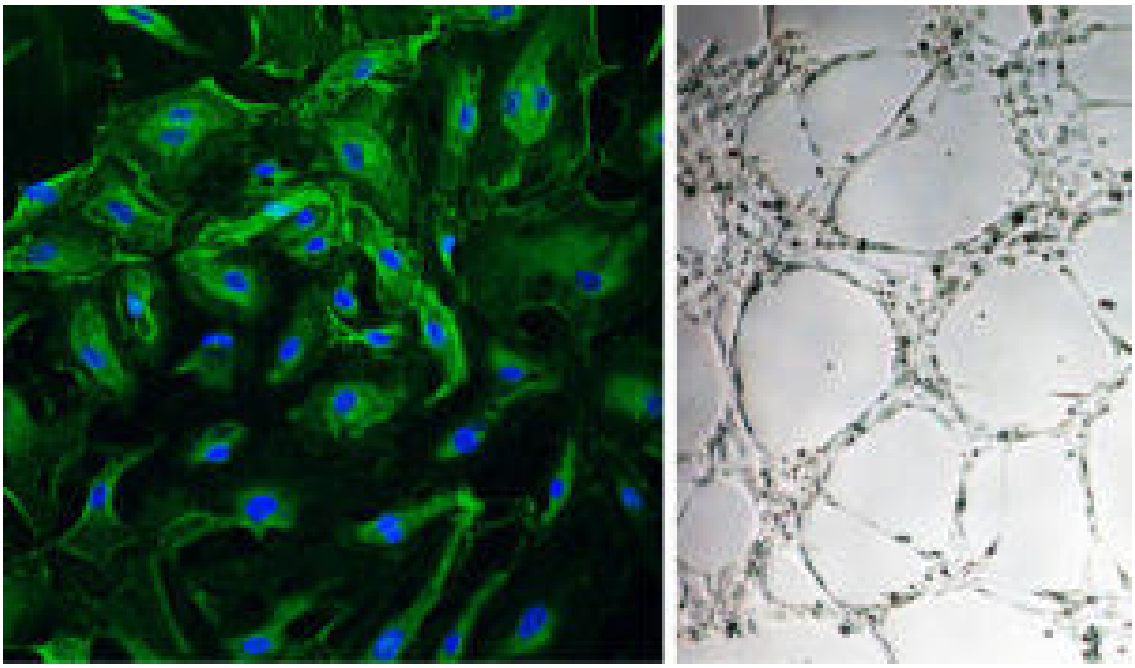
E

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 Jan Suszkiw.

http://www.sciencedaily.com/releases/2011/03/110310112319.htm

Molecule That Can Increase Blood Flow in Vascular Disease Identified



Human endothelial progenitor cells grown in the lab (left) and forming capillary tube like structures (right). (Credit: Image courtesy of University of North Carolina School of Medicine)

ScienceDaily (Mar. 10, 2011) — Circulating through the bloodstream of every human being is a rare and powerful type of cell, one that can actually create new blood vessels to bypass blockages that cause heart attacks and peripheral artery disease. Though everyone has these cells -- called endothelial progenitor cells -- they are often dysfunctional in people prone to vascular disease.

Now researchers at the University of North Carolina at Chapel Hill have discovered that a molecule -- called Wnt1 -- can improve the function of endothelial progenitor cells, increasing the blood flow to organs that previously had been cut off from the circulation. The finding could enhance clinical trials already testing these powerful cells in patients hospitalized with cardiac arrest.

"The premise of these trials is that these cells will supply the ischemic organ with new blood vessels and allow the damaged organ to function better," said senior study author Arjun Deb, MD, assistant professor of medicine in the UNC School of Medicine. "But because you are isolating these cells from the patients themselves, you know that the cells are dysfunctional -- so the approach is almost flawed from the very beginning. We want to see how we can improve the function of these cells so they can do their job better."

The study, published online Feb. 14, 2011, in the FASEB (Federation of American Societies for Experimental Biology) Journal, is the first to show that the Wnt1 protein, one of a family of 19 such molecules, can stimulate blood vessel formation.

A number of studies in the past few years have suggested that genes that play an important role during early development and get "turned off" during adulthood may also get "turned on" or expressed again in response to injury, such as heart attack.

Deb, who studies the Wnt family of developmental genes, looked to see if any of its members follow this same pattern. He found that one gene in particular, Wnt1, was expressed during development of blood vessels, shut off during adulthood and then re-expressed in angiosarcoma, a cancer of endothelial cells.

Deb wanted to see what would happen if he put the Wnt1 protein on human endothelial progenitor cells. He found that treating these special cells with Wnt1 not only greatly increased their function but also their number. Next, Deb and his colleagues investigated what effect the protein would have on a mouse model of peripheral artery disease, an illness in humans caused by decreased blood flow to the extremities. They found that treating these animals with a single injection of the Wnt1 protein resulted in almost three fold increase in blood flow in the affected areas.

"We found that Wnt1 is a novel proangiogenic molecule, something that has never been shown before," said Deb. "It gives us hope that injecting the Wnt1 protein -- or molecules that stimulate the Wnt1 signaling pathway -- into ischemic tissues in humans could improve blood flow and assert a therapeutic effect." Approximately 1 in 4 deaths in adults in the US are secondary to heart disease and as many as 15 percent of Americans age 65 and older have peripheral artery disease. In the future, Deb plans to use his findings to identify such small molecules or drug candidates that could reverse the endothelial progenitor cell dysfunction observed in so many patients with vascular disease.

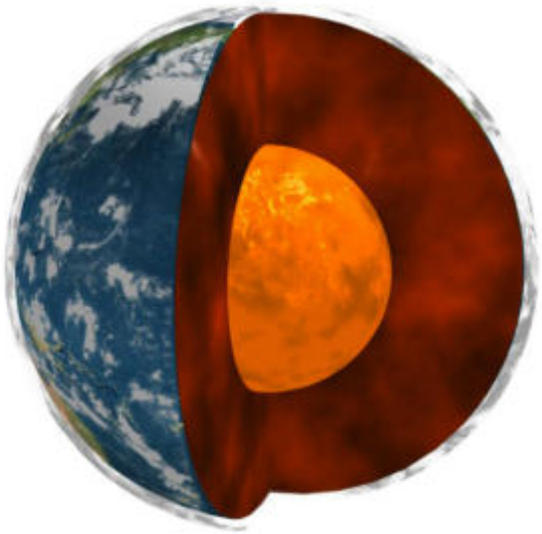
The research was funded by the National Institutes of Health and Ellison Medical Foundation. Study co-authors were Costin M. Gherghe, MD, PhD, postdoctoral fellow in Deb's lab; Jinzhu Duan, PhD, postdoctoral fellow in Deb's lab; Jucheng Gong, lab manager in Deb's lab; Mauricio Rojas, MD, MPH, director of mouse cardiovascular models core lab; Nancy Klauber-Demore, MD, associate professor of surgery; and Mark Majesky, PhD, Professor of Pediatrics, University of Washington, Seattle.

Story Source:

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

http://www.sciencedaily.com/releases/2011/03/110310112317.htm

NASA Study Goes to Earth's Core for Climate Insights



A NASA/university study of data on Earth's rotation, movements in Earth's molten core and global surface air temperatures has uncovered interesting correlations. (Credit: NASA/JPL-Université Paris Diderot - Institut de Physique du Globe de Paris)

ScienceDaily (Mar. 11, 2011) — The latest evidence of the dominant role humans play in changing Earth's climate comes not from observations of Earth's ocean, atmosphere or land surface, but from deep within its molten core.

Scientists have long known that the length of an Earth day -- the time it takes for Earth to make one full rotation -- fluctuates around a 24-hour average. Over the course of a year, the length of a day varies by about 1 millisecond, getting longer in the winter and shorter in the summer. These seasonal changes in Earth's length of day are driven by exchanges of energy between the solid Earth and fluid motions of Earth's atmosphere (blowing winds and changes in atmospheric pressure) and its ocean. Scientists can measure these small changes in Earth's rotation using astronomical observations and very precise geodetic techniques.

But the length of an Earth day also fluctuates over much longer timescales, such as interannual (two to 10 years), decadal (approximately 10 years), or those lasting multiple decades or even longer. A dominant longer timescale mode that ranges from 65 to 80 years was observed to change the length of day by approximately 4 milliseconds at the beginning of the 20th century.

These longer fluctuations are too large to be explained by the motions of Earth's atmosphere and ocean. Instead, they're due to the flow of liquid iron within Earth's outer core, where Earth's magnetic field originates. This fluid interacts with Earth's mantle to affect Earth's rotation. While scientists cannot observe these flows directly, they can deduce their movements by observing Earth's magnetic field at the surface. Previous studies have shown that this flow of liquid iron in Earth's outer core oscillates, in waves of motion that last for decades with timescales that correspond closely to long-duration variations in Earth's length of day.

Still other studies have observed a link between the long-duration variations in Earth's length of day and fluctuations of up to 0.2 degrees Celsius (0.4 degree Fahrenheit) in Earth's long-term global average surface air temperature.

So how might all three of these variables -- Earth's rotation, movements in Earth's core (formally known as the core angular momentum) and global surface air temperature -- be related? That's what researchers Jean Dickey and Steven Marcus of NASA's Jet Propulsion Laboratory, Pasadena, Calif., and colleague Olivier de Viron of the Universite Paris Diderot and Institut de Physique du Globe de Paris in France, set out to discover in a first-of-its-kind study.

The scientists mapped existing data from a model of fluid movements within Earth's core and data on yearly averaged length-of-day observations against two time series of observed annual global average surface

temperature: one from NASA's Goddard Institute of Space Studies in New York that extends back to 1880, and another from the United Kingdom's Met Office that extends back to 1860. Since total air temperature is composed of two components -- temperature changes that occur naturally and those caused by human activities -- the researchers used results from computer climate models of Earth's atmosphere and ocean to account for temperature changes due to human activities. These human-produced temperature changes were then subtracted from the total observed temperature records to generate corrected temperature records.

The researchers found that the uncorrected temperature data correlated strongly with data on movements of Earth's core and Earth's length of day until about 1930. They then began to diverge substantially: that is, global surface air temperatures continued to increase, but without corresponding changes in Earth's length of day or movements of Earth's core. This divergence corresponds with a well-documented, robust global warming trend that has been widely attributed to increased levels of human-produced greenhouse gases.

But an examination of the corrected temperature record yielded a different result: the corrected temperature record remained strongly correlated with both Earth's length of day and movements of Earth's core throughout the entire temperature data series. The researchers performed robust tests to confirm the statistical significance of their results.

"Our research demonstrates that, for the past 160 years, decadal and longer-period changes in atmospheric temperature correspond to changes in Earth's length of day if we remove the very significant effect of atmospheric warming attributed to the buildup of greenhouse gases due to mankind's enterprise," said Dickey. "Our study implies that human influences on climate during the past 80 years mask the natural balance that exists among Earth's rotation, the core angular momentum and the temperature at Earth's surface."

So what mechanism is driving these correlations? Dickey said scientists aren't sure yet, but she offered some hypotheses.

Since scientists know air temperature can't affect movements of Earth's core or Earth's length of day to the extent observed, one possibility is the movements of Earth's core might disturb Earth's magnetic shielding of charged-particle (i.e., cosmic ray) fluxes that have been hypothesized to affect the formation of clouds. This could affect how much of the sun's energy is reflected back to space and how much is absorbed by our planet.

Other possibilities are that some other core process could be having a more indirect effect on climate, or that an external (e.g. solar) process affects the core and climate simultaneously.

Regardless of the eventual connections to be established between the solid Earth and climate, Dickey said the solid Earth's impacts on climate are still dwarfed by the much larger effects of human-produced greenhouse gases. "The solid Earth plays a role, but the ultimate solution to addressing climate change remains in our hands," she concluded.

Study results were published recently in the *Journal of Climate*.

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

Journal Reference:

1. Jean O. Dickey, Steven L. Marcus, Olivier de Viron. **Air Temperature and Anthropogenic Forcing: Insights from the Solid Earth**. *Journal of Climate*, 2011; 24 (2): 569 DOI: 10.1175/2010JCLI3500.1

http://www.sciencedaily.com/releases/2011/03/110311140706.htm

Speed Demon Star Creates a Shock

NASA's Wide-field Infrared Survey Explorer, or WISE, captured this image of the star Alpha Camelopardalis, or Alpha Cam, in astronomer-speak, speeding through the sky like a motorcyclist zipping through rush-hour traffic. The big red arc is a bow shock, similar to the wake in front of the bow of a ship in water. (Credit: NASA/JPL-Caltech)

ScienceDaily (Mar. 11, 2011) — Just as some drivers obey the speed limit while others treat every road as if it were the Autobahn, some stars move through space faster than others. NASA's Wide-field Infrared Survey Explorer, or WISE, captured this image of the star Alpha Camelopardalis, or Alpha Cam, in astronomer-speak, speeding through the sky like a motorcyclist zipping through rush-hour traffic. The supergiant star Alpha Cam is the bright star in the middle of this image, surrounded on one side by an arc-shaped cloud of dust and gas -- a bow shock -- which is colored red in this infrared view.

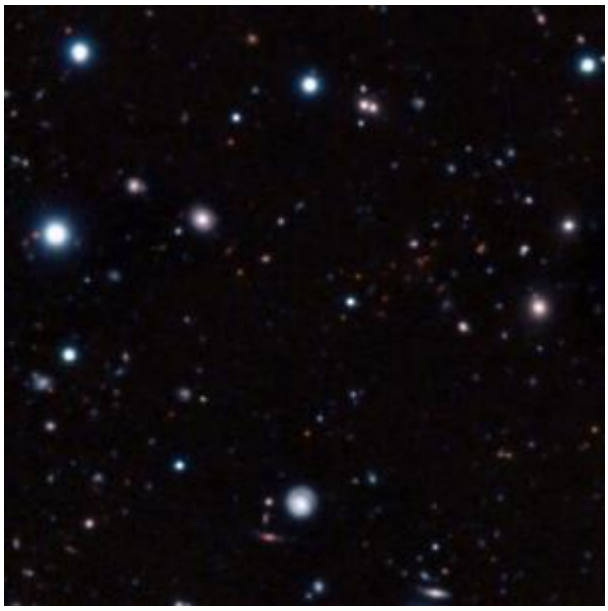
Such fast-moving stars are called runaway stars. The distance and speed of Alpha Cam is somewhat uncertain. It is probably somewhere between 1,600 and 6,900 light-years away and moving at an astonishing rate of somewhere between 680 and 4,200 kilometers per second (between 1.5 and 9.4 million mph). It turns out that WISE is particularly adept at imaging bow shocks from runaway stars. Previous examples can be seen around Zeta Ophiuchi , AE Aurigae, and Menkhib. But Alpha Cam revs things up into a different gear. To put its speed into perspective, if Alpha Cam were a car driving across the United States at 4,200 kilometers per second, it would take less than one second to travel from San Francisco to New York City!

Astronomers believe runaway stars are set into motion either through the supernova explosion of a companion star or through gravitational interactions with other stars in a cluster. Because Alpha Cam is a supergiant star, it gives off a very strong wind. The speed of the wind is boosted in the forward direction the star is moving in space. When this fast-moving wind slams into the slower-moving interstellar material, a bow shock is created, similar to the wake in front of the bow of a ship in water. The stellar wind compresses the interstellar gas and

dust, causing it to heat up and glow in infrared. Alpha Cam's bow shock cannot be seen in visible light, but WISE's infrared detectors show us the graceful arc of heated gas and dust around the star.
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 and http://wise.astro.ucla.edu and http://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**.

http://www.sciencedaily.com/releases/2011/03/110311131624.htm

The Most Distant Mature Galaxy Cluster: Young, but Surprisingly Grown-Up



This image is a composite of very long exposures taken with ESO's Very Large Telescope in Chile and the NAOJ's Subaru telescope on Hawaii. Most of the visible objects are very faint and distant galaxies. The clump of faint red objects to the right of center is the most remote mature cluster of galaxies yet found. (Credit: ESO/R. Gobat et al.)

ScienceDaily (Mar. 11, 2011) — "We have measured the distance to the most distant mature cluster of galaxies ever found," says the lead author of the study in which the observations from ESO's VLT have been used, Raphael Gobat (CEA, Paris). "The surprising thing is that when we look closely at this galaxy cluster it doesn't look young -- many of the galaxies have settled down and don't resemble the usual star-forming galaxies seen in the early Universe."

Clusters of galaxies are the largest structures in the Universe that are held together by gravity. Astronomers expect these clusters to grow through time and hence that massive clusters would be rare in the early Universe. Although even more distant clusters have been seen, they appear to be young clusters in the process of formation and are not settled mature systems.

The international team of astronomers used the powerful VIMOS and FORS2 instruments on ESO's Very Large Telescope (VLT) to measure the distances to some of the blobs in a curious patch of very faint red objects first observed with the Spitzer space telescope. This grouping, named CL J1449+0856 [1], had all the hallmarks of being a very remote cluster of galaxies [2]. The results showed that we are indeed seeing a galaxy cluster as it was when the Universe was about three billion years old -- less than one quarter of its current age [3].

Once the team knew the distance to this very rare object they looked carefully at the component galaxies using both the NASA/ESA Hubble Space Telescope and ground-based telescopes, including the VLT. They found evidence suggesting that most of the galaxies in the cluster were not forming stars, but were composed of stars that were already about one billion years old. This makes the cluster a mature object, similar in mass to the Virgo Cluster, the nearest rich galaxy cluster to the Milky Way.

Further evidence that this is a mature cluster comes from observations of X-rays coming from CL J1449+0856 made with ESA's XMM-Newton space observatory. The cluster is giving off X-rays that must be coming from a very hot cloud of tenuous gas filling the space between the galaxies and concentrated towards the centre of the cluster. This is another sign of a mature galaxy cluster, held firmly together by its own gravity, as very young clusters have not had time to trap hot gas in this way.

As Gobat concludes: "These new results support the idea that mature clusters existed when the Universe was less than one quarter of its current age. Such clusters are expected to be very rare according to current theory,

and we have been very lucky to spot one. But if further observations find many more then this may mean that our understanding of the early Universe needs to be revised."

Notes

[1] The strange name refers to the object's position in the sky.

[2] The galaxies appear red in the picture partly because they are thought to be mainly composed of cool, red stars. In addition the expansion of the Universe since the light left these remote systems has increased the wavelength of the light further so that it is mostly seen as infrared radiation when it gets to Earth.

[3] The astronomers measured the distance to the cluster by splitting the light up into its component colours in a spectrograph. They then compared this spectrum with one of a similar object in the nearby Universe. This allowed them to measure the redshift of the remote galaxies -- how much the Universe has expanded since the light left the galaxies. The redshift was found to be 2.07, which means that the cluster is seen about three billion years after the Big Bang.

Story Source:

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

Journal Reference:

1. R. Gobat, E. Daddi, M. Onodera, A. Finoguenov, A. Renzini, N. Arimoto, R. Bouwens, M. Brusa, R.-R. Chary, A. Cimatti, M. Dickinson, X. Kong, M. Mignoli. **A mature cluster with X-ray emission atz= 2.07**. *Astronomy and Astrophysics*, 2011; 526: A133 DOI: 10.1051/0004-6361/201016084

http://www.sciencedaily.com/releases/2011/03/110309073719.htm

David Brooks's Theory of Human Nature

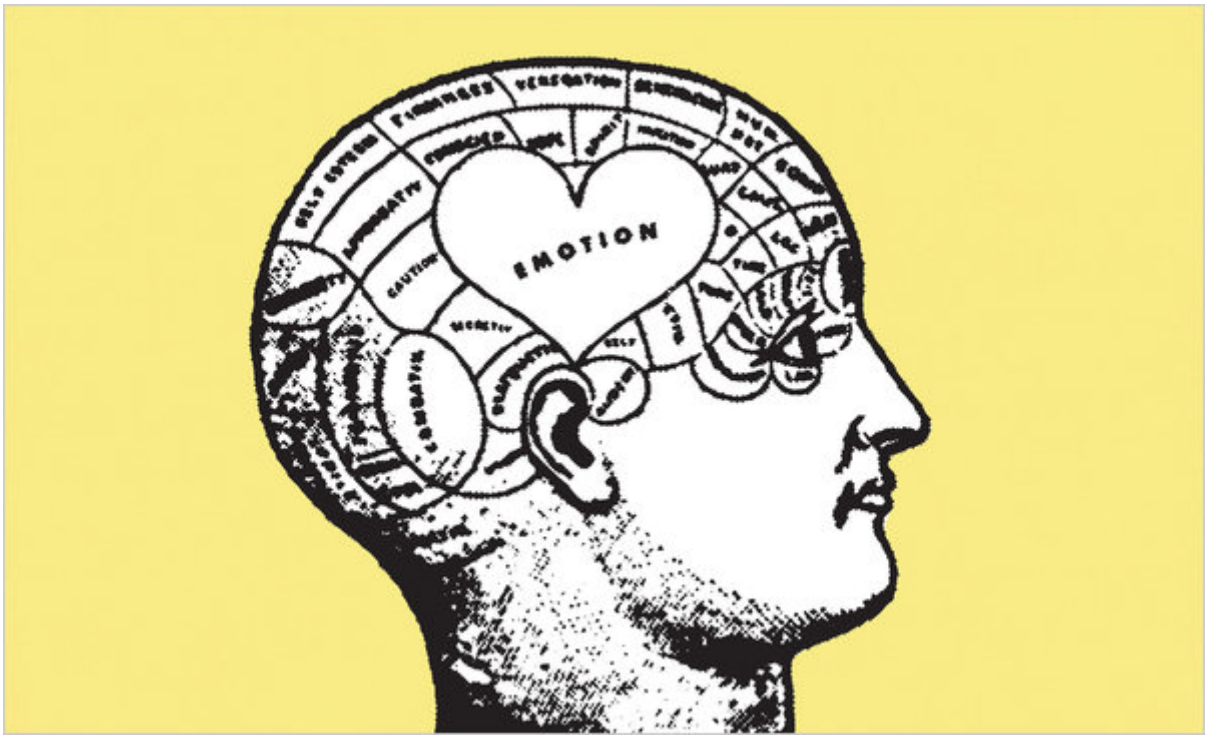


Illustration by Oliver Munday

By THOMAS NAGEL
THE SOCIAL ANIMAL
The Hidden Sources of Love, Character, and Achievement
By David Brooks
424 pp. Random House. $27.

Readers of his Op-Ed column in The New York Times know that David Brooks is an aficionado of research in the social sciences, especially psychology, and that he believes it has great practical importance. Now he has written a book, "The Social Animal," in order to assemble the evidence for a certain conception of the human mind, the wellsprings of action and the causes of success and failure in life, and to draw implications for social policy. The book is really a moral and social tract, but Brooks has hung it on the life stories of two imaginary people, Harold and Erica, who are used to illustrate his theory in detail and to provide the occasion for countless references to the psychological literature and frequent disquisitions on human nature and society.

This device is supposed to relieve the tedium of what would otherwise be like skimming through 10 years' worth of the Tuesday Science Times.But fiction is not Brooks's métier, and he lacks the ability to create characters that compel belief. The story of Harold and Erica, their formative years, eventual meeting, marriage and separate careers, is without interest: one doesn't care what happens to them because in spite of Brooks's earnest attempt to describe their psychological depths, they do not come to life; they and their supporting cast are mannequins for the display of psychological and social generalizations.

Harold is the imaginative and socially attuned child of middle-class parents, not terribly ambitious, but eventually successful as a writer and social commentator. (He notices that there is a New York Times columnist whose views are "remarkably similar to his own.") Erica is the tough and competitive daughter of socially marginal, unmarried parents, mother Chinese, father Mexican, who propels herself upward, and after a stellar business career becomes a high official in a Democratic presidential administration and eventually a regular at Davos. An original touch is that every stage of their long lives, from birth to death, is set "in the current moment, the early 21st century, because I want to describe different features of the way we live now."

Erica commits adultery once, and is overcome by shame, which provides a handle for theories of moral psychology. Harold's infant relations with his mother are used to illustrate theories of innateness and mental development; and so on. But the meat of the book is in its general claims about human nature and society.
The main idea is that there are two levels of the mind, one unconscious and the other conscious, and that the first is much more important than the second in determining what we do. It must be said immediately that Brooks has a terminological problem here. He describes the contents of the unconscious mind as "emotions, intuitions, biases, longings, genetic predispositions, character traits and social norms," and later he includes "sensations, perceptions, drives and needs." A majority of the things on this list are "conscious," in the usual sense of the word, since they are parts of conscious experience. The sense in which they are unconscious, which is what Brooks has in mind, is that they are not under direct conscious control. I may consciously choose from a menu, but I do not consciously choose what foods to like.
It is obvious, without the need for scientific research, that vastly more of the work of the human mind is unconscious or automatic in this sense than conscious and deliberate. We do not consciously construct a visual image from sensory input or consciously choose the word order and produce the muscle movements to utter a sentence, any more than we consciously digest our food. The huge submerged bulk of the mental iceberg, with its stores of memory and acquired skills that have become automatic, like language, driving and etiquette, supplies people with the raw materials on which they can exercise their reason and decide what to think and what to do.
The main problem that Brooks addresses in this book is how to understand the relation between these two mental domains. His aim is to "counteract a bias in our culture. The conscious mind writes the autobiography of our species. Unaware of what is going on deep down inside, the conscious mind assigns itself the starring role. It gives itself credit for performing all sorts of tasks it doesn't really control."
We may think that what we believe and do is largely under our conscious control, and we may believe that we should try to increase this control by the conscious exercise of reasoning and will power, but Brooks says that this is all wrong. Nondeliberate emotion, perception and intuition are much more important in shaping our lives than reason and will. Knowledge of what makes us tick, Brooks argues, does not come primarily from introspection but must rely on systematic external observation, experiment and statistics.
What is more, the Platonic ideal of putting the passions under the control of reason leads to policy mistakes, because rational incentives and arguments cannot change the most deep-seated sources of failure; only pervasive social influences that affect the unconscious operation of the mind can do that. The practical consequences Brooks would draw are suggested by the policy failures he identifies: he would protect old neighborhoods from urban renewal in order to support local networks of friendship and community; oppose welfare programs that reduce the traditional pressure to avoid out-of-wedlock births; and try to offer a substitute form of engagement when the parental culture does not encourage education. (Erica escapes poverty by forcing herself into a school that surrounds her with a comprehensive culture of discipline.)
"Emotion assigns value to things," Brooks writes, "and reason can only make choices on the basis of those valuations." The deeper level of the mind also holds a great store of information, coming from genetics, culture, family and education. "Our thoughts are profoundly molded by this long historic flow, and none of us exists, self-made, in isolation from it."
As Brooks observes, these ideas are not new: the importance and legitimacy of sentiment and social influence in determining human conduct was emphasized by figures of the British Enlightenment, notably David Hume, Adam Smith and Edmund Burke. Hume denied the dominance of reason, though he also offered brilliant analyses of the complex and systematic ways in which our sentiments, or passions, operate. So what has been added by recent cognitive science? Most significant, according to Brooks, is the accumulating evidence of the many specific ways that our lives and conduct are less under our conscious control than we think.
Brooks seems willing to take seriously any claim by a cognitive scientist, however idiotic: for example, that since people need only 4,000 words for 98 percent of conversations, the reason they have vocabularies of 60,000 words is to impress and sort out potential mates. But some findings are significant.
Take priming. If you tell people to write down the first three digits of their phone number and then ask them to guess the date of Genghis Khan's death, they will be more likely to put it in the first millennium, with a three-digit year, than those who are asked without the preliminary. Or framing. If a surgeon tells his patients that a procedure has a 15 percent failure rate, they are likely to decide against it; if he tells them the procedure has an 85 percent success rate, they tend to choose it. Such effects have long been familiar to salesmen and

advertisers, but lately they have been studied experimentally. In addition, statistics indicate that the effect of early environment and innate dispositions on later functioning is very marked.

Some groups are far better than others at inculcating functional norms and social skills. Children from disorganized, unstable communities have a much harder time acquiring the discipline to succeed in life. And a famous experiment conducted around 1970 demonstrated that the ability of 4-year-olds to postpone gratification by leaving a marshmallow uneaten for a time as a condition of receiving a second marshmallow was a very good predictor of success in life: "The kids who could wait a full 15 minutes had, 13 years later, SAT scores that were 210 points higher than the kids who could wait only 30 seconds. . . . Twenty years later, they had much higher college-completion rates, and 30 years later, they had much higher incomes. The kids who could not wait at all had much higher incarceration rates. They were much more likely to suffer from drug- and alcohol-addiction problems."

Similarly, in morality and politics. "The adult personality — including political views — is forever defined in opposition to one's natural enemies in high school," Brooks writes. His analysis of what he calls the "underdebates" in American politics — the web of associations and sympathies that divide Republicans and Democrats — is plausible, if familiar: snowmobiles versus bicycles, religious versus secular morality, and so forth.

Still, even if empirical methods enable us to understand subrational processes better, the crucial question is, How are we to use this kind of self-understanding? Brooks emphasizes the ways in which it can improve our prediction and control of what people will do, but I am asking something different. When we discover an unacknowledged influence on our conduct, what should be our critical response? About this question Brooks has essentially nothing to say. He gives lip-service to the idea that moral sentiments are subject to conscious review and improvement, and that reason has a role to play, but when he tries to explain what this means, he is reduced to a fashionable bromide about choosing the narrative we tell about our lives, "the narrative we will use to organize perceptions."

On what grounds are we supposed to "choose a narrative?" Experiments show that human beings feel greater sympathy for those who resemble them — racially, for example — than for those who do not. How do we know that it would be better to counter the effects of this bias rather than to respect it as a legitimate form of loyalty? The most plausible ground is the conscious and rational one that race is irrelevant to the badness of someone's suffering, so these differential feelings, however natural, are a poor guide to how we should treat people. But reason is not Brooks's thing: he prefers to quote a little Sunday school hymn about how Jesus loves the little children, "Be they yellow, black or white / they are precious in his sight." This is an easy case, but harder ones also demand more reflection than he has time for.

Brooks is right to insist that emotional ties, social interaction and the communal transmission of norms are essential in forming individuals for a decent life, and that habit, perception and instinct form a large part of the individual character. But there is moral and intellectual laziness in his sentimental devaluation of conscious reasoning, which is what we have to rely on when our emotions or our inherited norms give unclear or poorly grounded instructions.

Life, morality and politics are not science, but their improvement requires thought — not only thought about the most effective means of shaping people, which is Brooks's concern, but thought about what our ends should be. Such questions don't appeal to him, since they cannot be settled by empirical evidence of the kind he feels comfortable with. Brooks is out to expose the superficiality of an overly rational view of human nature, but there is more than one kind of superficiality.

Thomas Nagel teaches philosophy and law at New York University. His most recent book is "Secular Philosophy and the Religious Temperament."

http://www.nytimes.com/2011/03/13/books/review/book-review-the-social-animal-by-david-brooks.html?_r=1&nl=books&emc=booksupdateema3

A Resistance Hero Fires Up the French

By ELAINE SCIOLINO

Charles Platiau/Reuters
Stéphane Hessel at a pro-Palestinian rally. He is wearing a Phrygian cap, an icon of the French Revolution

PARIS — As a hero of the French Resistance, Stéphane Hessel was in exile with Charles de Gaulle in London, imprisoned in concentration camps, waterboarded in Nazi torture sessions and saved from hanging by swapping identities with an inmate who had died of typhus.

Now, at 93, he is the author of a best seller that has become a publishing phenomenon in France. It is not the story of his life (he wrote his autobiography years ago), but a thin, impressionistic pamphlet called "Indignez-Vous!," held together by two staples and released by a two-person publishing house run out of the attic of their home. It urges young people to revive the ideal of resistance to the Nazis by peacefully resisting the "international dictatorship of the financial markets" and defending the "values of modern democracy."

In particular Mr. Hessel protests France's treatment of illegal immigrants, the influence on the media by the rich, cuts to the social welfare system, French educational reforms and, most strongly, Israel's treatment of the Palestinians.

"When something outrages you, as Nazism did me, that is when you become a militant, strong and engaged," he writes. "You join the movement of history, and the great current of history continues to flow only thanks to each and every one of us."

Since its publication in October "Indignez-Vous!" has sold almost 1.5 million copies in France and has been translated into Spanish, Italian, Portuguese and Greek. Editions are planned in Slovenian, Korean, Japanese, Swedish and other languages. In the United States, The Nation magazine published the entire English text last month.

On Tuesday the British edition went on sale under the title "Time for Outrage!" with a foreword by Charles Glass, an American journalist in Europe who published it under his recently created imprint for Quartet

Books. Sylvie Crossman, a former correspondent for Le Monde, and her partner, Jean-Pierre Barou, who originally published the book, said they hoped to line up an American publisher — and a movie star like Sean Penn or George Clooney to write a new foreword.

At about 4,000 words "Indignez-Vous!" can hardly be called a book. Its French edition is 29 pages, including explanatory footnotes, an illustration and just 14 pages of text.

But the timing was right. It came out a year and half before the hotly anticipated presidential election here, with the French already loudly talking politics and considering alternatives to Nicolas Sarkozy, who is now at his lowest level in approval ratings. The book's short length and low price (it sells for about $4) made it a popular Christmas gift among left-leaning intellectuals, parents struggling to inject political activism into their children and just about anyone else who needed an extra stocking stuffer.

"Christmas came at the right moment — couldn't have been better," said Mr. Hessel, a courtly, gentle man who wore a three-piece pin-stripe suit and a stiffly starched white shirt from another era during an interview in his Paris apartment. "I have many friends who tell me, 'I've bought 10 copies because I want to give them to 5 of my children and 5 of my friends."

A deeper reason, perhaps, is that more than the book's emotional ramblings, the French have embraced Mr. Hessel as one of the last living heroes of the darkest era of the 20th century, as if to tell themselves that they too can be like him.

"It's, 'Ah, yes, he's the old man who has been in the Resistance and who has joined General de Gaulle,' " he said in superb English. "So obviously that was part of the success, I quite agree. If it had been written by a young man, it would probably not have had the same impact."

The book was an accident. Inspired by a speech Mr. Hessel gave in 2008 to commemorate the Resistance, Ms. Crossman proposed publishing a pamphlet based on his thinking. After three interviews with Mr. Hessel she whipped his words into a text. He did a bit of editing, and voilà, 8,000 copies were printed by Ms. Crossman and Mr. Barou's publishing house, Indigène. The only advertising was word of mouth.

Mr. Hessel confesses that although the ideas and content are his, Ms. Crossman did the writing. "My contribution was oral," he said, adding: "She used her words. It is true that it is her language."

The book has been a windfall for Indigène, which usually publishes books on subjects like Chinese medicine and American Indians that sell no more than a thousand or so copies apiece.

Mr. Hessel asked for no royalties from Ms. Crossman and Mr. Barou, just a promise that they give his share of the proceeds to his favorite causes.

The book has been criticized for offering no prescription for action, just attacks on the status quo. "Nothing would be less French than apathy and indifference," Prime Minister François Fillon said about the book. "But indignation for indignation's sake is not a way of thinking."

Luc Ferry, the philosopher and a former education minister, lectured Mr. Hessel in an open letter that indignation is the last passion needed in France at the moment. "This sentiment is one that is applied only to others, never to oneself, and real morality starts with demands one makes on oneself," he wrote.

Mr. Hessel's work also has been faulted for lacking literary value. "The book, or pamphlet, is rather poorly written," a columnist wrote in the British newspaper The Independent. "It is repetitive, unoriginal, simplistic and frustratingly short."

More serious is that the book has been branded anti-Semitic by some French intellectuals for its attack on Israel, in particular that country's 2008 incursion into Gaza. The book describes Gaza, which Mr. Hessel visited with his wife in 2009, as "an open-sky prison for a million and a half Palestinians," and says that "for Jews themselves to perpetuate war crimes is intolerable."

On his Facebook page Pierre-André Taguieff, an expert in the history of French anti-Semitism, wrote: "Certainly he could have ended his life in a more dignified way, instead of inciting hatred against Israel, thus adding his voice to the worst of anti-Jews. Even old age doesn't make someone impermeable to vanity, or kill the appetite for applause."

Mr. Hessel denies that he is anti-Semitic or anti-Israel. "I feel that I am completely in solidarity with Jews in the world, because I know what it is to be a Jew," he said. "I've seen what it is, I am myself of Jewish origin, and therefore I can only be fully in support of the idea that the Jews, after all they've suffered, need a country where they are at home. I shouted my joy when Israel was founded. I said, 'At last!' "

When a handful of protesters branded him a racist during a speech he gave in the Paris suburb of Montreuil last week, he said that he told them: "My love for Israel is stronger than yours. But I want it to be an honest country."
Other critics have pointed out the book's outrage does not mention human rights offenses in places like North Korea, Myanmar, China and Iran.
Since Mr. Hessel is widely respected as an honorable man without vanity or guile, the book has refocused attention on his extraordinary life. He was born in Berlin to a Jewish father and a Protestant mother and was baptized so that he could attend school. The family immigrated to Paris when he was 7.
With her husband's consent his mother had a longstanding affair with Henri-Pierre Roché, the writer and art dealer. The relationship became the inspiration for Mr. Roché's first novel and later for François Truffaut's classic French New Wave film "Jules and Jim." The young Stéphane character was the little girl in the film.
After the Nazi invasion of France, Mr. Hessel fled to England and then flew secretly into occupied France as a Resistance officer. Captured by the Gestapo, he spent time in concentration camps.
Asked how he survived torture, he said, "The third time of waterboarding, I said, 'Now, I'll tell you.' And I told them a lie of course." He added: "One survives torture. So many people unfortunately have been tortured. But it's not a thing to recommend."
After the war he worked as a junior official for the fledgling United Nations in New York, where he participated in the drafting of the Universal Declaration of Human Rights. He held diplomatic posts in Vietnam, Algeria and Switzerland. Named ambassador for life, he still carries a diplomatic passport.
This week another French publisher will release another slim volume, this time a series of interviews with Mr. Hessel, titled "Engagez-Vous!" ("Get Involved!"). In it he appeals to his readers to save the environment and to embrace the positive. He also emphasizes the importance of good luck in life.
"Luck can always intervene," he says in the book, adding: "I've been tremendously lucky. I went through things that turned out wrong, and I got myself out of them. So I project this luck onto history. History can bring luck: this is what we can call optimism."

http://www.nytimes.com/2011/03/10/books/stephane-hessel-93-calls-for-time-of-outrage-in-france.html?ref=books

Michael Frayn's Memoir of His Father

By CHRISTOPHER BUCKLEY

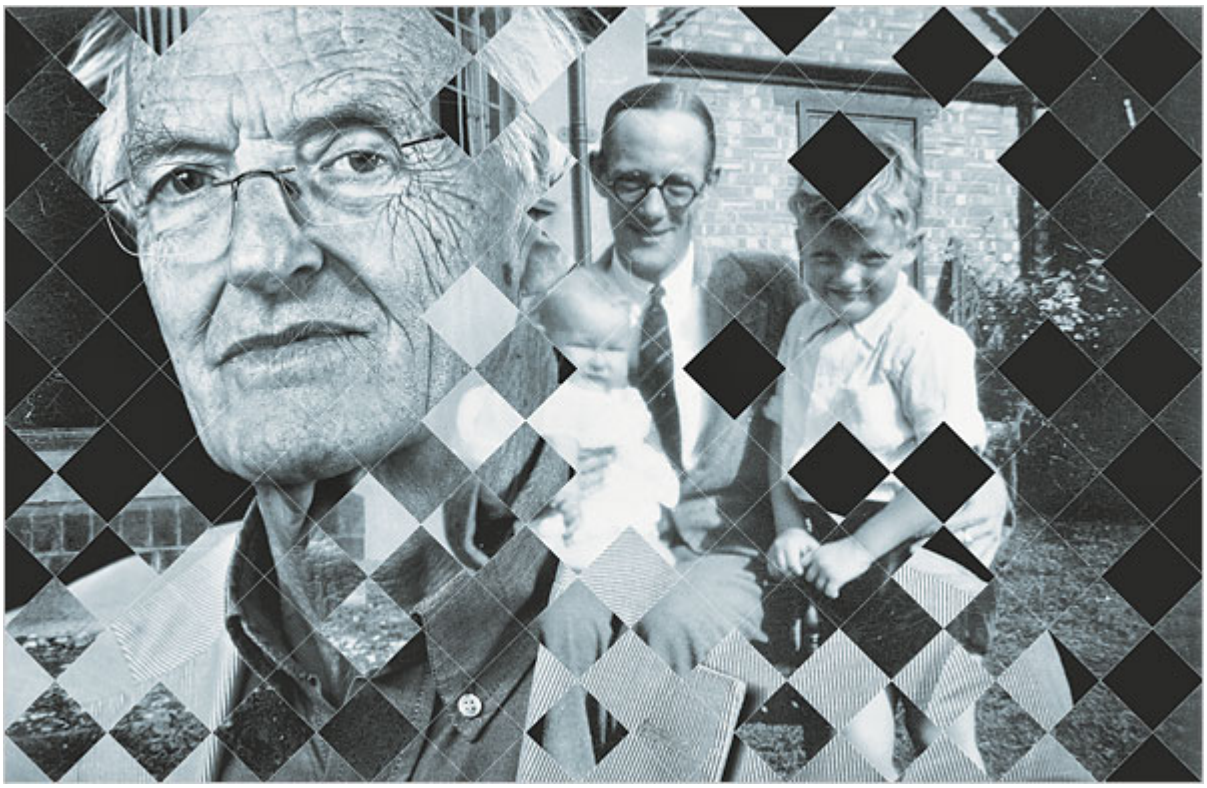


Illustration by Joon Mo Kang, photographs by Colin McPherson/Corbis, left, and courtesy of Michael Frayn

MY FATHER'S FORTUNE
A Life
By Michael Frayn
Illustrated. 273 pp. Metropolitan Books/Henry Holt & Company. $25.

Contemporary British letters do not lack for memoirs, autobiographies and other works in which the main event is the father-son relationship. John Mortimer's wonderful play "A Voyage Round My Father," about his dad, a celebrated, blind barrister; Max Hastings's funny and touching "Did You Really Shoot the Television?," about his feckless but irresistible father; Auberon Waugh's sublimely titled "Will This Do?," about life with Evelyn, who comes off (to my mind, anyway) as the Dad From Hell; then there is Auberon's own son Alexander's superb multigenerational layer-cake memoir, featuring Auberon-Evelyn-Arthur; Martin Amis's nuanced but adoring portrait of his dad, Kingsley; and most recently Christopher Hitchens's brilliant "Hitch-22," featuring his complex, fraught relationship with his father, Commander Hitchens of the Royal Navy. Rich terrain — and I've probably omitted a dozen or so others.

Comes now Michael Frayn's "My Father's Fortune," about his dad. Frayn says at the outset that his father has been dead for 40 years and that he wrote the book at the urging of his 47-year-old daughter, Rebecca, who wanted to know more about her antecedents. One senses that Frayn was initially reticent about the project; but by the time it ends, as many such books do, on a confessional, apologetic note, you feel his relief at having gotten it out. Rebecca owes her dad a kiss and a big thank-you.

Michael Frayn is probably best known in the United States for his hugely successful 1982 comedy, "Noises Off," which was nominated for a Tony Award for best play. He is probably next-best-known here for his drama "Copenhagen," about — as Monty Python used to put it, "and now for something completely different"

— an encounter in 1941 between the German physicist Werner Heisenberg and the Danish physicist Niels Bohr. It won the Tony for best play in 2000.

Frayn boasts a résumé that would make even Gore Vidal feel inadequate (well, maybe not). Fifteen plays; 10 novels; screenplays; he's translated Chekhov and Tolstoy and won so many literary awards and medals that if he wore them all at once, he'd look like one of those Soviet generals on top of Lenin's tomb on May Day. He is, in so many words, a significant literary personage.

I had to keep reminding myself of this fact during the first 70 or so pages of this book. At one point, a line from Clive James's review of Leonid Brezhnev's memoirs, which is mentioned in "Hitch-22," came to me: "Here is a book so dull that a whirling dervish could read himself to sleep with it. If you were to recite even a single page in the open air, birds would fall out of the sky and dogs drop dead."

I hasten, indeed sprint, to qualify that somewhat impolite reference, for a few pages later, Frayn's book kicked in and began to engage. It is not his fault that, as he puts it, "my father moved lightly over the earth, scarcely leaving a footprint, scarcely a shadow." Yet the problem remains — turning Tom Frayn's life story into compelling stuff. That said, by the end, it *has* become compelling. And with a dramatist's sure touch, Frayn introduces a ticking hand grenade on Page 107 that may have you saying to yourself: "Oh. My. God." Any translator of Chekhov is familiar with Chekhov's rule: introduce a rifle in Act I, and it must be fired by Act III.

I don't want to spoil it for you, but there's no point in being coy, so here it is: It turns out Dad works for a company that makes asbestos roofing and piping. Not only that, but he's constantly bringing home asbestos *samples* — huge chunks and slabs of pressed carcinogenic material from which the family makes (one cringes) myriad household items. Young Michael makes *toys* out of the stuff, hacksawing away at it, merrily filling the air with asbestos particles. My "Oh. My. God" moment came when they started making tomato planters out of it. Alas, the rifle does go off in Act III, but not quite as expected.

Frayn's childhood was a mix, or, to use one of his logophile father's favorite words, gallimaufry: a bit of Dickens, a bit of Wodehouse. He was 10 years old in 1943 and thus had a front-row seat at the blitz and the buzz bombing. He relates vivid and hairy memories of the "doodlebugs," the improbably cute nickname given to the V-1 missiles that annihilated 6,000 Britons and wounded tens of thousands more.

His mother dropped dead of a heart attack in November 1945, having survived the war. He and his younger sister, Jill, were not allowed to attend the funeral, presumably on the grounds it might upset them. Their father wasn't emotionally frigid, exactly, but neither was he a hugger.

"I suppose that he loved my mother," Frayn writes. "And loved me and my sister, though he never said. Perhaps, it occurs to me now with a shock of surprise, he loved us as blindly and helplessly as years later I love my own children — was filled with the same joy at the sight of us as I am at the sight of them."

Dad remarries a whack job named Elsie, the widow of a tinned-ham entrepreneur. The Frayns' modest living standard suddenly rises to the level of petite bourgeoisie as they move from a rented home named Duckmore into nicer digs named Chez Nous. For a time, Elsie is Lady Bountiful, cheerful and loving and dispensing pound notes from her handbag — until we discover that she suffers from what we now call bipolar disorder. Michael spends the balance of his father's second marriage tiptoeing around Chez Nous on eggshells.

But by now Michael is in secondary school, where his keen intellect is nurtured by a Mr. Chips type nicknamed Gobbo, the kind of teacher who makes a critical difference in a young man's life. Frayn forms a close male attachment — *not* homosexual (oddly, for a British memoir) — with a fellow student named Lane. Years later, Lane, now a senior civil servant in Canada (*that* must have been an exciting life), rebukes his old pal for having spoken publicly about their friendship and saying that it had "homoerotic overtones."

With the help of an assiduous and beguiling crammer (tutor), Frayn matriculates at Cambridge, somewhat to the disappointment of Frayn Sr., who had hoped his son would follow him into the — gasp — asbestos business. After he graduates with a perfectly respectable 2.1 degree (a "first" being the best), his father can only shake his head. "I knew it wouldn't come to anything, going to Cambridge." But by then Frayn has already gotten a reporting job on The Manchester Guardian. Modestly, he barely says a word about his later successes.

And there the story does not end. There is redemption. There's a heart-rending deathbed scene. And the rifle — hand grenade, doodlebug, whatever — that has been introduced on Page 107 finally goes off, casting a terrible pall.

In the final pages, Frayn, who in addition to Russian well knows his Greek and Latin, writes of his father, "I have borne him as best I could out of the ashes of the past in the way that the pious Aeneas bore his father Anchises on his back out of the ashes of Troy, in those pages of Virgil that fluttered away in the wind so many years ago."
This is beautiful writing. This is Michael Frayn's gift, not so much to his father, who one guesses would probably just have shrugged, but to a daughter who wanted to know what it had all been like. Rebecca's fortune is quite a large one. h
Christopher Buckley's latest book is "Losing Mum and Pup: A Memoir."

http://www.nytimes.com/2011/03/06/books/review/Buckley-t.html?ref=books

The Modesty Manifesto
By DAVID BROOKS

We're an overconfident species. Ninety-four percent of college professors believe they have above-average teaching skills. A survey of high school students found that 70 percent of them have above-average leadership skills and only 2 percent are below average.

Men tend to be especially blessed with self-esteem. Men are the victims of unintentional drowning more than twice as often as women. That's because men have tremendous faith in their own swimming ability, especially after they've been drinking.

Americans are similarly endowed with self-esteem. When pollsters ask people around the world to rate themselves on a variety of traits, they find that people in Serbia, Chile, Israel and the United States generally supply the most positive views of themselves. People in South Korea, Switzerland, Japan, Taiwan and Morocco are on the humble side of the rankings.

Yet even from this high base, there is some evidence to suggest that Americans have taken self-approval up a notch over the past few decades. Start with the anecdotal evidence. It would have been unthinkable for a baseball player to celebrate himself in the batter's box after a home-run swing. Now it's not unusual. A few decades ago, pop singers didn't compose anthems to their own prowess; now those songs dominate the charts.

American students no longer perform particularly well in global math tests. But Americans are among the world leaders when it comes to thinking that we are really good at math.

Students in the Middle East, Africa and the United States have the greatest faith in their math skills. Students in Japan, South Korea, Hong Kong and Taiwan have much less self-confidence, though they actually do better on the tests.

In a variety of books and articles, Jean M. Twenge of San Diego State University and W. Keith Campbell of the University of Georgia have collected data suggesting that American self-confidence has risen of late. College students today are much more likely to agree with statements such as "I am easy to like" than college students 30 years ago. In the 1950s, 12 percent of high school seniors said they were a "very important person." By the '90s, 80 percent said they believed that they were.

In short, there's abundant evidence to suggest that we have shifted a bit from a culture that emphasized self-effacement — I'm no better than anybody else, but nobody is better than me — to a culture that emphasizes self-expansion.

Writers like Twenge point out that young people are bathed in messages telling them how special they are. Often these messages are untethered to evidence of actual merit. Over the past few decades, for example, the number of hours college students spend studying has steadily declined. Meanwhile, the average G.P.A. has steadily risen.

Some argue that today's child-rearing and educational techniques have produced praise addicts. Roni Caryn Rabin of The Times recently reported on some research that found that college students would rather receive a compliment than eat their favorite food or have sex.

If Americans do, indeed, have a different and larger conception of the self than they did a few decades ago, I wonder if this is connected to some of the social and political problems we have observed over the past few years.

I wonder if the rise of consumption and debt is in part influenced by people's desire to adorn their lives with the things they feel befit their station. I wonder if the rise in partisanship is influenced in part by a narcissistic sense that, "I know how the country should be run and anybody who disagrees with me is just in the way." Most pervasively, I wonder if there is a link between a possible magnification of self and a declining saliency of the virtues associated with citizenship.

Citizenship, after all, is built on an awareness that we are not all that special but are, instead, enmeshed in a common enterprise. Our lives are given meaning by the service we supply to the nation. I wonder if Americans are unwilling to support the sacrifices that will be required to avert fiscal catastrophe in part because they are less conscious of themselves as components of a national project.

Perhaps the enlargement of the self has also attenuated the links between the generations. Every generation has an incentive to push costs of current spending onto future generations. But no generation has done it as freely as this one. Maybe people in the past had a visceral sense of themselves as a small piece of a larger chain across the centuries. As a result, it felt viscerally wrong to privilege the current generation over the future ones, in a way it no longer does.

It's possible, in other words, that some of the current political problems are influenced by fundamental shifts in culture, involving things as fundamental as how we appraise ourselves. Addressing them would require a more comprehensive shift in values.

http://www.nytimes.com/2011/03/11/opinion/11brooks.html?src=me&ref=general

Balanchine's Golden Boy Looks Back
By ALASTAIR MACAULAY

I WAS A DANCER
A Memoir
By Jacques d'Amboise
Illustrated. 439 pp. Alfred A. Knopf. $35.

Since Jacques d'Amboise was among the most distinguished American male dancers of his day — his prime was probably 1952-74 — it is startling to read, in his memoirs, of his part in a stabbing. He had been a student at the School of American Ballet for several years when in the summer of 1949, heading home through Washington Heights in Manhattan, he found himself in a clash with a local bully, who produced a switchblade. "Without even thinking, I did a grand battement — a big kick — knocking his hand and sending the knife flying," d'Amboise writes in "I Was a Dancer." "The force of my kick spun me around on the ball of my foot 360 degrees. I arrived with both feet under me in plié, leaped in the air, and jumped so high my feet kicked down on top of his shoulders, smashing him to the ground." Then d'Amboise, infected by "the virus of the bully," pinned down his opponent, "stabbed him in the buttocks, tearing through his jeans, piercing the skin and drawing blood."

What followed, "like a bucket of water," was "a wash of shame." Within months, d'Amboise — age 15 — left high school to join New York City Ballet at the invitation of George Balanchine. And "before I was through my teens," he reflects, "I had been introduced and exposed to artists who would, in later years, become legendary."

Balanchine is foremost among the artists remembered in this memoir, but d'Amboise also mentions Frederick Ashton, Antony Tudor, Jerome Robbins, Michael Kidd, Lew Christensen, Merce Cunningham, John Cranko, Martha Graham. "They were my mentors, teachers and choreographers," he writes (though it's never clear how Graham worked with him). "Often, Stravinsky, Gould and Bernstein would be in the orchestra pit conducting or at the piano playing." The audience included Alfred Kinsey, Anna Freud, William Faulkner, Salvador Dalí, W. H. Auden and Franchot Tone.

So this is a tale of personal transformation, and of a young man recognizing himself in a great role. In 1957, Balanchine cast d'Amboise in the title role of his and Stravinsky's "Apollo." D'Amboise notes how the choreographer had already summed up this ballet in a sentence: "A wild, untamed youth learns nobility through art."

D'Amboise was the foremost interpreter of Apollo in an illustrious era of New York City Ballet. It's too bad that few Americans have seen the 1966 Hamburg television recording in which he and Suzanne Farrell dance while Stravinsky himself conducts. Even though it's filmed in exceptionally cramped conditions, it remains the most galvanized performance of this classic I have ever seen: music and dance seem to meet as if for the first time.

D'Amboise stayed with City Ballet for almost 35 years, leaving a few months before his 50th birthday, in 1984. But before that departure, he'd reinvested his verve into his National Dance Institute, through which he worked and still works with children. In an affecting passage late in the book, d'Amboise takes three paragraphs to describe what was involved in assisting a boy who, unable to get from his right foot to his left on the music, became terrified and unable to move at all. "I put my arm around him and said, 'Let's do it together. We'll do it, moving forward, in slow motion.' We did. Then I said, 'Now do it alone, and fast.' With his face twisted in concentration, he slammed his left foot down, directly in front of him, smack on the musical note. The whole class applauded. He was so excited. He was on the way to discovering he could take control of his body, and from that he can learn to take control of his life."

"I Was a Dancer" is highly engaging, with many passages of particular import for Balanchine devotees. To anyone acquainted with d'Amboise's career, however, it will feel as if central portions are missing from his account. Instead of fully covering the years 1962-82, he writes two chapters, "Balanchine's Muses" and "Lincoln," about Lincoln Kirstein. Granted, these are important — what he says about Balanchine's relationships with his ballerinas is acute and revealing, and what he says about the manic-depressive Kirstein, the co-founder of City Ballet, is generous, compassionate and, occasionally, shocking. (Among the book's other revelations, d'Amboise recounts a late-1970s incident in which Kirstein, in bad condition, approached Balanchine and bellowed, "You're fired!" This doesn't stop d'Amboise loving this "wounded giant" the more of the two.)

But there's nothing on the making of several major Balanchine ballets. Why nothing on "Who Cares?" (1970), one of the ultimate demonstrations that classical ballet had become American? Here, to Gershwin music, Balanchine — for whom Fred Astaire was the greatest dancer of the 20th century — gave the all-American d'Amboise a role that, without any break in style, both invoked the casual elegance of Astaire and quoted the newly minted classicism of "Apollo." By passing over it, does d'Amboise mean it was a period piece that now, without the original Balanchine style, has passed its sell-by date? He hints as much but refrains from saying so outright, instead spelling out his reservations about the way Balanchine is performed today.

In the chapters concentrating on Balanchine's last years and his death, in 1983, d'Amboise offers a chronologically chaotic collage of diary and recollection. He gives the sense that the whole purpose of life changed once the master had gone. This is heightened by d'Amboise's perplexity that nothing came from the several assurances by Balanchine and Kirstein that they had considered him to be Balanchine's successor at City Ballet. (That successor is Peter Martins. D'Amboise speaks of his admiration for Martins's work while implying that City Ballet's glory days are over.) The descriptions of Balanchine's changing moods in his final months are touching. One poignant image, of the ballerina Karin von Aroldingen, Balanchine's closest friend among the dancers of his final era, cradling the dying choreographer's head while singing the German lullaby "Guten Abend, Gut' Nacht," is piercing.

Though d'Amboise lingers on this and other deaths, his temperament is too energetic for him to end on a downbeat. He never tells us of the 2009 death of his wife, Carolyn George, a photographer and former City Ballet soloist with whom he founded the National Dance Institute; we have the sense he can't bear to include it. Enthusiasm is what he does best, and he makes it infectious. His grin — once likened by Arlene Croce to that of the Cheshire Cat — was celebrated, and is captured here in a marvelous David Levine cartoon. The smile is wider than the torso.

Alastair Macaulay is The Times's dance critic.

http://www.nytimes.com/2011/03/06/books/review/Macaulay-t.html?ref=books

Photo Editing Online, Easy as Pie

By PETER WAYNER

Photofunia.com, left, Photo505.com allow users to see how their faces would look in unlikely contexts.

When Alexey Ivanov and his future wife, Marina Kiseleva, were dating, she gave him a memorable gift: a photograph of himself that looked as if it were hanging in the Tate Modern in London.

To create the image, she used a simple photo-editing program. And it gave the couple the idea for their Web site, Photofunia.com, which allows users to upload a photograph, select an image from dozens of templates showing a scene, and then merge the two photographs. It is just one of many Web sites for enhancing photographs that are becoming easier than ever to use.

The Web sites cater to novices, unlike sophisticated software packages like Photoshop, making it possible to create a greeting card, make photo collages, design new images for a Web site and tweak personal photographs without doing much more than clicking a button.

Some sites, like Photofunia, which is based in Ukraine, merge or mash up images. Others are aimed at transforming pictures to look as if they come from another time or place. Some sites have a more commercial aspect, selling products like lipstick by letting you try it by painting a virtual copy of the makeup on a photo of yourself.

Photofunia contains dozens of templates — of art galleries, urban scenes and locations like the Sphinx in Egypt. For example, users can put a picture of themselves into a scene from Times Square so that it looks as if the user's image is on a billboard. The site also has tools to digitally detect a person's face, extract it from a picture and graft it onto the head and body of another image, like Santa Claus or the Mona Lisa.

A similar site, based in Russia, is Photo505.com. It offers a wide array of templates, and can place a face in a wanted poster or the cover of a magazine like Cosmopolitan.

"We experiment and realize every idea we have in mind," said the site's founder, Vasily Giharev. "Even the most insane ones."

Mr. Giharev said he was inspired to create the site after seeing the film "Forrest Gump," which sliced film of the actor Tom Hanks into historical images from the 1960s, making it seem as if the character was present at the important events of that era.

Other sites — like Aviary.com, Pixlr.com, Splashup.com, and Citrify.com — are competing to offer simple tools for cropping an image, fixing red eye or making other tweaks to an image.

"The typical user is not a professional, but a step below, a beginner," said Ola Sevandersson, the Stockholm-based founder of Pixlr.

While Pixlr itself is meant to be easy to use, Mr. Sevandersson also created an even simpler version that does most of the work with the push of a button.

Pixlr includes another feature that allows users to modify the colors in a photo. For example, effects named Melissa, Sophie or Tony (to make them easier to remember) will mute colors and change the focus to imitate the film and lenses commonly used in different eras. The vintage ’60s effect, for instance, amplifies the red tones and mutes the blues, effectively producing more yellows and purples, and imitating the way that films and photographic paper of that time reproduced light from the scene.

Other sites take photo editing into different realms. Taaz.com, for instance, allows people to test various colors of makeup.

“Our main positioning is not as a photo modification site,” said Deepu John, vice president of marketing at Taaz, which is based in San Diego. “It’s a site where women can try on thousands of different makeup colors on themselves.”

Users upload a photo of themselves and can then modify it by trying on foundation, lip gloss, blush and other cosmetics. Cosmetic companies pay fees to the company to include their products. Making the images look realistic was a challenge for the company’s software designers, Mr. John said. “We have to focus on light interacting with surface. That’s part of the key to realism.”

The makeup test is licensed by Taaz to other Web sites like People.com and Esteelauder.com.

Mr. John said more than a quarter of a billion tests of makeup products were performed each month on all the sites.

Yet another site is Bighugelabs.com, where users create badges, jigsaw puzzles and art work meant to emulate the styles of Andy Warhol or David Hockney. John Watson, the site’s founder, said it had almost a half million registered users.

The most popular service, he said, produces images that imitate a popular line of black-matted, motivational posters often found in office hallways. The site matches a picture with a caption and produces an image with the correct typeface. Many of the people visit the site to produce posters that are sarcastic, not inspirational.

“I think most people can be creative but not everyone is going to learn to play guitar,” Mr. Watson said. “But there are other ways for people to be creative. You can give them tools that allow themselves to express themselves in ways they couldn’t before.”

http://www.nytimes.com/2011/03/10/technology/personaltech/10basics.html?src=me&ref=general

Rise of the Ethnoburbs

By TIMOTHY EGAN

SAN GABRIEL, Calif. — Just east of the still-seething volcano that is Charlie Sheen a visitor finds The Great Mall of China, so-dubbed, 12 acres of new-century America in the midst of an ethnic makeover far more compelling than the Twitter bursts of a raging celebrity.

Its formal name is San Gabriel Square, a crowd of restaurants, bubble tea shops and high-fashion footwear boutiques in a prosperous middle-aged suburb with a majority-Asian population. You can walk around for an afternoon, as I did, and hear nothing but Cantonese and Mandarin. But what stands out about the Great Mall, in this part of the West, is that it no longer stands out at all.

The fastest-growing ethnic group in the nation's largest state, the Census reported this week, is not Latinos, but Asians — up 31.5 percent over the last decade, to about 5 million. There are more Asians in California than the total population of any American city but New York, and the group is larger than 28 of the states. You don't see any of this in Congress, where there are 50 percent fewer Asians in the House than in the population at large, and 66 percent fewer Latinos than the numbers nationwide. But you will. Soon. And California, though it failed to add a congressional seat for the first time in nearly a century, will be at the head of the parade of new political power.

During other mash-ups in the country's makeup, the Irish clustered in Boston and Butte, Italians found like-minded communities in Philadelphia and Baltimore, Germans transformed Milwaukee and Cincinnati. Asians, who faced openly racist exclusion laws for nearly 80 years, huddled in Chinatowns, most of them on the West Coast. One was in Washington State, where the grandson of a house-servant would be named the first Chinese-American ambassador to China — Gary Locke. But his story is already one for the textbooks, the old route to the Asian-American Dream.

The new narrative comes from the ethnoburbs, a term coined in a 2009 book by Arizona State University professor Wei Li to describe entire cities dominated by a nonwhite ethnic group. They are suburban in look, but urban in political, culinary and educational values, attracting immigrants with advanced degrees and ready business skills.

Monterey Park, just to the south of here, is considered the first suburban Chinatown. And with 61,571 people, it's much more than a "town." Now there are eight Asian-dominated ethnoburbs sprawling through a 25-mile stretch of the San Gabriel Valley. Here, you'll find one of the largest Buddhist temples in the hemisphere, and a string of Boba drink shops, often called the Starbucks of the valley. (Boba is a drink flavored with small tapioca balls.)

Ethnoburbs are not limited to California. Bellevue, Washington, long dismissed by Seattle residents across the lake as a series of white bread cul-de-sacs and high-end malls, is now Washington State's most diverse big city, primarily because Asians make up 27 percent of its 122,363 residents. Quincy, Mass., is going through a renaissance, driven in part by the 22 percent who are of Asian descent.

Well to the east of San Gabriel is the urban laboratory of Riverside County, the fastest growing in California, expanding by 41.7 percent in the last decade to 2.2 million people. In Riverside, where Home Depots are seeded throughout the land, whites are now a minority, at 36 percent of the population, and Latinos, with 45.5 percent, are the largest ethnic group.

Riverside County is a Latino version of Li's smaller Asian ethnoburbs. Forget the stereotypes emanating from small-minded places like the Phoenix statehouse or any right-wing talk-radio station: In Riverside County, more than one in five businesses is Latino-owned, and median family income is well above the national average.

Now, as to the political power question: with every census count comes redistricting. This time around, following a rare showing of common sense, California voters took the task of sketching fresh congressional districts out of the hands of political hacks and created an independent citizen panel. By law and court decisions, they will have to draw districts that reflect the new demographic reality of the state.

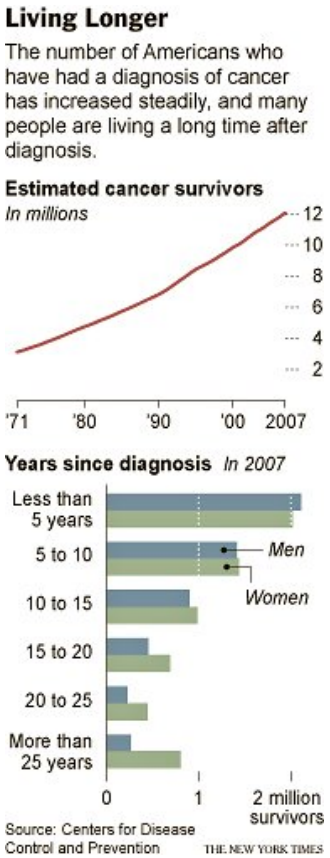
This should mean that Asians and Latinos, the dynamo forces of virtually every fast-growing Western state, will get their seat at the political table, at least in California. And since nearly one in eight members of Congress come from this state, Congress should soon look more like the new America.

As a general rule, I don't think it's good for any democracy to see itself, much less vote, strictly along ethnic lines. But the arc of American history is encouraging on this count. What were the suburbs of the 1950s and 1960s, especially in California, but all-white ethnoburbs?
Immigrants start out seeing the world through the lens of their parents, then move on to a broader view. Those Little Italys, Germantowns and Gaelic-speaking neighborhoods have largely disappeared. The diasporas have spread and diffused, coming together around a dish or drink or sainted holiday, with gauzy recollections of a past when they were kicked around and shunned.

http://opinionator.blogs.nytimes.com/2011/03/10/rise-of-the-ethnoburbs/?src=me&ref=general

20% Rise Seen in Number of Survivors of Cancer

By PAM BELLUCK



About one in every 20 adults in the United States has survived cancer, including nearly one-fifth of all people over 65, according to new federal data.

The numbers, released Thursday by the Centers for Disease Control and Prevention and the National Cancer Institute, indicated that the number of cancer survivors increased by about 20 percent in just six years, to 11.7 million in 2007, the latest year for which figures were analyzed, from 9.8 million in 2001. In 1971, the number of cancer survivors was three million.

"There's still a concept that cancer is a death sentence," said Dr. Thomas R. Frieden, director of the Centers for Disease Control. But, he said, "for many people with cancer there's a need for them and their families and caregivers to recognize that this is a stage. They can live a long and healthy life."

About 65 percent of cancer survivors have lived at least five years since receiving their diagnosis, 40 percent have lived 10 years or more, and nearly 10 percent have lived 25 years or longer.

The implications, Dr. Frieden said, are that many cancers are treatable and that it is just as important for people who have had cancer not to assume that they will necessarily die early.

"You might think, 'I've had cancer — I don't have to worry about eating right, quitting smoking, exercising,' " Dr. Frieden said. But people with cancer "need to be just as concerned about heart disease and other risks as they would otherwise," he said.

The study defined a survivor as anyone who ever received a diagnosis of cancer who was alive on Jan. 1, 2007, and it did not indicate if the person was cured, undergoing treatment, afflicted with a chronic cancer-related illness, or in the process of dying at that time.

And the numbers tell only a piece of the cancer story. Some cancers, like lung cancer, are aggressive and difficult to treat. And the death rate from cancer, an indicator that many health experts consider a more

accurate measure of progress in fighting the disease, has stayed virtually the same as it was in 1950 — about 200 deaths per 100,000 people a year, and about 1,000 deaths annually per 100,000 people over 65.

Dr. Frieden said the increase in cancer survivors was due to several factors, some of which varied by type of cancer. In some cases of breast cancer and colon cancer, for example, improved treatment and increased follow-up after treatment have helped increase survival. In others, like prostate cancer, an explosion in screening has identified many men with the disease, but the cancer is often so slow-growing that they would be unlikely to die from it. And other cancer diagnoses are simply the consequence of the country's aging population and improved care for other diseases — in other words, people are living long enough to develop cancer.

About a million more of the survivors were women than men, partly because women live longer than men, and partly because breast and cervical cancers are often diagnosed and treated at younger ages. About 22 percent of the survivors had breast cancer, about 19 percent had prostate cancer, and about 10 percent had colorectal cancer.

The study identified only the type of cancer first diagnosed in each person; additional tumors or cancer diagnoses were not recorded.

Health authorities urged families and physicians to be aware of the health needs of cancer survivors.

"Having cancer may be the first stage, really, in the rest of your life," Dr. Frieden said. "We need to continue to scale up" the services available for cancer survivors.

http://www.nytimes.com/2011/03/11/health/11cancer.html?ref=general&src=me&pagewanted=print

F.D.A. to Study Whether Anesthesia Poses Cognitive Risks in Young Children

By PAM BELLUCK

A federal panel will meet on Thursday to evaluate growing concerns about whether anesthesia in young children, used in millions of surgical procedures, can in some cases lead to cognitive problems or learning disabilities.

The meeting was prompted by a growing body of research, so far primarily in animals, that suggests a correlation between anesthesia exposure and brain cell death or learning problems, said Dr. Bob Rappaport, the Food and Drug Administration's director of the division of anesthesia and analgesia products, who wrote about the issue in Wednesday's New England Journal of Medicine.

The F.D.A. advisory panel will evaluate the research, suggest further studies and discuss whether parents whose children are facing surgery should be informed of possible cognitive or behavioral risks.
"We don't know what this means for children at this time," Dr. Rappaport said, adding, "That's exactly why it's so critical that we get all of the necessary information."

In the meantime, he said, "how do we communicate what we do know at this point without causing undue concern in parents and in physicians?" Medical advances are allowing more fragile and premature infants to survive birth, often to require critical surgical procedures.

Studies in rodents and monkeys have shown that exposure to anesthesia at a very young age, roughly corresponding to under age 4 in humans, is associated with brain cell death. And a new study, by the F.D.A.'s National Center for Toxicology Research, found that exposing 5-day-old rhesus monkeys to 24 hours of anesthesia resulted in poorer performance on tests of memory, attention and learning.

"That brings into the picture the sort of proof of concept that these drugs can cause cognitive disturbances in juvenile animals," Dr. Rappaport said.

Because of the difficulty of doing controlled clinical trials with children, human studies have mostly examined whether children with and without learning disabilities had anesthesia when younger. Such research has weaknesses because it may not account for children's various experiences or show whether learning deficits were coincidental.

Results of several of these studies suggest developmental or behavioral risks to children exposed to anesthesia, especially those who received more than one anesthetic.

"You don't have to be a rocket scientist to say, 'Geez, if this happens in monkeys, then there's a high probability that something like this occurs in humans,' " said Dr. Randall Flick, associate professor of anesthesiology and pediatrics at the Mayo Clinic, who has done some of the research involving children and is on the F.D.A. advisory panel.

But, Dr. Flick said, without definitive evidence, the issue is extremely fraught because most young children receiving anesthesia critically need surgery.

"What we know is that not giving anesthesia and appropriate medication to manage a child's pain during surgery does have long-term adverse affects on a child — physical as well as emotional," said another committee member, Dr. Jayant Deshpande, a pediatrician and anesthesiologist who is a senior vice president at Arkansas Children's Hospital. "So because the child needs surgery today, we are going to use the best information that we have and use the anesthetics."

To galvanize research, the F.D.A. has formed a public-private partnership with the International Anesthesia Research Society.

Dr. Rappaport said questions include whether possible effects vary by anesthetic (most studies so far involved ketamine, a common anesthetic), dose, age or length of exposure. Other questions include types of cognitive effects; Dr. Flick, for example, is studying whether anesthesia exposure appears related to autism or attention deficit disorder.

Dr. Nancy Glass, a pediatric anesthesiologist at Texas Children's Hospital and president-elect of the Society for Pediatric Anesthesia, wants practical answers, like "if we know that this baby needs two small procedures and two anesthetics is worse than one, then we would knock ourselves out to do it on the same day," she said. "We're all concerned," Dr. Glass said, but "we don't believe that there is data yet that says to us either that we should change our technique or that we should frighten parents about allowing us to anesthetize their children for necessary surgery."

http://www.nytimes.com/2011/03/10/science/10anesthesia.html?ref=health

Pain, Persistence, Family: Sickle Cell Disease

By KAREN BARROW

Ed Ou/The New York Times
Andre Hinckson, 38, Queens. “With a sickle cell crisis, there’s a lot of pain, unbelievable pain. It’s like a jackhammer on your back, basically.”

HOW do you live with a disease that can cause sudden episodes of extreme pain? What do you do when the only thing that helps relieve the pain are powerful, addictive painkillers? How does a family manage the needs of a child with a chronic, untreatable illness? These are among the questions that people facing a diagnosis of sickle cell anemia have to answer.

Sickle cell anemia is an inherited disease that causes red blood cells to have a distinctive crescentlike, or sickle, shape. These cells are unable to properly carry oxygen throughout the body, and they tend to clump together, blocking blood flow, damaging organs and causing severe pain.

Affecting about 72,000 people in the United States, sickle cell anemia is most common among people of African or South American descent, but the genetic trait is also routinely found in people with ancestry from Central America, India, Saudi Arabia and Mediterranean countries. One in every 500 African-American births results in a child with sickle cell disease, according to the Sickle Cell Disease Association of America.

The challenges of living with sickle cell anemia are great, but with diligent care, the disease can be managed. Here, three people speak about the impact sickle cell anemia has had on their lives and families. Hear more: Patient Voices: Sickle Cell Anemia.

Andre Hinckson, 38
Queens

“With a sickle cell crisis, there’s a lot of pain, unbelievable pain. It’s like a jackhammer on your back, basically. Imagine that kind of pain throughout your whole body. Sometimes there’s pain in your joints, in the abdominal area, in your head, in your chest. Sometimes it’s all over at one time.

I wish people in the medical field would take the disease more seriously. I’ve had experiences where they’ve called me ‘drug seeker.’ It’s as if we’re going to the emergency room once a month or once a week for our drug fix. They treat us atrociously, and I’m just tired of the whole situation.

Some people, they smile — that's how they deal with their pain. Me? I'm very serious, and I know people look at my face and they wonder why I'm so serious or so sad. Maybe its just because of what I've experienced, you know?"

Shanoah Moore, 8

Cincinnati

"Every time I have a pain episode, I either get a heating pad or they take my temperature. If it's over 101, that means I have to go to the hospital.

I know when I'm getting sick because my head starts getting warm, and my mom knows because my eyes kind of turn yellow. It feels like someone is just squeezing my legs or arms. Sometimes it's very, very painful. Normally in the middle of the night, I just go and get the heating pad and go back to my bed, but when I wake up and it feels worse, then I just go to my mom or dad. "I don't like getting sick. I still want to be in school, so I can be there and not be absent a lot."

Tiffany Dews, 33

Richmond, Va.

"When I first got pregnant, my intention was not to be a stay-at-home mom. My intention was to work and finish school, but of course, plans change.

Both my husband and I have the trait for sickle cell disease, and combined we have two children, Tracy and Riley, with the disease. There's a one in four chance each time we decide to have kids that we would pass on the disease.

Years ago, [children with sickle cell disease] were not making it past the age of 20 or 21. So my hope is that they will have kids, and hopefully not have kids with the disease."

http://www.nytimes.com/2011/03/08/health/views/08sickle.html?ref=health

On the Left Hand, There Are No Easy Answers

By PERRI KLASS, M.D.

Humans are asymmetric animals. Early in our embryonic development, the heart turns to the left. The liver develops on the right. The left and right lungs have distinct structure.

There are certain rare syndromes in which the usual asymmetry of organs is reversed — I remember how disconcerting it was the first time I examined a child with dextrocardia, a heart on the right side, and heard the heart sounds in unexpected places. But when it comes to handedness, another basic human asymmetry, which reflects the structure and function of the brain, the reversed pattern is relatively common, and for all that, not easily understood.

Over the centuries, left-handers have been accused of criminality and dealings with the devil, and children have been subjected to "re-education." In recent years the stigma has largely vanished; among other things, four of our last seven presidents — Ford, the elder Bush, Clinton, Obama — have been left-handed. (Reagan is sometimes cited as ambidextrous, and in his autobiography, Gerald Ford said he wrote with his right hand while standing.)

But the riddle of what underlies handedness remains. Its proportions — roughly 90 percent of people are right-handed and 10 percent left-handed — stay consistent over time.

"This is really still mysterious," said Clyde Francks, a geneticist and the lead author of a 2007 study in which Oxford University researchers identified a genetic variant linked to left-handedness.

Hand dominance (whether left or right) is related to brain asymmetry. And that, Dr. Francks said, "is not at all understood; we're really at the very beginning of understanding what makes the brain asymmetrical."

Though brain asymmetries exist in our closest primate relatives, there seems to be general consensus that the human brain is more profoundly asymmetric, and that understanding that asymmetry will show us much about who we are and how our brains work.

Brain lateralization, the distribution of function into right and left hemispheres, is crucial for understanding language, thought memory and perhaps even creativity. For many years, handedness has been seen as a possible proxy, an external clue to the balance in the brain between left and right.

For right-handed people, language activity is predominantly on the left side. Many left-handers also have left-side language dominance, but a significant number have language either more evenly distributed in both hemispheres or else predominantly on the right side of the brain.
Handedness clearly runs in families. The 2007 paper by the group at Oxford identified a gene, LRRTM1, that they discovered in the course of studying children with dyslexia, and which turned out to be associated with the development of left-handedness.
Dr. Francks, who is now at the Max Planck Institute for Psycholinguistics in the Netherlands, recalls that the discovery made headlines and attracted a great deal of attention, the more so because this gene was also found disproportionately in people with schizophrenia, even though none of these connections are simple or well understood. "We're not looking for a gene for handedness or a gene for schizophrenia," he said. "We're looking for subtle relationships." The gene affects the ways that neurons communicate with one another, he said, but its mechanisms still need to be studied.
Dr. Daniel Geschwind, a professor of human genetics, neurology and psychiatry at University of California, Los Angeles, School of Medicine, is interested in the connections between language and handedness, and the ways that handedness can help us understand the evolution of the human brain. "Handedness has a genetic basis, but like other complex traits — height, weight — it is complex," he said. "It's not a single gene that leads to it. There's a strong environmental component, too. It's a very tricky problem."
As with other traits that we are tempted to classify as either/or, handedness is probably better viewed as a spectrum encompassing the very strongly right-handed or left-handed, and a range of those who prefer to use one hand or the other, but have different degrees of comfort and competency with the nondominant hand.
In general, said Dr. Geschwind, left-handers have less asymmetric brains, with more even distribution over the two hemispheres. "Perhaps a more accurate conceptual way to think about them is as non-right-handers," he said. "Many of them are much more likely to be ambidextrous and have fine motor abilities with their right hands."
Because left-handedness has been seen as a key to the complex anatomy of the brain, researchers continue to look for — and debate — links to many other conditions, including immune disorders, learning disabilities and dyslexia, reduced life expectancy and schizophrenia.
None of it turns out to be simple. The idea of links to schizophrenia has been particularly persistent, but schizophrenia is a complicated and probably heterogeneous disorder, and studies of different populations show different patterns; last year, a study found no increased risk with non-right-handedness for schizophrenia or poorer neurocognition.
In pediatrics, we sometimes worry about children who manifest handedness too early, before their first birthday. The concern is that if a very young child seems to strongly prefer one hand, there may actually be some problem — perhaps some kind of neurological damage — on the other side.
Left-handedness has sometimes been treated as pathological. Cesare Lombroso, the infamous 19th-century physician who identified various facial (and racial) features with criminal traits, also saw left-handedness as evidence of pathology, primitivism, savagery and criminality. And I was brought up with the story that a generation ago, in the bad old days (and in the old country), foolish unenlightened people tried to force left-handed children to convert and use their right hands. My father said that my uncle, his older brother, had had his left hand tied behind his back as a child.
A colleague's husband, Anthony Gentile, a fund manager who is 41 and grew up outside Cincinnati, told me that though he was always left-handed, he was taught to write with his right hand — though he can form the letters, he could never learn to hold the pencil correctly in that hand. "I can hold the pencil properly in my left hand, but I don't have the coordination to write," he told me. "It looks like I'm holding the pencil properly, but I am unable to make any letters."
The percentage of left-handers in the population seems to be relatively constant, at 10 percent. And this goes back to studies of cave paintings, looking at which hands hunters are using to hold their spears, and to archaeological analyses of ancient artifacts. So though there has been prejudice against left-handers, and though there may be some developmental risks, said Dr. Geschwind, "there clearly must be advantages as well. The reason why it maintains that way, nobody knows what it is."
Indeed, there seems to be a certain fascination with figuring out the areas (like the presidency) in which left-handers seem to shine. Numbers are sometimes quoted about how many architects are left-handed, or how many M.I.T. professors. On the other hand (so to speak), at a moment when we can finally hope for an end to

winter, maybe we should celebrate the left-handers whose greatness truly lies in the ways they integrate motor control, strength and the highest kinds of skill and intelligence. Warren Spahn, Sandy Koufax, Whitey Ford, anyone? C. C. Sabathia, Jon Lester, Cliff Lee?

http://www.nytimes.com/2011/03/08/health/views/08klass.html?ref=health

When Optimism Is Unrealistic

By PAULINE W. CHEN, M.D.

Janos Radler/Getty Image

As a medical student and later during my residency, I trained for some time in a medical center known for its research and clinical trials. Every week, patients with rare diseases and cancers that had not responded to standard therapy arrived from all over the country, eager to try something new, even if the efficacy of the treatments had not yet been proven.

One of the patients was a woman in her late 30s, a mother of three. Known for her cheery disposition — she reminded the doctors and nurses of a brunette Cathy Rigby — she had melanoma that had spread through her body despite efforts to halt its growth. By the time I met her, she was already the veteran of two clinical trials at the center. Her tumor had responded slightly during one of those studies, but slowing the pace of its growth had come at a significant price. She had endured countless hospitalizations, serious bloating, a punctured lung, overwhelming fatigue and two nearly intractable infections.

Nonetheless, when her cancer began growing again, she eagerly applied for a third study. This time she would participate in one of the earliest studies of a brand-new drug, a Phase I clinical trial, and would have to undergo major surgery before taking the experimental drug.

On the evening before her operation, she joked with the surgical team and shook her head when we asked if she had any more questions. “Haven’t we talked about this enough?” she said smiling and nodding gamely as the head surgeon explained once more that because this was an early-phase trial, it would benefit research but was not likely to be of any therapeutic help to her. Like other such trials, it would test only for toxicity and the maximum safe doses of the experimental drug; generally fewer than 5 percent of patients ever benefit from such early trials.

The woman nodded and waved her hand for the consent form. “I’ve been through this before,” she said to us as she signed the papers. “I know what I am getting into.”

Then, voice lowered, she added: “I’m a mother. I would do anything for a little extra time with my children.”

We all fell silent when she said those words. She seemed to understand the study, and it was hard not to be in awe of her courage and selflessness. But we were also hesitant to probe any further. None of us wanted to deflate her sense of hope. And knowing what we did about the extent of her disease, it was hard not to convince ourselves that optimism, even if based on somewhat false hopes, had to be helpful for someone in her position.

I remembered her words a little over a year later when I heard she had died. Her tumor never responded to the experimental treatment.

For almost four decades, researchers and patient advocates have debated the ethics of informed consent in early-phase clinical trials, studies that test only toxicity and dosing and offer little, if any, therapeutic benefit to those enrolled. A major part of the debate has focused on the motivations of patients who participate. Some research on patient motivations has had disturbing ethical implications, indicating that patients may never fully understand the purpose of trials, despite explanations by the researchers. Others have been more

reassuring, noting that patients are driven by a sense of altruism and a desire to help others who may one day suffer from the same disease.

More recently, a few studies have offered what appears to be the happiest of hypotheses. Patients may simply be optimistic and have strong needs to express hope. And because optimism has long been considered an effective coping mechanism for patients with terminal diseases, other researchers have also then assumed that optimism in this context poses few ethical issues.

Now one group of ethicists has just published a study challenging that assumption. It turns out that when it comes to being hopeful, not all optimism is created equal.

The ethicists surveyed 70 patients enrolled in several early-phase cancer trials and asked them about their expectations and understanding of their respective trials. A solid majority understood that the trials' purpose was to advance research, not to treat them. But despite clearly understanding the purpose, and limits, of early-phase trials, the patients were also blinded by what researchers called an "unrealistic optimism," or an optimistic bias, when it came to applying that knowledge to their own particular situations. A majority of patients assumed that the experimental drugs would control *their* cancer and that *they* would experience benefits but not complications.

In essence, they believed they would fare better than the average patient enrolled in the same trial.

"It's the Lake Wobegon effect, " said Dr. Daniel P. Sulmasy, senior author and a professor of medicine and ethics at the University of Chicago. "If you have more than 50 percent of patients saying their chances are better than average of avoiding some harm or obtaining some benefit, they are being unrealistically optimistic because you can't say that most people are above average."

Such unrealistic optimism differs from so-called dispositional optimism, or a general optimistic outlook.

"This is not about trying to quash hope in dying patients," said Lynn A. Jansen, lead author and an associate director at the Center for Ethics in Health Care at Oregon Health and Science University in Portland. "It's about distinguishing between the different kinds of optimism."

Social psychologists point to smokers who underestimate their chances of getting cancer or gamblers who believe they will beat the odds as classic examples of unrealistic optimism. But unrealistic optimism can be present in anyone, regardless of whether they have a generally optimistic outlook. "No one is immune to this kind of bias," Dr. Jansen said. "Optimistic biases are part of human psychology."

But placed in the context of early-phase clinical cancer trials, unrealistic optimism results in a perfect ethical storm. "You have oncology, a field of medicine that is strongly evidence-based and research-intensive, and you have a population of patients who are experiencing an immediate threat to their lives," said Dr. Neal J. Meropol, a researcher who has done extensive work on the ethics of early-phase cancer trials and chief of the division of hematology and oncology at University Hospitals Case Medical Center and Case Western Reserve University in Cleveland. "Patients almost invariably take part in early-phase clinical trials because they believe they will personally benefit."

While the study represents a breakthrough in understanding how different types of optimism affect the informed consent process, doing something about these biases presents a whole different issue. Unrealistic optimism is notoriously difficult to recognize because most individuals are completely unaware that it even exists. "We would probably be able to walk away from these types of biases," Dr. Jansen said, "if we realized when we were operating under them."

Dr. Jansen and her colleagues are hoping next to delineate the factors involved in evoking this biased response in patients. By gaining a deeper appreciation of how unrealistic optimism develops, they believe they may be able to help patients and cancer researchers more easily recognize those optimistic biases that impair a patient's autonomy and compromise the ethics of clinical trials.

"We all need to care about this kind of research," Dr. Jansen said. "It's how we advance knowledge and cure disease."

She added: "We just need to realize that not all optimism is ethically benign."

http://www.nytimes.com/2011/03/03/health/views/03chen.html?ref=health

Hospitals With Robots Do More Prostate Cancer Surgery

By TARA PARKER-POPE

Chris Garlington for The New York Times Robots assist surgeons in performing prostate cancer surgery in a growing number of medical centers.

Hospitals that buy surgical robots end up performing more prostate cancer operations, suggesting that technology has become a driving force behind decisions about men's cancer care, new research shows.

The study, published in the journal Medical Care, is the latest report to suggest that how men are treated for prostate cancer appears to be influenced by a variety of factors, including the technology and marketing goals of hospitals and doctors, rather than scientific evidence on benefits and risks.

For men facing prostate cancer, the findings add more uncertainty to an already confusing array of choices for treatment, with little evidence to guide them about whether one is better than another. Current options include surgery to remove the prostate gland, performed with or without the assistance of robots, as well as radiation and hormone therapies. And because prostate cancer is often slow-growing, active surveillance without treatment is also an option for many men.

The new study, conducted by researchers at New York University and other institutions, tracked surgical robot purchases at 554 hospitals, along with the treatment given to more than 30,000 men given a prostate cancer diagnosis from 2001 to 2005.

According to the study, when a hospital acquires surgical robots, men in that region are more likely to have surgery to treat prostate cancer than before the technology was acquired. Buying a robot led to an average increase of 29 operations a year per hospital. Meanwhile, hospitals that didn't invest in robots performed an average of five fewer operations annually. Although large hospitals may perform hundreds of such operations a year, many of the local and regional hospitals in the study see no more than 100 to 150 cases a year, the study authors said.

One reason for the increase in operations in hospitals that own a surgical robot may be that the technology helps a hospital lure potential surgical patients away from the competition. But the data also suggest that once a hospital obtains a robot, patients who might be candidates for nonsurgical options are more likely to be steered toward robotic surgery instead.

"This may be the medical embodiment of the phrase, 'If you're a hammer, everything looks like a nail,'"said the lead study author, Dr. Danil V. Makarov, assistant professor of urology at New York University's Langone Medical Center. "If you have the technology, it will get used.''

Researchers note that over all, the number of operations declined slightly during the study period, possibly reflecting a plateau in cancer cases or a shift to other treatments. But when the data were examined at the hospital and regional levels, the researchers found that the purchase of a robot was associated with a pronounced change in treatment trends.

The findings are concerning because surgical removal of the prostate, called radical prostatectomy, can result in a number of complications, including incontinence and impotence. Robotic surgery typically costs about $2,000 more than regular surgery, but it's not clear whether its outcomes are better, worse or the same as traditional surgery, or how it compares to other treatments or even doing nothing at all.

Some research suggests the robotic procedure reduces hospital stays and blood loss, compared with regular surgery, but studies have also shown that robotic surgery offered no added benefit or worse results. In addition, when the Agency for Healthcare Research and Quality in 2008 compared the effectiveness and risks of eight prostate cancer treatments, including surgery, radioactive implants and active surveillance, no single treatment strategy emerged as superior.

But that hasn't stopped hospitals from conducting intense marketing campaigns that imply surgery using the high-tech robot gives prostate cancer patients a better result.

Surgical robots are expensive. A surgical robot used for prostate cancer costs $1 million to $2.25 million, according to the N.Y.U. study. In addition, hospitals spend $140,000 annually for a service contract and $1,500 to $2,000 per patient on disposable instruments.

"If you're a hospital and you get a robot, clearly you want to use it,'' said Dr. David Penson, a study co-author and director of the Center for Surgical Quality and Outcomes Research at Vanderbilt University.

"There are some real pressures here that have nothing to do with science," he said. "We have this interplay of patients' fascination with technology coupled with business interests on the part of the hospital and device makers, pushing people to try a new technology perhaps before it's been fully tested.'' He said he performs traditional prostate cancer surgery, though his practice offers robotic surgery as well.

Dr. Makarov, who is trained to perform both the traditional and robotic procedures, added that while financial incentives are likely to play a role in which treatments are promoted, patients also often want the newest technological advance, and hospitals are simply responding to that demand.

A study published last year in The Journal of Clinical Oncology tracked the treatment of 11,892 men given a prostate cancer diagnosis. About half the men opted for surgery. Among the remaining men, 14 percent were given hormone therapy; 13 percent were given radioactive seed implants; 12 percent had external-beam radiation; 5 percent had cryoablation, which destroys prostate tissue through freezing; and about 7 percent selected active surveillance, in which the cancer is closely monitored for changes, but no treatment is given.

The researchers found that treatment patterns varied markedly across the clinical sites studied, and those differences could not be explained by measurable factors like severity of disease or patient age.

In addition, recent reports, including an investigation of Medicare billing by The Wall Street Journal and the nonprofit Center for Public Integrity, also suggest that financial incentives to doctors and radiology groups are driving patients to a new form of radiation therapy called intensity modulated radiotherapy, or I.M.R.T. Patients are often referred to I.M.R.T. treatment centers by doctors who have a financial stake in the practice.

"For patients, there are a lot of choices in prostate cancer,'' said Dr. Makarov. "Knowing that technology can influence both what they want and what their physician may advise them should make them a little more skeptical and maybe make them ask a few more questions.''

http://well.blogs.nytimes.com/2011/03/11/hospitals-with-robots-do-more-prostate-cancer-surgery/

An Italian Idyll Fights for Its Very Survival

By Fiona Ehlers in Venice
The city of Venice absorbs 20 million tourists each year. In addition, rising water levels have meant an increasing number of floods each year. A new barrier aims to keep Mother Nature at bay, but Venice faces an equally big problem: Its population is shrinking dramatically as Venetians flee the city.
They cast off near the old fish market, relaxing in gondolas, sitting on velvety black benches, dressed in Mickey Mouse, mermaid and pirate costumes. A rock band is playing music while a porn star exposes her fake breasts in the middle of the Grand Canal. The Venetian Carnival is just around the corner. This isn't some merry parade, however, but a bitterly angry demonstration against the impending demise of a grand old city.
It's not Japanese tour groups or enchanted Germans taking snapshots of gondoliers singing "O sole mio" who are sitting in the gondolas. Instead, they are young Italians who were born in Venice and grew up in a city that now feels like Disneyland to them.
An official with the city's cultural agency is dressed as a rat. "The flood is driving the rats onto land," he says. He isn't just referring to Venice's winter floods, which have been transforming St. Mark's Square into a big puddle more and more frequently. He also means the rising human flood of 20 million tourists that inundate the city every year. The city accepts them because they are the type of flood that brings in revenue.
"Venice is drowning," says the rat, "and we are becoming extinct."
The protest fleet docks at Piazzale Roma. The square is the gateway to Venice. Those who arrive there are likely to search in vain for the places depicted in the glossy photos of tourist brochures, the sites where Thomas Mann or Donna Leon wrote eulogies. The bridge to the mainland begins at the square, the terminal station discharges armies pulling their trolley cases and buses from the mainland spit out commuters by the minute at the ferry dock. The new high-tech "People Mover" elevated train picks up day trippers from the

parking garages. The Benetton Group has bought the old railroad building and is converting it into a shopping center.

A Fairground with Old Walls

Anyone seeking Venice's morbid charm should avoid this square. If he doesn't, he'll hate the city from the start.

This is the Venice of Chinese markets, gambling dens and fast food stands. Ship terminals are being excavated, and there are plans to build a metro to the new city airport and an offshore port. Everything is in fast motion, and everything is geared toward mass processing and profit. At its gateway, the city seems artificial, a fairground with old walls. Entry is still free.

"Welcome to Veniceland!" a clown shouts. People dressed in rat suits unfold Disney-esque city maps and tout the attractions. "Here you can surf the wakes of the cruise ships in the 'Tsunami Channel' and race up to the bell tower on a roller coaster at the 'St. Marks Fun Camp.' Shop to your heart's content at 'Little Shanghai,' the former Murano glassblowers' island. Be there live when police officers beat up handbag sellers from Africa. A show starts every hour. And visit the last real Venetians -- on the San Michele cemetery island."

Venice is sinking and Venice is dying. These dire predictions have become as regular as the tides. The city is accustomed to them and yet it has no solutions. It is true that the historic old city is losing its residents, as they move to the mainland to find work and an ordinary life. A few months ago, the city's population dropped below 60,000. There are now two foreigners for every Venetian. Many believe that Venetians will be gone altogether by 2030.

The city, a magnet for tourists on the order of Mecca and Las Vegas, has already been cloned in Macau and elsewhere. But can the original, mobbed by millions, photographed again and again and loved to death, even be called a city anymore? What does Venice really need -- residents or museum guards? Venice is a laboratory where one can observe what happens when global currents of people collide in a very small space.

Anyone Who Hopes to Save Venice Has to the Think Big

At the Arsenale, the abandoned shipyard at the other end of the city, a helicopter is lifting off on this afternoon. Giovanni Cecconi, 52, an engineer in metal-rimmed glasses and a blue parka, looks down at the sea. From the air, Venice looks like a fish, with a head, tail and fins, with the Grand Canal, which winds through the old city like an artery, feeding a web of hundreds of canals.

The historic central district looks tiny from above, surrounded by Venice's future as a postmodern city. Evidence of the future can be found in the waters off the Lido beach island, where there is nothing in sight but the horizon and the sea. This is where the fish will be dried out, Cecconi explains. The lagoon surrounding Venice, as large as Lake Constance, but not as deep, will be protected at its three access points to the sea, so that it doesn't overflow when the real floods arrive.

The helicopter lands on an artificial island made of landfill. Cecconi jumps out and rushes around as if he were on the set of a futuristic movie. "Think big," he says frequently. Indeed, anyone who hopes to save Venice has to think big. Cecconi works for the Consorzio Nuova Venezia, the most powerful company in the city. He shows us excavations the size of bomb craters illuminated by glaring floodlights. The air is filled with the sound of jackhammers, but there isn't much to see. The rescue of Venice is taking place underwater.

Venice's savior is called MOSE, or Modulo Sperimentale Elettromeccanico, a play on the Italian name for Moses, the prophet who parted the Red Sea to lead the Jewish people out of Egypt. It is a project of truly biblical proportions. Conceived after the great flood of 1966 and under construction for the past seven years, MOSE is a dike system the likes of which the world has never seen before -- and comes at a price tag of €4.5 billion ($6.17 billion). Day and night, 3,600 workers are hard at work on 78 steel tanks that are being lowered into the water around the Lido barrier island and farther south.

When the sea is calm, the tanks, measuring 20 by 30 meters (66 by 98 feet) each and filled with water, remained anchored on the sea floor. If there is a threat of flooding and if water levels in the city rise above 1.1 meters, compressed air pushes the water out of the tanks and allows them to rise to the surface, creating a steel wall around Venice.

Can MOSE Part the Mediterranean Sea?

Engineer Cecconi believes in MOSE. He has been defending the project against leftists and environmentalists for more than 20 years. Until a few years ago, MOSE was the Venetian version of Stuttgart 21, the southern German city's highly controversial urban redevelopment project. The various interest groups argued, issued

warnings, searched for alternatives and found none. Now MOSE is two-thirds finished and is expected to go into operation in 2014.

MOSE is being paid for with Italian government funds, and bidding for the construction contracts was closed to non-Italian companies. The consortium delegates everything and no one pays attention to where the billions are going and whether the final financing is secure. "Typically Italian," writes the newsmagazine *L'Espresso*. "We don't know what it will do and whether it will work, but we just forge ahead anyway."

Whether MOSE is truly benefiting only those who are building it isn't clear. It is obvious, however, that the protective wall cannot save the city in the long term. In the last 100 years, Venice has sunk by 23 centimeters (nine inches), and if what United Nations Educational, Scientific and Cultural Organization (UNESCO) scientists are predicting today is true, namely that the water level in the Adriatic lagoon could rise by 50 centimeters by the year 2100, the city could very well be underwater for 250 days a year. If that happened, Venice would be the most famous casualty of climate change, and MOSE would be an ineffective weapon.

"MOSE will last 100 years," says engineer Cecconi, "and then we'll see what's next." Cecconi's detractors say Venice needs more radical solutions, like a ring of tall buildings around the old city, the restoration of rotting foundations and a center for futurology staffed with international experts. There are plenty of ideas, but no one is taking the initiative. "MOSE is just the beginning," says Cecconi. "Now we have to figure out how to handle the floods of people."

Standing on his artificial island, he smiles and says he likes the idea of managing Venice like a national park in the United States, complete with rangers to protect its monuments as if they were wild bears, and with the power to turn away visitors when the park is full.

There are Italians who despise him for saying such things. Matteo Secchi is one of them. He says: "I would rather wear rubber boots than live in a city without a soul." He thinks MOSE is a non-starter, and he fears that the external steel wall will lead to a total operation on the inside. Venice, he says, has much bigger problems than water. To save the city, it has to be revived first, says Secchi.

The Disneylandification of Venice

Secchi is the founder of a citizens' initiative and the inventor of Veniceland, the protest campaign in the gondolas. He is fighting against his city being turned into something that isn't real. While his campaigns are much applauded abroad, he is considered a troublemaker in Venice. Secchi is standing on the Rialto Bridge, a 40-year-old biker type in leather pants, surrounded by hordes of people equipped with digital cameras and pigeon feed accompanied by the clicking sound of trolley cases. He has set up a memorial of sorts in the window of a pharmacy, a digital counter that illustrates how Venice is wasting away. The current population of the old city appears in red neon numbers. It is now 59,520, and the number keeps getting smaller.

Secchi had also moved away from Venice. He was living in Mestre on the mainland, where he owned a car, never got his shoes wet and lived comfortably. Three years ago he returned to his old neighborhood, Cannaregio, where he now runs a 12-room, three-star hotel. The city is his livelihood, and he is now part of the powerful lobby of businesspeople who earn up to €1.5 billion a year from tourism in Venice. He says that his guilty conscience keeps him going, as does the future of his two-year-old daughter.

The tourists and their treatment of Venice as an object of desire are not to blame for the city's demise, says Secchi. The real culprits, he insists, are incapable city planners who "want to hand over a broom-cleaned Venice to investors." Secchi complains about the sale of old buildings, the horrendous rents, and the so-called bed-and-breakfast law, which offers tax incentives to homeowners who rent out rooms to tourists. Secchi is demanding more of a say for citizens, tax benefits and inexpensive housing for students and families. He also wants to see restrictions imposed on the number of cruise ships camped around the city like strange animals. More than 500 cruise ships dock there every year. "So much for a car-free city," says Secchi, pointing out that a single ship emits as much exhaust gas as 15,000 cars.

Secchi senses that he can't compete against the power and influence of the merchants and the tourism industry. The vegetable stall where he used to shop is now a mask store. "What do tourists need eggplants for? They want something for eternity." They want to get married in the city of lovers, which offers a marriage ceremony for €4,200, complete with a live broadcast on the Internet. "And they're closing our children's hospital because there aren't enough people left who are having children."

The future Secchi fears is already unfolding in front of his hotel, on the Murano glassblowers' island, a popular destination for Asian tour groups arriving by ferry. Barkers with homemade tour guide cards drag them into cold convention buildings and give them group discounts on Salvador Dali kitsch and vases

designed to look like Ferraris. Only a fraction of the glassware is still made on Murano. In fact, most of it is "made in China" instead. The Asians photograph the canals and the last few local bars, where unemployed fishermen and glassblowers go to drink and complain.
Murano is already lost, says Secchi, but they are still fighting for Venice. He will dress up as an Indian, as the last native on the reservation, for Carnival in late February. "The world watches," he says, "and I want it to understand."

A City that Has Lost its Contours

Anyone who wants to find out what Venice really was should pay a visit to the house of Alvio and Gabriella Gavagnin. They are the keepers of a treasure in black-and-white and packed away in crates. They are Venetians, 66 and 64, and they captured the face of the city on photographic paper before it lost its contours.
As a child Alvio wanted to become a navy sailor. Instead, he became a ticket seller on the Vaporetti, Venice's public waterbus service. He traveled up and down the Grand Canal on Line 1 for 15 years. He often saw Peggy Guggenheim, the wealthy New York collector of modern art, on the terrace of her palazzo, sunbathing while wearing diamond-studded sunglasses, playing with her Tibetan dogs and patting her equestrian statue by the sculptor Marino Marini, the figure of a man sitting on a horse with an erect penis.
That was in the 1970s. Alvio thought she was a little ordinary, even stingy. He used to have to lend her 50 lira for a ticket to the other side of the canal, but he says he did it gladly, because he liked the quirky foreigner.
Eventually more and more Russians, Japanese and Eastern Europeans started coming, and soon he became annoyed by the questions the foreigners were asking, the ones who wanted to know when Venice closed at night and which ferry would take them to the Coliseum. Eventually Alvio noticed that his city was changing. He had a local journalist teach him how to take pictures and, together with Gabriella, documented the city's neighborhoods. They took 5,000 photos in two decades and had only completed two of the city's districts. Suddenly, they woke up one day and realized they had grown old.
Today the tears well up in Alvio's eyes as he looks through the photos, while his wife sheepishly wipes the table. They no longer know their neighbors. Eight out of 10 are foreigners and rarely spend time in the city. Via Garibaldi is now a touristy shopping street with Vietnamese junk shops and karaoke bars. Their sons live on the mainland and don't want to return.
Perhaps this is inevitable, as the residents move on, leaving the stones of the city behind. It isn't just happening in Venice, but also, though not as quickly, in Florence and Rome, in Prague and in the historic cities on the resort islands of Mallorca and Ibiza.

The Most Dynamic City on the Old Continent?

Perhaps death is merely part of the legend of Venice. The British art historian John Ruskin gave the Doge's Palace five years. That was in 1852. Cameras are constantly flashing in front of the palace today, and sometimes the building is half underwater, but it's still standing. Perhaps Venice has simply had to reinvent itself more often than any another city in the world. And it would be pure fantasy to think that, just because it appears that time has stood still here, one could escape the evils of modernity by fleeing to Venice.
That's the way Wolfgang Scheppe sees it, at any rate. A 55-year-old German professor, Scheppe believes that Venice is the most dynamic city on the old continent, a city willing to take risks and to exploit itself to the hilt, a laboratory that offers the chance to study what could eventually happen in other cities.
Scheppe is standing on the Bridge of Sighs, the place where, 300 years ago, convicted criminals saw daylight for the last time before being taken into the dungeons. Today the bridge is surrounded by enormous ads for Bulgari jewelry, insurance companies and Guess jeans. Tourists pose for snapshots in front of the billboards to prove that they were there, before walking into souvenir shops with signs on the door that read: "Enter only to buy." For Scheppe, this sentence sums up the entire truth about Venice.
Scheppe heads the "Migropolis" research project. For three years, his students searched for the flipside of Venice's romantic postcard charm. Two nightmarish volumes of images are the result of their efforts. Venetians do not appear in the books, because they are no longer relevant. Scheppe says: "Venice is Europe's most global city. The currents of worldwide migration come together here, including millions of tourists and tens of thousands of immigrants. Venice shows us the conditions under which we will live in 20 years."
A tour of the city with Scheppe as the guide offers a taste of what he describes. Russians in street cafés praise the "real Italian pasta" prepared in the kitchen by underpaid Bangladeshis. Vendors at souvenir stands quickly tear off the "Made in China" labels from their wares before luring in Chinese tour groups.

Scheppe tells a tale of flows of commodities, parallel economies, exploitation and isolation, a tale of a city that was created to protect itself against invaders like the Huns and the Lombards, eventually turned itself into a global trading center and is now barricading itself against intruders again.

'Trying to Save Venice Is Sentimental Nonsense'

Trade shapes this city. This was always the case, and today Venice abides by the laws of globalization. "Trying to save Venice is sentimental nonsense. It's like trying to stop the course of history," says Scheppe. "Venice can't be saved, not with MOSE and not by citizens protesting. The future has already arrived." That future, for Scheppe, has turned Venice into a shopping paradise. "Shopping against a romantic backdrop refines the act of purchasing," says Scheppe, "even if the goods are fake."

The vendors who make up the city's shadow economy include people like Momo, a tall, thin 28-year-old from Dakar, Senegal, one of the new sons of the city. Momo's eyes dart back and forth and he is constantly turning his head from side to side. He works in front of one of the most expensive hotels in Venice, the Danieli on the promenade. Suddenly a group of Carabinieri appears and Momo quickly gathers together the fake Gucci, Prada, Fendi and Chanel items he has spread out on a white sheet, throws the bundle over his shoulder and runs.

Momo, a handbag vendor, is one of thousands of illegal aliens classified as "non in regola," or not in the system, indispensible for Venice's tourists but hunted down by law enforcement.

Anyone who runs through Venice with him, maneuvering through tiny alleys and stopping to catch one's breath in dim doorways, learns about X-ray scanners in the port that the military uses to detect illegal immigrants in trucks and container ships, about tightened immigration laws under the government of Prime Minister Silvio Berlusconi, and about raids and racism. The battle between the First and the Third World, between the winners and losers of globalization, is being fought in Venice, now a city on the front lines of Fortress Europe.

Momo's older brother arrived by sea, just like the tourists. The boat he was traveling on was full of dead bodies when military patrols pulled it on land. The brother sent money home, and Momo arrived by air, with a forged visa from the German embassy stamped into his passport.

Venice is famous in Senegal as the city of the rich white man. Momo is constantly asking himself what he is doing here. He speaks five languages and has a university degree, and he says that his country is losing its brightest minds. He became furious when his youngest brother asked him when it would finally be his turn to come to Europe.

Momo's territory is the tiny tourist triangle demarcated by the Rialto, St. Mark's Square and the Bridge of Sighs, but his real life takes place among the endless rows of apartment buildings around Mestre, where he shares a tiny apartment with his brother. He communicates every day with his family via Skype, using a laptop placed on an African drum, and he buys his merchandise from a Chinese dealer on the fourth floor, where he is required to use the rear entrance. The handbags arrive from the port of Naples and are trucked from there to a drop-off point outside Venice. The Chinese distributors pay taxes and are tolerated, and the real producers are never prosecuted.

Momo was arrested and ordered to leave Italy within five days, but then he went into hiding. He wants to return to Senegal, he says, "but not with empty pockets." He sends up to €2,000 a month via Western Union to Dakar, where he supports nine people.

Momo has been standing on the promenade for nine hours, during which he has had to run from the police eight times. Two white South African women are now looking at his merchandise. It's a joyless encounter in a foreign place, an unfair deal at the intersection of currents of people. "Where are you from?" Momo asks. "Africa," they reply. "Me too," he says. They buy a Fendi trolley case, their trophy from Old Europe, and then they're off to the cruise ship terminal. The booming ship horns can be heard all the way to this spot.

Momo shoulders the sheet filled with his wares. It's getting dark. The ship that will take the two African women home steams past the promenade. They had told him they would wave. Momo tilts his head back as the ship, 300 meters long and as tall as an apartment building, glides by. Bits of music and loudspeaker announcements drift eerily down from the nine decks as the passengers stand at the railing, twinkling down at the city.

As Momo waves and thinks of Africa, the windows shake in the Gavagnin's house nearby. The ship's engines interfere with broadcast frequencies, temporarily disrupting the picture on their television set. At the other end of the city, hotel owner Secchi is calling the registry office to get the latest population figure. Tomorrow he

will update the counter at the pharmacy to 59,514, six fewer Venetians than the week before. He pulls his Indian costume out of a box and waits for Carnival.
Translated from the German by Christopher Sultan

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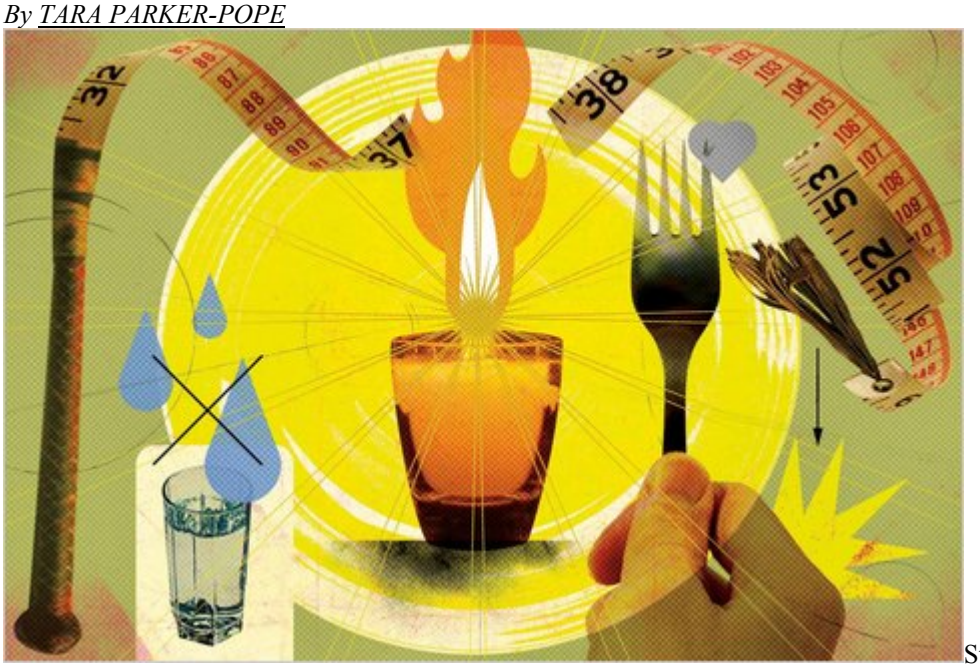
Go Easy on Yourself, a New Wave of Research Urges

By TARA PARKER-POPE



Stuart Bradford

Do you treat yourself as well as you treat your friends and family?

That simple question is the basis for a burgeoning new area of psychological research called self-compassion — how kindly people view themselves. People who find it easy to be supportive and understanding to others, it turns out, often score surprisingly low on self-compassion tests, berating themselves for perceived failures like being overweight or not exercising.

The research suggests that giving ourselves a break and accepting our imperfections may be the first step toward better health. People who score high on tests of self-compassion have less depression and anxiety, and tend to be happier and more optimistic. Preliminary data suggest that self-compassion can even influence how much we eat and may help some people lose weight.

This idea does seem at odds with the advice dispensed by many doctors and self-help books, which suggest that willpower and self-discipline are the keys to better health. But Kristin Neff, a pioneer in the field, says self-compassion is not to be confused with self-indulgence or lower standards.

"I found in my research that the biggest reason people aren't more self-compassionate is that they are afraid they'll become self-indulgent," said Dr. Neff, an associate professor of human development at the University of Texas at Austin. "They believe self-criticism is what keeps them in line. Most people have gotten it wrong because our culture says being hard on yourself is the way to be."

Imagine your reaction to a child struggling in school or eating too much junk food. Many parents would offer support, like tutoring or making an effort to find healthful foods the child will enjoy. But when adults find themselves in a similar situation — struggling at work, or overeating and gaining weight — many fall into a cycle of self-criticism and negativity. That leaves them feeling even less motivated to change.

"Self-compassion is really conducive to motivation," Dr. Neff said. "The reason you don't let your children eat five big tubs of ice cream is because you care about them. With self-compassion, if you care about yourself, you do what's healthy for you rather than what's harmful to you."

Dr. Neff, whose book, "Self-Compassion: Stop Beating Yourself Up and Leave Insecurity Behind," is being published next month by William Morrow, has developed a self-compassion scale: 26 statements meant to determine how often people are kind to themselves, and whether they recognize that ups and downs are simply part of life.

A positive response to the statement "I'm disapproving and judgmental about my own flaws and inadequacies," for example, suggests lack of self-compassion. "When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people" suggests the opposite.
For those low on the scale, Dr. Neff suggests a set of exercises — like writing yourself a letter of support, just as you might to a friend you are concerned about. Listing your best and worst traits, reminding yourself that nobody is perfect and thinking of steps you might take to help you feel better about yourself are also recommended.
Other exercises include meditation and "compassion breaks," which involve repeating mantras like "I'm going to be kind to myself in this moment."
If this all sounds a bit too warm and fuzzy, like the Al Franken character Stuart Smalley ("I'm good enough, I'm smart enough, and doggone it, people *like* me"), there is science to back it up. A 2007 study by researchers at Wake Forest University suggested that even a minor self-compassion intervention could influence eating habits. As part of the study, 84 female college students were asked to take part in what they thought was a food-tasting experiment. At the beginning of the study, the women were asked to eat doughnuts.
One group, however, was given a lesson in self-compassion with the food. "I hope you won't be hard on yourself," the instructor said. "Everyone in the study eats this stuff, so I don't think there's any reason to feel real bad about it."
Later the women were asked to taste-test candies from large bowls. The researchers found that women who were regular dieters or had guilt feelings about forbidden foods ate less after hearing the instructor's reassurance. Those not given that message ate more.
The hypothesis is that the women who felt bad about the doughnuts ended up engaging in "emotional" eating. The women who gave themselves permission to enjoy the sweets didn't overeat.
"Self-compassion is the missing ingredient in every diet and weight-loss plan," said Jean Fain, a psychotherapist and teaching associate at Harvard Medical School who wrote the new book "The Self-Compassion Diet" (Sounds True publishing). "Most plans revolve around self-discipline, deprivation and neglect."
Dr. Neff says that the field is still new and that she is just starting a controlled study to determine whether teaching self-compassion actually leads to lower stress, depression and anxiety and more happiness and life satisfaction.
"The problem is that it's hard to unlearn habits of a lifetime," she said. "People have to actively and consciously develop the habit of self-compassion."

http://well.blogs.nytimes.com/2011/02/28/go-easy-on-yourself-a-new-wave-of-research-urges/?nl=health&emc=healthupdateema2