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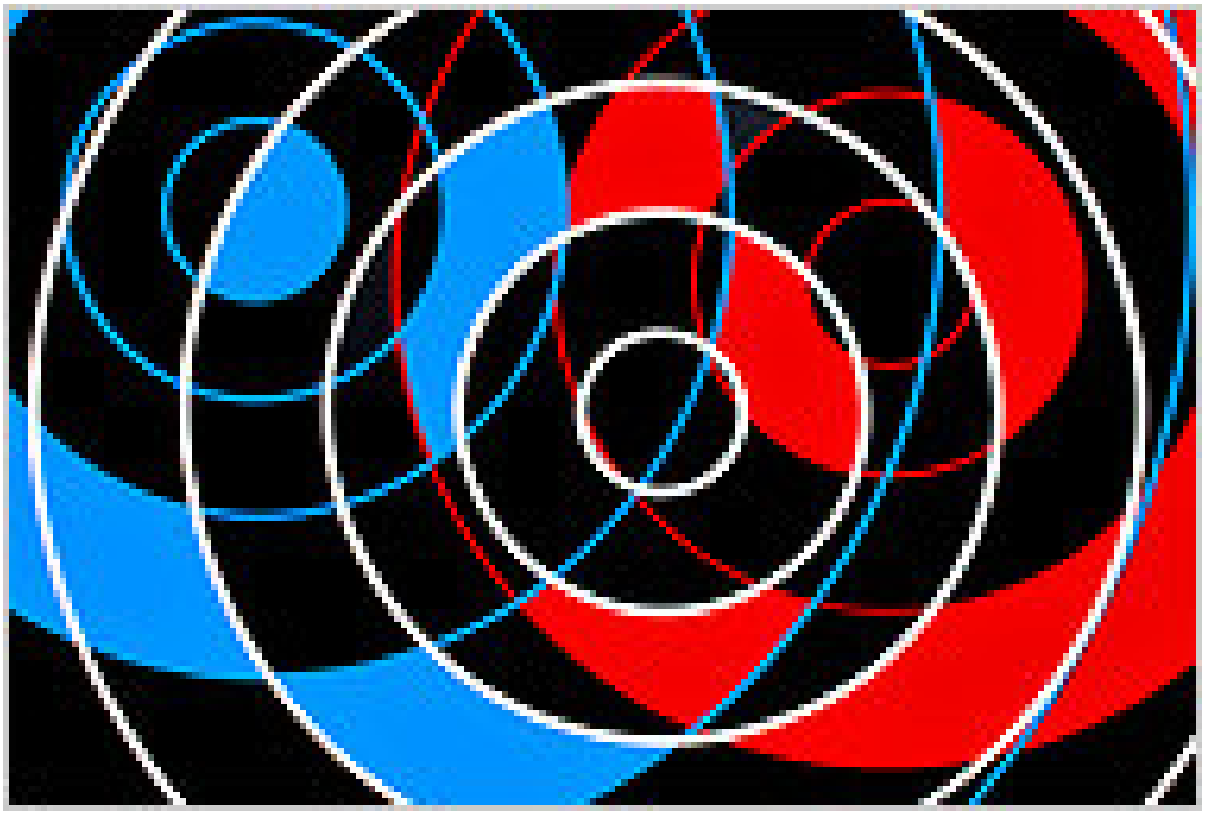
Nassos Daphnis, an Artist of Geometry, Dies at 96

By WILLIAM GRIMES



Nassos Daphnis, a Greek-American artist who deployed brilliantly colored geometric forms in precise formal relationships to create nervous, dynamic paintings on a heroic scale, died on Nov. 23 in Provincetown, Mass. He was 96 and lived in Manhattan.

The cause was Alzheimer's disease, his son, Demetri, said in announcing the death last week.

Mr. Daphnis, a florist by early training and a renowned cultivator of hybrid tree peonies, drew on his sensitivity to color and his keen understanding of nature's geometry to develop a precise, hard-edged painting style that harked back to Mondrian and looked forward to minimalism. Its dynamism depended on the tense juxtapositions of primary colors arranged in rectangles, squares and curved lines to create what he called "vibrations."

The critic Brian O'Doherty, reviewing a 1961 show at the Leo Castelli Gallery in The New York Times, called Mr. Daphnis "a modern purist concerned with the almost scholastic dialogue of pure colors imprisoned in bands and rectangles."

Nassos Panagiotis Daphnis was born on July 23, 1914, in Krokeai, near Sparta, in Greece. He emigrated to the United States as a teenager and worked at his uncle's shop in Manhattan's flower district, where, in his spare time, he drew the plants around him. He struck up a friendship with another florist's assistant, the sculptor Michael Lekakis, who offered him the use of his studio.

His first works were naïve paintings of remembered Greek scenes and episodes from classical myth, on display in his first show, at Contemporary Arts on 57th Street, in 1938.

In 1942 he was drafted into the Army, which put him to work camouflaging trucks in Italy and making large-scale topographical maps in Germany.

The devastation inflicted on the Italian countryside inspired him to create dark, surreal landscapes, thickly painted with a palette knife, after his return to the United States. While spending summers at artists' colonies in Rockport, Mass., and Provincetown, he began painting biomorphic abstractions, with a Technicolor palette, based on the marine life he observed.

On a visit to Greece in 1950, Mr. Daphnis underwent a kind of visual conversion, dazzled by the intensity of light that seemed to transform color into flat planes.

At a time when Abstract Expressionism placed a premium on psychological intensity and spontaneous mark-making, he coolly arranged color in precise, controlled patterns on the canvas. In his color-plane theory, black commanded a forward position, with blue, red and yellow progressively receding toward white, which represented infinity.

"The important thing for me was to place the color in its proper plane, which I feel is the only way that a color can exist," he said in an oral history interview for the Smithsonian Institution's Archives of American Art in 1964.

His work was ignored until Leo Castelli gave him a one-man show in 1959 that established him as a leading exponent of geometric abstraction.

In the mid-1960s Mr. Daphnis embraced curves and spheres, whose possibilities he exploited with unflagging invention.

"The Continuous Painting," first exhibited in 1975, created a gallery-filling environment of modular paintings of four-pointed stars. The canvases, each more than nine feet high, formed an unbroken series that measured more than 86 feet in length.

In the mid-1990s, Mr. Daphnis put his spheres into visual orbit. In "Energies in Outer Space," a show at Castelli, saucer-shaped disks hovered over pinstriped fields. In a simultaneous show at the Andre Zarre Gallery, "Matter in Outer Space," solid-seeming discs, like the rings of Saturn, floated near black and turquoise planetary forms.

Mr. Daphnis enjoyed equal fame in the gardening world. Indeed, he often said that he had two careers, as an artist and as a horticulturist, a pursuit that began in the late 1930s when William Gratwick, a renowned breeder of hybridized tree peonies, bought one of his first paintings.

Mr. Gratwick invited him to paint the tree peonies at his experimental nursery in Pavilion, N.Y., and Mr. Daphnis soon became a partner in developing new crossbreeds, which he named after artists or characters from Greek mythology. His work yielded some of the most esteemed varieties grown today, including Hephestos, Nike, Pluto and Gauguin.

In addition to his son, of Manhattan, he is survived by a daughter, Artemis Daphnis of Ossining, N.Y., and a brother, Demetrios, of Jamaica, Queens.

http://www.nytimes.com/2010/12/13/arts/design/13daphnis.html?ref=design

Up Front: Why Criticism Matters

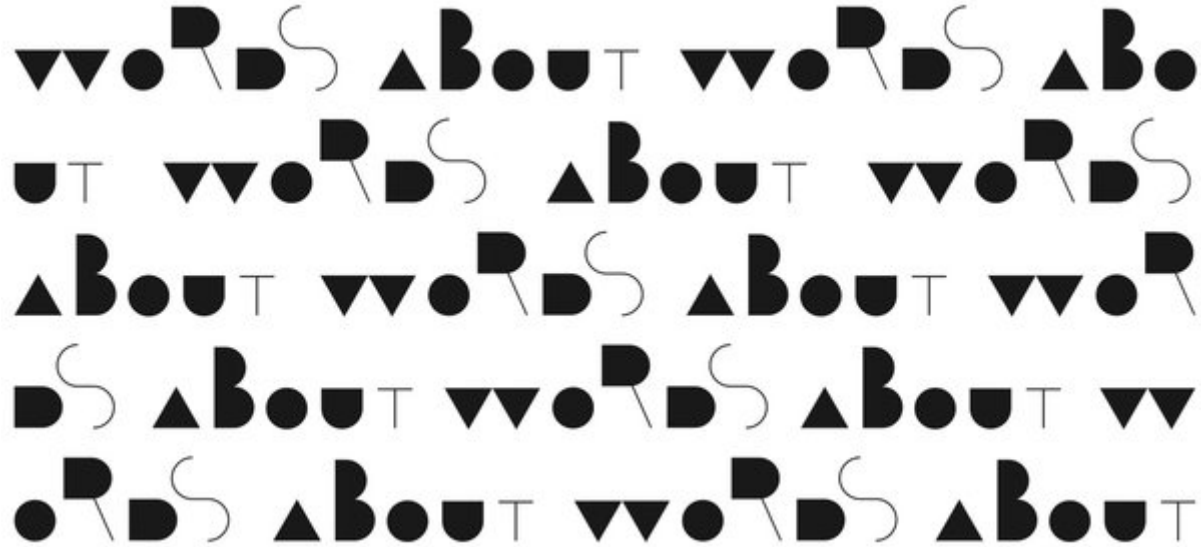


Illustration by Leonardo Sonnoli

By THE EDITORS

We live in the age of opinion — offered instantly, effusively and in increasingly strident tones. Much of it goes by the name of criticism, and in the most superficial sense this is accurate. We do not lack for contentious assertion — of "love it" or "hate it," of "wet kisses" and "takedowns," of flattery versus snark, and assorted other verbal equivalents of the thumb held up or pointed down. This "conversation" is often lively. Sometimes it is fun. Occasionally it is informed by genuine understanding as opposed to ideological presumption.

But where does it leave the serious critic, one not interested, say, in tabulating the number of "Brooklyn novelists" who receive attention each year in publications like this one (data possibly more useful to real estate agents and sociologists than to readers)? Where does it leave the critic interested in larger implications — aesthetic, cultural, moral? This question prompted us to approach six accomplished critics, each well versed in the idioms of the moment but also steeped in the older traditions of literature and criticism. We asked the six to explain what it is they do, why they do it and why it matters. We asked them, additionally, to undertake the assignment in the spirit Alfred Kazin did half a century ago in his ambitious statement of purpose "The Function of Criticism Today." (Not that Kazin was the first critic to reflect on the "function" and value of his craft. See our essay "Masters of the Form" for other examples, some dating back to the 19th century.)

http://www.nytimes.com/2011/01/02/books/review/Tanenhaus-t.html?_r=1&nl=books&emc=booksupdateema1

After Ravages of Time and War, Triage to Save Ruins of Babylon

By STEVEN LEE MYERS

Joao Silva for The New York Times
An Iraqi helicopter hovering over the Ishtar Gate in May. Groundwater and excavations have eaten away brick reliefs at its base.

JIMIJMA, Iraq — The damage done to the ruins of ancient Babylon is visible from a small hilltop near the Tower of Babel, whose biblical importance is hard to envision from what is left of it today.
Across the horizon are guard towers, concertina wire and dirt-filled barriers among the palm trees; encroaching farms and concrete houses from this village and others; and the enormous palace that Saddam Hussein built in the 1980s atop the city where Nebuchadnezzar II ruled.

Something else is visible, too: earthen mounds concealing all that has yet to be discovered in a city that the prophet Jeremiah called "a gold cup in the Lord's hands, a cup that made the whole earth drunk."
On the hillside during one of his many visits to the ruins, Jeff Allen, a conservationist working with the World Monuments Fund, said: "All this is unexcavated. There is great potential at this site. You could excavate the street plan of the entire city."

That is certainly years away given the realities of today's Iraq. But for the first time since the American invasion in 2003, after years of neglect and violence, archaeologists and preservationists have once again begun working to protect and even restore parts of Babylon and other ancient ruins of Mesopotamia. And there are new sites being excavated for the first time, mostly in secret to avoid attracting the attention of looters, who remain a scourge here.

The World Monuments Fund, working with Iraq's State Board of Antiquities and Heritage, has drafted a conservation plan to combat any further deterioration of Babylon's mud-brick ruins and reverse some of the effects of time and Mr. Hussein's propagandistic and archaeologically specious re-creations.

In November, the State Department announced a new $2 million grant to begin work to preserve the site's most impressive surviving ruins. They include the foundation of the Ishtar Gate, built in the sixth century B.C. by Nebuchadnezzar's father, Nabopolassar, and adorned with brick reliefs of the Babylonian gods Marduk and Adad. (The famous blue-glazed gate that Nebuchadnezzar commissioned was excavated in the early 20th century and rebuilt in the Pergamon Museum in Berlin.)

The objective is to prepare the site and other ruins — from Ur in the south to Nimrud in the north — for what officials hope will someday be a flood of scientists, scholars and tourists that could contribute to Iraq's economic revival almost as much as oil.

The Babylon project is Iraq's biggest and most ambitious by far, a reflection of the ancient city's fame and its resonance in Iraq's modern political and cultural heritage.

"This is one of the great projects we have, and it is the first," Qais Hussein Rashid, the director of the State Board of Antiquities and Heritage, said in an interview in Baghdad. "We want to have it as a model for all the other sites."

The task at hand is daunting, though, and the threats to the site abundant. In the case of some of the Hussein-era reconstructions, they are irreversible. The American invasion and the carnage that followed brought archaeological and preservation work to a halt across the country, leaving ruins to wither or, in the case of looting, much worse.

The American military turned Babylon into a base. It was later occupied by Polish troops and, though it was returned to the control of the State Board of Antiquities and Heritage in 2004, the detritus of a military presence still scars the site.

The World Monuments Fund has been carrying out what amounts to archaeological triage since it began its conservation plan in 2009. It has created computer scans to provide precise records of the damage to the ruins and identified the most pernicious threats, starting with erosion caused by salty groundwater. "What we've got to do is create a stable environment," Mr. Allen said at the site in November. "Right now it's on the fast road to falling apart."

The wicking of groundwater into mud bricks, compounded by a modern concrete walkway and the excavations conducted by the German archaeologist Robert Koldewey more than a century ago, have already eaten away some of the 2,500-year-old brick reliefs at the Ishtar Gate's base.

"They took care of Ishtar Gate only from the inside, because you had visiting leaders and dignitaries who would come," said Mahmoud Bendakir, an architect who is working with the fund, referring to the site's caretakers during the Hussein era. "The outside is a disaster."

The grant from the United States will pay for repairs to channel the water away from the gate's foundation, which stands several yards beneath the surrounding area. Similar repairs are planned for two of Babylon's temples, Ninmakh and Nabu-sha-Khare, the most complete sets of ruins, though they too suffer from erosion and harmful restorations with modern bricks.

"It's difficult to say which is doing more," Mr. Allen said, "but the two together are nearly toxic for the preservation of monuments."

The American reconstruction team has refurbished a modern museum on the site, as well as a model of the Ishtar Gate that for decades served as a visitors' entrance. Inside the museum is one of the site's most valuable relics: a glazed brick relief of a lion, one of 120 that once lined the processional way into the city.

The museum, with three galleries, is scheduled to open this month, receiving its first visitors since 2003. And with new security installed, talks are under way to return ancient Babylonian artifacts from the National Museum in Baghdad.

The fate of Babylon is already being disputed by Iraqi leaders, with antiquities officials clashing with local authorities over when to open it to visitors and how to exploit the site for tourism that, for the most part, remains a goal more than a reality. Even now they are clashing over whether the admission fee should go to the antiquities board or the provincial government.

Another of the more dire threats to the site has been unchecked development inside the boundaries of the old city walls, enclosing nearly three square miles. The fund's project has plotted the old walls on a map, causing trepidation among Iraqis who live along them now.

They fear the preservation of Babylon's ruins will force them from their homes and farmlands, as when Mr. Hussein expelled residents of a local village to build his palace. "They took them from their lands," said Minshed al-Mamuri, who runs a civic organization for widows and orphans here. "It's psychological for them."
Mr. Allen, who oversees the fund's work, said the preservation of Babylon would require collaboration among competing constituencies that is extremely rare amid Iraq's political instability.
"We're looking at not just archaeology," he said of the project. "We're looking at the economic opportunities and viability for local people. They need to see something out of this site. That's possible, and possible at the same time to preserve the integrity of the site."

http://www.nytimes.com/2011/01/03/arts/03babylon.html?ref=arts

The Nonconformist

By DEBORAH SOLOMON
ALICE NEEL
The Art of Not Sitting Pretty
By Phoebe Hoban
Illustrated. 500 pp. St. Martin's Press. $35

Sam Brody © The Estate of Alice Neel; courtesy of David Zwirner, New York

Alice Neel has never commanded the household-name status of Georgia O'Keeffe or Frida Kahlo, art heroines who have been the subject of multiple biographies. But within the art world, she remains a beloved and influential figure. The pre-eminent painter-chronicler of New York bohemia, Neel specialized in frank, nervy portraits of artists and intellectuals and various other marginalized types, like black children, pregnant women and old men. More often that not, her subjects are shown in minimally decorated apartments, sitting by themselves or with a friend. They make you feel as if you have wandered into a room where they will continue sitting long after you have left. They are not classically attractive, with their shaggy hair and spindly, crooked German Expressionist fingers, but everyone — babies included — has a look of wide-eyed intelligence.

Phoebe Hoban's sprawling "Alice Neel: The Art of Not Sitting Pretty" is the first full-length biography of the artist. Hoban, whose previous book was a biography of Jean-Michel Basquiat, wants to vault Neel into the art-heroine pantheon, and her tone is consistently admiring. Neel, who died in 1984, pursued the ancient art of portraiture at a time when Abstract Expressionism was king and wielded its power absolutely; she failed to garner wide attention until she was in her 70s. Her love life, too, was an exercise in noncompliance. She had four children with three different men, one of whom she married. At 500 pages, Hoban's biography furnishes

enough anecdotal detail about her lovers to fuel a miniseries. But they were not as interesting as she was — she tended to fall for men who were second-rate artists and first-rate cads — and a shorter, shapelier biography could have better underscored her accomplishments.

A plump, witty woman with a round face and twinkly blue eyes, Neel had none of the gaunt linearity one expects of old-time bohemians. The painter Joseph Solman said she looked like "a dairy maid," an assessment she shared. As she lamented, "I am cursed to be in this Mother Hubbard body. I am a real sexy person."

Her humor could be caustic, which earned her the sobriquet Malice Neel. In 1970, she painted a tender portrait of Andy Warhol — he looks nearly ethereal as he sits without a shirt, displaying his famous scar — yet dismissed his art as overrated and undercooked. "I think he's the greatest advertiser living," she scoffed, "not a great portrait painter."

Born outside Philadelphia in 1900, the daughter of a railroad clerk, Neel grew up in a working-class family haunted by a feeling of lost social eminence. The artist's mother, who claimed to be a descendant of a signer of the Declaration of Independence, suffered from depression and seemed consoled only by sitting in the sun. A therapist later wondered aloud whether Neel became a portraitist on account of the years spent closely observing her mother's face, looking for clues into her moods, never knowing whether affection was about to be bestowed or withdrawn.

After studying art at the Philadelphia School of Design for Women, Neel moved to New York in time to witness the devastations of the Great Depression. Millions of men were jobless, but opportunities for artists actually improved. Living on Cornelia Street in Greenwich Village, Neel earned a steady paycheck in the easel division of the Works Progress Administration — which did not deter her from denouncing capitalism and declaring her adoration of Russia. She joined the Communist Party in the belief that it helped the common man, but in her personal dalliances she far preferred the uncommon man. Among her friends was Joe Gould, the Village legend and author of, well, nothing, other than grandiose claims about his ever-forthcoming, never-written "Oral History of Our Time." Years before he was profiled by Joseph Mitchell in The New Yorker, Gould sat for Neel, whose portrait of him remains outrageous. He is perched on a wooden stool, naked and grinning, a writer-mutant complete with three penises.

Too much of a nonconformist to remain among her fellow nonconformists in the Village, Neel eventually moved way uptown, raising her two sons in a series of apartments in Spanish Harlem and Morningside Heights. When the W.P.A. ended, she went on welfare and shoplifted to make ends meet. In the '50s, the most sustained attention she received came not from power critics like Clement Greenberg or Harold Rosenberg but rather from the F.B.I., which kept a thick file on her Communist activities. One day, two agents showed up at her apartment seeking information. "We were playing in the playroom," Neel's son Hartley recalled. "They came in their trench coats, these two Irish boys." Neel refused to answer their questions, but she invited them into her studio and asked if they would like to pose for her, an offer they declined.

She had to await the advent of "women's lib," as it was then called, before her career took off. In 1970, Time magazine published a cover article on Kate Millett, who was about to accomplish the unlikely feat of turning her Columbia University dissertation into a patriarchy-bashing best seller, "Sexual Politics." Neel was asked by Time to furnish the portrait. When Millett balked at the idea of posing, claiming she didn't want to break from the communal ranks of sisterhood to become a feminist celebrity, Neel painted her from a photograph. The portrait remains among her best-known works. Millett is depicted as a figure of mannish glamour, staring out fiercely in her white button-down shirt. Splayed against a flat patch of green inscribed with leaves, she is half truck driver, half Matisse mademoiselle.

Virtually overnight, Neel became famous for her lack of fame, the long years of neglect. In 1974, she was given a full-dress retrospective at the Whitney Museum. In 1979, President Carter summoned her to the White House, along with Georgia O'Keeffe and Louise Nevelson, to receive a lifetime achievement award. Which is not to suggest that Neel espoused the feminist party line. In public she made alarming comments not likely to be quoted in Ms. magazine. "I much preferred men to women," she once told an interviewer. "Women terrified me. I thought they were stupid because all they did was keep children and dogs in order."

The comment was fatuous but probably intended as something besides pointless provocation. If Neel had no interest in bonding with her female colleagues, the feeling appears to have been mutual. "She wasn't a feminist; she was an Alice Neelist," the painter May Stevens told Hoban. "I didn't want anything to do with Alice."

There is no way to explain or condone her treatment of her estranged daughter, Isabetta. In 1925, Neel married a Cuban painter named Carlos Enríquez, who eventually ran off and deposited their 1-year-old baby, Isabetta, with his wealthy relatives in Havana. Over the years, as Hoban reports in unstinting detail, Isabetta tried repeatedly to engage the attention of her mother. But her letters remained unanswered, and Neel's habit of expedient inattention could be brutal. In 1978, when Isabetta was 50 and living in Miami, she showed up unannounced at the reception for a Neel exhibition at the Fort Lauderdale Museum of Art. Hoping to say hello, she suffered a final indignity when her mother apparently failed to recognize her. Isabetta died, a suicide, some four years later.

This is all inordinately sad, not to mention galling, and there are moments in the book when it becomes impossible to sustain sympathy for Neel. It is probably the case that we expect more moral accountability from women artists than from their male counterparts, perhaps because women — creative demons notwithstanding — are biologically built to nurture. Yet the expectation is unfair. If male artists from Picasso on down were judged on the basis of their parenting skills, the child welfare office would have no choice but to permanently outlaw the practice of art.

One finishes Hoban's book wondering, among other things, how a woman who was so narcissistic and needy became such an empathetic chronicler of other lives. She had a great talent for close observation, and she was probably one of the last major painters in this country to work directly from life, spending hours upon hours with her models. Her connection with them was so intense she claimed to feel newly desolate every time she completed a portrait.

Nowadays, when figurative painting is hot again, Neel's portraits seem less like the end of a tradition than the start of one. Granted, in the place of her psychological realism, contemporary artists favor photo-based realism; they find their inspiration in secondhand sources, like magazine photographs of pop stars. Their work is less about capturing a likeness, a particular person of inwardness and vulnerability, than commenting on the diminished potency of images in our culture. Neel was not a postmodernist. Her art was direct and unfiltered, unmediated by the effects of the media. The surprising part is that today it feels utterly up to the minute, perhaps because it bares its anxiety about whether it could be done at all.

Deborah Solomon, who writes the "Questions For" column in The Times Magazine, is the author of "Utopia Parkway: The Life and Work of Joseph Cornell" and a forthcoming biography of Norman Rockwell.

http://www.nytimes.com/2011/01/02/books/review/Solomon-t.html?ref=design

Perfect Poise, Pulled From Jaws of Distortion

By KEN JOHNSON

Whitney Museum of American Art
"Early Sunday Morning" (1930), by Edward Hopper, at the Whitney Museum of American Art, is a scene of aching solitude, albeit relieved by the transcendental light.

'COMTESSE D'HAUSSONVILLE,' BY INGRES, THE FRICK COLLECTION If not always for the same reasons, people of both genders love to feast their eyes on beautiful women. So it is no coincidence that some of the world's most compelling works of art are weddings of female and painterly beauty. One is at the Frick Collection: "Comtesse d'Haussonville" (1845), a near life-size portrait of a lovely young woman standing before a mirror in a blue satin dress. Rendered by Ingres in a cool, neo-Classical style, she tilts her head, holds an index finger to her chin and gazes back with lowered eyelids and a quizzical, enigmatic expression.

The blue dress is a tour de force of realistic depiction, its every fold and wrinkle attended to with as much care as the marmoreal surfaces of the comtesse's flawless skin. (Ingres drew about 60 studies for the dress alone during the three years he worked on the portrait.) And yet, as art historians never tire of pointing out to novice viewers, her body is oddly misshapen. Her pudgy right arm seems to have grown out of her stomach, her upper back looks painfully hunched, and her egg-shaped head appears about to roll off her elongated neck as if in a Monty Python cartoon.

You don't notice the distortions at first because of how subtly Ingres folded her parts into a configuration of interlocking ovals, giving the impression of perfect poise. The painting may be a triumph of form over anatomy — Picasso certainly took notice — but the comtesse still casts a spell.

Intellectually ambitious as well as beautiful, the comtesse, a k a Louise d'Haussonville, went on to write memoirs, romantic novels, historical studies and biographies, including two volumes on Lord Byron. She was 27 when Ingres finished her portrait; he was 65. A friend told her, "M. Ingres must be in love with you to have painted you this way." Indeed.

'THE MOUNTAIN,' BY BALTHUS, THE METROPOLITAN MUSEUM OF ART The hikers in Balthus's "Mountain" (1936-37) could be a group of patients on an alpine excursion from Carl Jung's psychiatric clinic just outside Zurich. It is not like a French Impressionist holiday scene. These mountaineers have a sculptural solidity about them; they seem magically frozen into living statues. Each has a curiously

distracted expression. The sky is blue, but not in an airy way; it seems heavy and dark, enhancing the ominous atmosphere of the picture.

At more than 8 feet tall and 12 feet wide "The Mountain" is the biggest painting Balthus made, and it is markedly different from the works for which he is best known. Updating neo-Classical style and narrative, he made interior scenes in which young girls are viewed with an erotic interest that many critics have found unseemly.

Though comparatively chaste, "The Mountain" is not without a certain dreamy, sexual tension. The girl who stretches like a cat in the light of the sun is a typical Balthusian object of desire, and so is the girl reclining at her feet in sleep.

What this gathering means is hard to say, but each figure seems emblematic in some way. The man gripping a pipe in his teeth and kneeling in the foreground has his face pinched into a mask of saturnine tension. He is earthy and rocklike. The sun-struck, stretching girl is day; the sleeping one night. The androgynous figure in a red, short-sleeve jacket looking on from the middle distance with enigmatic intent seems elfin and mischievous, perhaps an agent of transformation.

Another strange thing is how the landscape echoes the figures. The highest peak seems to heave up in response to the stretching girl. A vaguely humanoid projection mimics the swayed posture of the elfin androgyne. The man and woman at the edge of the illuminated abyss point excitedly at a mass of rock that resembles a Cubist sculpture of a couple kissing.

Somehow the picture would not be complete without the tiny, lone figure in the distance on a rising field of grass: a romantic wanderer traveling far away from human society and ever closer to the divine.

'EARLY SUNDAY MORNING,' BY EDWARD HOPPER, THE WHITNEY MUSEUM OF AMERICAN ART Many of Hopper's most beloved paintings offer nocturnal views from the outside into electrically lighted interiors: a diner in which night owls sit at the counter or an apartment in which a single woman ponders her life. It's as if we were seeing through the eyes of a lonely insomniac pining for human contact.

In "Early Sunday Morning" (1930) we look out rather than in, but the piercing loneliness is just as palpable. The raking sun is hard and cold. The windows of the buildings are implacably dark. Painted with a dry, slightly brushy touch, it is a scene of aching solitude, although relieved by the transcendental light.

The subject is a stretch of buildings on Seventh Avenue in Manhattan, but it could just as well be the main street of a factory town upstate or somewhere in New England. A red, white and blue barber pole and a squat fireplug stand in for absent pedestrians. The bright barber pole looks oddly incongruous, even surrealistically so, on this dingy street. A totemlike symbol of patriotic, small-town American values, it is another sign of human community that Hopper, always the outsider, considers with mordant curiosity.

American Scene painting by artists like Thomas Hart Benton and Grant Wood was popular at the time; maybe Hopper's painting was a wry nod to that chauvinistic trend.

And yet there is also a feeling of wonder. People will be out and about in a while, but for now they are sleeping in, nestled in apartments above the street-level shops, wrapped up in their dreams. The early-rising viewer has the world all to himself.

Though tinged by melancholy — the Great Depression had hit the nation like a hurricane — there a sense of possibility in the air and light. This moment might have come at the end of an all-night bender, but there it is, the promise of a brand new day.

'A STORM IN THE ROCKY MOUNTAINS, MT. ROSALIE,' BY ALBERT BIERSTADT, THE BROOKLYN MUSEUM If Albert Bierstadt were reincarnated as a Hollywood movie director, he would surely give James Cameron a run for his money. In the mid-19th century Bierstadt advanced the art of spectacular illusion making to great popular acclaim, as viewers by the thousands lined up and paid money to see his enormous Western landscapes, meticulously rendered with nearly photographic verisimilitude, presented in gaslighted, theatrical installations. Also like Mr. Cameron, Bierstadt projected visions of transcendentalist pantheism in which American Indians and deer lived, like the Na'vi in "Avatar," in conditions of Edenic bliss.

In the 12-foot-wide "Storm in the Rocky Mountains, Mt. Rosalie" (1866) sunlight breaking through angry, dark clouds shines on a peaceful lake like a promise from God. This was the age of Emerson and Thoreau, who found in every part of nature, from leaves of grass to towering mountains, metaphors of divine

beneficence. Bierstadt was as attentive to the microscopic as he was to the macro, and this makes for an enthralling visual and poetic experience.

Bierstadt named Mount Rosalie, now called Mount Evans, after Rosalie Osborne Ludlow, who married him in 1866 after she divorced his traveling companion Fitz Hugh Ludlow. Fitz Hugh Ludlow is remembered today for his best-selling autobiographical book "The Hasheesh Eater" (1857), in which he explored the wonders of subjective experience under the influence of cannabis.

As it turned out, Bierstadt's paintings of the Wild West did more to attract than to discourage invasion by forces of industrial progress. For most of the 20th century his paintings were relegated to the dustbin of art history along with similarly operatic landscapes by Frederic Edwin Church.

Many scholars still view them as unworthy confections of overwrought kitsch. I find myself helplessly thrilled by these artists' proto-cinematic extravaganzas and, at the same time, saddened to think of the lost paradises they memorialize. For better or worse "A Storm in the Rocky Mountains" tells a story about America that should never be forgotten.

'YOUNG WOMAN WITH A WATER PITCHER,' BY VERMEER, METROPOLITAN MUSEUM OF ART Vermeer's "Young Woman With a Water Pitcher" (around 1662) might be my No. 1 desert island pick. Partly it would be for sensory and formal reasons: the silky application of paint, the finely tuned orchestration of velvety blues and coolly luminous near-whites and the structure of nested rectangles. But it is the way that material dimension embodies the image of the girl at the window — caught in the act of turning her head as if to listen for something she thought she heard outdoors — that cinches the deal.

I think of the painting as a kind of Annunciation, making contemporary the moment Mary learns she will conceive and bear a divine child. With her head enveloped by a starchy, crisply creased cowl of virginal whiteness, Vermeer's young woman is bathed in the light of the Holy Spirit. She holds the handle of a silver pitcher filled with water, the stuff of life, which stands on a silver platter on a tapestry-covered, domestic altar. Pearls and a ribbon spill from a reliquarylike jewel box. All is painted with excruciating, reverential tenderness.

To be sure, everything going on in the picture can be explained without invoking supernatural agency. In its slightly blurry, photographic realism, the painting presents an implacably empirical view of the world. The image looks almost as if it had been photo-chemically imprinted on the canvas without manual intervention, and the picture in turn stamps itself on our retinas. Optical nerves fire, neurotransmitters swarm and the image somehow appears in our minds. Whether you believe in intelligent design or Darwinian happenstance, it is pretty miraculous.

The image in our mind's eye pictures a painting that pictures a moment in historical time — note the map of Europe on the wall — that may or may not have actually happened but that in any case appears at once immediately real and distantly fictive. All of this incites a hyper-alertness about seeing and a heightened consciousness of consciousness itself and its construction of the real. "Young Woman With a Water Pitcher" announces the birth of the modern, self-reflexive mind.

http://www.nytimes.com/2010/12/31/arts/design/31johnson.html

Robot, robot, wherefore art thou robot?

- 30 December 2010 by **Celeste Biever**
- Magazine issue 2792.

Data, the powered-up stand-up (Image: Kris Krüg)

From tragedy to comedy, robot performers are proving as emotive as they are automotive

"HEATHER," says the performer, "help me with my stylish scarf." He regally flings his arms in the air, and waits. The woman he is addressing, Heather Knight, places a black lacy garment around his neck. He brings his arms back down and starts to tell a joke.

The performer, whose name is Data (see photo, right, and video above), is rehearsing for his stand-up-comedy debut. Yet Data is not just any comedian: he is a half-metre-tall humanoid robot. He and Knight are doing their thing in Washington Square Park, New York, in front of a crowd of passers-by.

Data is not the first robot to take to the stage in the hope of entertaining an audience (see "Performance a bit mechanical"). But now there is a bigger goal at stake for performers like him: to acquire acting skills that could help the rest of robotkind interact more fluidly with humans.

And boy, do robots have a lot to learn. Present-day robots can often be annoying, creepy or just plain rude in their interactions with us. Humans are adept at coping with social nuances and subtle cues in communication, says Knight, a PhD student at Carnegie Mellon University (CMU) in Pittsburgh, Pennsylvania, and founder of a New York City-based robotics company called Marilyn Monrobot. "Yet robots today are socially disabled," she says. For their developers, it's about more than politeness. Unless robots develop more social awareness, they cannot become more sophisticated, and we will have to wave goodbye to the idea of asking a friendly robot for help with the chores, or any kind of realistic companionship.

Seeking inspiration, robotics researchers have begun testing their robots in the theatre. "People are realising that we have a lot to learn from the arts," says Leila Takayama of Willow Garage, a robotics company based in Menlo Park, California. She co-organised a workshop on robots and the arts at the Human-Robot Interaction 2010 conference in Osaka, Japan.

Theatre directors and actors can often provide insights into human interaction that have eluded roboticists, according to Hiroshi Ishiguro, who leads the Intelligent Robotics Laboratory at Osaka University. Robot programmers often don't know where to start when recreating the speech and myriad movements of a human. Yet theatre directors often know these cues intuitively: they tease the right responses from actors all the time.

The theatre is also a great place to test robots' skills, because the dialogue is scripted and the characters behave predictably, unlike in the real world. Ishiguro has already staged several robot plays in the hope of distilling the elements that could make robots seem more human.

One of the first people to use theatre to polish up robotic social skills was Guy Hoffman. In 2005, he was a PhD student at the Massachusetts Institute of Technology's Media Lab, working on machines with artificial intelligence. In his spare time, he started taking drama lessons. There he discovered that actors were routinely tackling many of the headaches he faced in his day job, such as making sure that every piece of speech and every action was consistent with an overall personality.

Hoffman decided to put one of his artificial creatures on stage: a robot called AUR, an expressive desk lamp. By flexing its neck AUR can make "eye contact" using its multicoloured light, and narrow its aperture rather like the iris in the human eye. The result was a performance in Cambridge, Massachusetts, in 2007 involving AUR and human actors.

Hoffman focused on making AUR's acting balance timeliness with spontaneity. He programmed AUR to use the play's script to predict how the human actors might be behaving at any moment. It meant AUR could respond in a relatively flexible fashion as well as promptly, without processing delays. AUR could also carry on acting as the other actors delivered their lines. Previous robot thespians have been able to act in a similarly expressive way, but the performance felt more canned because it had to be totally pre-programmed.

Hoffman's approach seemed to work. The actors and the director said that after a while it felt as if AUR was a character in his own right. "The robot was weirdly adorable. I felt surprisingly protective of it," reported one actor.

The robot actor was weirdly adorable. I felt surprisingly protective of it

Hoffman reckons timely responses from robots are essential for honing their ability to interact fluidly with humans. Offstage, he conducted an experiment in which he asked 33 people to collaborate on a task with AUR. Those that worked with AUR in his "anticipatory" mode subsequently attributed more human characteristics and intelligence to the robot than those who partnered with him while his predictive skills were switched off. And that's despite the fact that AUR made more response errors when he was anticipating.

"People accept robots taking some risk with their decision as long as they are snappy," says Hoffman, now at the Interdisciplinary Center Herzliya in Israel. "They kind of forgive the robot for being wrong." He has since used the same principles to design another robot performer - a marimba player called Shimon, who can improvise jazz together with a human pianist.

Audience reaction

Both AUR and Shimon bounce off fellow performers to polish their social skills, but the response of an audience is just as handy for social training. When Data the robot comedian performed in December at the TEDWomen conference in Washington DC, he started with material selected in a pre-programmed manner from a database of around 200 jokes, says Knight. But he was also listening for laughter, clapping and chatter via a microphone pointed at the audience. Using software that Knight built with colleagues at CMU, the robot then began to pick gags that were more likely to get a laugh.

The jokes were classified according to their theme, degree of interactivity with the audience and other characteristics. If people found risque jokes a turn-off, but liked having Data ask them questions, he would respond to suit their taste, every so often throwing in a random joke to keep the performance fresh. He also picked jokes according to where he was in his routine, saving his best jokes for the finale, for example.

Knight already has plans to extend these techniques to robots outside the theatrical setting. She will soon use the same software for a robotic tour guide at her university that will personalise its route around the campus and propose activities that it thinks guests will appreciate.

Merely predicting what people will enjoy won't give Data a full set of social smarts, though. To communicate with humans convincingly, automatons must also be able to inject a dash of personality into their actions and words. So for the next stage of Knight's robo-comedian endeavour, she plans to vary many more aspects of its behaviour besides joke selection.

The plan is for a robot to perform the same joke, or even the same script, to different audiences. While the words will be the same, all the non-verbal behaviour - gestures, plus the volume and mode of delivery of the robot's speech - will vary. The idea is to let the software deduce, from the audience reactions, which combinations of non-verbal communication work for which parts of the script. To provide feedback, the audience will wear wristbands that interpret their excitement levels, their gaze will be watched by cameras, and they will be seated in chairs that can detect fidgeting.

For example, a robot playing Juliet might learn by trial and error that when it delivers the line "parting is such sweet sorrow", it is appropriate to look into Romeo's eyes and pause before sending him away. A robot

insensitive to the crowd's reaction might instead "blithely stare into the audience and brusquely end the scene", Knight says.

Robot personas

Knight hopes to use what she learns from this audience feedback to create a range of believable robot personalities. That would allow you to choose a robot persona to suit a given task. "Personality becomes one of the design principles," she says.

"I think it's a great idea - it makes sense," says Takayama. She likens Knight's approach to the way a director can tweak a movie based on focus-group screenings. "It's pretty cool that you could do that with robots." She cautions, however, that using theatre in this way has its limitations too: an audience may react differently to somebody interacting one-on-one with the robot. "It might not directly translate," she says. "Knowing it's on stage, where you are the fourth wall, is different to having one in front of you in a small room."

Still, Knight points out that this is all part of a rich tradition of placing robots in unexpected settings. For example, making robots play soccer has driven the development of algorithms that can coordinate many robots simultaneously. There was also the DARPA Grand Challenge, a long-distance robot car race that honed the technology of autonomous vehicle navigation.

Back in New York, Data has his audience captivated. He begins to tell another joke. "Waiter! Waiter! What's this robot doing in my soup?" he says. The punchline: "It looks like he's performing human tasks twice as well, because he knows no fear or pain." Not surprisingly, that one falls flat. But Data learns his lesson, and launches into another gag.

'**Performance a bit mechanical**'

Data

ROLES: Stand-up comic in New York, August 2010 (see video above), and on stage at PopTech in October 2010, and at TEDWomen, December 2010

Helicopter fairies

ROLE: Flying fairies with rotors in *A Midsummer Night's Dream*, performed at Texas A&M University in 2009

"The robot fairies capture the attention of everyone and don't let go." thebatt.com

Wakamaru

ROLE: Acts as a male and female robot living with two humans in the play *Hatakaru Watashi* (*I, Worker*), staged in 2008 at Osaka University, Japan (see photo)

"Soon they may be signing autographs or trying to roll away from paparazzi". BBC News

AUR

ROLE: Desk lamp in a play called *The Confessor*, performed in 2007 in Cambridge, Massachusetts (see video above)

"It's interesting how much meaning a change of colour can channel. When he turned and switched to red I instantly got the feeling he wanted something." thinkartificial.org

Geminoid-F

ROLES: Appears in the play *Sayonara* (*Goodbye*), reading a poem to a dying woman, played by a human actor. It was performed in November 2010 in Tokyo (see video above)

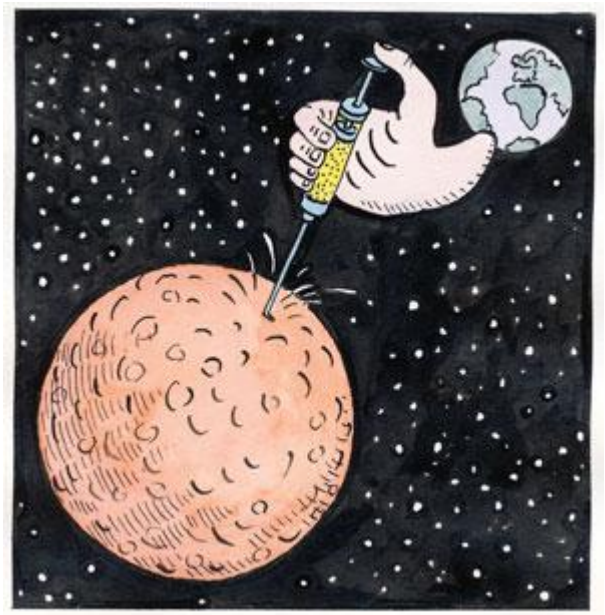
"The android, seated on a chair throughout the performance, resembles a part-Russian, part-Japanese woman. Her voice was calm, but her performance a bit mechanical." Reuters

***Celeste Biever** wonders if she would be funnier if she were a robot*

http://www.newscientist.com/article/mg20827920.400-robot-robot-wherefore-art-thou-robot.html

Don't send bugs to Mars

- 28 December 2010 by **Barry E. DiGregorio**
- Magazine issue 2792.



*A plan to send live microbes to the Red Planet's largest moon risks wrecking our search for extraterrestrial life, argues **Barry E. DiGregorio***

WE HUMANS have a unique talent for contaminating pristine environments. We put millions of tonnes of pollutants into the atmosphere every year. We poison our soils, lakes, rivers and streams with chemical and radioactive waste. We spill oil into our seas. We fill the Pacific and Atlantic oceans with islands of plastic garbage visible from space. Is it any surprise that we are also contaminating pristine celestial bodies with bacterial spores?

Spacefaring nations have been sending unsterilised spacecraft to the moon, Mars, Jupiter, comets and asteroids for over 40 years. It has been estimated that about one trillion microbial spores from spacecraft are now scattered around Mars (*Advances in Space Research*, vol 35, p 1648). Yet the search for life in our solar system has barely begun.

It wasn't always so. At the dawn of the space age, policy-makers had every intention to protect space from contamination. They also set out to protect Earth from material brought in from other celestial bodies that might contain toxins or pathogens.

These lofty goals were enshrined in the United Nations Outer Space Treaty of 1967, now signed by all spacefaring nations. It plainly states: "Parties to the Treaty shall pursue studies of outer space, including the moon and other celestial bodies, and conduct exploration of them so as to avoid their harmful contamination and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter."

Early spacecraft had to be thoroughly and expensively sterilised before they could be sent to the moon or planets. However, over the years this requirement has been watered down. The Committee on Space Research (COSPAR) in Paris, France, has been charged with making adjustments based on new data. COSPAR now allows spacecraft to bypass any sterilisation as long as they are not carrying life-detection instruments or landing on areas of Mars designated as "special regions" - areas where liquid water could exist for short periods that might support terrestrial microbial growth. The problem with these policy changes is that they are premature: our knowledge about the survivability of life on Mars is constantly changing with each spacecraft mission.

Numerous reports have debated whether terrestrial spores might be able to replicate and spread on Mars. We still don't know the answer, so why risk contaminating the most Earth-like planet in our solar system?
Now a mission slated to launch in the second half of 2011 will effectively tear up the treaty. The Russian Federal Space Agency's Phobos Sample Return Mission (formerly known as Phobos-Grunt) will send not just microbial spores but live bacteria into the solar system for the first time. If this isn't a direct violation of the Outer Space Treaty then what is?
The mission will fly to Mars, study it from orbit and then land on Phobos, the larger of Mars's two moons. On board will be two sealed capsules containing live micro-organisms. Some months later the craft will embark on the return journey carrying the still-sealed capsules, plus samples of soil scooped up from the surface of Phobos. All being well it will return to Earth in 2014.
The reason for sending live micro-organisms to Phobos is to investigate if any survive the three-year journey. If they do, the researchers say it would support the theory of transpermia, which holds that microbial life can be exchanged between planets via rocks ejected from their surfaces by collisions.
That theory is tenuous at best. All of the Martian meteorites found on Earth spent millions of years in space before they arrived. In order to justify their experimental goals, one of the groups involved in the experiment, The Planetary Society of Pasadena, California, argues that rocks larger than 100 grams are transferred from Mars to Earth in only two to three years. No direct evidence exists for this claim. Is the transpermia question really so important that it is worth risking the contamination that would surely happen if the spacecraft malfunctioned and crashed on Mars?
This is no small risk. Of 38 craft launched towards Mars, only 19 succeeded. At least three crash-landed on the planet's surface.
Of 38 craft launched towards Mars, only 19 made it. At least three crash-landed on the surface
The Phobos Sample Return Mission has one of the most complex mission profiles ever flown. Not only will the spacecraft have to perform a series of manoeuvres in Mars orbit to launch a satellite, it will also have to change its orbit to rendezvous with Phobos. The last time the Russians attempted to land on Phobos was in 1988 with the Phobos 1 and 2 spacecraft. Both lost contact en route.
To make matters worse, we already know a good deal about microbial survival in space thanks to experiments done with Apollo, the Mir space station, the International Space Station and the space shuttles. Similar experiments have also been done at space environment simulation facilities on Earth. Why not continue to use these and spare Mars potential contamination?
For those having any doubts about microbes surviving a fiery re-entry, you need only consider the break-up of the Columbia space shuttle in February 2003. One of the microbial experiments on Columbia survived intact, although slightly charred. After analysis it was determined that a heat-resistant microbe, *Microbispora*, had survived.
The question "Is there life on Mars?" has surely been answered by our own ignorant actions. Yes, there is life on Mars, because we put it there. The only remaining question is, will it survive and grow, confusing future scientific results? Sending live bacteria to Phobos can only increase the risk that it will.
Barry E. DiGregorio *is director of the International Committee Against Mars Sample Return and author of Mars: The Living Planet (North Atlantic Books)*

http://www.newscientist.com/article/mg20827924.300-dont-send-bugs-to-mars.html

Role Reversal

December 23, 2010
By Rob Weir
I've just had one of those semesters in which one of my classes had just enough rotten eggs to jeopardize the barrel. You probably know the eggs in question, the ones suffering from SBS (Spoiled Brat Syndrome). Love that term. It was given to me by one of my students who got tired of hearing from peer whiners. SBS students are those who occasionally come to class, voice a few complaints about how (they've heard) you conduct it, insist that you personally take responsibility for improving their grades, register moral outrage when told that you intend to hold them to the same standards as lesser-deserving students, and then disappear for several more weeks.

I get through this kind of class because I've learned not to waste my time on SBS sufferers. (Seriously, there's little you can do to please them, so don't bother trying.) The end-of-semester problem is that our campuses practice the same one-person/one-vote democratic practices that muddy our civic lives. Everyone gets to fill out a class evaluation, whether they're Einstein or the campus idiot, a perfect attendee or a ghost, a hard worker or an SB. Alas, it only takes a few SBs to pull down your class evaluation scores. I've written before about what you should and should not take away from student evaluations. My relaxed views on these notwithstanding, this semester's brush with SBS students aroused my sense of justice. It's just not fair that students get to evaluate us, but we don't get to say our piece about them. In theory, of course, our grades are their evaluations, but as many on this site have noted, professors who break the institutional curve do so at their own peril. Let's just say that C has become the new F and B is now the new C. I say it's time to give profs parallel rights and allow them to evaluate their students. Distribute machine-scored bubble sheets and make the results on each student available campus wide. Heck, let's even set up a Rate My Students website. Based on my university's instructor evaluation form, here is a working draft of what one might look like. (Disclaimer: This test comes to you as a seasonal dose of seasonal humor and should not be construed as an exercise in cynicism. I truly love almost all of my students, even a few of the SBSers.)

1. The student was well-prepared for class.
a. Almost always.
b. Frequently.
c. Sometimes.
d. Rarely.
e. Have I ever seen this person?

2. The student actually reads directions before asking what they are.
a. Almost always.
b. Frequently.
c. Sometimes.
d. Only if the directions appear in red, bold, and 48-point font.
e. A new immaculate conception is more likely.

3. The student demonstrated that s/he actually opened assigned books.
a. Almost always.
b. Frequently.
c. No, but student cruised some cool websites.
d. Student didn't buy the books, but did complain about their cost and the fact that I didn't use them enough in class
e. Read! What kind of tyrant would impose such an indignity?

4. The student used class time well.
a. Almost always.
b. Frequently.
c. Does catching up on sleep count?

d. Perhaps, but it was at some out-of-class pursuit.
e. Remind me again who this person is.

5. The student demonstrated a keen interest to learn.
a. Almost always.
b. Frequently.
c. Maybe once, but I could be wrong.
d. ROTFL.
e. Who?

6. The student looked at the syllabus at any point other than day one.
a. Student always consulted it.
b. Frequently.
c. Not sure s/he is familiar with the term.
d. Left it on the desk upon leaving the first class.
e. Thinks it's my job to call each night and remind him/her of assignments.

7. Student made valuable contributions to the class.
a. Almost always.
b. Frequently.
c. S/he once gave a cold to several classmates.
d. Class exchanges were acrimonious though there's no way s/he could spell that word.
e. Class contribution analogous to Cruella Deville's to animal rights.

8. Percentage of time student spent working vs. complaining about working.
a. Never complained.
b. Seldom complained.
c. About 50/50.
d. You'd have thought I was asking for both kidneys.
e. Never stopped complaining, though one must admire student's consistency and persistence.

9. Percentage of classes student actually attended.
a. 100 percent or nearly so.
b. 75-90 percent.
c. At least 50 percent.
d. Peer nickname was "Caspar."
e. Do I really have a student by this name? Are you sure?

10. Student begins working on major assignments at least 12 hours in advance.
a. Almost always.
b. Frequently.
c. It could have happened once, but I kind of doubt it.
d. Did you say "in advance?" Hah, hah! That's a good one.
e. Are you under the misapprehension that this student actually handed in work?

11. Student has actually looked at things marked on returned papers other than the grade.
a. Almost always.
b. Frequently.
c. Yes, s/he once remarked on the lovely shade of red splashed across the page.
d. Stop! You're killing me with these jokes.
e. See 10e.

12. Student accepts responsibility for mistakes.
a. Almost always.
b. Frequently.
c. S/he once apologized for spilling soda on my office carpet.
d. Insists s/he is always misinterpreted.
e. Student's lawyer will not allow me to answer this question.

13. How much did this student learn in your course?
a. Quite a lot.
b. An average amount.

c. A new idea may have sneaked in when student's guard was down.
d. Wouldn't the student actually have to be in class for this to happen?
e. A brain surgeon with a power drill couldn't get into this student's head.

14. Estimated hours per week this student devoted to your course.

a. More than 10.
b. 5 to 10.
c. A good 15 minutes. Maybe.
d. 2-3 nanoseconds.
e. Do zombies study?

15. What is your overall assessment of this student?

a. S/he is a stellar student, a credit to her/his family, and has a promising future.
b. Student has room for improvement, but has the potential to do well.
c. Student's ability to moan and complain certainly ranks in the top 25 percent.
d. My God! If this student is ever again in one of my classes please, please just shoot me.
e. I had a better chance of marrying into the British royal family than seeing this student at any point during the semester.

16. What testing would you recommend to this student's adviser that would help that adviser plan the student's future?

a. LSAT.
b. GRE.
c. Test for possible learning disabilities.
d. Myers-Briggs personality test.
e. An EEG.

http://www.insidehighered.com/views/2010/12/23/weir

Spare the Rod, Pay the Prof

December 21, 2010
Kentucky might be known for being a major exporter of baseball bats. But in Lexington, 75 miles east of the Louisville Slugger factory, the University of Kentucky has decided that blunt objects are not the best way to get professors to create and teach online courses.
Instead, the university is offering to share tuition revenues from online students with colleges and departments that accommodate them. In the College of Arts and Sciences, professors — who are not generally given bonuses for developing new courses — are offered $5,000 to adapt a course to the online medium.

In other words: no mandates, just incentives. Colleges get to keep 60 percent of what the university makes in tuition revenue from the online students enrolled in the summer programs for those colleges. In the College of Arts and Sciences, departments get to keep half of what the college makes from the online students enrolled in that department's courses. The idea is to give departments control over which of their courses go online, and let them share in the rewards.

And officials there say it is working — not just for the usual suspects in math and science or professional fields, but in humanities departments, too. Mark Kornbluh, a history professor and dean of the College of Arts and Sciences, says that biology (Kentucky's leading major) put the most courses online last summer, but the anthropology, sociology, philosophy, geography, and modern and classical languages departments all took the opportunity to create online courses — 20 altogether from these departments — and each department netted about $20,000. They will be able to use that additional cash on travel, speakers, and department events, Kornbluh says. They are planning more than 40 courses next summer.

Of the college's 16 departments, only one (which Kornbluh declined to name) did not create an online course. "They were told that the other departments earned some money doing this, but they weren't punished," says Kornbluh. That department is planning to add two online courses this summer.

Kentucky currently is limiting the revenue-sharing program to summer courses (which enroll mostly traditional students who are already enrolled at the university), though it is "cautiously" looking to bring it into the fall and spring semesters. The goal of the online push is to give Kentucky students extra opportunities to complete crucial courses they might have failed or skipped during the fall or spring; hence the university is especially encouraging faculty to adapt "bottleneck" courses — i.e., courses students need to pass to advance along a degree path.

Encouraging, but not commanding. The crucial difference between Kentucky's tack and that of some other public institutions, Kornbluh says, is that it involves no overtures from on high warning departments that they must increase enrollments (presumably by going online) or face possible cuts — an approach that has created tensions at the Minnesota State Colleges and Universities system. With state budgets tight, many public higher education systems view online teaching as a way to bolster shrinking allocations with extra tuition dollars, and online is viewed as the best way to enroll more students quickly without having to buy land and build classrooms.

Kornbluh also draws a contrast with the strategy employed by the University of Illinois, which sought to create a separate online entity (the now-defunct "Global Campus") and eventually alienated many of its faculty. "The reason we were successful is that we worked with the faculty and with the departments," he says. "So this wasn't something imposed from above as a moneymaking operation."
James Grossman, executive director of the American Historical Association, says using carrots in lieu of sticks in order to grow online programs will most likely result in higher-quality online courses. "People are more creative when they're doing something they want to do than when they're doing something they're forced to do," Grossman says.

"A lot of people just aren't cut out for online teaching," says Jean Stuntz, a history professor at West Texas A&M University and president of H-NET, an association of humanities scholars who advocate for the Web as an academic resource. "And this might encourage the ones who are to at least explore and try it out."
The college also shoulders the development and infrastructure costs of creating the online courses. Hence there is no incentive for departments to throw together low-cost online courses in order to maximize their cut of the revenue, Kornbluh says.

"Our pressure on the departments was, how can you serve general education better, and how can you serve your majors better," he says. "If this works, you can get rewarded, and if it doesn't work, you shouldn't be doing it! And that's the same thing I tell them about their in-person courses, to be honest."
For the latest technology news and opinion from Inside Higher Ed, follow @IHEtech on Twitter.
— Steve Kolowich

http://www.insidehighered.com/news/2010/12/21/university_of_kentucky_rewards_professors_for_teaching_online

Throwing the Book at China

The author of "China in the 21st Century: What Everyone Needs to Know" examines the current crop of books aiming to open Western eyes to China in this "post-post-Cold War Era."
By Jeffrey Wasserstrom

A look at 2010 books that examine China's rise, and whether is should cause nightmares.

"Sweetie, are you having nightmares about the Chinese again?" — Cartman's mother to her son, in an October 2008 episode of South Park *that begins with Cartman frightened by a dream featuring the drummers from the opening ceremony of the Beijing Olympics.*

A funny thing happened on the way to the close of the 21st century's first decade. We started to hear less and less about the "post-Cold War era" from brand-name columnists, high-profile pundits and Foreign Affairs contributors (hardly mutually exclusive groups, of course), and more and more about a new period taking shape.

There isn't yet an agreed upon name for this new age — though a pair of strong candidates are suggested by the title of Fareed Zakaria's latest book, *The Post-American World* and Timothy Garton Ash's recent allusions to "our increasingly post-western world" in his commentaries — so for now just calling it the "post-post-Cold War Era" will do. Two things about the period are already clear. China's rise is shaping it. And as it unfolds, it is not just the makers of irreverent animated shows who are asking whether it's sensible to be having nightmares about the Chinese — again.

That last word is crucial. Dark dreams about China have a long history, stretching back a century (Jack London's *Unparalled Invasion*, a tale of a future conflict between Chinese and Western forces, appeared in 1910) and indeed further (the Boxer Uprising inspired a wave of Sinophobia in 1900). In light of this, as 2010 comes to a close, it's worth taking stock of how the latest books on China's rise come down on the issue of whether Cartman (who is sure the Chinese are out to get him and are "gonna take down America") or his mother (who tells him he's being foolish) is right.

The first thing to note about recent books on post-post-Cold War realities is that some bear the stamp of old ways of thinking. This is to be expected, for influential frameworks often have long half-lives. So it shouldn't surprise us to hear both faint echoes of Cold War-era Red Menace rhetoric and much stronger echoes of 1990s-style "Clash of Civilizations" fear-mongering in former Nixon staffer turned policy analyst Stefan Halper's *The Beijing Consensus: How China's Authoritarian Model Will Dominate the Twenty-First Century*,

one of the most pessimistic as well as most stolidly written of this year's China books. Nor is it odd that there are moments when MIT political scientist Edward Steinfeld's much better *Playing Our Game: How China's Rise Doesn't Threaten the West*, one of the best efforts to calm Sinophobic tendencies, starts feeling like a sophisticated reboot of Francis Fukuyama's 1989 "End of History" fairy tale of global convergence around Western norms.

Among recent books on China's rise that leave old approaches behind more decisively, a particularly engaging entry into the list is *The End of the Free Market* by Ian Bremmer, founder of the Eurasia Group investment consulting firm. It's a bracing and illuminating read, even if, like me, you remain much more skeptical than the author is about the virtues of relatively unfettered capitalism. The book's strengths include Bremmer's witty, fast-paced writing style and refreshing insistence that we avoid the temptation of thinking that today's China is similar only to other places that are either run by self-proclaimed communists or shaped by Confucian values.

His chief concern is with how much or little involvement a government has in the economic life of a country, for the puzzle he wants to solve is why, after a period when privatization and retreat from central planning seemed the order of the day, "state capitalism" has made such a strong comeback. This leads him to place China, where state-owned enterprises and state-funded development drives remain important, into the same category as Russia (which is no longer run by a communist party) and Saudi Arabia (which has never been influenced by Confucian values), treating all as examples of the kinds of "state capitalist" nations that differ markedly from free market ones like the U.S.

In the end, in terms of the debate limned in *South Park*'s inelegantly named "The China Probrem" episode, Bremmer comes down, albeit cautiously, on the side of the sanguine Liane rather than the fearful Cartman. For despite his book's title, Bremmer does not think the days of the free market are numbered. He is confident that, if the Washington responds appropriately to China's challenge (and he gives specific examples of what to do: e.g., keep military budgets robust and don't "close the door on immigrants"), the "Beijing Consensus" will remain just a nighttime specter, not become a daily reality.

And, he writes (page 183), "it's much more likely that the Chinese leadership," now addicted to high growth rates to retain its legitimacy, "will have to reconsider core assumptions about government's role in an economy than that leaders in the United States will retreat fundamentally from free-market principles."

The American-born and American-trained but now Oxford-based historian Karl Gerth's *As China Goes, So Goes the World: How Chinese Consumers are Transforming Everything* also moves beyond Cold War and post-Cold War approaches, but in a very different manner that leads him to conclude that there's something to fear about China's rise — just not Beijing's plans or capacity for world domination. The author's main point is simple: China's embrace of consumerism is the most important phenomenon to keep our eye right now, since it affects so many things and has the potential to cause so many problems.

Fascinated by how much the country has changed since the mid-1980s (when he first visited), Gerth peppers his account with then-and-now vignettes that enliven his narrative and highlight the rapidity of China's transformations. The result is an informative set of quick sketches of everything from the proliferation of convenience stores, to the declining use of bicycles, to the increased flow of goods, fashions and people between Taiwan and the mainland (something that, he argues, is reducing the chance of a future cross-straits war).

Gerth also discusses the shift in the PRC from worrying about famine to worrying about obesity — a subject that is the main focus of another noteworthy recent book, Paul French and Matthew Crabbe's *Fat China: How Expanding Waistlines Are Changing a Nation*.

As China Goes gets repetitious at times and Gerth is given to overstating the novelty of some of his assertions. For example, at the start of a nicely done but hardly first-of-its-kind discussion of the change from reusable to disposable chopsticks, he mentions the "often overlooked environmental implications of China's new consumer lifestyles." Perhaps the issue has been downplayed by economists interested only in how growing Chinese middle class tastes for foreign goods could help Western companies, but it's hardly been "overlooked" by others. Jonathan Watts of the *Guardian*, for example, has published many articles on the subject in recent years and has a good book out now (part travelogue and part ecological cautionary tale) that looks closely at the topic, *When a Billion Chinese Jump: How China Will Save Mankind — Or Destroy It*.

Still, *As China Goes* is a valuable book, since it hammers home effectively a truly important point. Namely that, while it was the seemingly endless lines of Chinese drummers drumming at the start of the Olympics that

haunted Cartman's dreams, it is visions of more and more Chinese drivers driving that should engender the concern of those of us living not in the imaginary world of *South Park* but a real one of finite resources. This reminds us that, while Sinophobia has a long history, at least one thing is novel about post-post-Cold War anxieties regarding China. In earlier periods, the assumption in the United States was always that, while some things going on in China might worry us, we could place our hopes in one kind of group of Chinese citizens: those who had already converted or might convert to our ways. If only, this traditional logic went, more Chinese would become Christians (the early version of the dream) or more Chinese would become democrats (the 2.0 variant), all would be well. Now, by contrast, the most legitimate fear linked to China may be the potentially catastrophic results of a large number of residents of the PRC becoming more like us by embracing not one of our religions or our political system but our wasteful consumerist ways.
Jeffrey Wasserstrom is chair of the History Department at the University of California, Irvine, and the author, most recently, of China in the 21st Century: What Everyone Needs to Know *(Oxford University Press, 2010).*

http://www.miller-mccune.com/politics/throwing-the-book-at-china-26241/?utm_source=Newsletter140&utm_medium=email&utm_content=1221&utm_campaign=newsletters

Next They'll Tell Us Germs Can Dance

Researchers discover very specific patterns in the movement of bacteria, which has important implications for the treatment of infections.

By Matt Palmquist

Researchers say bacteria are capable of "standing up" and moving while vertical. (Petrovich9/istockphoto)

Anyone who's ever visited a male collegiate dorm room can testify to the amazing properties of bacteria, but not even the guys in *Animal House* could have seen this one coming: Bacteria can stand up — *gulp* — and walk around.

University of Notre Dame researcher Joshua Shrout, co-author of a new study with UCLA scientist Gerard Wong in the journal *Nature*, reports that he and his colleagues have observed very specific patterns in the movement of bacteria, which has important implications for the treatment of infections.

"The significance of the work is that we show bacteria are capable of 'standing up' and moving while vertical," Shrout said in a press release announcing the findings. "The analysis methodology developed by Gerard's group made this observation possible. They developed a computer program to analyze time-lapse data series, just like those showing plant development that you watched on PBS as a kid, of bacterial motion on surfaces. By tracking thousands of bacteria for minutes to hours, the stand-up walking pattern was observed and verified to occur with some frequency."

All of which raises the question: There used to be a show on PBS about time-lapsed plant development? Can't imagine why it would have been canceled.

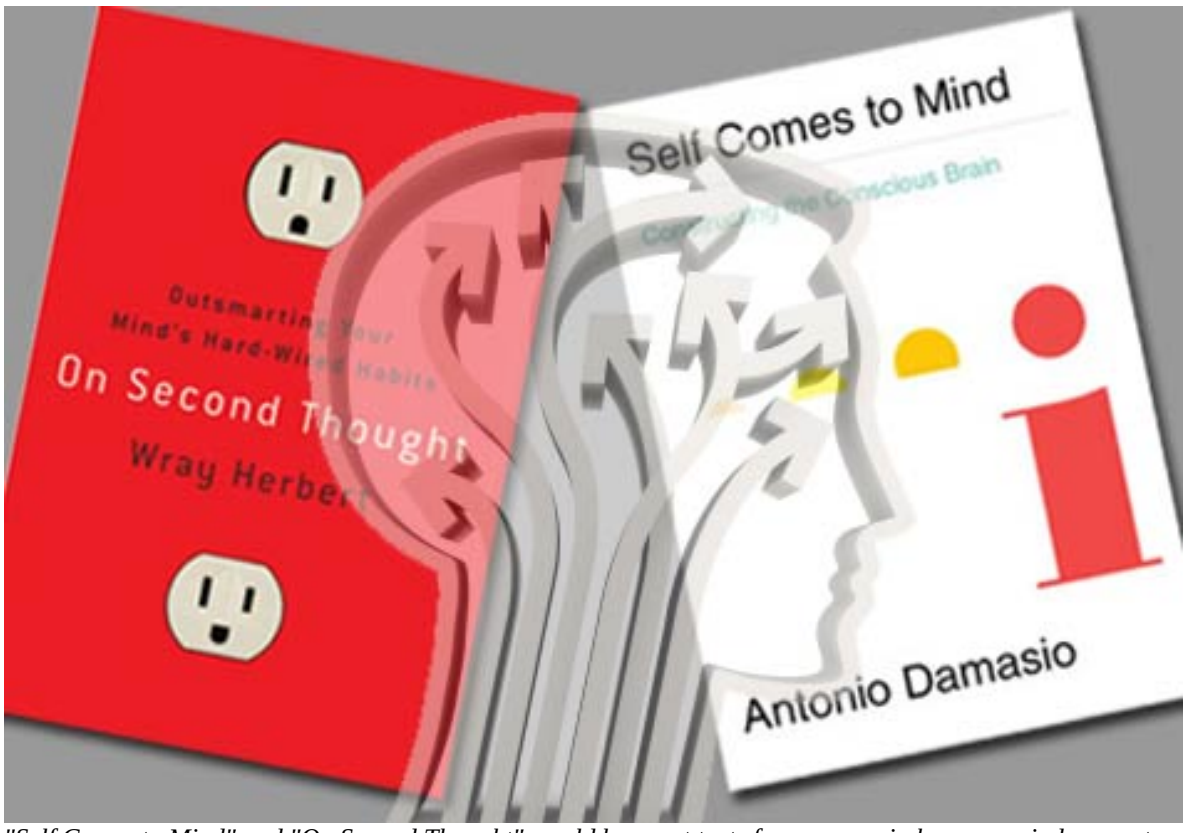
The Cocktail Napkin appears at the back page of each issue of Miller-McCune *magazine, highlighting current research that merits a raised eyebrow or a painful grin.*

http://www.miller-mccune.com/science-environment/next-theyll-tell-us-germs-can-dance-26366/

Your Brain: A User's Guide

New books "Self Comes to Mind" and "On Second Thought" examine the origins of consciousness, and the unconscious pulls that influence our behavior.

By Tom Jacobs



"Self Comes to Mind" and "On Second Thought" would be great texts for a course in how our minds operate. (pavlen/istockphoto)

In light of recent research into the workings of the mind, personal responsibility is threatening to become a casualty of science, and free will is looking like a frighteningly fragile construct. Our carefully considered decisions often turn out to be rationalizations for conclusions we have already come to on an unconscious, emotion driven level.

Renowned brain researcher Antonio Damasio and veteran science writer Wray Herbert each address this accountability issue in their newly published books, and both come to the same conclusion: We're not off the hook. Herbert insists "we are capable of catching ourselves in the act" of being driven by instinctual impulses that are harmful to ourselves or others, while Damasio decries "our insufficient education of unconscious processes."

It's clearly time to revise the curriculum — at the college level and, arguably, far earlier — to include a mandatory exploration of how our minds operate. Any introductory course in the subject would impart a basic understanding of how our mental, emotional and physical selves interact and why some thoughts and feelings rise to consciousness while others do not. Damasio's *Self Comes to Mind* and Herbert's *On Second Thought* would make excellent, highly readable texts for such a course.
Damasio, director of the University of Southern California's Brain and Creativity Institute, uses his book to lay out a framework for how and why consciousness developed in humans. His central argument, based in

evolutionary biology, is that "a brain exists for managing life inside a body." Mind, body and emotions are intricately interconnected in a way that keeps the organism functioning efficiently; to use Damasio's bumper-sticker summation, "Body and brain bond."

"The defining aspect of our emotional feelings is the conscious readout of our bodily states," he writes. If that sounds familiar, think back to William James, who wrote in 1884 that bodily sensations lead directly to emotional states. Damasio explains that James — who, to be fair, lived a century before the invention of fMRI brain scans — was mistaken in his belief the mind is bypassed in this process: We now know that some measure of appraisal takes place between sensation and emotion. Nevertheless, his basic notion of a "body loop mechanism of feeling" rings absolutely true today.

"Can there be consciousness without feelings?" Damasio asks. "The answer is no." Sorry, Monsieur Descartes: We feel, therefore we are, and these emotional responses are biologically based. The creation of consciousness remains "a ceaseless source of awe," but its origins are clear enough: It evolved because it enhanced our survival prospects. When we're cold, the unconscious mind promotes our physical well-being by triggering a shiver; the conscious mind builds a structure and then closes the door.

Self Comes to Mind is often an exhilarating read. Not unlike Carl Sagan, Damasio is clearly excited by the findings he describes, and the thrill of discovery shines through his fine, clear prose. (His many music metaphors are both colorful and helpful in aiding our understanding.) He becomes a bit hesitant when discussing the unconscious mind, which by definition is hard to probe, but he acknowledges the role it plays in everything from racial prejudice to failed diets and believes that lawyers, judges, legislators, policymakers and educators all need to acquaint themselves with the current research on how unconscious thought affects our behavior.

One enjoyable way to make such acquaintance is to read On Second Thought. Herbert, a former chief editor of Psychology Today who now blogs for the Association for Psychological Science, has compiled a fascinating summary of recent studies on unconscious drives and the behaviors they evoke. (I wrote about several experiments he mentions for this magazine and its website.) His organizing topic is heuristics, which he defines as "cognitive rules of thumb, hard-wired mental shortcuts that everyone uses every day in routine decision making and judgment." Confirming James' wisdom yet again, many such heuristic responses are based in our body's everyday experiences.

Take the concept of momentum. In the physical world, it's quite real, and because we feel that reality in our bones — or, more accurately, our neurons — we apply it liberally, to political campaigns, sports teams, you name it. Win three hands at poker, and you'll probably feel you're on a streak — a belief that can cost you dearly when the odds inevitably catch up with you.

That cautionary tale reflects Herbert's overarching theme: The use of heuristics is inevitable (given the way our brains evolved), essential (if our mind didn't operate on autopilot much of the time, we'd never make it through the day) and dangerous (such as when we think in terms of stereotypes as a way of conserving mental energy). As Shankar Vedantam, another excellent writer on this topic, recently observed, it's perfectly understandable from an evolutionary perspective that we would conflate Muslims with terrorists. But that evolutionary basis doesn't make racism OK.

Herbert covers a lot of ground, and his once-over-lightly approach works better in some cases than others. His quick examinations of how deep-seated emotions inform various systems of morality, and the way repressed fears of death feed aggressive impulses don't do justice to those very important topics (although if they point readers to the writing of Jonathan Haidt and Ernest Becker, they'll have done a real service).
Herbert's at his best when explaining phenomena such as the "anchor heuristic" — the tendency for puzzled people to make an educated (or uneducated) guess about a subject, and then move outward from that spot in search of the actual answer. "A person's original anchor exerts a kind of cognitive drag on the mind as it tries

to adjust," he writes. Our refusal to believe we could have been that far off initially makes it harder for us to find, or accept, the truth.

So how do we counteract these deeply embedded dysfunctional impulses? Herbert's one-word answer is "thoughtfulness." "We can do this," he insists. "We are capable of detecting what our automatic brain wants to do and either affirming or trumping that impulse." Those fatalistic ancient Greeks would presumably disagree, but Damasio is fully on board: He views our capacity for "flexible self-reflection" as "the next momentous event" in human evolution.

Damasio concludes his volume by introducing the lovely concept of "sociocultural homeostasis." He argues that, just as the various parts of the brain and nervous system work together to ensure optimal operation of the body, humanity has evolved in ways that keep societies operating harmoniously. He points to the development of religion and the arts, both of which use storytelling to help spread wisdom.

He may be a tad idealistic. If the climate scientists are right, we're endangering the environment that sustains us, and our ingrained mental patterns — including the heuristic that limits our sense of danger to immediate, palpable threats, allowing us to ignore slowly developing crises — are failing to prompt needed action. On this, as on so many other subjects, it's time to hit the override switch. Damasio and Herbert helpfully show us where it's located and how to activate it.

http://www.miller-mccune.com/science-environment/your-brain-a-users-guide-26353/

Art and Alzheimer's: Another Way of Remembering

How the life and death of the Chicago painter known as Hilgos helped bring art — and a better quality of life — to Alzheimer's patients.

By Robert Whitcomb

Hilda Goldblatt Gorenstein, center, paints alongside art students. (Courtesy Berna Huebner)

In 1995, painter Hilda Goldblatt Gorenstein — whose nom d'art was "Hilgos" — was placed in a Chicago-area nursing home because of steadily worsening dementia. Lawrence Lazarus, then a Chicago psychiatrist specializing in treating the elderly, remembers that she was withdrawn and sometimes agitated — so much so that Lazarus, a former president of the American Association for Geriatric Psychiatry, prescribed a mild tranquilizer. She had stopped painting several years earlier, as she entered the great isolation booth that is Alzheimer's.

But one day her daughter, Berna Huebner, asked her mother if she'd like to paint again. Gorenstein responded in a surprising way. "I remember better when I paint," she said.

Huebner quickly told Lazarus, who suggested that she contact the School of the Art Institute of Chicago (which Gorenstein had attended in the 1920s) to hire art students to work with the elderly artist. This was a somewhat unorthodox thought; although art therapists had for years worked with people with Alzheimer's, using artists without training in therapy, not to mention very young ones, was something else.

The first student in the project was Jenny Sheppard, who worked for some weeks trying to lure Gorenstein back into painting. But the elderly woman stayed withdrawn and silent, and nursing-home officials, who were dubious about having art students working in the facility at all, were not encouraging. One told Sheppard: "You're wasting your time. The lights are either on or they are off, and with Hilda, they are definitely off."

Yet, in time, Gorenstein did pick up a brush and complete her first painting in a decade — wavy, brightly colored lines and the intriguing words "The Hidden Hour." But then she stopped painting again.

Sheppard persisted, but after several months, the young student was ready to give up. As Sheppard was leaving one day, Gorenstein, out of the blue, beckoned to her with her notably long fingers and said: "I've never had something like this, you know, so let's just keep it this way."

On Sheppard's next visit, Gorenstein resumed painting. And over the next three and a half years, Gorenstein would create hundreds of watercolors. Many had strong representational aspects, especially those with the

nautical themes she had long specialized in. But others were deeply abstract and sometimes mysterious — lines and circles in bright colors.

Sheppard was the first of several Art Institute students over those three and a half years to work with Gorenstein. Another, Jane Benson, now a sculptor in New York, told me that the artist became "transformed when she was painting" — although Benson said she couldn't know how much of this carried over when she left her brushes and went downstairs to her room.

Would it have been better if the students had had art therapy training? Timothy Daly, another Art Institute student who worked with Gorenstein, told me, "If I had some training in art therapy, it would have given me more insight into what might be happening [neurologically] and how I could take this energy further. … I felt like I was a family member who was interacting with his grandmother by means of painting together."

John Zeisel is a sociologist who runs Hearthstone Alzheimer's Care, based in Woburn, Mass., and who, with the organization's creative director, Sean Caulfield, has pioneered ways of using the arts to help those with Alzheimer's. He notes that whether a student has training in art therapy may be unimportant to a person who has Alzheimer's, however useful to science the written-down observations of a professional art therapist might be. (Zeisel also is the author of *I'm Still Here*, a book that discusses some of these new therapies.)

In any case, Lazarus and all the students I spoke with said Gorenstein tended to be much calmer and more focused when working on her painting with the students. She would even interrupt long silences with banter and advice, such as, "The first thing you think of is the first thing you use." Sometimes the students would have to put a brush in her hand to get her going. At other times, once they had set up her paints and brushes, she would start by herself.

The artist had a highly idiosyncratic way of putting ideas together, drawing on what she saw around her. Another Art Institute student who worked with Gorenstein, Robin Barcus Slonina, said the elderly artist named one of her vivid watercolors "Jewel Distilled" — after she saw a bottle of distilled water from the Jewel food store.

Huebner was overjoyed to see her mother's improvement and began to educate herself about Alzheimer's and its treatment. The Art Institute, its art therapy department and the school's chancellor, Tony Jones, became her allies. In 1998, after some months of rapid decline, Hilda Goldblatt Gorenstein died at almost 94, ending her very-late-in-life artistic re-flowering.

After her mother's death, Huebner created a nonprofit organization, the Hilgos Foundation (hilgos.org), to promote the arts among people with Alzheimer's. With quiet relentlessness, she signed up members of her international network of friends to help reach out to arts, medical, social service and other organizations.

She has quite a network. A small, soft-spoken woman in her late 60s, Huebner has had a long public life that included stints as research director for former Vice President and New York Gov. Nelson Rockefeller and as the chairwoman of nonprofit organizations in various places, including Paris, where she and her husband have lived full- or part-time since 1979.

The initial mission of the new Hilgos Foundation was to raise money to pay students from the Art Institute to work with Alzheimer's patients, but it has since come to encompass a public education role as the disease becomes an ever larger problem for a society with lengthening life spans. Students in the Hilgos project, in which four "Hilgos scholars" participate each academic year, have served more than 100 people with Alzheimer's.

Huebner has drawn on the growing recognition by neurologists and other experts that, as Dr. Robert Stern of the Boston University School of Medicine told me, "participating in art, including music, can stimulate emotions that engage parts of the brain that are less damaged in the earlier stages of the disease." A colleague of Stern's at Boston University, Dr. Robert Green, expanded on the notion: "It's fascinating to see how art can let you access the hidden talents of people with Alzheimer's disease. There's a lot more going on with these patients than you'd expect. … Art projects might stimulate people, help them experience the world more fully and give them pleasure."

All the doctors I spoke with said that improved drugs to combat Alzheimer's might be some years away, but meanwhile, the arts, both participatory and more passive (such as visiting museums and listening to music), can play a role in maintaining a higher quality of life for patients. A number of experts referred to heightened "sense memory" or "body memory" when trying to describe what happens to some Alzheimer's patients when they work on art.

So far, about 40 Hilgos scholarships have been awarded. Huebner hopes to widen the project by getting other art schools and professional caregivers in the U.S. and Europe to set up cooperative programs similar to what she established in the Chicago area.

While expanding her mission to include public education about Alzheimer's, Huebner got into the movie business. In 2002, she gave a talk on the Hilgos project in Paris, attracting the attention of a friend, Mary Louise Stott, a public relations executive who was also a friend of French film director Eric Ellena. Stott later introduced Huebner to Ellena, who had been looking for new documentary ideas.

Thus was born *I Remember Better When I Paint*. The movie, made in 2008 and 2009, was co-directed by Ellena and Huebner. Using Gorenstein's story as the impetus, the film dramatizes the challenges presented by the Alzheimer's epidemic and medical, psychological, sociological and art-based approaches to dealing with it. It's a mix of personal stories and science, crisply narrated by then-93-year-old movie star Olivia de Havilland (of *Gone with the Wind* fame). The film includes an emotional interview with Yasmin Aga Khan, movie star Rita Hayworth's daughter; Hayworth developed early-onset Alzheimer's and also painted.

Using scenes of Gorenstein and other elderly people creating or simply experiencing visual and musical art; interviews with neurologists and other health care professionals; and visits to senior centers, nursing homes and museums in the U.S. and France, the film is a quietly moving and sometimes drolly funny exploration not only of Alzheimer's treatment, but also of the very nature of human consciousness and memory. Besides the main movie, a DVD includes seven short features on specific creative therapies for Alzheimer's. Huebner and her colleagues also put together a resource book for the film, *I Remember Better When I Paint: Treating Alzheimer's Through the Creative Arts*, and they plan to publish another book on her mother's experience with the art students.

Lazarus says that as good as art therapies may be, they will not work for every patient. Families need to educate professional caregivers about the personal histories of Alzheimer's patients, he says. Then caregivers can mine that information for guidance toward therapies that might be effective in drawing on patients' remaining intellectual, aesthetic and emotional resources, however hidden they might seem when a patient moves to a nursing home.

Lazarus says he encourages people in late middle age to make videos of themselves talking about their lives and histories, so caregivers can later be aware of and appeal to patients' strengths and interests. Another therapy, presented in the film by geriatric psychiatrist Gene Cohen, is "Making Memories Together," a noncompetitive board game that people with memory disorders can play with their caregivers, thereby transferring knowledge about their personal histories.

While society awaits more neurological research and better pharmaceutical approaches to Alzheimer's, the arts can help alleviate some of Alzheimer's most challenging symptoms, help maintain patients' dignity and sense of worth and bring meaning to them, their families and friends. As Samuel Gandy, associate director of the Mount Sinai Medical Center Alzheimer's Research Center in New York, puts it: "Alzheimer's typically hits memory areas of the brain early, while sparing areas responsible for creativity. Art and music are perfect modalities for stimulating these creativity areas."

http://www.miller-mccune.com/health/art-and-alzheimers-another-way-of-remembering-25996/

More Can Also Be Less in Medical Effectiveness

The president of the Center for Advancing Health argues we need a more complete public discussion about comparative effectiveness research, not only for innovative therapies but for the standard ones, too.

By Jessie Gruman

Most of us remain unaware that the evidence base for much of the current practice of medicine is so spotty. (AlexRaths/istockphoto)

When the public turns its attention to medical effectiveness research, as Miller-McCune.com did earlier this fall, ("For Dying Cancer Patients, Geography is Destiny") a discussion often follows about how this research might restrict access to *new* medical innovations. But this focus obscures the vital role that effectiveness research will play in evaluating *current* medical and surgical care.

I am now slogging through chemotherapy for stomach cancer, probably the result of high doses of radiation for Hodgkin lymphoma in the early 1970s, which was the standard treatment until long-term side effects (heart problems, additional cancers) emerged in the late '80s. So I am especially attuned to the need for research that tracks the short- and long-term effectiveness — and dangers — of treatments.

Choosing a surgeon this September to remove my tumor shone a bright light for me on the need for research that evaluates current practices. Two of the three surgeons I consulted wanted to follow "standard treatment procedures" and leave a 6-centimeter, cancer-free margin around my tumor. This would mean taking my whole stomach out, because of its anatomy and arterial supply.

The third surgeon began our consultation by stating that her aim would be to preserve as much of my stomach as possible because of the difference in quality of life between having even part of one's stomach versus none. If at all possible, she wanted to spare me life without a stomach.

But what about the 6-centimeter margin? "There isn't really much evidence to support that standard," she said. "This issue came up and was discussed at a national guidelines meeting earlier in the week. No one seemed to know where it came from. We have a gastric cancer registry at this hospital going back to the mid-1990s and we haven't seen support for it there, either. A smaller margin is not associated with an increased risk of recurrence."

I agonized about different types of uncertainty, which I realize is embedded deeply in many medical diagnostic and treatment decisions, but which most of the time I don't have to confront quite so personally.

Then I decided to work with the surgeon who was guided by the evidence (and lack thereof) rather than the "accepted standards" for surgical treatment.
Here's why: The standard radiation treatment for Hodgkin lymphoma that probably resulted in my current stomach cancer has been shown to be overly aggressive and harmful. If at all possible, I did not want to experience the effects of another unnecessarily aggressive medical procedure, one that for years has been the accepted standard but for which little evidence yet exists.
Most of us remain unaware that the evidence base for much of the current practice of medicine is so spotty. Some of the drugs and technologies we use to keep us upright and free of pain do indeed help us, but some of them may make no difference and some may do us serious harm. We believe that our physicians wouldn't recommend them if they weren't effective. We remain optimistic that advances in medicine will be even better in saving our lives. And so we resonate with media messages that focus on the impact of comparative effectiveness research on new approaches to care: messages that don't undermine our trust in current medical practice, but often do make us question our access to more and better treatments in the future.
My experience reminds me of how little the public understands about comparative effectiveness research. We need to realize that:
• Such research determines not only how well new treatments work, but more importantly, which among standard treatments works best and should remain the dominant approach, and what causes harm and should change.
• Producing such evidence is only the first step in changing a given clinical practice; informing clinicians and supporting widespread adoption of a new approach is no small challenge.
• The evidence for different treatments can and should be a topic that patients and doctors discuss together, difficult though that discussion may be for all parties.
• We — patients and families — are the major stakeholders in the comparative effectiveness research enterprise. Such research is not done by white-coated lab scientists. Rather it is done with, to, and for us: we must actively participate in clinical trials and other types of research if we and our kids and grandkids are going to benefit from the best available care.
Sure, the effect of comparative effectiveness research on new developments in medicine is important. But those concerns constitute only one small part of a much larger, more important public discussion about what it is going to take to develop, identify, provide — and to understand — the evidence to support decisions we make with our doctors to improve the length and quality of our lives.

http://www.miller-mccune.com/health/more-can-also-be-less-in-medical-effectiveness-26028/

Tracking Racial Identity, But Not Defined by It

By HOLLAND COTTER

Erik Jacobs for The New York Times

BOSTON — A spin of the marketing wheel has brought abstract painting back into the spotlight, and much of the new stuff turns out to be rewrapped old stuff. At the same time there are enough artists seriously rethinking existing models that very basic definitions — What does abstract mean? What qualifies as painting? — are in flux. Mark Bradford, a 49-year-old Californian, is one of these rethinkers, and a lean, bright 10-year survey of his work at the Institute of Contemporary Art here gives a sense of what he's been up to.

Mr. Bradford first gained national attention in 2001 in "Freestyle," the self-designated "post-black," new-talent survey at the Studio Museum in Harlem. He was one of the oldest people in the show, but his art looked fresh, and it came with an intriguing history. He had a graduate degree from the California Institute of the Arts, known for its theory-intensive curriculum. But he supported himself as a stylist in his mother's beauty salon in South Central Los Angeles and used hairdressing supplies — curling paper, gels — in his art, the large abstract collages that he called paintings.

One of the pictures that was in the Studio Museum show, "Enter and Exit the New Negro," opens this retrospective. With its all-over linear grid and monochromatic silver-gray tone, it immediately brings to mind Agnes Martin's graphite-line-and-wash paintings. But Mr. Bradford used neither paint nor drawing to make it. Instead he composed a grid from many small sheets of translucent, dark-edged paper arranged in rows on canvas. The paper is the kind used to wrap strands of hair for perms.

He bought it in bulk and lightly singed stacks of it with a blowtorch to get the dark edges, which form the grid lines. He then glued the sheets in place with gel, occasionally pausing to digitally photograph the grid-in-progress. He printed the photos and glued them to the canvas too, to create an effect of deep layering.

The title he chose added yet another unorthodox layer in the form of political content. In 1925 the African-American philosopher Alain Locke, a shaper of the Harlem Renaissance, told black artists to advance themselves by adopting modernist forms that would move them beyond racial stereotypes. Mr. Bradford's art

takes Locke's idea and flips it around by creating modernist abstraction from everyday materials of black culture.

Soon afterward, in search of more painterly effects, Mr. Bradford began to experiment with color. For a 2002 picture, "Strawberry," he scavenged advertising posters, most of them printed in Day-Glo orange and yellow, from the poor, crime-plagued neighborhood around his mother's shop. He cut the posters into scraps, glued them down, and laid the translucent papers on top, so the colors showed from behind. The paintings radiated a kind of ethereal warmth even though everything about them was straight from the city street, including the title. Strawberry is slang for a female crack addict who supports her habit through prostitution.

Mr. Bradford's art is of and about cities, the main one being Los Angeles, where he grew up black and gay in an era dominated by hip-hop, identity politics and AIDS. He lived in South Central until he was 11, then in a largely white neighborhood, and finally returned to where he started from, and stayed. After his mother retired, he turned the beauty salon into the studio that he still uses.

Los Angeles appears in his art primarily in the form of the quick-and-dirty printed posters that he routinely harvests in South Central. Most are ads for credit cleanup businesses, or DNA testing to establish paternity, or other services directly geared to social and economic realities of a particular place and time. Long after he stopped using the perm end papers, he continued to cover his surfaces with cut, torn and shredded poster paper, each scrap the equivalent of a paint stroke.

In a large piece called "Scorched Earth" hundreds of tiny cut-up papers are carefully lined side by side to suggest the buildings or blocks of a city seen in aerial view. Much of the center of the city, however, is bare of such structures, and ash black as if smoldering. And, in an addition rare for this artist, the top third of the piece, representing the sky, is covered with paint, fiery red.

Mr. Bradford made "Scorched Earth" in 2006 as a response to the American war in Iraq. But the precise reference he had in mind was to another war, one that had occurred almost a century earlier, in 1921, on United States turf, when mobs of white men torched an African-American neighborhood in Tulsa, Okla., after rumors spread of an assault on a white woman. Technically "Scorched Earth" is abstract. Nothing in it actually identifies a historical event, but everything speaks of cities, violence and fire.

Several other pieces in this show were inspired by a more recent urban catastrophe, the devastation of New Orleans by natural disaster and governmental neglect. In 2008 Mr. Bradford spent time there working on a temporary public sculpture — an ark built from scrap materials in the flood-flattened Lower Ninth Ward — commissioned for the city's new contemporary-art biennial, Prospect 1.

The only evidence of the sculpture in the retrospective comes in the video "Across Canal," which documents its construction. But the sight of what amounted to an immense three-dimensional collage being fitted and hammered together gives a sense of how labor intensive Mr. Bradford's art is, and how formally versatile his career has been.

The retrospective has several modest-size sculptures that tend to be fairly literal in their political allusions. Race is the unmistakable subject of "Crow," and "Kobe I Got Your Back" plays with codes of masculinity. It consists of a basketball covered in black papier-mâché in which a string is embedded in what looks like a fissure, as if the ball were about to split open.

By far the strongest and wittiest of the nonpainting works, though, is the 2005 video "Niagara." It's based on a single famous sequence in the 1953 film of that name, the long-held shot of Marilyn Monroe walking into the distance as the camera focuses on her undulating posterior. Mr. Bradford's Marilyn equivalent is a South Central neighbor, Melvin, who, wearing marigold-colored shorts, walks away from the camera and down the street with a wild, hip-swinging strut. In a departure from the 1953 model, however, Melvin's body is pressed up against the camera when the sequence starts. And he is filmed in slow motion, which transforms his strut into a sensuous sashay.

But it is painting — or Mr. Bradford's collagist's version of it — with all the touching, shaping and editing that clearly engages him most fully. And he does not stand still with it. The most recent pieces, dated to this year, are both some of his densest and his most reductive. Made from multiple layers of inked, bleached and sanded newsprint, they have no apparent narrative subtext; they seem to be entirely about the material allure of their surfaces, alternately bumpy with raised relief and as smooth as watered silk.

Of course "pure" abstraction carries narratives of its own, about making choices and why, as Mr. Bradford is fully aware. If one had to point to bodies of historical painting with which his art is closely aligned, African-American abstraction of the 1960s and '70s would certainly be one. I'm thinking of Alma Thomas's pictures

composed of blocks of color and infused with references to both dressmaking and urban life, and of the sewn, pieced and stained painting-sculpture hybrids of Al Loving, Sam Gilliam and Joe Overstreet, with sources in tailoring and quilting.

I'm thinking of the ways these painters and others, who wanted to avoid being trapped in didacticism — political, ethnic or formal — managed to incorporate their lives and histories into abstraction, often in symbolic ways. Jack Whitten used an Afro comb to texture his surfaces; Ed Clark pushed paint around with a broom; William T. Williams accompanied a solo show of abstract paintings with a jazz soundtrack.

In the 1960s cultural identity and abstract painting were still widely viewed as irreconcilable. As a result many of those abstract artists were insufficiently honored. Today such categorical barriers have pretty much evaporated. Mr. Bradford's retrospective — originally organized by Christopher Bedford for Wexner Center for the Arts in Columbus, Ohio, and coordinated in Boston by Helen Molesworth, chief curator at the Institute of Contemporary Art — is an eloquent demonstration of that.

It is also an instructive example of what "post-black" art means: art that can choose to refer to racial identity — or to class, or gender, or aestheticism, or daily life — or choose not to. Mr. Bradford has opted to tackle the full spectrum of subjects, which is what makes his abstraction feel deep. And he does so to stay on the move, trying this, trying that, hands on, hands off, which keeps his art light and fleet.

http://www.nytimes.com/2010/12/24/arts/design/24bradford.html?ref=design

Spiritual Seeker With a Taste For the Satirical

By KEN JOHNSON

Ginshu Collection
Recommend

Every so often we are shocked — shocked! — to learn that a great artist was not such a great human being. In these disillusioned modern times, we have learned to separate artistic and literary achievement from the artist's moral character. We may admire the works of Tolstoy, Céline, Picasso and Pollock and overlook their failings as people. Still, the fantasy that spiritual and artistic evolution should go hand in hand is hard to give up.

So it is refreshing to encounter an artist who was, by all accounts, a man of transcendent character who made commensurately wonderful art. Such a rare case is that of Hakuin Ekaku (1685-1768), the Japanese calligrapher and draftsman, who is regarded by those in the know as the most important Zen master of the last 500 years. It was Hakuin who came up with the koan "What is the sound of one hand?" to which popular imagination has added "clapping."

Organized by the Zen scholars Audrey Yoshiko Seo and Stephen L. Addiss, "The Sound of One Hand: Paintings and Calligraphy by Zen Master Hakuin" at Japan Society presents 69 of his works. The first retrospective of his art to be seen in the United States, it is an enchanting show.

Hakuin was first and foremost a spiritual seeker and teacher. He began his formal training in Zen Buddhism at 14 and, after much restless travel and numerous experiences of enlightenment, returned at 31 to Hara, the rural village of where he was born, and he became the abbot of Shoin-ji, the local temple. From there his fame as a teacher, lecturer and writer spread throughout Japan. Monks and laymen came from all over to learn his

spiritual practices based on meditation and study of koans, those seemingly nonsensical problems intended to open minds to the true nature of reality, unfiltered by habits of dualistic, abstract thinking.
Hakuin had no formal training in art, and he was 60 before he began to focus on painting. He was no dabbler, though. Art for him was another way to convey his teachings, and by the time he died at 84, he had produced more than a thousand works on paper.
His calligraphy evolved formally from relatively traditional blocks of text to characters made with three- or four-inch brushes that have the immediacy of modernist abstraction. His mostly brush-drawn imagery depicts older masters, landscapes, scenes of daily life and mythological visions with a relaxed yet exacting line and wonderful sensitivity of touch.
There is a gently humorous mood throughout that is reflected in, for example, a picture of sumo wrestling mice observed by a fat monk hiding in a big cloth bag. Portraits caricature revered teachers with gnarly, fiercely expressive faces rendered in crisp linear detail. There is little feeling of technical effort in Hakuin's art. Delightfully free of academic conventions and sentimental piety, its aesthetic freshness matches its vitality of soul.
Some are complicated and extensively worked in accordance with complex symbolism. In one of the exhibition's most beautiful paintings the serene, long-haired bodhisattva Manjusri, a spiritual benefactor drawn in flowing lines, sits in meditation next to a comically ferocious, recumbent lion. Wisdom keeps power in check.
Passages of verse enhance the poetry of many images. In "Vulture Peak," sketchy boats bob on water, and a mountain just beyond has the profile of a giant vulture roughly brushed on it. Characters in the sky read: "If you look up, Mount Washizu" — Vulture Mountain. "If you look down, fishing boats along the Shigeshishi shore."
"As if to say," notes Mr. Addiss in the exhibition catalog, " 'It's all in how you look and what you see, right here and right now.' "
On the other hand, you have to see beyond the surfaces of things. An old blind man with a cane who calls to mind Mr. Magoo confronts a one-eyed goblin and exclaims paradoxically, "I'm not afraid of you —/Since I have no eyes at all/You should be scared of me!" Spiritual insight trumps mere sensory perception.
Hakuin was a master satirist too. A monkey is caught in the act of writing on a wall, "What a strange, demented feeling it gives me when I realize I have spent whole days before the ink stone, with nothing better to do, jotting down at random whatever nonsensical thoughts have entered my head." The charming text quotes from an essay by Yoshida Kenko, a 14th-century priest whose popular, worldly writings Hakuin considered unenlightened.
Deeper meanings underlie the most humble pictures. An image that Hakuin drew multiple times shows an ant on a grindstone. A haiku on the page reads, "Circling the grindstone, an ant — this world's whisper," hinting at a great truth in the inaudible sound of an ant walking. In a separate poem Hakuin elaborated:
An ant goes round and round without rest
Like all beings in the six realms of existence,
Born here and dying there without release,
Now becoming a hungry ghost, then an animal.
If you are searching for freedom from this suffering
You must hear the sound of one hand.
These are still resonant words. Take a break from the clamorous rat race of modern life. Just listen.
"The Sound of One Hand: Paintings and Calligraphy by Zen Master Hakuin" is on view through Jan. 9 at Japan Society, 333 East 47th Street, Manhattan; (212) 832-1155, japansociety.org.

http://www.nytimes.com/2010/12/24/arts/design/24paintings.html?ref=design

High-Tech Electronics Dressed Up to Look Old

By ROY FURCHGOTT

Clockwise from top left, the U.S.B typewriter, the Yeti THX-certified microphone, the BookBook MacBook Pro case, the Crosley portable U.S.B. turntable, the ThinkGeek Bluetooth handset and the Surround-sound X-Tube.

This has been a great year for the next new electronic thing. The iPad, new iPhone, the Nexus S, HTC Evo and other Android phones, the Kindle 3 and Microsoft's Kinect caught the eye of consumers.
But some people prefer their next new thing to look like an old thing. So what's the appeal of the latest electronics wrapped in a retro design, like full-size jukeboxes that are really $4,000 iPod docks and manual typewriters reconfigured to work as U.S.B. keyboards? Has anyone ever said, "It's a nice Ferrari, but it would be cooler if it looked like a covered wagon?"
There are theories: the throwback designs make challenging technology seem familiar. For the technically proficient, an old phone handset that connects to a cellphone seems comically ironic. Retro designs can also give a sense of permanence to disposable devices. Some of it is art.
An example of the phenomena is a manual typewriter refashioned as a computer keyboard. Jack Zylkin of Philadelphia made one as a novel way for people to sign in when visiting Hive76, a Philadelphia communal studio for electronics tinkerers. "I thought it would be kind of a lark," he said. "I didn't realize there was such demand for them." Now he is turning out several typewriters a week, with a two- to three-week lead time for new orders.
Mr. Zylkin says he starts with a typewriter that has been refurbished by a retired Remington salesman, then wires it with a sensor board that recognizes when a key is pressed. It leads to a U.S.B. plug that makes the typewriter work like any computer keyboard. Even if the type bar doesn't hit the platen, a computer will recognize the input, but if you bang the keys hard enough you can make an old-school hard copy on paper while a computer also records your keystrokes.
The typewriters sell for $600 to $900 at the Web site Etsy, although it is $400 if you supply your own typewriter. If you are handy with a soldering iron, you can buy Mr. Zylkin's do-it-yourself conversion kit for $70.

A variation of this theme of fashioning the old into new relies on the smart design of the old Western Electric Bell telephones. Consider the handset. Unlike today's telephone earpieces and cabled headphone and mic arrangements, the large handset put the speaker over the ear and the microphone next to the mouth so bystanders weren't forced to listen to bellowed phone conversations.

The gadget purveyors ThinkGeek have taken that old handset and added Bluetooth so you can have some privacy while connected wirelessly to a mobile phone. The $25 handset can transmit and receive at a distance of about 30 feet from your phone.

Crosley Radio has been making the old new again since the early 1980s when a group of investors bought a discarded radio brand and started cranking out replica radios. The company has replica Wurlitzer-style jukeboxes that play music from CDs or iPods. "What really rolls out the door is the turntables, that has been a runaway train," said James P. LeMastus, president of Crosley.

The company has had a hit with the Crosley AV Room Portable U.S.B. turntable, made exclusively for the youth-oriented clothing chain Urban Outfitters.

The $160 portable player has built-in speakers and an amp, and a U.S.B. connection so it can be used with a computer to turn songs on vinyl records into MP3s. The company makes about 25 styles of turntables, some with iPod docks and CD and cassette tape players and recorders. They can be found at stores including Restoration Hardware, Pottery Barn and online.

The Yeti from Blue Microphones may look like something from the golden age of radio, but it is the first THX-certified microphone, meaning it is capable of high-fidelity reproduction. While it looks as if it belongs on the desk of Walter Winchell, it has three built-in miniature mics that can capture sound three ways: from just in front of the mic, in stereo or from an entire room.

The Yeti works on PCs and Macs and requires no software drivers to work, although there is a free recording program for it in the iTunes store. Good enough to record your band's demo, the $150 mic is also popular with podcasters and VoiP users who want to sound as smooth as Orson Welles.

The X-Tube looks like a vacuum tube from inside an old radio that would have broadcast Mr. Wells. It's really a small processor that plugs into a computer through a U.S.B. connection to produce surround sound for headphones. The warm glow? A blue LED light.

The device processes DTS Surround Sensation software to alter the volume of certain frequencies and add delays to some sounds, all psychoacoustic tricks to fool the brain into perceiving sound as coming not just from left and right, but from the front and back as well. The device, which comes with over-the-ear headphones, isn't easy to find in the United States, but can be ordered from Japan for about $95.

Sometimes, retro designers cloak the electronics in something other than older electronics. Makers of laptop covers usually brag about the high-tech materials they use: high-impact plastics, advanced neoprenes or carbon fiber. Twelve South brags that its MacBook Pro and iPad cases use old-fashioned bookbinding technology. The covers are leather-bound and distressed to look like a collectible volume. The cases have a hard cover on top and bottom, with a zipper around the center to keep your computer secure.

The BookBook covers are priced at $80 to $100, depending on the size of your computer. The company says the covers disguise the device inside and could deter thieves — unless they know that many collectible books are worth far more than the next new thing.

http://www.nytimes.com/2010/12/23/technology/personaltech/23basics.html?ref=design

Faithful to Two Worlds: The Marines and the Artistic Life

By MICHAEL R. GORDON

Chris Gordon for The New York Times

WASHINGTON — He's an artist on his way to his second war, and he wants to make one thing perfectly clear: He is not a Marine who paints, but a painter who fights.

A series of Lt. Col. David Richardson's bold canvases, with their bright colors and geometric themes inspired by Homer's "Iliad," is on view in "Trojan War Years" at the Ralls Collection, a gallery in the Georgetown neighborhood here. The show, through Jan. 29, demonstrates his abstract style, emphasis on color and design, and the considerable influence of his tours of duty in Asia.

But for the last several months Colonel Richardson, 45, has been studying Pashto in preparation for his February deployment to Helmand Province in southern Afghanistan, where he will work with Afghan security forces. It is a logical progression for an officer who has advised the Iraqi Army, devised a plan to help East African nations fight pirates and smugglers, and served for two years side by side with the South Korean military. With his tall, muscular frame and close-cropped brown hair, he looks the part.

By his own account he has long led a double existence. He grew up in rural Michigan, northwest of Detroit, one of seven children, with two artists ahead of him in the family — his mother and his older brother Nathan — and a father who had been a Navy diver in World War II. His mother, a landscape and flower painter in the Impressionist style, took him to art fairs during the summers.

Nathan Richardson has made a career as a sculptor and painter in Germany, while Colonel Richardson, after being accepted into medical school, joined the Marines instead and became an artillery officer. "I was raised on two things," he said during an interview, "the military and art, and I just stuck with it." He keeps his two universes parallel by painting during peacetime assignments between combat tours, leaving his brushes at home in Arlington, Va., when he's in the field.

Colonel Richardson, who has been in the Marine Corps for 19 years, started college on an art scholarship, then switched to biology when he became frustrated trying to develop his artistic vision. After he graduated from Harding University in Arkansas in 1988, his mother encouraged him to paint again. He did and hasn't stopped.

"Art has gotten very much away from what it really is — a kind of personal expression," said John Blee, an art critic in Washington and a painter who has followed Colonel Richardson's work and wrote an essay for the show's catalog. "David's art is against what our times are pushing."

"David is a natural-born colorist, and the 'Trojan War' series is his strong suit," Mr. Blee continued. "It is vivid, intense work. David is an Expressionist. He has found something in 'The Iliad' that works for him and has mined a lot in that."

The oil paintings in the series, with their glowing blocks of colors forming geometric frameworks for additional colors piled on top, bear the names of major figures in "The Iliad": "Hector III — Most Noble of the Greeks and Trojans" shows a field of blue overlaid with green at one point and a pink-and-white checkerboard at another, as if a picnic cloth had been thrown over a portion of the sea. "Ajax" is a waterfall of red, framed by strips of luminescent blue and wider areas of pink and purple.

"I was never interested in painting ugly paintings," Colonel Richardson said. "We often say to the general, 'Here is the bottom line up front.' My bottom line up front is I want to create something beautiful. To me there are enough disturbing and ironic things in life."

In addition to Mr. Blee, who studied with Helen Frankenthaler, Colonel Richardson said he was influenced by Robert Motherwell, Richard Diebenkorn (who also served in the Marines) and Adolph Gottlieb. "They were doing something real big," he said. "It wasn't figurative. It was almost untouchable. There was a bigness to it that I liked with some of the concepts they were taking on. When a person is painting a figure, that is pretty concrete. But when you are doing something like Gottlieb or Diebenkorn or Motherwell, they are trying to capture a yearning or an idea. They are addressing a much larger topic."

Asia also affected his art, especially Japan. "It has a very subtle but alluring culture," he said. "It kind of creeps up on you, and the next thing, you are enamored by the monuments and how the people conduct themselves. I liked it."

During his time in Okinawa as a second lieutenant, and to the amusement of his fellow Marines, Colonel Richardson set up a studio in his living quarters. Prowling the streets of Tokyo he was struck by the stone markers at temples and businesses inscribed in Kanji, the Chinese characters that led to the modern Japanese writing system. They became a visual inspiration for the "Trojan War" paintings.

During a later tour in South Korea he had small canvases made for him by a local carpenter, hauled them back to his studio on his bicycle, painted symbols on the individual squares and then clamped them together to form larger works, part of his "R Series," also at the Ralls. The faint arrows, similar to the directional markings on a tactical map, are one of the rare carry-overs from his military world.

The catalog for the show mentions his travels to Japan and Korea, but at his request never suggests that his military service took him there. In 2006 this reporter spent several scorching days with him and his 11-man team in Anbar Province, when he was an adviser to the Iraqi Army. To his frustration he had watched from the sidelines as a naval R.O.T.C. instructor at George Washington University while his Marine buddies headed for the invasion of Iraq in 2003. He eventually secured a role by volunteering to be a mentor to Iraqi forces.

In Anbar, home to a virulent insurgence, the region had yet to be calmed by the alliance of tribes and American forces, later reinforced by the surge of United States troops in 2007. After fighting alongside the Iraqis in the province's capital of Ramadi — combat that led the military to award Colonel Richardson the Bronze Star for valor — he and his Marines were holed up with Iraqi troops in a dilapidated soap factory in Fallujah. During the long lulls between patrols he never hinted that he had a passion for art.

"It's been pretty compartmentalized," Colonel Richardson said about his two lives, before taking off for his most recent training at Camp Lejeune in North Carolina. "My father taught me to talk the talk. You don't talk about art with the Marines, and you don't talk about the Marines with artists."

http://www.nytimes.com/2010/12/20/arts/design/20colonel.html?ref=design

Culture of Recession? Or Vice Versa?

By MICHAEL KIMMELMAN

Hazel Thompson for The New York Times

BACK in October, when headlines in Britain were all gloom and doom about the pending cuts to public spending, a prominent New York art dealer manning a booth at the Frieze fair in London was grumbling about business. It seemed odd considering that before him stretched a sea of bodies: roaming mobs of ardent 20-somethings and middle-aged flâneurs (not a few of them trying to look 20-something). Dealers schmoozed with art consultants who were collecting info and photographs to send home to clients who might (possibly, perhaps, we'll get back to you, love your stuff, ciao) be interested in buying something.

But not much actual business, so said the prominent New York dealer. Meanwhile Larry Gagosian's people boasted that some collector shelled out $5.6 million for a Damien Hirst, a claim prompting much private skepticism among rival dealers. The spinmeisters of the art market, including fair promoters, are forever making assertions about their commercial conquests that have to be taken on blind faith. Notwithstanding the recession, art-worlders insist smart people still pay good money for great art. (Really? Smart? Hirst?) And then occasionally dealers or even artists themselves are discovered discreetly propping up prices at auction to maintain this rosy notion.

Who's to know the truth? That skeptical New York dealer wasn't the only dissenter. But then, there were all those gawkers, just looking around. The current art world, in the form of art fairs like Frieze, as well as the ubiquitous biennials and other festivals, is without debate succeeding at something now.

It's succeeding at providing relatively cheap forms of mild distraction for ever-larger masses of fashion-conscious people whose budgets cover dinner at PizzaExpress, but not works of art.

Escapism, in other words.

It's not a minor function of culture, in straitened times or flush ones. Britain ended up sparing the arts a cut as deep as others suffered; for the big national art institutions it will be about 15 percent over four years. Arts officials, like Nicholas Serota, the director of the Tate, made ritual lamentations afterward about the unfortunate "sea change" this would bring about, but the government had basically bought their argument

beforehand — that unlike welfare or child care, culture generates revenue. It brings in tourist dollars. It is good public relations for the nation, critical to the future economy. Just how critical is fuzzy math? Museum directors and publicists, like art dealers, are also masters of creative accounting.

But whatever the true figures might be, the money argument clearly trumps squishy pleas for preserving civilization to save the soul of people when trying to bargain with besieged and parsimonious politicians. Especially in austere times, the winning argument is that, business-wise and propaganda-wise, the show must go on.

Is there a culture specific to this recession, as there was to the Depression, a culture in Europe and the United States, at least? Something memorable and distinct that will define the age? Not to belittle the present malaise, but can any recession inspire such a thing in the first place?

Depressions, sure. Wars, definitely. But recession? Granted, the current slowdown and high unemployment figures are grave for many art institutions, especially small ones, without private resources; and it's bad for who knows how many aspiring Jonathan Franzens and Sasha Waltzes and Tacita Deans who decide to steer clear of careers in the arts because they've got to make money, now, and jobs are scarce.

While Wall Streeters still rake in the dough, only a tiny bit of their booty will be passed on to the arts in the form of collecting and charity. So a recession is basically as lousy for many artists as it is for the rest of us.

The recessionary 1970s, for a long time derided culturally, in retrospect produced darkling riches across the board: in film, theater, music, television, fashion, dance, literature and art. But then, besides the oil crisis and runaway inflation, there was Vietnam, Watergate, the cold war and a slew of other soul-shaking events to add to that period's climate of disillusion and unrest, which, in turn, inspired artful responses.

About the present it's just too early to say. And maybe the question's wrong to begin with. Let history sort out what defines this era.

What can be said already is that some things never change. During the 1930s and '40s Americans forgot their cares for a few hours watching William Powell down martinis as "The Thin Man," Cary Grant court Katharine Hepburn in "The Philadelphia Story," Johnny Weissmuller's Tarzan swing from tree branches and Esther Williams paddle around the Aquacade. People lost themselves for an afternoon or evening at Palisades Amusement Park or Coney Island. They laughed at Fibber McGee and Jack Benny and tracked the Lone Ranger on the radio. A beleaguered audience indulged in fantasies of vicarious wealth and in preposterous extravaganzas.

That's pretty much the cultural menu now, no? Movies and "Mad Men" aside, the art world, having become almost entirely extension of the fashion and entertainment industries, offers its own version of bygone Hollywood's outlandish riches and loopy entertainment. Instead of Esther Williams, it's Jeff Koons. Instead of Tarzan, there's Olafur Eliasson. At the same time a universe of computer games, smartphone gadgets and reality television shows have come to replace the Aquacade and the amusement park.

As I said, escapism.

If this were all that art produced, the era's legacy would look dire. But it would also be grim to contemplate the arts being serious and important all the time. We need both Pierre Boulez and Tokio Hotel, Richard Serra and also Turkish soap operas. Some modern Waugh or Daumier or Tati may even now be capitalizing on the delicious way Britons and French played to type in responding to the financial crisis this fall: the Britons initially stiffening their upper lips at word that half a million jobs would be lost and $130 billion in public spending cut; the French taking to the barricades, blocking airports and refineries, shutting down gas stations and schools, just to defy President Nicolas Sarkozy's initiative that the retirement age rise to 62 from 60.

As Anne Applebaum put it on Slate: "And thus did everyone, amazingly, conform to national stereotypes. In an age of supposed globalization when we are all allegedly becoming more alike — listening to the same American music, buying the same Chinese products — it is astonishing how absolutely British the British remain, and how thoroughly French are the French."

Right. And that's the grander truth about culture now: that it has only become more atomized, and impossible to generalize about, because of the very global forces we're told homogenize us today. We react against those forces to assert our own identities. And culture is how, consciously or otherwise, we express those identities.

Recession, double-dip inflation, whatever, that's the essence of art now, and perhaps forever.

There's no escaping it.

http://www.nytimes.com/2010/12/19/arts/design/19kimmelman.html?ref=design

Well-Worn Toys Tell Stories of Times Past

By SUSAN HODARA

Courtesy of Stamford Museum and Nature Center

Stamford, Conn.
AMONG the various playthings in “Dolls, Toys and Teddy Bears,” the holiday exhibit at the Stamford Museum and Nature Center, is a well-worn teddy bear slumped in its glass case. “The bear’s owner grew up in Egypt,” said Rosa Portell, the museum’s curator of collections. “When the family had to leave the country, the child was told that the only way he could bring his bear was to remove its stuffing. So he took scissors, emptied the whole thing, put it in his pocket and kept it with him. Years later, his wife found it, and when he told her the story, she had it restuffed for Christmas.”
This tale is one of many stories — historical, cultural and sometimes quite personal — that give the nearly 150 pieces on view in the museum’s Leonhardt Gallery context and fill them with life.
All are collectibles dating from 1850 to 1950, significant for many reasons. Some, like the antique dolls from Europe and the United States, have monetary worth and cachet for collectors. Some are notable for preserving family lore, like the handmade dollhouse filled with furnishings accumulated over generations, and the army of lead soldiers painted by the owner and his children. Others are a peek into the past, like the windup toys from the 1930s and ’40s and the Fisher-Price pull toys, including Kitty Bell and Kriss Kricket from the 1950s.
“I admire the pristine antiques, the dolls with perfect eyes and beautiful outfits in their original packaging,” Ms. Portell said. “But there are so many aspects of toyhood, and some of the toys that spoke to me were ones a more antiquarian approach might have left out.”

The most well-preserved items in the exhibit are the immaculate 19th-century Jumeau and Francois Gaultier bisque dolls from France, and two Kammer & Reinhardt dolls from Germany, one perched in a wicker stroller. The dolls are elaborately dressed, some with hats, bows or little leather shoes, one clutching a parasol in her delicate hand.

Deborah Fratino and Irma Geher, doll enthusiasts, gathered the more than 40 dolls on display from 23 collectors in Connecticut and Westchester County. Noting a Jumeau Triste, named for her sad expression, Ms. Fratino said: “Just look at that face! The modeling, the proportions — it’s a form of art.”

In addition to being arranged by type — most of the dolls are in one area, toys and stuffed animals in another — the collectibles are grouped by theme. Alongside a Joan of Arc doll in a case titled “Historically Speaking,” for example, is Gen. Douglas MacArthur, one of several World War II military dolls made in New York around 1942. The “Budding Engineers” case includes an early-20th-century Erector set complete with original manual and wooden case. A display titled “Training for Motherhood” features Tiny Tears and Dy-Dee Baby, along with their instruction booklets.

Museumgoers will find dolls inspired by books (Raggedy Ann — “the ultimate toy,” Ms. Portell said — and the characters from “Winnie-the-Pooh”) and films (two Shirley Temples from the 1930s and a Charlie Chaplin from 1915).

There are also pressed-metal cars and airplanes —“for the boys,” Ms. Portell said, adding “It’s a fact of life that dolls fascinate girls more than boys.”

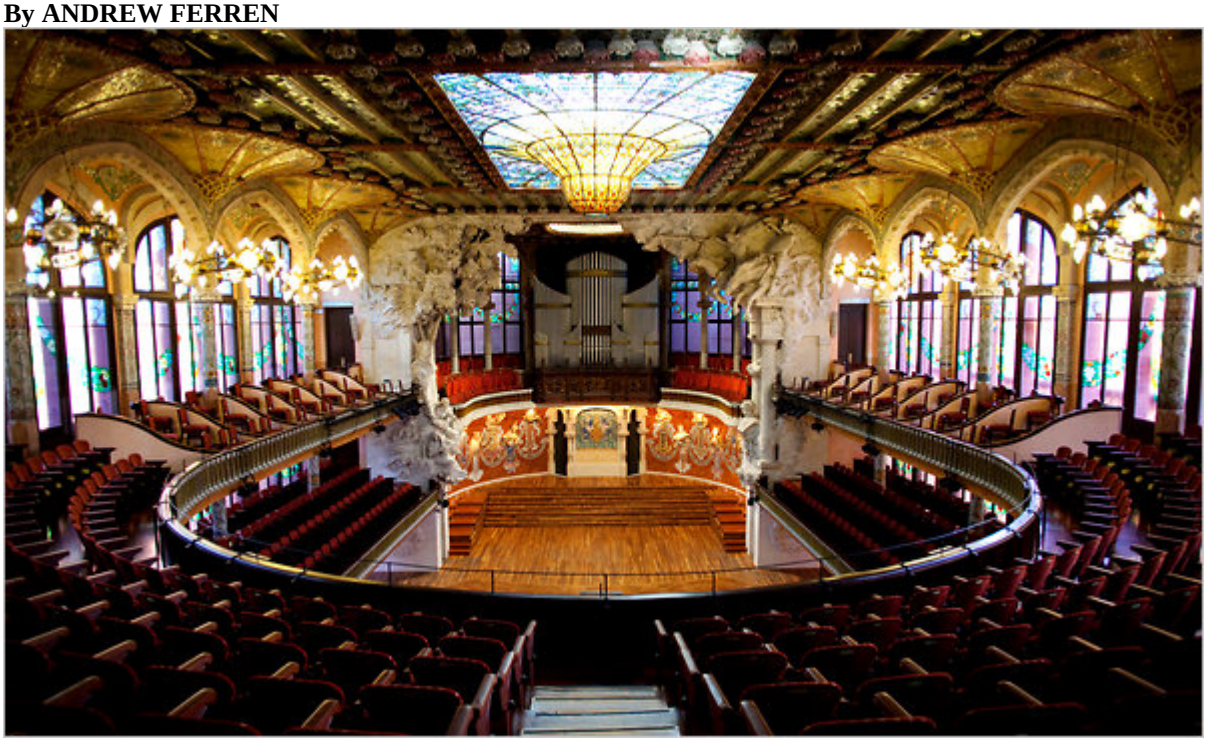
Appealing to both sexes was part of the mission in this exhibit. So was reaching all ages. “We try to cater to families,” Ms. Portell said, “to offer something that speaks to adults and also to children, and that elicits conversation between them. With this show, it was easy. For the adult, there’s the element of nostalgia, the warm memories. For the child, it’s all about the toys.”

“Dolls, Toys and Teddy Bears” runs through Jan. 10 in the Bendel Mansion at the Stamford Museum and Nature Center, 39 Scofieldtown Road, Stamford; stamfordmuseum.org or (203) 322-1646.

http://www.nytimes.com/2010/12/19/nyregion/19toysct.html?ref=design

Barcelona's Other Architect, Domènech

By ANDREW FERREN



Lourdes Segade for The New York Times
Lluís Domènech i Montaner created the dazzling 1908 Palau de la Música Catalana, a jewel of Catalan modernisme, adorning surfaces and choosing stained glass to fill the space with light.

IT'S sometimes hard to have a conversation about Barcelona that does not include the name Gaudí in it. The world is so gaga for Antoní Gaudí — the genius of Catalan modernisme (the Spanish version of Art Nouveau) whose early 20th-century buildings are virtual emblems of the city — that most of his modernista contemporaries go little noticed by tourists.

But if you're like me, and don't much like the structural theatrics and unbridled mannerism of Gaudí's buildings, check out those of Lluís Domènech i Montaner (1849-1923), an under-sung hero of the movement. A journey to the three places in Catalonia where his buildings made a splash a century ago — including Barcelona — is made easier by following the Barcelona Modernisme Route, which was created in 2005. A guidebook and map of the route can be bought for 18 euros, or $23.50 at $1.31 to the euro, at several kiosks around the city, and can be viewed online at rutadelmodernisme.com.

Domènech is often hailed as the most modern of the modernistas, notably for his mastery of lightweight steel construction. Unesco, at least, doesn't give him short shrift, having designated his most important buildings in Barcelona a World Heritage Site (just as it did with the works of Gaudí). Multifaceted and astonishingly productive, Domènech wore many hats. Besides being an architect and professor (Gaudí was his student at Barcelona's School of Architecture), he was also a prominent politician and Catalan nationalist and a pre-eminent scholar of heraldry.

For architects, Barcelona at the turn of the 20th century was the right place at the right time. Nineteenth-century industrialization brought tremendous wealth, and between the Universal Exposition of 1888 (for which Domènech created two of the most noteworthy buildings) and the construction of the Eixample — the vast grid of streets laid out in 1859 to decongest the old city — there was a heady mix of civic pride and social ascension in the air. The rising middle class was eager to make its mark on the rapidly growing city, and the new modernista style seemed perfectly suited to this task, rife as it was with neo-Gothic motifs that linked the newly minted mercantile titans to Barcelona's rich medieval history.

Robert Lubar, an associate professor at New York University's Institute of Fine Arts, points out that, much more so than Gaudí, Domènech was influenced by the English Arts and Crafts movement of Ruskin and Morris. "He believed that 'the complete interior' served some kind of ethical purpose," Professor Lubar said.
Domènech's most "complete interior" is the 1908 Palau de la Música Catalana, a stunning concert hall miraculously shoehorned into a small lot at the junction of the old city and the new. Often likened to a conductor, Domènech knew how to get the best performance from the sculptors, ceramicists and woodworkers who executed his designs. Indeed, nearly every surface inside the auditorium has been adorned with color, texture and relief and, because the walls and ceiling are made almost entirely of stained glass, colored light.
Atop the balcony's mosaic-clad columns, bronze chandeliers tilt like sunflowers toward the stained-glass sun that seems to float in midair from the ceiling's inverted dome. The astonishing expanses of glass were achieved with the use of structural steel — invisible beneath so much decoration.
The other pillar of Domènech's World Heritage status is the Hospital de la Santa Creu i Sant Pau (Hospital of the Holy Cross and Saint Paul), set on 40 park-like acres at the northern edge of the Eixample. Heeding the latest theories of hygiene, Domènech envisioned a complex of 20 pavilions to ensure ventilation and access to sunshine. He ingeniously sunk the corridors and service areas of the hospital underground so that patients and visitors in the pavilions and gardens above would feel as if they were in a village — a fantastical one with myriad domes, spires, finials, sculptures and mosaics. Currently, the 12 pavilions Domènech built (his architect son completed the last eight) are being restored; some will become a museum of Modernisme and others offices for humanitarian organizations like Unesco. Until its scheduled opening in 2016, hard-hat tours are offered daily.
With the Modernisme Route's map and guidebook in hand, you can lead yourself around Domènech's residential structures in Barcelona, most of which are clustered between the Passeig de Gracia and Carrer Girona. You can stay in one of the grandest of his palatial homes, Casa Fuster, now a five-star hotel, at the top of Passeig de Gracia. In the street-level Café Vienes, you can sip Champagne and admire a vaulted ceiling and a forest of marble columns.
Near the port is the Hotel España, which, though not built by Domènech, had its restaurant, La Fonda España, renovated by him a century ago. It's just been spruced up and shines anew with Domènech's strappy wood and ceramic wainscoting, murals by Ramon Casas and a sculptural fireplace by Eusebi Arnau.
Want to see more? Eighty miles south, in the town of Reus, is Casa Navàs, another "complete interior," which surrounds you the minute you step into the stair hall — a tiny indoor garden of flowers and vines wrought in mosaic, stained glass and carved stone. Throughout the house, the capital of each column features a different floral motif. Most of the rooms contain their original, exuberant furnishings by master craftsmen like Gaspar Homar.
On the outskirts of Reus, the Pere Mata Institute, a mental health hospital begun by Domènech in 1898, was meant to counter the tradition of keeping the mentally ill out of sight. Today you can visit one of the six pavilions, the one that housed "rich and illustrious men," as the guide explains on the 90-minute tours. The sumptuously decorated men's pavilion has a billiard room, grand salon and formal dining room. But lest it be confused with a typical men's club, the delicate-looking leaded glass windows were reinforced with iron to keep patients in.
Upstairs, the rooms contain many of their original furnishings, including clever armoires with basins (and running water) built into them. There were also suites with office spaces (and secretaries) for those patients who still had empires to run.
About 50 miles northeast of Barcelona in the coastal town of Canet de Mar, one can see three charming structures in the space of about 100 yards. Domènech's mother was from the region and he also had a home here, which is now a museum that displays his drawings and original furnishings. Across the street is the Ateneu Canetenc, once a cultural and political club and now a library.
Perhaps the most satisfying stop in Canet is Casa Roura, a little fortress of a house that is now a restaurant. The facade's bravura brickwork creates a lively play of light and is further animated by turrets, parapets and gleaming roof tiles glazed in cobalt blue and canary yellow. The old double-height salon with its baronial fireplace is now the main dining room. On par with the rich architectural surroundings is the amazing lunch menu (13.50 euros) — especially the seafood fideua (like paella, but made with pasta instead of rice).

The tour ends where Domènech's love of medieval architecture may have begun: at his mother's house. (One of them anyway — the Castell Santa Florentina in the hills above Canet has been in the Montaner family for centuries.) Around 1909, Domènech expanded the original fortified stone house, deftly mixing his neo-Gothic riffs with authentic Gothic architectural elements like columns, portals and arcades "harvested" from a defunct monastery into a modernista masterpiece, one that quite literally spans the ages.

IF YOU GO

IN BARCELONA

For 18 euros, or $23.50 at $1.31 to the euro, a **Modernisme Route pack** of two guidebooks with maps and discounts for many sites can be purchased at special Modernisme tourist offices in Plaça de Catalunya, Hospital de Sant Pau and Pavellons Güell. Information: www.rutadelmodernisme.com.

Palau de la Música Catalana, Palau de la Música 4-6, (34-90) 247-5485; www.palaumusica.cat. A tour is 12 euros.

Hospital de la Santa Creu i Sant Pau, San Antoní Maria Claret 167, (34-93) 291-9000; www.santpau.es.

Hotel Casa Fuster, Passeig de Gracia 132, (34-93) 255-3000; www.hotelescenter.es.

Hotel España, Sant Pau 9-11, (34-93) 318-1758; www.hotelespanya.com

IN REUS

Tours of both the **Pere Mata Institute** and **Casa Navàs** can be arranged on specific days through the Reus tourism office.

Reus Turisme, Plaça del Mercadal 3, (34-97) 701-0670; turisme.reus.cat

IN CANET DE MAR

Casa Museu Lluís Domènech i Montaner, Xamfra Rieres Buscarons i Gavarra, (34-93) 795-4615; www.canetdemar.cat. Entrance fee: 2 euros.

Casa Roura, Riera Sant Domènec 1, (34-93) 794-0375; www.casaroura.com.

Castell Santa Florentina is a private home but tours can be booked some Saturdays and by appointment. Riera del Pinar s/n, (34-609) 813-339; www.santaflorentina.com.

http://travel.nytimes.com/2010/12/19/travel/19cultured-barcelona.html?ref=design

Siberian Fossils Were Neanderthals' Eastern Cousins, DNA Reveals

By CARL ZIMMER

David Reich/Nature
The entire genome of the Denisovans was extracted from a tooth and finger bone.

An international team of scientists has identified a previously shadowy human group known as the Denisovans as cousins to Neanderthals who lived in Asia from roughly 400,000 to 50,000 years ago and interbred with the ancestors of today's inhabitants of New Guinea.

All the Denisovans have left behind are a broken finger bone and a wisdom tooth in a Siberian cave. But the scientists have succeeded in extracting the entire genome of the Denisovans from these scant remains. An analysis of this ancient DNA, published on Wednesday in Nature, reveals that the genomes of people from New Guinea contain 4.8 percent Denisovan DNA.

An earlier, incomplete analysis of Denisovan DNA had placed the group as more distant from both Neanderthals and humans. On the basis of the new findings, the scientists propose that the ancestors of Neanderthals and Denisovans emerged from Africa half a million years ago. The Neanderthals spread westward, settling in the Near East and Europe. The Denisovans headed east. Some 50,000 years ago, they interbred with humans expanding from Africa along the coast of South Asia, bequeathing some of their DNA to them.

"It's an incredibly exciting finding," said Carlos Bustamante, a Stanford University geneticist who was not involved in the research.

The research was led by Svante Paabo, a geneticist at the Max Planck Institute for Evolutionary Anthropology in Liepzig, Germany. Dr. Paabo and his colleagues have pioneered methods for rescuing fragments of ancient DNA from fossils and stitching them together. In May, for example, they published a complete Neanderthal genome.

The stocky, barrel-chested Neanderthals left a fossil record stretching from about 240,000 to 30,000 years ago in Europe, the Near East and Russia. Analyzing the Neanderthal genome, Dr. Paabo and his colleagues concluded that humans and Neanderthals descended from common ancestors that lived 600,000 years ago. But the scientists also found that 2.5 percent of the Neanderthal genome is more similar to the DNA of living Europeans and Asians than to African DNA. From this evidence they concluded that Neanderthals interbred with humans soon after they emerged from Africa roughly 50,000 years ago.

Dr. Paabo's success with European Neanderthal fossils inspired him and his colleagues to look farther afield. They began to work with Anatoli Derevianko of the Russian Academy of Sciences, who explores Siberian caves in search of fossils of hominins (species more closely related to living humans than to chimpanzees, our closest living relatives).

Last year, Dr. Derevianko and his colleagues sent Dr. Paabo a nondescript fragment of a finger bone from a cave called Denisova. Dr. Derevianko thought that the fossil, which is at least 50,000 years old, might have belonged to one of the earliest humans to live in Siberia.

Dr. Paabo and his colleagues isolated a small bundle of DNA from the bone's mitochondria, the energy-generating structures within our cells. Dr. Paabo and his colleagues were surprised to discover that the Denisova DNA was markedly different from that of either humans or Neanderthals. "It was a great shock to us that it was distinct from those groups," Dr. Paabo said in an interview.

Dr. Paabo and his colleagues immediately set about to collect all the DNA in the Denisova finger bone. Once they had sequenced its genome, they sent the data to researchers at Harvard Medical School and the Broad Institute in Cambridge, Mass., to compare with other species.

The Massachusetts scientists concluded that the finger bone belonged to a hominin branch that split from the ancestors of Neanderthals roughly 400,000 years ago. Dr. Paabo and his colleagues have named this lineage the Denisovans.

Next, the researchers looked for evidence of interbreeding. Nick Patterson, a Broad Institute geneticist, compared the Denisovan genome to the complete genomes of five people, from South Africa, Nigeria, China, France and Papua New Guinea. To his astonishment, a sizable chunk of the Denisova genome resembled parts of the New Guinea DNA.

"The correct reaction when you get a surprising result is, 'What am I doing wrong?' " said Dr. Patterson. To see if the result was an error, he and his colleagues sequenced the genomes of seven more people, including another individual from New Guinea and one from the neighboring island of Bougainville. But even in the new analysis, the Denisovan DNA still turned up in the New Guinea and Bougainville genomes.

If the Denisovans did indeed have a range spreading from Siberia to South Asia, they must have been a remarkably successful kind of human. And yet, despite having the entire genome of a Denisovan, Dr. Paabo cannot say much yet about what they were like. "By sequencing my complete genome, there's very little you could predict about what I look like or how I behave," he said.

One solid clue to what the Denisovans looked like emerged in January. Dr. Paabo and his team had flown to Novosibirsk to share their initial results with Dr. Derevianko. Dr. Derevianko then presented them with a wisdom tooth from Denisova.

Bence Viola, a paleoanthropologist in the Department of Human Evolution at the Max Planck Institute of Evolutionary Anthropology, who was at the meeting, was flummoxed. "I looked at it and said, 'Ah, O.K., this is not a modern human, and it's definitely not a Neanderthal,"' said Dr. Viola. "It was just so clear."

The tooth had oddly bulging sides, for one thing, and for another, its large roots flared out to the sides. Back in Germany, Dr. Paabo and his colleagues managed to extract some mitochondrial DNA from the tooth. It proved to be a nearly perfect match to that of the Denisova finger bone.

That match offers some hope that if researchers can find the same kind of tooth on a fossil skull, or perhaps even a complete skeleton, they'll be able to see what these ghostly cousins and ancestors looked like in real life.

Dr. Bustamante also thinks that other cases of interbreeding are yet to be discovered. "There's a lot of possibility out there," he said. "But the only way to get at them is to sequence more of these ancient genomes."

http://www.nytimes.com/2010/12/23/science/23ancestor.html?ref=science

Behold the African Elephant. But Which One?

By SINDYA N. BHANOO

Nicholas Georgiadis
Forest elephants in Africa have been confirmed as a new species of elephant and have been distinguished from the larger savanna elephant.

There are two distinct species of elephants in Africa, not one, according to new genetic evidence.
Previously, some scientists argued that the African savanna elephant and the forest elephant were the same species.
Scientists from Harvard, the University of Illinois and the University of York in England analyzed DNA samples from the two African elephants and the Asian elephant and from two extinct elephant ancestors, the woolly mammoth and the mastodon. They report their findings in the journal PLoS Biology.
The debate over the two kinds of African elephants has always been contentious. Some studies have suggested that the two varieties split about 6.6 million to 8.8 million years ago, but these estimates were based on mitochondrial DNA samples that consider only maternal ancestry.
Using nuclear DNA, the scientists determined that the African elephants most likely split into two distinct groups closer to 2.5 million to 5 million years ago.
“This allows us to know about the mother’s father’s mother, and the father’s mother’s mother, and so on,” said David Reich, a geneticist at Harvard and one of the study’s authors. “It’s the whole ancestry.”
The two types of African elephants are as genetically distinct as the Asian elephant and the woolly mammoth, which scientists agree are clearly two different species, Dr. Reich said.
The evidence means that conservation efforts may need to be re-evaluated, said Alfred Roca, an animal scientist at the University of Illinois and another author of the study.
“Conservation efforts tend to focus on savanna elephants,” he said. “But the forest elephant also really needs to be a priority for conservation.”

http://www.nytimes.com/2010/12/28/science/28obelephant.html?ref=science

Bones Give Peek Into the Lives of Neanderthals

By CARL ZIMMER

El Cidrón Research
REMAINS The bone fragments of the family were retrieved at El Cidrón.

Deep in a cave in the forests of northern Spain are the remains of a gruesome massacre. The first clues came to light in 1994, when explorers came across a pair of what they thought were human jawbones in the cave, called El Sidrón. At first, the bones were believed to date to the Spanish Civil War. Back then, Republican fighters used the cave as a hide-out. The police discovered more bone fragments in El Sidrón, which they sent to forensic scientists, who determined that the bones did not belong to soldiers, or even to modern humans. They were the remains of Neanderthals who died 50,000 years ago.

Today, El Sidrón is one of the most important sites on Earth for learning about Neanderthals, who thrived across Europe and Asia from about 240,000 to 30,000 years ago. Scientists have found 1,800 more Neanderthal bone fragments in the cave, some of which have yielded snippets of DNA.

But the mystery has lingered on for 16 years. What happened to the El Sidrón victims? In a paper this week in The Proceedings of the National Academy of Sciences, Spanish scientists who analyzed the bones and DNA report the gruesome answer. The victims were a dozen members of an extended family, slaughtered by cannibals.

"It's an amazing find," said Todd Disotell, an anthropologist at New York University. Chris Stringer of the Natural History Museum of London said the report "gives us the first glimpse of Neanderthal social structures."

All of the bones were located in a room-size space the scientists dubbed the Tunnel of Bones. They were mixed into a jumble of gravel and mud, which suggests that the Neanderthals did not die in the chamber. Instead, they died on the surface above the cave.

Their remains couldn't have stayed there for long. "The bones haven't been scavenged or worn out by erosion," said Carles Lalueza-Fox of Pompeu Fabra University in Barcelona, a co-author of the new paper. Part of the ceiling in the Tunnel of Bones most likely collapsed during a storm, and the bones fell into the cave.

No animal bones washed into the Tunnel of Bones along with the Neanderthals'. In fact, the only other things scientists have found there are fragments of Neanderthal stone blades. And when the scientists closely examined the Neanderthal bones, they found cut marks — signs that the blades had been used to slice muscle from bone. The long bones had been snapped open. From these clues, the scientists concluded that the Neanderthals were victims of cannibalism. Scientists have found hints of cannibalism among Neanderthals at other sites, but El Sidrón is exceptional for the scale of evidence.

As the researchers examined bone fragments, they tried to match them to each other. Some loose teeth fit neatly into jawbones, for example. "The whole thing was quite complicated. In fact, it was a mess," said Dr. Lalueza-Fox.

After spending years on these anatomical jigsaw puzzles, Dr. Lalueza-Fox and his colleagues could identify 12 individuals. The shape of the bones allowed the scientists to estimate their age and sex. The bones belonged to three men, three women, three teenage boys and three children, including one infant.

Once the scientists knew who they were dealing with, they looked for DNA in the bones. The cold, damp darkness of El Sidrón has made it an excellent storehouse for ancient DNA. Dr. Lalueza-Fox and his colleagues have published a string of intriguing reports on their DNA. In two individuals, for example, they found a gene variant that may have given them red hair. They launched an ambitious project to find DNA in the teeth of all 12 individuals. In one test, they were able to identify a Y chromosome in four. The scientists had already identified all four of them as males — the three men and one teenage boy — based on their bones.

The scientists then hunted for mitochondrial DNA, which is passed from mothers to their children. They looked for two short stretches in particular, called HVR1 and HVR2, that are especially prone to mutate from generation to generation. All 12 Neanderthals yielded HVR1 and HVR2. The scientists found that seven of them belonged to the same mitochondrial lineage, four to a second, and one to a third.

Dr. Lalueza-Fox argues that the Neanderthals must have been closely related. "If you go to the street and sample 12 individuals at random, there's no way you're going to find seven out of 12 with the same mitochondrial lineage," he said. "But if you go to the birthday party for a grandmother, chances are you'll find brothers and sisters and first cousins. You'd easily find seven with the same mitochondrial lineage."

All three men had the same mitochondrial DNA, which could mean they were brothers, cousins, or uncles. The females, however, all came from different lineages. Dr. Lalueza-Fox suggests that Neanderthals lived in small bands of close relatives. When two bands met, they sometimes exchanged daughters.

"I cannot help but suppose that Neanderthal girls wept as bitterly as modern girls faced by the prospect of leaving closest family behind on their 'wedding' day," said Mary Stiner, an anthropologist at the University of Arizona.

Linda Vigilant, an anthropologist at the Max Planck Institute for Evolutionary Anthropology in Germany, considers the research "a nice start." But she challenges Dr. Lalueza-Fox's claim that the Neanderthals must be immediate family because they belong to the same mitochondrial lineage. In her own work on wild chimpanzees, she finds that some chimpanzees with identical HVR1 and HVR2 are not closely related.

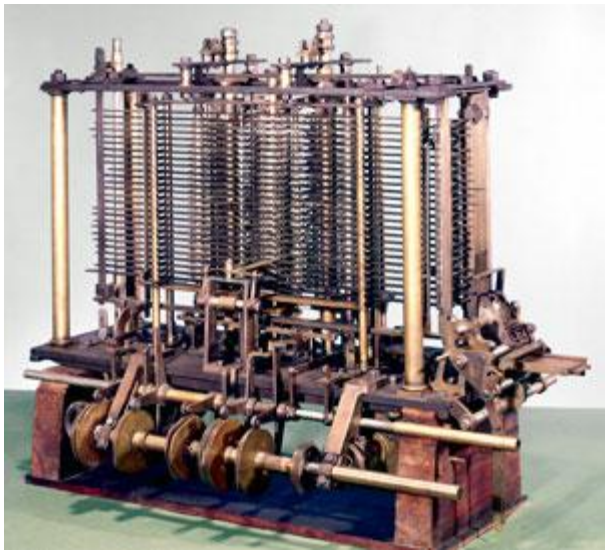
The best way to settle the debate, said Dr. Vigilant, is to find more Neanderthal DNA to which the El Sidrón genes can be compared. "It is exciting to think that we might actually be able to tackle the question in the near future," said Dr. Vigilant.

Dr. Lalueza-Fox thinks it may be possible to draw a detailed genealogy of the El Sidrón Neanderthals in the next few years. He also hopes to get a better idea of how they died. The stone blades may provide a clue. They were made from rocks located just a few miles away from the cave. The victims might have wandered into the territory of another band of Neanderthals. For their act of trespass, they paid the ultimate price.

http://www.nytimes.com/2010/12/21/science/21neanderthal.html?ref=science

Let's build Babbage's ultimate mechanical computer

- 23 December 2010 by **John Graham-Cumming**
- Magazine issue 2791.



Part of the Analytical Engine that was completed before Babbage's death – now for the rest (Image: Science and Society/Getty)

The 19th-century Analytical Engine computer, complete with CPU and a memory, remained unbuilt – time to put that right, says ***John Graham-Cumming***

IN 1837 British mathematician Charles Babbage described a mechanical computer that later became known as the Analytical Engine. Calling it a computer is no stretch: the Analytical Engine had a central processing unit and memory and would have been programmed with punched cards.

Parts of the Analytical Engine were built in the 1800s and are on display in the Science Museum in London along with a stack of punched cards. But Babbage never completed the project.

The computer was an extension of his well-known Difference Engine, which was designed to calculate tables of numbers such as logarithms.

While building a prototype of the Difference Engine No 1, Babbage realised that a more general-purpose machine was possible. While the Difference Engine could perform the same set of calculations over and over again, it couldn't examine its own results to change its calculations. A machine that can do that has the power of a modern computer.

Even though the Analytical Engine would have been mechanical and powered by steam, it would likely have been Turing-complete - that is, capable of computing any computable function. Babbage later returned to difference engines, designing a simpler and faster model referred to as No 2. But though he never built this machine either, he left complete plans which the Science Museum used to build a working model in the early 1990s.

Even steam-powered, the analytical engine would have been able to compute any computable function

So far no one has completed Babbage's tour de force: the first working computer. I think it is time to make amends.

Building the Difference Engine No 2 eliminated much of the doubt about Babbage's designs and showed that the machine could have been built in the 1800s. Since the Analytical Engine shares many elements with Difference Engine No 2, it too would likely have worked, but we won't know until we build one.

I have started a project to build an analytical engine, dubbed Plan 28 after one of Babbage's detailed plans. I'm aiming for £100,000 and hope to complete the project in time for the 150th anniversary of Babbage's death on 18 October 2021.

John Graham-Cumming *is author of The Geek Atlas: 128 places where science and technology come alive. For more information visit plan28.org*

http://www.newscientist.com/article/mg20827915.500-lets-build-babbages-ultimate-mechanical-computer.html

Placebos can work even when you know they're fakes

- 14:04 23 December 2010 by **Jessica Hamzelou**

There is little doubt that the placebo effect is real, but it has always been argued that a person feels better because they think the pill is the real deal. But what if it works even when you know it's a fake?
According to Ted Kaptchuk at Harvard Medical School and his colleagues at least one condition can be calmed by placebo, even when everyone knows it's just an inert pill. This raises a thorny question: should we start offering sugar pills for ailments without a treatment?
In the latest study, Kaptchuk tested the effect of placebo versus no treatment in 80 people with irritable bowel syndrome. Twice a day, 37 people swallowed an inert pill could not be absorbed by the body. The researchers told participants that it could improve symptoms through the placebo effect.
While 35 per cent of the patients who had not received any treatment reported an improvement, 59 per cent of the placebo group felt better. "The placebo was almost twice as effective as the control," says Kaptchuk. "That would be a great result if it was seen in a normal clinical trial of a drug."
Edzard Ernst, professor of complementary medicine at the Peninsula Medical School in Exeter, UK, thinks that "the size of the benefit is too small to be clinically relevant". Kaptchuk agrees and wants to run some larger trials to get a better picture of the effect.
If a dummy pill can improve IBS, shouldn't we be exploring its effect on other ailments? "It wouldn't work on a tumour or kill microbes, but it's likely to affect illnesses where self-appraisal is important, such as depression" says Kaptchuk.
A 2008 study found that around a third of physicians had prescribed a dummy pill to unwitting patients. "Now we have shown that there are ethical ways of harnessing the placebo effect," says Kaptchuk.
Surely now you can make a case for using a placebo when there are no other treatment options? Kaptchuk feels there is still an ethical dilemma here. "I'm against giving patients something unless it's been shown to work in that condition," he says, though the individuals concerned may feel differently.
Journal reference: *PLoS One*, DOI: 10.1371/journal.pone.0015591

http://www.newscientist.com/article/dn19904-placebos-can-work-even-when-you-know-theyre-fakes.html

'Impulsivity gene' found in violent offenders

- 13:06 23 December 2010 by **Andy Coghla**

A gene mutation linked with impulsivity and possible violent outbursts has been discovered in Finnish men convicted of violence and arson.

The mutation, in a gene called *HTR2B*, prevents production of the serotonin 2B receptor, a key docking point in brain cells for the neurotransmitter serotonin. One consequence could be depletion of serotonin in the nucleus accumbens, a part of the brain involved in providing restraint and foresight into the consequences of actions.

The mutation was three times as common in violent criminals as in the general population. Of 228 Finnish inmates serving sentences for violent crimes who were screened, 17 carried the mutation, compared with only 7 of 295 healthy controls.

Although the mutation appears confined to Finnish people, it could have counterparts in populations elsewhere, with similar negative consequences, say the researchers.

"We would anticipate that over time, a large number of functional variants [of HTR2B] will be identified, with a range of behavioural effects," says David Goldman at the US National Institute on Alcohol Abuse and Alcoholism in Bethesda, Maryland, and head of the team that carried out the work.

Impulsivity played a pivotal role in the criminal behaviour of all 17 prisoners carrying the mutation, who were convicted of crimes ranging from murder and attempted murder to arson, battery and assault. "The crimes occurred as disproportionate reactions to minor irritations and were unpremeditated, without potential for financial gain and recurrent," say the researchers in *Nature*.

Alcohol trigger

In almost all cases, the men had been drinking heavily, suggesting that the mutation is only a problem in combination with alcohol. "[People with the gene] behave as if they have a very short fuse, and it becomes even shorter when they're disinhibited by alcohol," says Goldman.

Goldman and his colleagues supported their findings by demonstrating that the mutation causes impulsive behaviour in animals. In five standard tests of impulsivity, such as showing boldness in exploring unfamiliar environments, mice engineered to lack a functional *HTR2B* gene were more impulsive than healthy mice.

But the team cautions against screening for the gene and others like it to identify potentially violent and impulsive individuals, because only a fraction of carriers turn to violence. "The vast majority of carriers are normal behaviourally and cognitively, so population screening would not be justified," Goldman says.

Other researchers echo his warnings against exaggerating the effects of the mutation in human carriers, pointing out that there are probably around 100,000 carriers in Finland, but only a fraction of these have turned or will ever turn to violence.

"Even though this genetic predisposition is a strong risk factor for violence, it still needs other factors to bring it out, in this case alcohol," says Han Brunner at Radboud University in Nijmegen, the Netherlands.

Other genetic factors

In 1993, Brunner discovered a predisposition to violence in a single Dutch family carrying a mutation in the gene which makes monoamine oxidase A (MAOA), another enzyme vital for regulating neurotransmitter levels in the brain.

A more common variant of MAOA linked with antisocial behaviour was discovered in 2002 by a team led by Avshalom Caspi at Duke University in Durham, North Carolina. Its negative effects only kicked in if children were poorly cared for in infanthood.

For perspective, Brunner points out that a well-known genetic trait affects half the world's population and makes its carriers nine times more likely to commit violent crime than those who don't carry it. "That's the Y chromosome, which makes people male," he says.

Journal reference:

Nature, DOI: 10.1038/nature09629

http://www.newscientist.com/article/dn19903-impulsivity-gene-found-in-violent-offenders.html

George Soros: Economics needs fixing

- 22 December 2010 by **Jim Giles**
- Magazine issue 2791

Hands-off (Image: Daniel Acker/Bloomberg via Getty Images)

Why has the billionaire financier donated $50 million to rethink economics?

You have provided $50 million to set up the Institute for New Economic Thinking (INET) in New York City. What prompted you to do this?

It was the crash of 2008, which brought home the fact that there is something broken in economic theory. Two ideas - rational expectations theory and the efficient market hypothesis - have a monopoly of thought. Neither prepared us for the crash, yet other ideas don't have enough support. I talked to friends about how to address this and the idea of an institute emerged. Now it's running away with itself. I have never been involved in any initiative with this kind of self-generating interest before.

What does the institute aim to achieve?

A radical reorientation of economic theory. Exactly what shape it will take is impossible to predict, but I hope it will recognise the fundamental uncertainties in our economic system. These uncertainties have been ignored for the past 25 years.

Wouldn't it be better to eliminate the uncertainties, so we can avoid a repeat of the financial crisis of 2008?

We will never be able to do that. There will always be a threat of instability - it's built into the market. You can't avoid it, but you can be aware of it. Perfection might be unattainable, but we can become less imperfect by recognising the imperfections.

Tell me about some of the projects that have been selected for funding by the institute.

I am encouraged by the fact that INET is embracing multiple disciplines. The first round of grants have been given to people with backgrounds in law, history, medicine and science, as well as economics and finance. Several projects are taking concepts directly from science, such as the mathematics behind the spread of contagious diseases, and applying the principles to financial markets. During the financial crisis we saw instances of contagion - how a relatively small number of infected institutions made others sick.

Is INET also funding research to examine whether investors make use of all the information available to them?

Yes. The research is looking into how well markets reflect useful and true information about asset prices, given the presence of real-world ambiguities. It is also trying to understand what happens to asset prices when true uncertainty is wrongly discarded.

You have been developing an alternative economic theory, known as reflexivity, for years. Will INET be a vehicle to explore your own ideas?

I won't impose my views on the institute. I provided the initial funds, but I don't want to provide more than a third of the funding. INET has to have its own identity. When the first round of grants were chosen earlier this year I didn't even see the applications. I'm not on INET's board or its advisory board.

Profile

George Soros was born in Budapest, Hungary. He studied at the London School of Economics before moving to the US in 1956. He is chair of Soros Fund Management and founding sponsor of The Institute for New Economic Thinking, led by former fund manager Robert Johnson

http://www.newscientist.com/article/mg20827915.600-george-soros-economics-needs-fixing.html

Superhero move may save black holes from nakedness

- 11:39 22 December 2010 by **Rachel Courtland**

Black holes may dodge the speeding "bullets" that would otherwise strip them naked – and pose problems for Einstein's theory of general relativity.

The finding is good news for physicist Stephen Hawking, who has wagered that such naked singularities are a physical impossibility.

The event horizon surrounding a black hole means nothing, not even light, escapes. But in 2009, physicists Ted Jacobson and Thomas Sotiriou at the University of Maryland at College Park calculated that, under some circumstances, an incoming particle might cause a spinning black hole to rotate so fast that this horizon is destroyed, allowing light to escape.

The trouble is, the theory of general relativity and other laws of classical physics break down around the resulting "naked singularity".

Now Enrico Barausse, also at the University of Maryland in College Park, and his colleagues reckon that such incoming particles needn't strip spinning black holes.

Hawking wager

The problem with the previous study, says Barausse, is that it did not include so-called "self-force" effects that stem from the gravity of incoming matter. By estimating these effects, Barausse's team calculates that the incoming particles in question should distort a spinning black hole's gravity so that the black hole "shrinks away" from the particles.

These particles then speed on past instead of falling in. "The black hole basically dodges the bullet," Barausse says.

The accuracy of this assertion might become clearer in a few years, as various groups are running computer simulations to calculate the self-force of particles orbiting spinning black holes, says Barausse.

If the hypothesis turns out to be correct, Stephen Hawking will be a happy man. In 1997, he bet physicists John Preskill and Kip Thorne of the California Institute of Technology in Pasadena that naked singularities do not exist.

What happens if he loses the wager? According to the terms of the bet: "The loser will reward the winner with clothing to cover the winner's nakedness. The clothing is to be embroidered with a suitable, truly concessionary message."

Reference: http://arxiv.org/abs/1008.5159

http://www.newscientist.com/article/dn19899-superhero-move-may-save-black-holes-from-nakedness.html?full=true&print=true

Could we detect trees on other planets?

- 20:23 17 December 2010 by **Rachel Courtland**

The shadows cast by alien trees should change the amount of light their host planet reflects as it orbits its star (Image: Edward Webb/Rex Features)

It sounds like a zen koan. If a tree on an alien world falls, would we notice? Christopher Doughty of the University of Oxford and Adam Wolf of Princeton University think we just might.

They say the shadows cast by trees would change the amount of light a planet reflects as it orbits its star. When the planet is behind its star as seen from Earth – as the moon is during its full phase – the trees would cast little visible shadow, while at other points in its orbit the shadows would grow longer from Earth's perspective. Future telescopes should be able to search for these changes in brightness, they say.

Plants and some microbes on Earth reflect a large fraction of the near-infrared light that hits them, apparently because absorbing it would cause them to overheat during photosynthesis. So any exoplanet that showed a spike in the near-infrared light it reflected, called a "red edge", might potentially host plant life.

This new technique could help distinguish between worlds with simple photosynthetic life, such as algae or bacterial mats, and those in which competition for light and the need to distribute water and nutrients drove the evolution of branching, tree-like life-forms.

Nancy Kiang of the NASA Goddard Institute for Space Studies in New York City says the proposal is interesting, but cautions that steep mountains could mimic the effect.

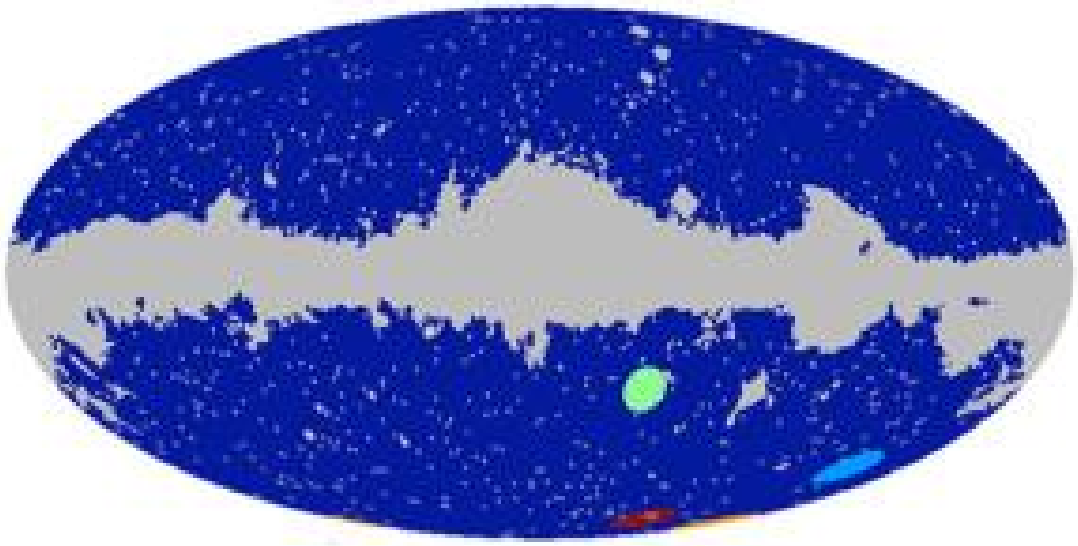
Wolf counters that an Earth-like planet exhibiting erosion and plate tectonics would probably boast few sharp geological features, noting that less than 1 per cent of Earth's surface has a slope of 45 degrees or more.

Journal reference: *Astrobiology*, DOI: 10.1089/ast.2010.0495

http://www.newscientist.com/article/dn19889-could-we-detect-trees-on-other-planets.html

Microwave radiation map hints at other universes

- 18:15 17 December 2010 by **Rachel Courtland**
- Magazine issue 2792.



The four candidate "bruises" are in the lower-right quadrant of this all-sky map of the CMB, in green, light blue, red and orange (edge of image) (Image: S. Feeney and colleagues)
Enlarge image

Collisions between our cosmos and other universes may have left round "bruises" in a map of ancient cosmic radiation.

Our universe is thought to have expanded rapidly in a process called inflation in the first moments after the big bang. Some physicists suspect inflation is still happening, starting up in some regions while stopping in others, such as the part of the universe we live in. In this picture, called eternal inflation, new universes are continually popping into existence like bubbles in a vast, expanding sea of space-time.

Many of these universes should be carried away from one another as soon as they form. But universes born close together could collide if they are expanding faster than the space between them.

If our universe was hit by another bubble universe, the impact would release colossal bursts of energy. If this occurred before inflation ended in our patch of the universe, it could leave an imprint that might still be detectable today. Now Stephen Feeney of University College London and colleagues say they may have spotted such imprints in the cosmic microwave background (CMB), the all-sky glow that comes from photons emitted when the universe was less than 400,000 years old.

Hot and cold

A collision would alter how long inflation lasted in the impact zone. If the expansion continued for longer than it otherwise would, the density of matter in the impact zone would be lower than in surrounding regions.

This would show up as a cold spot in the CMB. Conversely, a shorter period of inflation would create a warm spot in the CMB.
The team calculated the likely temperature profiles for such impacts and searched for them in CMB data from NASA's Wilkinson Microwave Anisotropy Probe.
The search turned up four circular patches, each spanning an area of sky equivalent to at least eight full moons (arxiv.org/abs/1012.1995 and arxiv.org/abs/1012.3667). One is a cold spot that had already been cited as evidence of another universe interacting with our own.
"There's no obvious, boring explanation for the features," says team member Matthew Johnson of the Perimeter Institute for Theoretical Physics in Waterloo, Canada.

Calling cards

If collisions with other universes did indeed create these patches, they should have left other calling cards in the CMB, such as a telltale signature in the orientation, or polarisation, of CMB photons. The European Space Agency's Planck satellite, which launched in 2009, should be able to detect these signs. Its first full maps of the sky are expected in 2012.
Even if just one of these spots turns out to be a bubble collision, it would be "a discovery of the first magnitude", says Thomas Levi of the University of British Columbia in Vancouver, Canada. The finding would bolster theories – such as string theory – that call for a vast number of universes with different properties.
"It is encouraging they found some candidates," says Alexander Vilenkin of Tufts University in Medford, Massachusetts. But he adds that even if bubble universes exist, they might not form at a rate that would guarantee one would have collided with our universe.

http://www.newscientist.com/article/dn19887-microwave-radiation-map-hints-at-other-universes.html

Google goes to space, by balloon

- 16:15 14 December 2010 by **MacGregor Campbell**

Digital postcard from the edge of space (Image: Andrey Armyagov/Shutterstock.com)

Seven styrofoam beer coolers sit lined up behind the open hatchback of an SUV, parked next to a soccer field in California's rural Central valley. Each box contains a black Google Nexus S phone, mounted with their cameras facing out through a clear plastic cut-out in the side. Some of the boxes/phones have consumer-grade wide-angle sport video cameras mounted on the outside, odd bits of custom-soldered circuitry poke out of others.

In a few hours these coolers will be lifted to the edge of space, dangling beneath huge helium-filled weather balloons.

Sending small cameras to ultra-high altitudes with weather balloons is a do-it-yourself craze these days and today's activities have more of a "let's see what happens" feel than any rigorous product testing.

The team, made up of Google engineers and students from the University of California, Santa Cruz, is mainly curious to see how well the phone's sensors cope with a freezing cold near-vacuum.

Star gazer

If all goes well, once the craft return to earth, the team will read accelerometer, gyroscopic, and compass data to calculate the forces that the payloads experienced. The phones will also be running a number of apps including SkyMaps, an augmented reality star-gazing program that shows which stars would be in the sky, given the phone's position and orientation.

To track and recover the balloons, the coolers have each been fitted with a dedicated GPS transponder, a radio transmitter and an antenna that will broadcast location and altitude.

With the first box ready for launch, Greg Klein, a ballooning hobbyist and Santa Cruz undergrad, leading the day's operations, walks the 10-metre-high rig into the middle of the field. A final check verifies that the GPS transmitter is functioning, then he lets go. The balloon rushes skyward and the rest soon follow.
About 3 hours after launch, the balloons start to pop. Most have climbed higher than 32,000 metres. From that height, the coolers will take between 20 and 30 minutes to fall back to Earth, their speed arrested by small, florescent orange parachutes. The first one registers a soft landing. The others follow in turn.
After a couple hours' drive south, and a few wrong turns down dusty country roads, we're standing in the middle of publicly owned grassland. The smell of cows and fertilizer fertiliser hangs thick as the daylight fades to red, then black. Klein's phone says our quarry is a couple several hundred metres away, but the cooler's not revealing itself easily. After an unsuccessful hour's search by flashlight, the team resolves to return later.

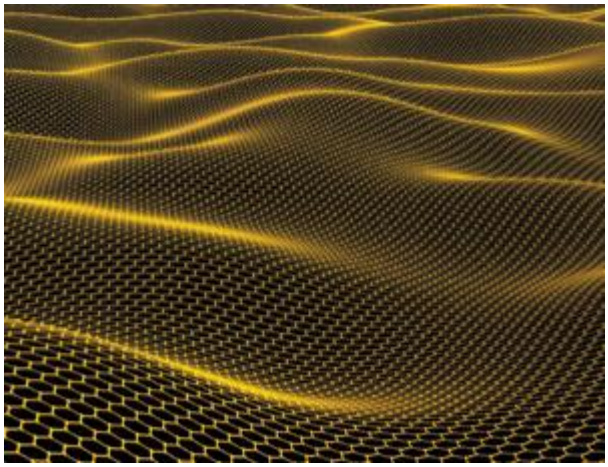
Watch them fall

Two days after launch, all but one of the coolers have been retrieved. In footage from the recovered cameras, one can see terrain fading away slowly as the blue curve of the planet appears. Then a jolt and the camera begins to fall and spin.
The phones survived the journey intact and still functioning. Video of the phone-screens at altitude shows that the apps worked as hoped, and Google engineers are sifting through data from the other sensors to see what they can glean. They are already planning future launches.
Zi Wang, a product manager for the Nexus S, says that while the launch was just for fun, it likely won't be the last time the technology reaches space. He says Google is in talks with a UK-based satellite manufacturer to build small "commodity" satellites based on the core Nexus S technology. "The phone is powerful enough," he says.

http://www.newscientist.com/article/dn19871-google-goes-to-space-by-balloon.html

Less is more when measuring fragile atomic bonds

- 15 December 2010 by **MacGregor Campbell**
- Magazine issue 2791.



Not so sturdy at the edges (Image: Pasiek/SPL)

IF YOU want to look at individual atoms, it helps to have a powerful microscope. But for delicate situations such as a lone atom on the edge of a sheet of carbon atoms, a high-energy beam can disturb the bonds that hold such atoms in place, making them difficult to study. Now, for the first time, a low-energy beam has been used to count these bonds.

In the past, beams of high-energy electrons have been used to probe individual atoms. For example, such an electron beam was used to identify single atoms of so-called "rare earth" elements that were trapped inside buckyballs, round cages made of carbon atoms. By looking at the energy spectra of the electrons that bounced back, researchers could deduce the size of the atom inside, and so identify it.

Probing atoms in other situations, however, may require more delicate methods. Kazu Suenaga and Masanori Koshino at the National Institute of Advanced Industrial Science and Technology in Tsukuba, Japan, wanted to make measurements on carbon atoms clinging to the edge of a sample of graphene - a sheet of carbon atoms arranged in a hexagonal mesh. In particular, they were interested in the number of bonds holding these edge atoms in place, as this can affect the graphene sheet's electrical and chemical properties.

In principle, the energy spectra of electrons scattered off an edge atom can be used to count the bonds. The trouble is that a high-energy electron beam can also rearrange the edge atoms, changing the very property we want to measure.

Suenaga and Koshino took advantage of a new electron microscope that was capable of precisely resolving the spectra of scattered electrons, even if they were of relatively low energy. Using beams of electrons with around 40 per cent less energy than those in previous studies, the pair were able to resolve the spectra of electrons scattered by individual graphene edge atoms before any disruption to the bonds occurred.

They found that these spectra were consistent with those produced in simulations of dangling carbon atoms linked to the sheet by either one, two or three bonds. They used this to deduce how many bonds linked the individual edge atoms in their sample to the sheet (*Nature*, DOI: 10.1038/nature09664).

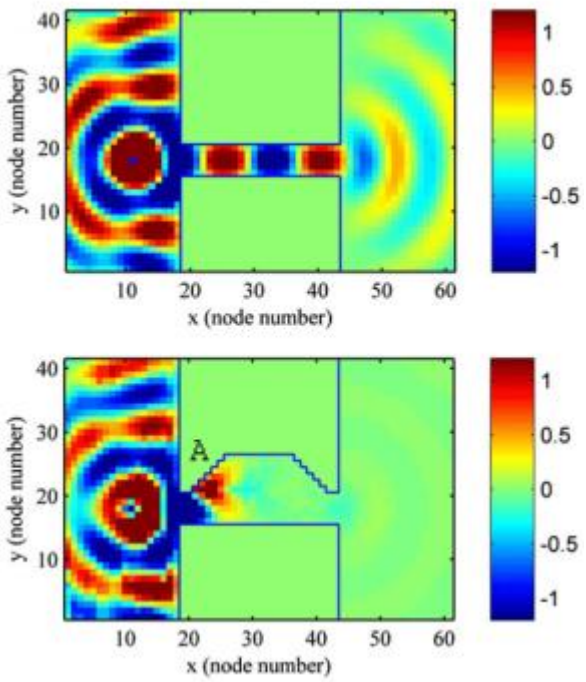
Suenaga says the technique could also be used to measure the electronic properties of one-dimensional chains of carbon atoms, which could be useful in future nanocircuits. It might also be applied to silicon solar cells to determine which atoms are generating the most current.

Ondrej Krivanek of Nion, an electron microscope maker in Seattle, Washington, who was not involved in the study, calls it "a tour de force", applying novel techniques to "a problem of great technological interest".

http://www.newscientist.com/article/mg20827914.000-less-is-more-when-measuring-fragile-atomic-bonds.html

Metamaterials offer a path through the looking glass

- 17:12 14 December 2010 by **Kate McAlpine**



Now you see it, now you don't. Top: An electric current from a source ripples outwards and through a standard corridor. Below: One wall of the corridor comprises a trapezoid chunk that behaves like a metamaterial with an angled mirror behind (at point A). The electric current interacts with the "metamaterial" and mirror, and seems to reflect off a mirror angled across the corridor's entrance (Image: Physical Review Letters)

A house of mirrors can fool you into thinking a wall is really an open corridor; using metamaterials, the opposite is possible. The first practical demonstration of illusion optics shows that an open passageway can take on the appearance of a mirror wall – suggesting that in future it may be possible to emulate Alice and pass through the looking glass.

The demonstration, conducted in a two-dimensional electrical version of an optical system, relies on replicating the negative refractive index of some metamaterials. This property causes light entering or exiting the metamaterial to refract "backwards" – as if reflected off a mirror passing at a right angle through the surface of the metamaterial.

If a chunk of such a metamaterial formed one wall of a corridor, the magic would begin. Shining a light down the corridor would illuminate the walls as normal, but instead of bouncing off the metamaterial wall and continuing down the corridor, the light would be refracted at the interface and enter the metamaterial. Inside the metamaterial, the light travels diagonally backwards before hitting an angled mirror directly behind the metamaterial chunk. It is reflected back through the metamaterial and is negatively refracted once more as it leaves the wall and returns to the corridor. Consequently, on re-entering the corridor, the light travels back towards the light source.

A viewer looking down the corridor would be unaware of the unusual path taken by the light entering it. They would simply see themselves apparently reflected in a mirror blocking the corridor at an angle – although in reality the mirror reflecting them is embedded behind the metamaterial that forms one wall of the corridor.

Circuit training

So much for the theory: now Huanyang Chen of Soochow University in Suzhou, China, and colleagues have shown that the illusion works in practice too. Metamaterials that control light perfectly without absorbing it exist, but are difficult to make , so the physicists instead simulated their illusion using an electrical system of inductors and capacitors. An alternating current passing through this system can be made to behave in much the same way as light would if it was travelling through an optical system that included metamaterials with a negative index of refraction.
Instead of travelling freely through the circuits, the current was blocked off at the entrance of the "passage" as though reflected off an "angled wall" lying there, exactly as the optical system is expected to behave.
Jason Valentine of Vanderbilt University in Nashville, Tennessee, calls the experiment an excellent proof of principle. "With future advances in technology it may be possible to some day achieve such concepts at higher, maybe even visible [light] frequencies," he says.
Chen's team is not new to the field of illusion optics: last year they suggested how metamaterials could theoretically help one object take on the appearance of another.
Journal reference: *Physical Review Letters*, DOI: 10.1103/PhysRevLett.105.233906

http://www.newscientist.com/article/dn19872-metamaterials-offer-a-path-through-the-looking-glass.html

Cryptographers chosen to duke it out in final fight

- Updated 21:20 13 December 2010 by **Celeste Biever**

A competition to find a replacement for one of the gold-standard computer security algorithms used in almost all secure, online transactions just heated up.

The list of possibilities for Secure Hash Algorithm-3, or SHA-3, has been narrowed down to five finalists. They now face the onslaught of an international community of "cryptanalysts" – who will analyse the algorithms for weaknesses – before just one is due to be selected as the winner in 2012.

The competition, which is being run by the US National Institute of Standards and Technology in Gaithersburg, Maryland, is a huge deal for cryptographers and cryptanalysts alike. "These are incredibly competitive people. They just love this," says William Burr of NIST. "It's almost too much fun. For us, it's a lot of work."

The need for the competition dates back to 2004 and 2005, when Chinese cryptanalyst Xiaoyun Wang shocked cryptographers by revealing flaws in the algorithm SHA-1, the current gold-standard "hash algorithm", which is relied upon for almost all online banking transactions, digital signatures, and the secure storage of some passwords, such as those used to grant access to email accounts.

Diversity of designs

Hash algorithms turn files of almost any length into a fixed-length string of bits called a hash. Under SHA-1, it was believed that the only way to find two files that produce the same hash would require millions of years' worth of computing power, but Wang found a shortcut, raising the possibility that online transactions could one day be rendered insecure.

So in 2007, NIST launched a competition to find a replacement.

Submissions closed in 2008, by which time NIST had received 64 entries "of widely varying quality", says Burr. In July 2009, NIST pruned the list to 14 that warranted further consideration.

Then, on 9 December, he announced that NIST had settled on just five finalists (pdf).
"We picked five finalists that seemed to have the best combination of confidence in the security of the algorithm and their performance on a wide range of platforms" such as desktop computers and servers, Burr told *New Scientist*.

"We also gave some consideration to design diversity," he says. "We wanted a set of finalists that were different internally, so that a new attack would be less likely to damage all of them, just as biological diversity makes it less likely that a single disease can wipe out all the members of a species."

Sponge construction

The finalists include BLAKE, devised by a team led by Jean-Philippe Aumasson of the company Nagravision in Cheseaux, Switzerland; and Skein, the brainchild of a team led by famous computer security expert and blogger Bruce Schneier of Mountain View, California.
All of the finalists incorporate new design ideas that have arisen over the last few years, says Burr.
Hash algorithms start by turning a document into a string of 1s and 0s. Then over multiple cycles these bits are shuffled around, manipulated and either condensed down or expanded out to produce the final string, or hash.
One novel idea, called the "sponge hash construction", does this by "sucking up" the original document and then later entering a "squeezing state" in which bits are "wrung out" to produce a final hash, Burr says. One of the finalists, an algorithm called Keccak devised by a team led by Guido Bertoni of STMicroelectronics, makes a particular point of using this method .

'Brilliant woman'

The five teams have until 16 January 2011 to tweak their algorithms. Then there will be a year in which cryptanalysts are expected to attempt to break these algorithms. On the basis of these, and its own analyses, NIST will then choose the winner in 2012.

So will Wang, the cryptanalyst who attacked the initial SHA, be among those attempting to break the algorithms that are left? "We assume she may," says Burr. "She is certainly a brilliant woman. But we hope to pick something that is good enough that she will fail this time."

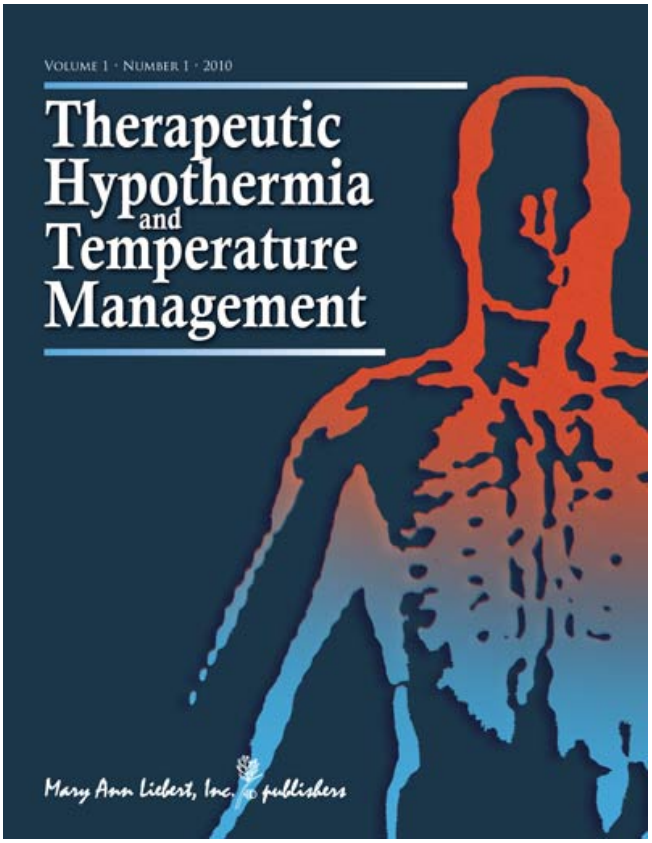
As well as finding a gold-standard algorithm, Burr is excited about the ability of such competitions to further cryptographic knowledge. The idea to use a competition to select the algorithm was inspired by the competition that led to the Advanced Encryption Standard (AES) used by the US government.

"There is a general sense that the AES competition really improved what the research community knew about block ciphers," says Burr. "I think the same sense here is that we are really learning a lot about hash functions."

http://www.newscientist.com/article/dn19865-cryptographers-chosen-to-duke-it-out-in-final-fight.html

Experts Discuss How to Optimize Patient Outcomes After Therapeutic Hypothermia for Traumatic Brain Injury
04 January 2011 Mary Ann Liebert, Inc., Publishers

- **Publication title:** Therapeutic Hypothermia and Temperature Management
- **Author:** Mary Ann Liebert, Inc.
- **Publication type:** Journal



Lowering the body temperature of patients soon after they have suffered a severe brain injury may reduce neurologic complications and improve outcomes. The safety of therapeutic hypothermia for traumatic brain injury (TBI) has been demonstrated in national studies. According to a Roundtable Discussion of renowned experts in the field, when and how it is administered should depend on the clinical condition of individual patients. The Roundtable was published online ahead of print in the new peer-reviewed journal *Therapeutic Hypothermia and Temperature Management* from Mary Ann Liebert, Inc. (www.liebertpub.com) that will launch officially in March 2011. The Roundtable is available at www.liebertpub.com/ther
Guy Clifton, MD, from the University of Texas Health Science Center at Houston, moderated the discussion on the "Future of Rewarming in Therapeutic Hypothermia for Traumatic Brain Injury: A Personalized Plan." He led an expert panel comprised of Alex Valadka, MD, from the Seton Brain and Spine Institute (Austin, TX), Imoigele Aisuku, MD, from the University of Texas Health Science Center, and David Okonkwo, MD, PhD, from the University of Pittsburgh Medical Center (PA), all of whom participated in the National Acute Brain Injury Study: Hypothermia II (NABISH II).
The panel concluded that factors such as the degree of body cooling, the duration of hypothermia, and the rate of rewarming need to be determined individually for each patient to maximize the effectiveness of the treatment and minimize the risk of complications. The successful transition of therapeutic hypothermia from a concept proven to be safe in human patients to an effective, widely used treatment strategy will require a better understanding of how the different types of TBI and the clinical condition of the patient affect the utility and risks of hypothermia.
"I think the readership of our new Journal will greatly appreciate the thoughtful comments made by this prestigious panel of experts concerning how best to use therapeutic hypothermia in this heterogeneous patient population," says Editor-in-Chief W. Dalton Dietrich, PhD, Kinetic Concepts Distinguished Chair in Neurosurgery, and Professor of Neurological Surgery, Neurology and Cell Biology and Anatomy at the University of Miami Leonard M. Miller School of Medicine.
http://www.liebertpub.com/ther

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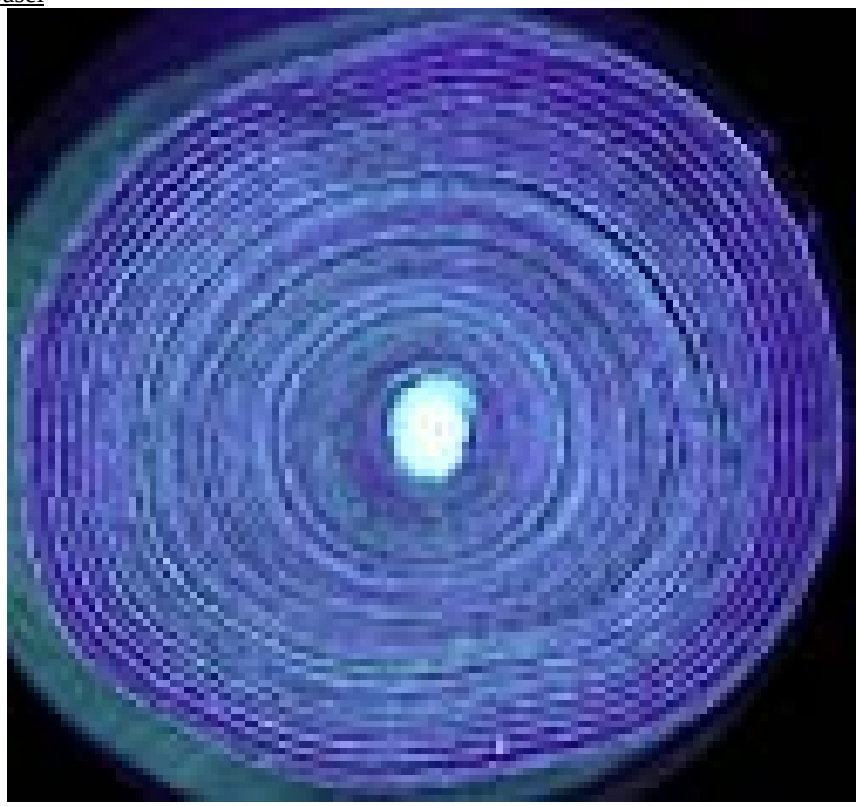
Corals provide evidence of changes to oceanic currents

04 January 2011 Universität Basel



Annual growth rings of deep sea corals in UV-light (A. Sherwood)

Examination of deep sea corals reveals that there have been drastic changes to oceanic currents in the western North Atlantic since the 1970s. The influence of the cold water Labrador Current, which is in periodic interchange with the warm Gulf Stream, has been decreasing continually since the 1970s. Occurring at the same time as Global Warming this phenomenon is unique in the past 2000 years. These results are reported by researchers from the University of Basel and Eawag in the current edition of the scientific journal «PNAS».
One of the oldest known weather systems in the world is the North Atlantic Oscillation (NAO), the periodic variation of atmospheric pressure difference between the Azores and Iceland. It dictates not only whether the winters in Europe will be cold and dry or wet and warm, but also influences the oceanic currents in the North Atlantic. On the continental shelf off Nova Scotia, the NAO seems to control the interaction between different water masses. During *positive phases*, the oceanography of the north-west American continental shelf is dictated by a relatively warm water mass at 10 degrees Celsius which is salt and nutrient rich, originating from the Gulf Stream. If the NAO is in a *negative phase*, the Labrador Current is dominant, a relatively cold water mass at 6 degrees Celsius, which is nutrient scarce and originates from sub-polar regions.
Using new geochemical methods, an international team of researchers including the biogeochemists Prof. Moritz Lehmann (University of Basel) and Dr. Carsten Schubert (Eawag – Swiss Federal Institute of Aquatic Science and Technology) were able to prove that a drastic change to a «warm water mode» occurred in the western North Atlantic in the early 1970s. This change, the timing of which coincides with and may be directly related to Global Warming, is unique in the last 2000 years.
Corals record climate data
The researchers made use of the fact that water masses carry different nitrogen isotopic signatures (different ratios of the stable nitrogen isotopes ^{15}N und ^{14}N) depending on their origins. These signals are then recorded

in the biomass of deep sea corals hundreds of metres below the surface that feed on sinking organic particles from above. The deep sea corals thus allow a reconstruction of the oceanic current ratios over the last few decades. An exact dating of the individual samples is possible due to the corals' production of easily identifiable annual growth rings. The researchers were able to show a clear reduction in the $^{15}N/^{14}N$ ratio since 1970 which indicates that the role of the cold Labrador Current, with a higher $^{15}N/^{14}N$ ratio is becoming less important.

Possible alternative bio-ecological or geochemical causes for such a change in the stable isotope ratio were able to be excluded by the researchers using component-specific nitrogen analyses of the corals. Depending on the food chain structure, changes occur in the $^{15}N/^{14}N$ ratio of specific amino acids in the corals' individual annual growth rings. The nitrogen isotope signatures of the amino acids show that the food chain effect did not play a significant role at least since the 1970s.

Global Warming with consequences

Isotopic analysis of fossil deep sea corals from the same region confirms that the nitrogen isotope ratios and thus the oceanic current situation have remained practically unchanged over the past 2000 years. This indicates that the oceanographic change in oceanic currents of this scale, which has been occurring since the 1970s, is a unique occurrence within the past 2000 years.

The researchers suspect there is a direct connection between the changes in the oceanic currents in the North Atlantic and Global Warming primarily caused by human activities.

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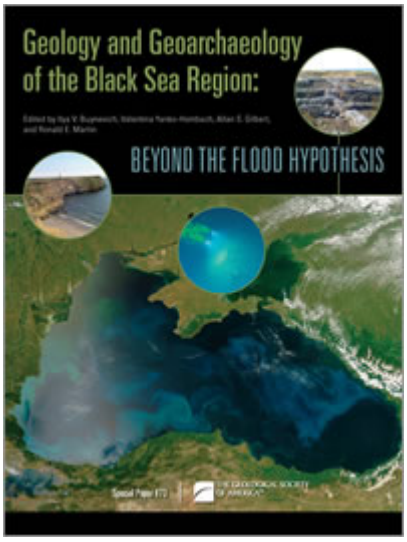
Clarifying the Black Sea Region

04 January 2011 Geological Society of America, The



- **Publication title:** Geology and Geoarchaeology of the Black Sea Region: Beyond the Flood Hypothesis
- **Author:** Ilya V. Buynevich, Valentina Yanko-Hombach, Allan S. Gilbert, and Ronald E. Martin (editors)
- **Publication type:** Book (Paperback)
- **Publication date:** 04 January 2011
- **Number of pages:** 196
- **ISBN number:** 978-0-8137-2473-7
- **Price:** 80.00 USD US Dollars

The Black Sea is the largest anoxic basin in the world. Research opportunities here are growing, due especially to the presence in the region of newly independent states now faced with population pressure and a variety of environmental issues. This new GSA Special Paper presents the multidisciplinary work of scientists from twelve countries addressing a range of topics, including climatic and hydrologic modeling, paleogeographic reconstruction of Late Quaternary landscapes, palynology and paleoclimatology, and geoarchaeological studies.
More reasons for the surge in research opportunities and interest include (1) the Great Flood hypotheses that tie the Biblical Flood to the Black Sea; (2) the presence of huge methane reserves within gas hydrates beneath the seafloor that may be exploitable as new nontraditional energy sources; (3) the growing tangle of underwater infrastructure (e.g., gas pipelines and communication cables) laid across the Black Sea floor that is increasingly subject to geohazards from landslides, tectonics, and other dynamic forces; and (4) the presence of vast amounts of raw materials (e.g., sapropels) that have economic applications in agriculture.
The process of putting together a volume of this magnitude took time and several international meetings. Senior volume editor Ilya V. Buynevich of Woods Hole Oceanographic Institution writes, "No interdisciplinary publication is ever achieved without help from a wide range of contributors whose part in the process deserves a public statement of deep appreciation."
East-west collaboration is growing through the research programs of individual scientists as well as in international multidisciplinary projects, such as International Geological Correlation Programme (IGCP) 521, "The Black Sea-Mediterranean Corridor during the last 30 k.y.: Sea-level change and human adaptation," and International Union for Quaternary Research (INQUA) 501, "The Caspian-Black Sea-Mediterranean Corridor

during the last 30 k.y.: Sea-level change and human adaptive strategies" Today, these projects involve the work of ~400 scientists, not only from the Black Sea region, but from around the world
Individual copies of the volume may be purchased through the Geological Society of America online bookstore, http://rock.geosociety.org/Bookstore/default.asp?oID=0&catID=9&pID=SPE473, or by contacting GSA Sales and Service, gsaservice@geosociety.org.
Book editors of earth science journals/publications may request a review copy by contacting Jeanette Hammann, jhammann@geosociety.org.
Geology and Geoarchaeology of the Black Sea Region: Beyond the Flood Hypothesis
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Impregnating plastics with carbon dioxide

Impregnating plastics with carbon dioxide

Fraunhofer-Gesellschaft

Everyone has heard that carbon dioxide is responsible for global warming. But the gas also has some positive characteristics. Researchers are now impregnating plastics with compressed CO2 in a process that could lead to new applications ranging from colored contact lenses to bacteria-resistant door handles.

CO2 is more than just a waste product. In fact, it has a variety of uses: the chemical industry makes use of this colorless gas to produce urea, methanol and salicylic acid. Urea is a fertilizer, methanol is a fuel additive, and salicylic acid is an ingredient in aspirin.

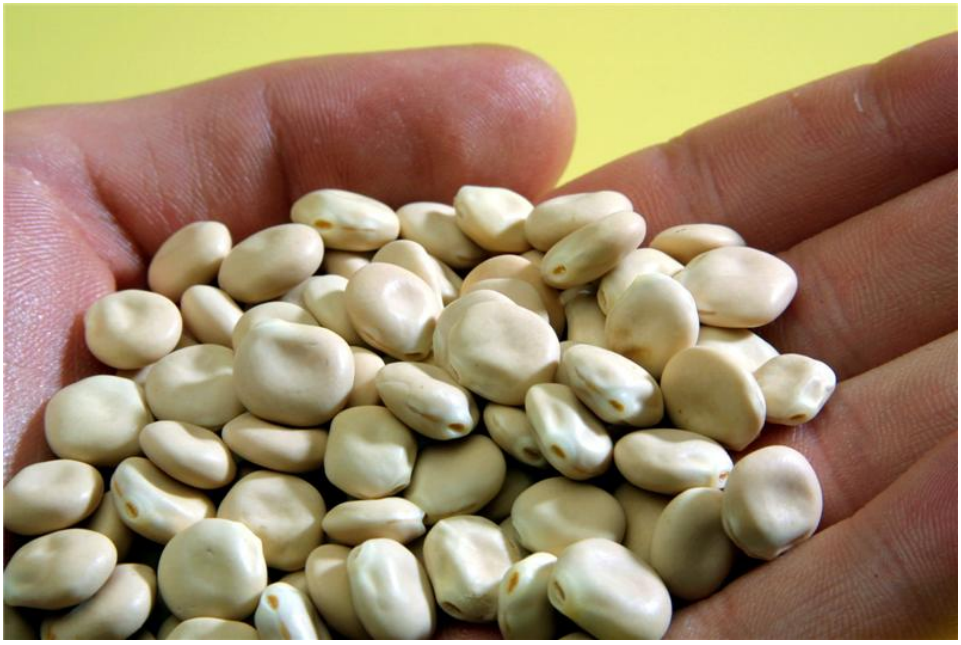
Researchers at the Fraunhofer Institute for Environmental, Safety and Energy Technology UMSICHT in Oberhausen are pursuing a new idea by testing how carbon dioxide can be used to impregnate plastics. At a temperature of 30.1 degrees Celsius and a pressure of 73.8 bar, CO2 goes into a supercritical state that gives the gas solvent-like properties. In this state, it can be introduced into polymers, or act as a "carrier" in which dyes, additives, medical compounds and other substances can be dissolved. "We pump liquid carbon dioxide into a high-pressure container with the plastic components that are to be impregnated, then steadily increase the temperature and the pressure until the gas reaches the supercritical state. When that state is reached, we increase the pressure further. At 170 bar, pigment in powder form dissolves completely in the CO2 and then diffuses with the gas into the plastic. The whole process only takes a few minutes. When the container is opened, the gas escapes through the surface of the polymer but the pigment stays behind and cannot subsequently be wiped off," explains Dipl.-Ing. Manfred Renner, a scientist at Fraunhofer UMSICHT.

In tests, the researchers have even managed to impregnate polycarbonate with nanoparticles that give it antibacterial properties. E-coli bacteria, placed on the plastic's surface in the institute's own high-pressure laboratory, were killed off completely – a useful function that could be applied to door handles impregnated with the same nanoparticles. Tests conducted with silica and with the anti-inflammatory active pharmaceutical ingredient flurbiprofen were also successful. "Our process is suitable for impregnating

partially crystalline and amorphous polymers such as nylon, TPE, TPU, PP and polycarbonate," states Renner, "but it cannot be applied to crystalline polymers."
The process holds enormous potential, as carbon dioxide is non-flammable, non-toxic and inexpensive. Whilst it shows solvent-like properties, it does not have the same harmful effects on health and on the environment as the solvents that are used in paints, for example. Painted surfaces are also easily damaged and are not scratch-resistant. Conventional processes for impregnating plastics and giving them new functions have numerous drawbacks. Injection molding, for instance, does not permit the introduction of heat-sensitive substances such as fire retardants or UV stabilizers. Many dyes change color; purple turns black. "Our method allows us to customize high-value plastic components and lifestyle products such as mobile phone shells. The best about it is that the color, additive or active ingredient is introduced into layers near the surface at temperatures far below the material's melting point, in an environ mentally friendly manner that does away with the need for aggressive solvents ," says Renner. The process could, for example, be used to dye contact lenses – and lenses could even be enriched with pharmaceutical compounds that would then be slowly released to the eye throughout the day, representing an alternative to repeated applications of eye drops for the treatment of glaucoma. According to the scientist, this new impregnation method is suitable for a broad range of new applications.
http://www.fraunhofer.de/en/press/research-news/2010-2011/13/impregnating-plastics.jsp

http://www.alphagalileo.org/ViewItem.aspx?ItemId=92963&CultureCode=en

Eating low-fat, thanks to lupin proteins



Eating low-fat, thanks to lupin proteins

Fraunhofer-Gesellschaft

In emerging countries such as China or Brazil, meat consumption is rising dramatically. Indeed, worldwide consumption of red meat has quadrupled since 1961. The United Nations Food and Agriculture Organization (FAO) expects increasing prosperity to lead to a doubling of global meat production by the year 2050. The question is whether our planet, with its limited farmland resources, will still be able to meet all of our needs into the future. Possible solutions for the brewing dilemma are familiar to Dr.-Ing. Peter Eisner of the Fraunhofer Institute for Process Engineering and Packaging IVV in Freising, Germany.

It takes a lot of land to produce meat. “Producing a kilogram of meat consumes between seven and 16 kilograms of grain or soybeans as animal feed,” Eisner reports. “As a result, in the US around 80 percent of grain is fed to livestock.”

Compared to meat production, the cultivation of plants as a food source is considerably less land-intensive. It takes 40 square meters to produce a kilogram of meat, yet that same space could produce 120 kilograms of carrots or 80 kilograms of apples instead. As the researcher points out: “Plants are a source of high-quality foodstuffs, but they can also provide raw materials for technological applications – and are a source of energy.” He demonstrates this in the case of sunflower seeds: up until now, they were used for oil production, their residues serving as low-grade livestock feed. As a result, a 2 ½ -acre parcel of land could be expected to yield around 950 euros. If all of the components were processed and converted to high-quality raw materials for the food, cosmetics and fuel industry, that same parcel would generate some 1770 euros in income.

Plant-based food ingredients can be expected to play a particularly important role as a substitute for raw materials derived from animals. Eisner presented a “milk substitute” made from lupin proteins and suitable as a basis for foods such as ice cream or cheese. It contains no lactose, has a neutral flavor, is cholesterol-free and rich in polyunsaturated fatty acids. Lupin seeds are also the basic ingredient in a new vegetable protein isolate with fat-like properties that has been developed by IVV researcher Daniela Sussmann.

A special production method applied to the lupin seed yields a highly viscous protein suspension with a very creamy consistency. “The microscopic structure of this product resembles that of the fat particles in sausage

meat. So you can use it to produce low-fat sausage products that taste just as good as the original," the researcher added. In sensory tests she investigated whether adding lupin protein could improve the juicy and creamy impression of a low-fat sausage recipe. With success: "By adding 10 percent protein isolate, we were able to markedly improve the fat-like impression of low-fat liverwurst."

Since sausage products are among the foods with the highest levels of fat, this would certainly be a step in the right direction. On average, a German eats 31 kilograms of sausage products each year. The result: An overweight population and cardiovascular disease. If some of the fat could be replaced with proteins derived from plants, every one would benefit: the consumer by eating less fat, the farmer through higher in come, and the environment because plants can be produced more sustainably than meat.

http://www.fraunhofer.de/en/press/research-news/2010-2011/13/low-fat-lupin-proteins.jsp

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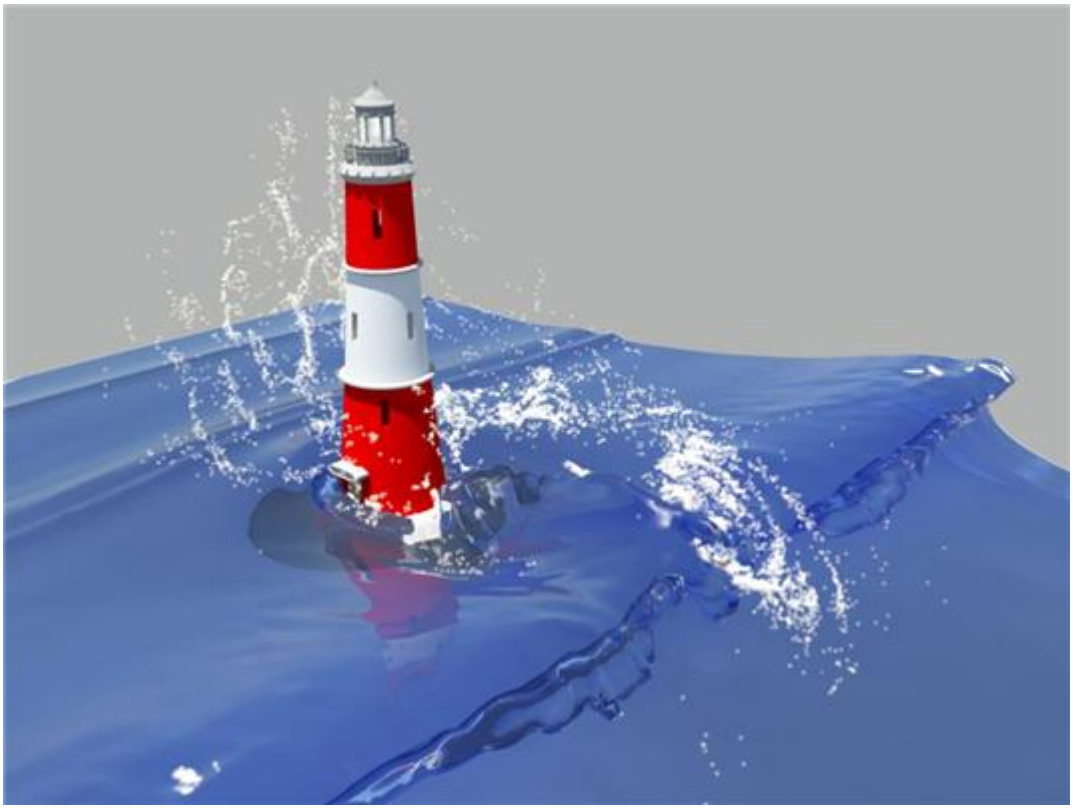
Computing on multiple graphic cards accelerates numerical simulations by orders of magnitude



Fraunhofer Institute for Algorithms and Scientific Computing (SCAI)

The Fraunhofer Institute for Algorithms and Scientific Computing SCAI, in conjunction with the Institute for Numerical Simulation (INS) at the University of Bonn have been selected as one of the first CUDA™ Research Centers in Germany based on the vision, quality and impact of their work. The research will emphasize the development of massively paralleled multi-GPU based software packages for numerical simulation in the Natural and Engineering Sciences. Companies will benefit from the transfer of knowledge from basic research to practical applications.

Because of their leading research in numerical simulation using parallel computing practices, the Fraunhofer Institute for Algorithms and Scientific Computing SCAI and the Institute for Numerical Simulation (INS) at the University of Bonn have officially become one of the first German NVIDIA CUDA Research Centers. The research on parallelization of existing simulation codes to run on machines with multiple graphics processing units (GPUs) is led by Prof. Dr. Michael Griebel, director of the INS and director of the Fraunhofer Institute SCAI.

"Our vision is to develop a massively parallel, completely multi-GPU based high performance molecular dynamics software package, as well as a massively parallel, completely multi-GPU based high performance fluid dynamics code," says Griebel. "Our customers from industry and research institutes will profit from our ability to solve general challenges of high-performance computing in this way."

Today, numerical simulations are indispensable in industrial production. Examples are the creation of new materials, the modeling of manufacturing process chains, and the simulation of material strength and fluid dynamics. However, these simulations require computing times from hours to days – even on high performance computers. This is why industry and science are very interested to shorten processing times.

Computing on multiple graphics cards promises an enormous acceleration of these simulations. NVIDIA's

CUDA parallel computing architecture, enables a dramatic increase in computing performance by harnessing the tremendous power of the GPU. Especially for software that is well suited for parallel computing, the graphics processor is faster than conventional CPUs by orders of magnitude. For example, the INS successfully ran the fluid solver package NaSt3DGPF on eight traditional processors coupled with eight graphics processors. Performing a benchmark study showed that the multiple GPU configuration was even slightly faster than a system using 256 conventional processors.

The researchers from INS and SCAI hope to gain similar effects from adapting the software package Tremolo-X for use on multiple graphics cards. Tremolo-X is used for the molecular dynamics of atoms or molecules. This software simulates materials at the nano scale, and therefore makes it possible to efficiently design new and innovative materials.

Computing on graphics cards not only promises an enormous acceleration of numerical simulations. The GPUs also require much less electricity, delivering a much higher performance per watt benefit. A particular computing task on a conventional parallel computer with 256 processors uses up to 70 kilowatts, compared to only 3 kilowatts on the machine with multiple GPUs. Furthermore, companies profit from GPU computing because the hardware is cheaper.

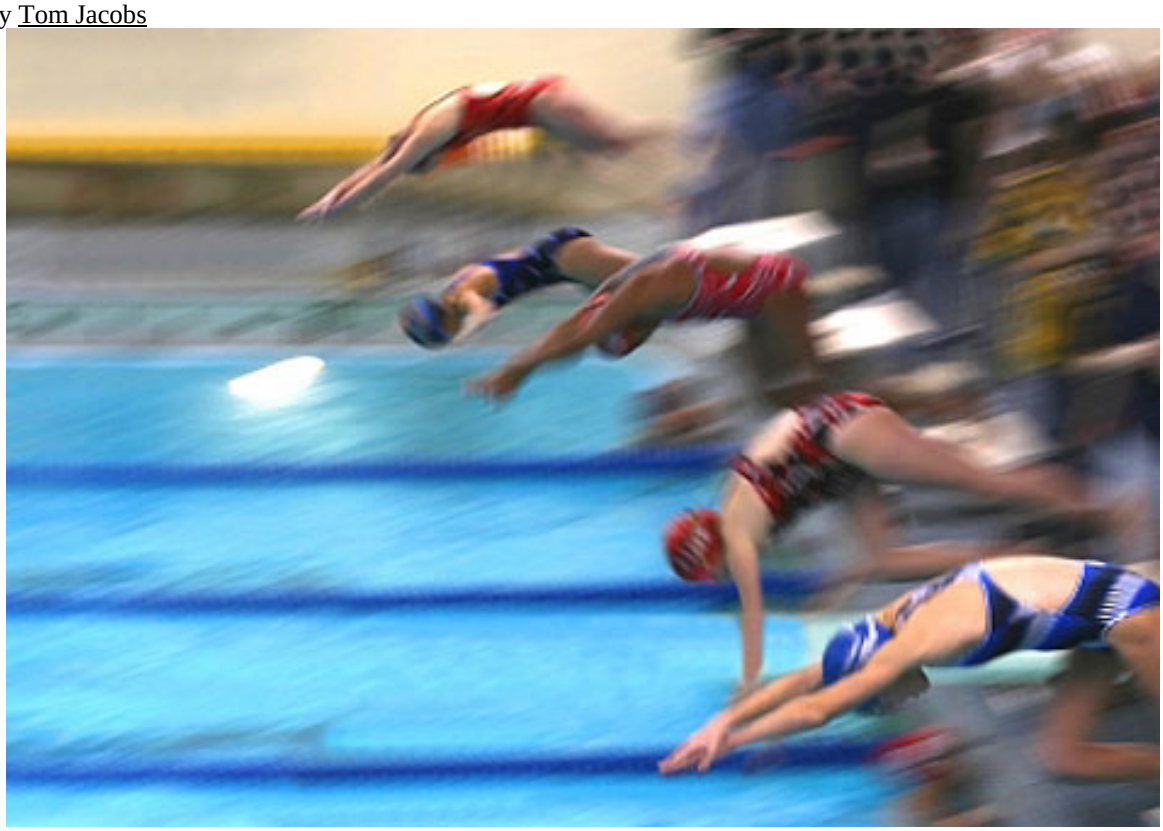
Further information:
http://research.nvidia.com/content/fraunhofer-unibonn-crc-summary
http://www.scai.fraunhofer.de

http://www.alphagalileo.org/ViewItem.aspx?ItemId=92951&CultureCode=en

Secret of Peak Performance: Indispensability

A look at swimmers competing in the 2008 Beijing Olympics concludes they gave their best performances when their efforts were essential for a team win.

By Tom Jacobs



A study of Olympic swimmers reveals that indispensability appears to be a highly effective motivator — even for the best of the best. (Wwegel / istockphoto.com)

Necessity may or may not be the mother of invention, but it appears to be a highly effective motivator — even for the best of the best.

That's the conclusion of a new study that looks at data from swimming competitions at the 2008 Olympics. It finds these world-class athletes turned in better performances during relays than in their individual competition heats.

But there was a catch: This team effect was only found when they were the second, third or fourth person in a four-person relay. A sense of "perceived indispensability" — the understanding that their performance had to be excellent if the team were to win — drove them to even higher levels of athletic achievement.

"Motivation gains at the Olympics are especially remarkable," co-authors Joachim Huffmeier and Guido Hertel write in the *Journal of Experimental Social Psychology*, "because athletes should already be maximally motivated in their individual competitions."

The German psychologists first conducted a pilot study of 29 competitive swimmers, asking them "How well can a bad performance on your part be compensated by the other swimmers of your relay?" As expected, they found the athletes considered their own contribution more indispensible the later they performed in the relay.

The researchers then examined data on 64 Olympic swimmers from 21 countries, focusing on the semifinal rounds. All the athletes took part in both individual and relay freestyle competitions.

They found the times for the first swimmers in a relay were no better than those they turned in during their individual meets. However, “second, third, and last swimmers swam significantly faster in the relay than in the individual competition.”

Huffmeier and Hertel attribute this to two factors: intergroup competition (in other words, being pushed by one another) and “social indispensability.” In the athletes’ minds, a mediocre opening performance can be compensated for later on, but one toward the end cannot, making their late-stage efforts even more vital. A number of studies have found that, compared to working individually, individuals tend to be more motivated by group projects. But as Hertel and his colleague Bernhard Weber noted in their 2007 meta-analysis of this research, this effect “is particularly true for less-capable, inferior group members.”

The new study finds this dynamic isn’t limited to raising the level of the mediocre: It also inspires some of the most capable members of an elite group. Topflight athletes may, of necessity, be self-focused. But at least in this sample, they reached their highest performance levels when they were highly motivated to not let down their teammates.

http://www.miller-mccune.com/culture-society/the-secret-of-peak-performance-indispensability-26167/

Self-Doubt May Help Improve Performance

New research finds that, under certain conditions, a dip in self-confidence can increase one's performance level.

By Tom Jacobs

A new group of studies suggests a little bit of doubt can help fuel a person to do their best work. (Joana Croft / stockxchange.com)

Does a high level of self-confidence lead to better performances, on the stage or the athletic field? Plenty of research says yes. But another group of studies questions that conventional wisdom, suggesting a dollop of doubt is precisely what many people need in order to do their best work.

So is that tingle of anxiety you feel as you anticipate the curtain rising or the starter's pistol going off helpful or harmful? Newly published research suggests that, at least under certain conditions, those butterflies in the stomach can be your friends.

Writing in the journal *Psychology of Sport and Exercise,* a British research team led by Bangor University psychologist Tim Woodman describes a study centered on skipping rope. (The reasons behind this seemingly odd choice will be made clear shortly.)

Twenty-eight volunteers who were "at least moderately confident in their skipping ability" took part in the test. They were asked to say the word "now" each time they received an auditory cue while they were skipping.

After taking part in a one-minute practice run, half the participants were given a different rope for the actual test. They were told that this rope "would be more difficult to use, and would possibly interfere slightly with performance due to differences in weight, length and stiffness," the researchers write. "In reality, the two skipping ropes were identical except for their color."

This was, of course, a way to manipulate the athletes into a state of self-doubt. And according to their scores on a confidence-measuring test they filled out at the beginning of the experiment and again before the "real" test began, it worked: The self-confidence level of the participants presented with a second rope was significantly lower than that of the others.

However, their performance level – the number of skips they performed in each one-minute trial – was significantly higher than that of the control group. Only those using the "different" rope experienced a significant increase in performance level from the practice round to the actual competition.

Woodman and his colleagues can't say precisely why this occurred, but they suspect that their warnings about the second rope may have negated any feelings of complacency the jumpers felt.
"Overconfidence may lead to feelings that one need not invest effort in the task," they write. Thus a decrease in confidence may inspire people to greater levels of effort, which positively impacts their performance.
So why doesn't this dynamic work all the time, as performers from Carly Simon to Laurence Olivier can attest? The answer brings us back to skipping rope.
The researchers note the task their volunteers took part in was extremely simple, arguably "to the point of being relatively effortless. Indeed, once it is mastered, it is possible that skipping requires minimum cognitive effort."
That being the case, the test participants were able to channel their anxiety into motivation. If you're performing a more complex task, such as playing a musical instrument, anxiety can result in focusing your attention on "specific elements of task execution." And as any performer knows, that sort of self-consciousness can be self-defeating.
So the tentative answer this research suggests is: Pre-performance jitters can be helpful motivating tools, but only if the task you are executing is so strongly etched in your brain and body it is virtually automatic. The question of how you arrive at that state echoes the old joke about how you get to Carnegie Hall: Practice, practice, practice.

http://www.miller-mccune.com/culture-society/self-doubt-may-help-improve-performance-23390/

Boredom Enthusiasts Discover the Pleasures of Understimulation

Envoy of Ennui Calls a Meeting; An Energy Bar for Everybody

By GAUTAM NAIK

LONDON—"Brace yourself for five piping-hot minutes of inertia," said William Barrett. Then he began reciting the names of every single one of 415 colors listed in a paint catalog: damson dream, dauphin, dayroom yellow, dead salmon…and on and on and on.

Mr. Barrett's talk was titled, "Like Listening to Paint Dry," and to judge from the droopy faces in the audience, it was a hit. He was speaking, after all, at a conference of boredom enthusiasts called Boring 2010, held here Dec. 11.

View Full Image

Gautam Naik / The Wall Street Journal

Rhodri Marsden speaks on 'The Draw In Test Match Cricket.'

For seven hours on that Saturday, 20 speakers held forth on a range of seemingly dreary diversions, from "The Intangible Beauty of Car Park Roofs" and "Personal Reflections on the English Breakfast," to "The Draw in Test Match Cricket" and "My Relationship With Bus Routes." Meanwhile, some of the 200 audience members—each of whom had paid £15 (about $24) for a ticket—tried not to nod off.

Not many did, surprisingly. "It is quintessentially English to look at something dull as ditchwater and find it interesting," said Hamish Thompson, who runs a public-relations firm and was in the audience.

Boring 2010 is the handiwork of James Ward, 29 years old, who works for a DVD distribution and production company. In his other life, as the envoy of ennui, Mr. Ward edits a blog called "I Like Boring Things." He is also co-founder of the Stationery Club, whose 45 members meet occasionally to discuss pens, paper clips and Post-it Notes.

For another of his projects, Mr. Ward over the past 18 months has visited 160 London convenience stores and made careful notes about a popular chocolate bar called Twirl, including the product's availability, price and storage conditions. He publishes the details online.

Boredom has become a serious subject for scientific inquiry. For example, a 25-year study of British civil servants published earlier this year found that some people really can be bored to death: People who complain about "high levels" of boredom in their lives are at double the risk of dying from a stroke or heart disease, the study concluded.

James Ward

The "Boring Institute," in South Orange, N.J., started as a spoof. Its website says it now plays a more serious role describing "the dangers that are associated with too much boredom and offers advice on how to avoid it." Tell that to the Marines. It's a well-known fact that soldiers who experience war trauma in the field are at higher risk of displaying antisocial behavior, such as getting into fights or neglecting their families, once they return home.

But a survey of more than 1,500 U.S. Marines, published in September in the journal Aggressive Behavior, suggests that being bored may be a bigger risk factor for such behavior than war trauma is.

Boring 2010 sprang to life when Mr. Ward heard that an event called the Interesting Conference had been canceled, and he sent out a joke tweet about the need to have a Boring Conference instead. He was taken aback when dozens of people responded enthusiastically.

Soon, he was hatching plans for the first-ever meet-up of the like-mindedly mundane. The first 50 tickets for Boring 2010 sold in seven minutes.

"I guess the joke is on me," said the laid-back Mr. Ward. "I've created this trap and there's no way out." Proceedings at the sell-out event were kicked off by Mr. Ward himself, who discussed his tie collection at great length, accompanied by a PowerPoint presentation.

He noted that as of June 2010, he owned 55 ties, and 45.5% of them were of a single color. By December, his tie collection had jumped by 36%, although the share of single-color ties fell by 1.5%.

"Ties are getting slightly more colorful," he noted. Also, apparently, his taste was improving. By December, only 64% of his ties were polyester, down from 73% in June.

Even less stirring was a milk tasting. Ed Ross, an actor, swirled, sniffed and sipped five different milks in wine glasses, commenting on each one's flavor, finish and ideal "food pairing." (Cereals got mentioned a lot.) One eagerly awaited talk was about writer Peter Fletcher's meticulous three-year—and still running—sneeze count. With the help of graphs and charts, Mr. Fletcher disclosed that he had sneezed 2,267 times in the past 1,249 days, thus gaining "a profound understanding of the passing of time."

"I've even sneezed when recording a sneeze," he said.

Karen Christopher of Chicago, who now lives in London, found at least one presentation so wearisome that she stopped paying attention. "I started thinking about Swedish police procedurals instead," she said.

The organizers did their best to keep the audience alert. Many viewers brought coffee, and each received a goodie bag containing an energy bar.

After a much-needed break, a drawing was held. Some of the winners got a DVD called "Helvetica," a 2007 documentary about typography.

To mix things up, Mr. Ward and his colleagues set up a 1,000-piece jigsaw puzzle depicting British cereal boxes from the 1970s. Each attendee got a few pieces of the puzzle and was asked to help complete it.
For all its archness, the conference occasionally veered from the ridiculous to the philosophical.
Journalist and author Naomi Alderman spoke about the difficulty of having to observe the Jewish Sabbath as a child. Her talk, "What It's Like to Do Almost Nothing Interesting for 25 Hours a Week," ended on an unexpected, touching note. "When we learn to tolerate boredom," she said, "we find out who we really are."
To get to the conference, Jo Lee took an hour's train ride from the seaside town of Brighton. She said it was worth it because her own idea of fun is to take photographs of random marks left on walls and of chewing gum stuck under desks.

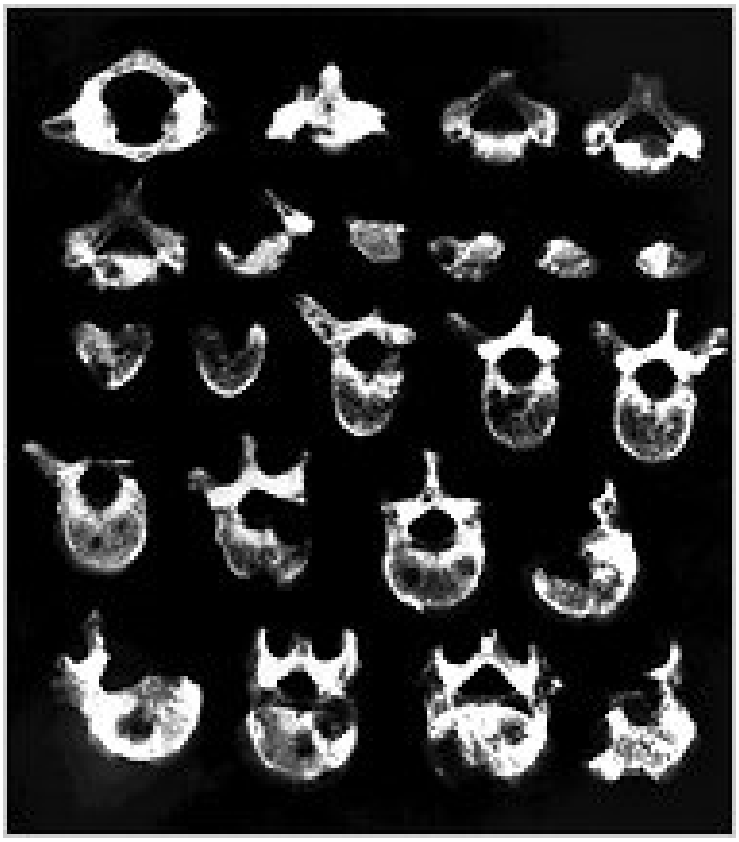
"We're all overstimulated," said Ms. Lee. "I think it's important to stop all that for a while and see what several hours of being bored really feels like."

She will have her chance again next year, when Mr. Ward plans to play host to Boring 2011. He hopes to include a talk that didn't make it on the roster this year entitled "The Ease of Extracting Electricity From Municipal Buildings and Beyond: A Comparison."
It's about electric sockets.
Write to Gautam Naik at gautam.naik@wsj.com

http://online.wsj.com/article/SB10001424052748703395904576025482554838642.html

Unearthing Prehistoric Tumors, and Debate

By GEORGE JOHNSON



Alena Sefcakova, Slovak National Museum, Bratislava, Slovakia

ANCIENT DISEASE An X-ray of vertebrae from a 50–to 60–year–old man exhumed from an early medieval cemetery in Slovakia showed damage from what paleopathologists believe was metastatic carcinoma – a cancer that began in the soft tissues of the body and spread to the bone

When they excavated a Scythian burial mound in the Russian region of Tuva about 10 years ago, archaeologists literally struck gold. Crouched on the floor of a dark inner chamber were two skeletons, a man and a woman, surrounded by royal garb from 27 centuries ago: headdresses and capes adorned with gold horses, panthers and other sacred beasts.

But for paleopathologists — scholars of ancient disease — the richest treasure was the abundance of tumors that had riddled almost every bone of the man's body. The diagnosis: the oldest known case of metastasizing prostate cancer.

The prostate itself had disintegrated long ago. But malignant cells from the gland had migrated according to a familiar pattern and left identifiable scars. Proteins extracted from the bone tested positive for PSA, prostate specific antigen.

Often thought of as a modern disease, cancer has always been with us. Where scientists disagree is on how much it has been amplified by the sweet and bitter fruits of civilization. Over the decades archaeologists have made about 200 possible cancer sightings dating to prehistoric times. But considering the difficulties of extracting statistics from old bones, is that a little or a lot?

A recent report by two Egyptologists in the journal Nature Reviews: Cancer reviewed the literature, concluding that there is "a striking rarity of malignancies" in ancient human remains.

"The rarity of cancer in antiquity suggests that such factors are limited to societies that are affected by modern lifestyle issues such as tobacco use and pollution resulting from industrialization," wrote the authors, A. Rosalie David of the University of Manchester in England and Michael R. Zimmerman of Villanova University in Pennsylvania. Also on the list would be obesity, dietary habits, sexual and reproductive practices, and other factors often altered by civilization.

Across the Internet, news reports made the matter sound unequivocal: "Cancer Is a Man-Made Disease." "Cure for Cancer: Live in Ancient Times." But many medical experts and archaeologists were less impressed.

"There is no reason to think that cancer is a new disease," said Robert A. Weinberg, a cancer researcher at the Whitehead Institute for Biomedical Research in Cambridge, Mass., and the author of the textbook "The Biology of Cancer." "In former times, it was less common because people were struck down in midlife by other things."

Another consideration, he said, is the revolution in medical technology: "We now diagnose many cancers — breast and prostate — that in former times would have remained undetected and been carried to the grave when the person died of other, unrelated causes."

Even with all of that taken into account, there is a fundamental problem with estimating ancient cancer rates. Two hundred suspected cases may not sound like much. But sparsity of evidence is not evidence of sparsity. Tumors can remain hidden inside bones, and those that dig their way outward can cause the bone to crumble and disappear. For all the efforts of archaeologists, only a fraction of the human bone pile has been picked, with no way to know what lies hidden below.

Anne L. Grauer, president of the Paleopathology Association and an anthropologist at Loyola University of Chicago, estimates that there are roughly 100,000 skeletons in the world's osteological collections, and a vast majority have not been X-rayed or studied with more modern techniques.

According to an analysis by the Population Reference Bureau, the cumulative total of everyone who had lived and died by A.D. 1 was already approaching 50 billion, and had nearly doubled by 1750. (The analysis refutes the oft-made assertion that more people are alive today than have ever lived on earth.) If those figures hold, the number of skeletons in the archaeological database would represent barely one ten-thousandth of 1 percent of the total.

Within that minuscule sample, not all of the remains are complete. "For a long time archaeologists only collected skulls," said Heather J. H. Edgar, curator of human osteology at the Maxwell Museum of Anthropology at the University of New Mexico. "For the most part, there's no way to know what the rest of those people's skeletons might have said about their health."

So how are scientists to evaluate, for example, the significance of the handful of fossilized examples of osteosarcoma, a rare bone cancer that mostly affects young people? (What may be the oldest case was found in 1932 by the anthropologist Louis Leakey in a prehistoric relative of man.) Today the incidence of osteosarcoma among people younger than 20 is about five cases per million per year.

"You would need to screen 10,000 individuals to find a case," said Mel Greaves, a professor of cell biology at the Institute of Cancer Research in England, and the author of "Cancer: The Evolutionary Legacy" (Oxford, 2000). Not enough teenage remains have been scrutinized, he said, to draw a meaningful conclusion.

There is a further complication: more than 99 percent of cancers originate not in bone but in softer organs, which quickly decay. Unless they spread to bone, they will most likely go unrecorded.

Ancient mummies would seem to be an exception. But here, too, the pickings have been slim.

Only on rare occasions can pathologists get their hands on a comparatively recent mummy like Ferrante I of Aragon, king of Naples, who died in 1494. When his body was autopsied five centuries later, adenocarcinoma, which begins in glandular tissues, was found to have spread to the muscles of his small pelvis.

A molecular study revealed a typographical error in a gene that regulates cell division — a G had been flipped to A — which pointed to colorectal cancer. The cause, the authors speculated, might have been gluttonous consumption of red meat.

Over the years hundreds of Egyptian and South American mummies have turned up a few other cases. A rare tumor called a rhabdomyosarcoma was found on the face of a Chilean child who lived sometime between A.D. 300 and 600.

Dr. Zimmerman, co-author of the recent review, discovered a rectal carcinoma in a mummy dated between A.D. 200 and 400, and he confirmed the diagnosis with a microscopic analysis of the tissue — a first, he said, in Egyptian paleopathology.

"The fact remains that there are only a minute number of truly ancient mummies and skeletons that show evidence of cancer," he said. "We just don't find anything like the modern incidence of cancer."

Although average life span was lower in ancient Egypt than it is today, Dr. Zimmerman argues that many individuals, especially the wealthy, lived long enough to get other degenerative diseases. So why not cancer? Other experts have suggested that most tumors would have been destroyed by the invasive rituals of Egyptian mummification. But in a study published in 1977, Dr. Zimmerman showed it was possible for the evidence to survive.

In one experiment, he took the liver from a modern patient who had succumbed to metastatic colon cancer, dried it out in an oven and then rehydrated it — demonstrating, he said, that "the features of cancer are well preserved by mummification and that mummified tumors are actually better preserved than normal tissue."

But as with skeletons, the problem remains: Given the small sample size, just how much cancer should scientists expect to see?

To get a rough idea, Tony Waldron, a paleopathologist at University College London, analyzed British mortality reports from 1901 to 1905 — a period late enough to ensure reasonably good records and early enough to avoid skewing the data with, for example, the spike in lung cancer caused in later decades by the popularity of cigarettes.

Taking into account variations in life span and the likelihood that different malignancies will spread to bone, he estimated that in an "archaeological assemblage" one might expect cancer in less than 2 percent of male skeletons and 4 to 7 percent of female skeletons.

Andreas G. Nerlich and colleagues in Munich tried out the prediction on 905 skeletons from two ancient Egyptian necropolises. With the help of X-rays and CT scans they diagnosed five cancers — right in line with Dr. Waldron's expectations. And as his statistics predicted, 13 cancers were found among 2,547 remains buried in an ossuary in southern Germany between A.D. 1400 and 1800.

For both groups, the authors wrote, malignant tumors "were not significantly fewer than expected" when compared with early-20th-century England. They concluded that "the current rise in tumor frequencies in present populations is much more related to the higher life expectancy than primary environmental or genetic factors."

With so little to go on, archaeology may never have a definitive answer. "We can say that cancer certainly existed, and probably in somewhat lower frequency than it does today," said Arthur C. Aufderheide, emeritus professor of pathology at the University of Minnesota and co-author of the Cambridge Encyclopedia of Human Paleopathology. That may be as certain as we ever can be.

As scientists continue to investigate, there may be comfort in knowing that cancer is not entirely civilization's fault. In the normal course of life a creature's cells must be constantly dividing — millions of times a second. Sometimes something will go wrong.

"Cancer is an inevitability the moment you create complex multicellular organisms and give the individual cells the license to proliferate," said Dr. Weinberg of the Whitehead Institute. "It is simply a consequence of increasing entropy, increasing disorder."

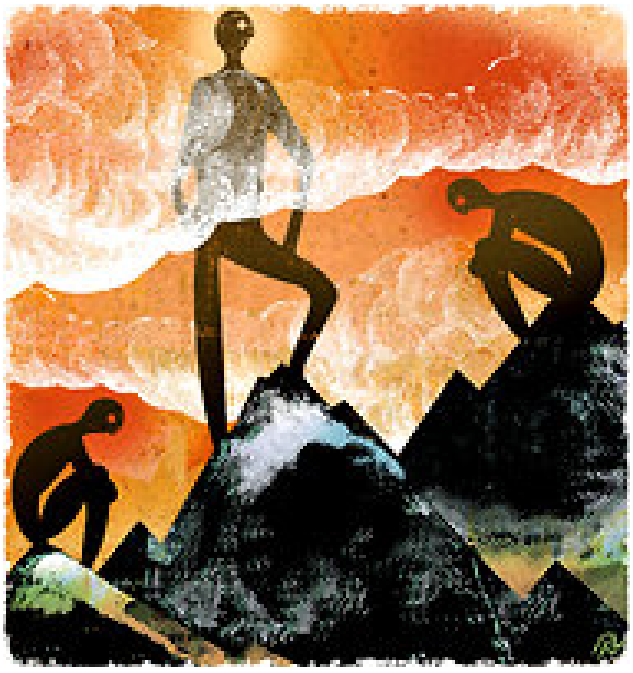
He was not being fatalistic. Over the ages bodies have evolved formidable barriers to keep rebellious cells in line. Quitting smoking, losing weight, eating healthier diets and taking other preventive measures can stave off cancer for decades. Until we die of something else.

"If we lived long enough," Dr. Weinberg observed, "sooner or later we all would get cancer."

http://www.nytimes.com/2010/12/28/health/28cancer.html?_r=1&nl=health&emc=healthupdateema2

On Road to Recovery, Past Adversity Provides a Map

By BENEDICT CAREY



Tim Robinson

Whatever else it holds, this new year is sure to produce a healthy serving of redemption stories, against-the-odds tales of people who bounced back from the layoffs, foreclosures and other wreckage of 2010. They landed better jobs. They started successful companies. They found time to write a book, to study animal husbandry, to learn a new trade: to generate just the sort of commentary about perseverance, self-respect and character that can tempt anyone who's still struggling to throw things at the TV.

Character is a fine thing to admire, all right — once the storm has passed and the rigging is repaired.

But when people are truly sinking, because of job loss, illness, debt or some combination of ills, they have no idea what mix of character, connections and dumb luck will be enough to pull through. To use the psychologists' term, they don't know how "resilient" they are, or how much resilience even matters.

Do I have the right stuff? Or is this sinkhole simply too deep?

"As with so many of life's experiences, humans are simply not very good at predicting how they'll behave when hit by a real adversity," said Laura King, a psychologist at the University of Missouri.

Researchers aren't so good at it, either. It is clear that with time, most people can and do psychologically recover from even devastating losses, like the death of a spouse; but reactions to the same blow vary widely, and no one can reliably predict who will move on quickly and who will lapse into longer-term despair.

The role of genes is likewise uncertain. In a paper published online Monday in The Archives of General Psychiatry, researchers at the University of Michigan who analyzed more than 50 studies concluded that variations in a single gene determine people's susceptibility to depression following stressful events. But an earlier analysis, of fewer but similar studies, concluded that the evidence was not convincing.

New research suggests that resilience may have at least as much to do with how often people have faced adversity in past as it does with who they are — their personality, their genes, for example — or what they're facing now. That is, the number of life blows a person has taken may affect his or her mental toughness more than any other factor.

"Frequency makes a difference: that is the message," said Roxane Cohen Silver, a psychologist at the University of California, Irvine. "Each negative event a person faces leads to an attempt to cope, which forces

people to learn about their own capabilities, about their support networks — to learn who their real friends are. That kind of learning, we think, is extremely valuable for subsequent coping," up to a point.

In a study appearing in the current issue of The Journal of Personality and Social Psychology, Dr. Cohen Silver, E. Alison Holman, also of the University of California, Irvine, and Mark D. Seery, of the State University at Buffalo, followed nearly 2,000 adults for several years, monitoring their mental well-being with online surveys. The participants, a diverse cross section of Americans between the ages of 18 and 101, listed all of the upsetting life events they had experienced before entering the study and any new ones that hit along the way. These included divorce, the death of a friend or parent, a serious illness, and being in a natural disaster.

Or, none of the above: A subset of the participants, 194, reported that they had experienced not one of the fairly comprehensive list of 37 events on the survey. "We wondered: Who are these people who have managed to go through life with nothing bad happening to them?" Dr. Cohen Silver said. "Are they hyper-conscientious? Socially isolated? Just young? Or otherwise unique?"

They weren't, the researchers found. Stranger still, they were not the most satisfied with their lives. Their sense of well-being was about the same, on average, as people who had suffered up to a dozen memorable blows.

It was those in the middle, those reporting two to six stressful events, who scored highest on several measures of well-being, and who showed the most resilience in response to recent hits.

In short, the findings suggest that mental toughness is something like the physical strength: It cannot develop without exercise, and it breaks down when overworked. Some people in the study reported having had more than a dozen stressful events, and it showed.

"These people were truly suffering," Dr. Cohen Silver said, "and we do not minimize in any way the pain of such events when you're going through them. But it does appear that if you've had several such experiences but not too many, you learn something."

Other researchers who looked at the study were more cautious. George Bonanno, a psychologist at Columbia University, said that the results may partly reflect a trick of memory. In particular, "people who are more distressed will tend to recall more stressful life events," Dr. Bonanno, the author of the book "The Other Side of Sadness," said by e-mail. That by itself could explain the correlation between high numbers of lifetime crises and low current mood, he said.

It does not as easily explain the correlations at the lower end, Dr. Seery said. "The people in the study who recalled zero or one negative events were worse off than those with some adverse events," he said. "So they were willing to admit to not doing so well, yet did not recall stressful life events."

Experience may provide more than a sense of what to expect and who one's real friends are. In a recent study in the journal Emotion, researchers at the University of Denver and the University of Basel in Switzerland tested the ability of 78 women to reduce the amount of sadness they felt after watching an upsetting film clip, using a technique called reappraisal. Reappraisal comes naturally to many people and is a way of taking the sting out of a situation by reframing how it's understood: "I wasn't afraid to act, I was uncertain; I didn't have all the information." The study found that the women who were adept at this sort of self-therapy were less susceptible to depressive symptoms after significant crises in their own lives.

It may be that experience with a few threatening or upsetting events refines these types of psychological skills, in a person's own thinking through of the problem or in discussion with friends.

Either way, the lifetime resilience study suggests that the pain, the self-doubt, the disorientation and the anger that swarm the consciousness in the wake of a job loss, a foreclosure or a divorce can have some upside, even though it's not remotely visible at the time.

"Perhaps the one most fundamental thing you learn in living through an experience like this is that you can come out the other end of almost anything," Dr. King said. "You say, 'Well, it may have crushed me, but I survived.' "

http://www.nytimes.com/2011/01/04/health/04mind.html?ref=health

Detecting Tuberculosis: No Microscopes, Just Rats

By NICHOLAS BAKALAR

Sala Lewis/Reuters
IN TRAINING While the Gambian rat is accepted as a diagnostic tool in Tanzania, "the medical community is still skeptical," a researcher says.

Researchers have found a new way of testing for tuberculosis that is fast, cheap and widely available: large rats that can smell the bacteria in a sputum sample.

There are expensive and complicated laboratory tests for tuberculosis, and the World Health Organization recently endorsed a new machine that can give accurate results in under two hours. But the device costs $17,000, and each test requires a $17 cartridge.

Whatever else can be said about them, rats are cheaper.

Today, the most commonly used detection method in developing countries is smear microscopy. This 100-year-old technique involves collecting sputum, dyeing it with a substance that colors only Mycobacterium tuberculosis, the germ that causes TB, and examining the sample under a microscope.

The technique can be used in places where facilities are minimal, but it is not very sensitive — unless there is a high concentration of them, the bacilli are easy to miss, and that results in as many as 60 to 80 percent of positive cases going undiagnosed.

Studies suggest that the Gambian pouched rat can do better. The animal, an omnivorous rodent with puffy cheeks and that chillingly familiar rat body and tail, weighs 10 to 15 pounds and thrives in colonies of up to 20 all over sub-Saharan Africa.

The Gambian pouched rat apparently can smell the difference between tuberculosis bacilli and the myriad other germs that inhabit human phlegm.

The lead author of one study on the rats, Alan Poling, a professor of psychology at Western Michigan University, said that while the animals had been accepted as a reasonable diagnostic tool in Tanzania, "the medical community is still skeptical."

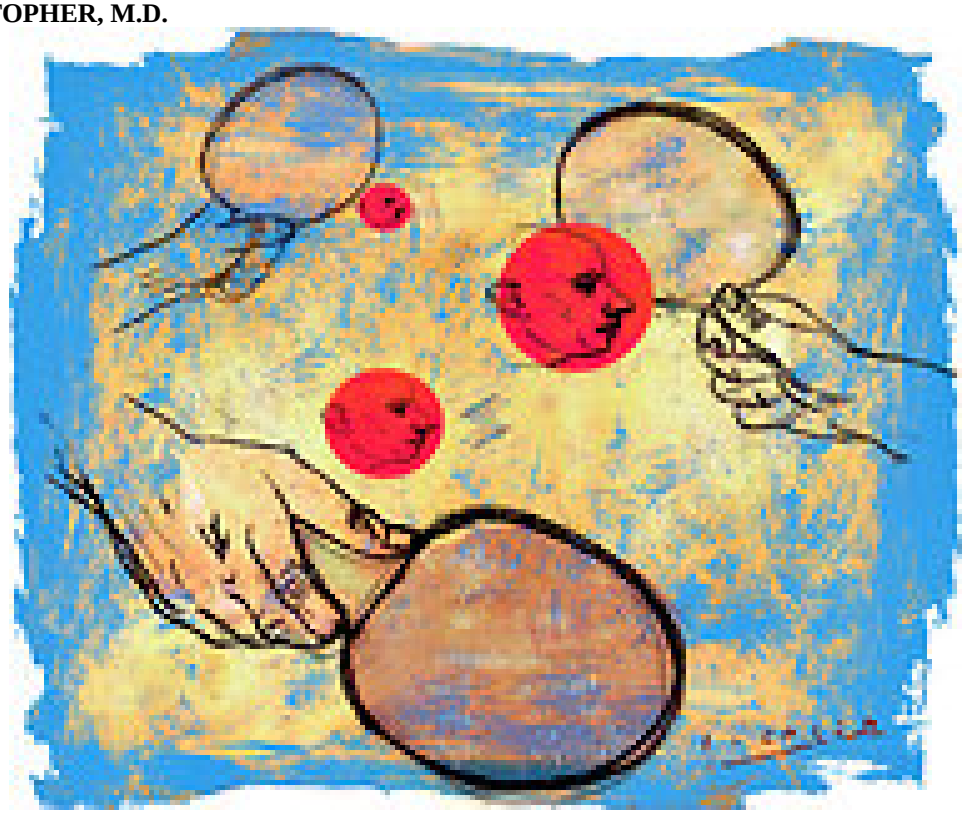
Writing in the December issue of The American Journal of Tropical Medicine and Hygiene, Dr. Poling and his colleagues report a test of the rats using samples that were confirmed by laboratory culture as either positive or negative.

The animals' sensitivity — that is, their ability to detect the presence of tuberculosis — ranged as high as 86.6 percent, and their specificity, or ability to detect the absence of the germ, was over 93 percent.
In another test that compared the rats' success to microscopy, the rats picked up 44 percent more positive cases.
The rats, raised in captivity, are all descended from animals captured in the Uluguru Mountains in Tanzania, or on the outskirts of Morogoro, a city of about 200,000 people in the nearby Tanzanian highlands. This is the same animal, Cricetomys gambianus, that has been trained to sniff out land mines.(It is light enough not to set them off.)
The newborns open their eyes at about 4 weeks, and immediately begin a habituation and socialization program. When the rats are about 8 weeks old, the trainers put sputum samples, positive and negative for tuberculosis, under "sniffing holes" in a specially designed cage.
When a rat spends at least five seconds at a positive sample, it is rewarded with peanuts and bananas. Eventually, the rats learn that a longer sniff at a positive sample gets a reward, and that negative samples are unproductive and should be skipped over quickly.
By the time they are 26 weeks old, some have flunked, but the clever ones among them are experts.
Some human experts are dubious. "They're a long way from demonstrating the robustness of their technique," said Dr. Neil W. Schluger, a professor of medicine at Columbia University who specializes in lung diseases.
"These rats can do something amazing," he continued, "but even if you accept that it worked within their lab, are they still good at it a year later? Do they all have to be trained by the same person? How do they have to be cared for? If you change their cage or their bedding, does it still work?"
Dr. Poling conceded that research on the rats was still preliminary. But he said, "We think that eventually there will be a place for them in first-line screening."
Dr. Poling says he likes Gambian pouched rats. "They're handsome animals, they follow you around, come when you call them," he said.
"If they didn't have those long, scaly tails," he added wistfully, "they'd be lovable."

http://www.nytimes.com/2011/01/04/health/04tb.html?ref=health

A Winding Path to the Emergency Room

By PAUL CHRISTOPHER, M.D.



Joseph Daniel Fiedler

He was the first patient of the day, dropped off at the emergency room by the police or a family member — a man in his 50s, unshaved, stumbling, engulfed in the pungent aroma of alcohol.

When he blew into the breathalyzer's strawlike tube, the readout was 0.18, more than twice the legal limit.

"I get seizures," he said, referring to the dangerous reaction some people experience when they abruptly stop drinking. Then, as if to prove it, he held out trembling hands. Each bore the nicks and scars of a hard-lived life.

I looked at the beads of sweat on his brow, then down at his vital signs. Heart rate 120; blood pressure pushing 170/90. Despite his high alcohol level he was already in withdrawal. A medical detoxification — with drugs to counteract the sudden absence of alcohol in his system — was the right first step.

"Let's admit him," I said to his nurse. Because it was still early, there was a good chance a hospital bed would be available.

Her reply was apologetic but resigned: "He's out of network." I winced at my own naïveté. "Out of network," a euphemism for "insurance will not pay," was a roadblock I should have anticipated. A nuisance for many patients and would-be providers, it is ubiquitous in the second-class world of substance-abuse treatment, where insurance companies contract with selected hospitals and doctors to deliver care at bargain rates.

We called the few in-network hospitals within a broad radius. One had a bed. But before accepting my patient, the receiving doctor wanted a battery of tests, including an electrocardiogram and laboratory work, to rule out other medical concerns. It would be a day or so before the tests came back.

But the patient was already in withdrawal, I told the doctor. He couldn't wait a day.

"Sorry," he said flatly. "He has to be cleared first. Hospital policy."

I hung up and made a quick calculation. An hour had passed since my patient's arrival. If we sent him out now, he might get medically cleared in a few hours, before being transported to the in-network hospital for admission. It would be a rough day, but with any luck, in six hours he'd be in a bed.
On the way to tell my patient the plan, his nurse caught me. "You know we'll have to get authorization, too."
And there was the second ugly truth: nearly all mental health admissions, no matter the reason, require authorization from insurance companies. Otherwise, the admitting hospital won't get paid. Although this patient wasn't coming into my facility, we were the first point of clinical contact; and because I was the one recommending admission, it fell to us to justify that decision to the insurer. The short straw was ours.
A bad situation was beginning to look worse. The insurance company wouldn't authorize an admission until my patient had been accepted to a bed, but he couldn't be accepted until he'd been medically cleared.
The sawtooth path to treatment now looked like this: after arriving at my hospital (1), the patient would be sent to a medical emergency room (2) to be cleared, then return to my hospital (1), where he would wait while we obtained insurance authorization before sending him to a psychiatric hospital (3), where, we hoped, he'd be admitted.
"Serves me right, I guess," my patient said when I gave him the news.
I smiled, wondering whether he'd misunderstood what I'd told him or was simply taking it all in stride. Perhaps he'd been through this before.
As the ambulance arrived to take him to the other hospital's emergency room, I ordered a dose of lorazepam — a sedative to ease his withdrawal symptoms — and wished him well. Then I turned to the next patient waiting to be seen.
About 10 hours later, as I was finishing my shift, my patient returned. He'd been cleared and brought back for us to get insurance authorization.
Before he stepped off the gurney, I turned to his nurse.
"I'm already on it," she said.
In the meantime I rechecked his vitals. Still sky-high, so I wrote another prescription for lorazepam. A few minutes later, his nurse approached.
"Did we get the authorization?" I asked excitedly.
She nodded once and then shook her head with a rueful smile.
"What is it?" I asked.
"The bed at the other hospital. It was already filled."
Physicians in emergency rooms everywhere share the challenge of figuring out where their patients will get the best and most timely care — a medical or a psychiatric floor, the intensive care unit or the surgical suite? But in psychiatry more than in other specialties, it is insurance that is likely to tie a Gordian knot.
In my psychiatric residency, I spent four years learning the intricacies of mental illness and its remedies, the interactions between medications, and the ethical conundrums of involuntary treatment. Yet now that I'm in my first post-residency job, it turns out I spend much of my time wrangling with insurance companies over what I believe to be appropriate treatment.
And legislative reforms like the recent Mental Health Parity and Addiction Equity Act, while helpful, have yet to be the Alexandrian sword that so many hope for. Too many patients with substance disorders are still unable to get the prompt care they need and deserve.
The nurse and I tried once again to find an inpatient bed, this time broadening our search. But by now it was late in the day and the in-network hospitals were full.
Looking over our own census, I saw we still had two unassigned beds. I sat and wrote admission orders; we would probably end up eating the costs.
The nurse, standing behind me, said, "That seems like the right thing to do."
Dr. Paul Christopher is a psychiatrist at Butler Hospital in Providence, R.I.

http://www.nytimes.com/2011/01/04/health/04cases.html?ref=health

Rh Factor, 1944

By NICHOLAS BAKALAR

The so-called Rh factor makes few headlines these days, but until the middle of the 20th century it was a serious public-health concern, implicated in the deaths and severe disabilities of 10,000 babies in this country every year.

The presence or absence of the blood protein Rh (for rhesus, the monkey in which it was discovered) can lead to runaway immune reactions in Rh-positive babies born to Rh-negative mothers, or in people receiving transfusions of incompatible blood.

So in hindsight, The New York Times's first mention of the Rh factor, on Sunday, March 26, 1944, should have made bigger news than it did — in a brief article at the bottom of the "Science in Review" column on Page 9 of Section 4, The News of the Week in Review. "The recently discovered Rh factor in human blood," it said, "need not cause infant deaths and childless marriages."

The article quoted Dr. Alexander S. Wiener, who in 1940, along with his colleague Karl Landsteiner, first described the Rh factor in humans. "Dr. Wiener believes that some method may be developed to desensitize mothers so that their babies may be saved," the article said. "Research based on this hope has already been started."

The first mention of a preventive treatment for newborns with Rh disease appeared on April 24, 1947, in a report of a conference at which Dr. Philip Levine said that "the destruction of red blood cells in new-born babies of mothers with an Rh disturbance in their blood may be controlled if the Rh negative pregnant woman receives only Rh negative blood in the event of a transfusion," and that her baby "may be saved by the transfusion of Rh negative blood." Unfortunately, he added, blood tests for the Rh factor were not widely available to pregnant women.

But they were available to lawyers and their clients. On July 21, 1947, The Times reported the first use of the Rh factor, an inherited trait, as a test of parentage in a court case. The judge decided that on the basis of the man's Rh test he could not be the father

It was not until Sept. 11, 1965, that the paper reported on clinical trials of a drug treatment for Rh disease. The article did not refer to the substance by name, but this was the first test of Rh immune globulin, a solution of antibodies derived from human plasma.

Injected into the Rh-negative mother, the antibodies bind to and destroy fetal Rh-positive blood cells that have passed from the fetus to the mother during birth. If the trials succeeded, the vaccine would prevent the maternal immune reaction that can cause Rh disease in babies.

The trials did succeed. On April 24, 1968, an article on Page 48 by Jane E. Brody began, "A New Jersey pharmaceutical laboratory announced yesterday that its vaccine to prevent Rh blood disease in infants had been approved for marketing and would be generally available in June."

On April 28, Ms. Brody reported that the drug, Rhogam, "will be made available to hospitals at $64.80 a dose" — about $407 in today's money. Rh immune globulin, or RhIg (Rhogam is one of several brands), now costs about $100 a dose. Rh blood disease is no longer a threat.

NICHOLAS BAKALAR

http://www.nytimes.com/2011/01/04/health/04first.html?ref=health

With proper planning, selective rather than mass vaccination can provide immunity against flu, say Hebrew U., US scientists

Hebrew University of Jerusalem

With the current outbreak of the flu season in Israel, ospitals are reporting overcrowding, and doctors are advising people who have not yet been vaccinated against flu to get their shots.

Surprisingly, however, three physicists -- one from the Hebrew University of Jerusalem and two others from the University of Michigan – have developed an unconventional, theoretical strategy for intensive but limited vaccination against infectious diseases (such as flu) that would replace the practice of mass inoculation over a prolonged period. The physicists developed their theory using a technique borrowed from quantum mechanics.

How does it work? The program is based on accelerating the natural extinction of the disease through selective vaccination.

Prof. Baruch Meerson of the Racah Institute of Physics at the Hebrew University explains the strategy: "Consider an unfortunate situation when an infectious disease has spread over a population, and a certain portion of the population is sick. Most of the infected individuals recover from the disease and develop immunity to it. On the other hand, the infected individuals can spread the disease in the population through contacts with susceptible individuals.

"To reduce the infection spread, one can vaccinate all possible susceptible individuals. If they are all willing to be vaccinated and there is enough vaccine for everybody, the vaccination campaign will eradicate the disease with certainty. Very often, however, a large portion of susceptible individuals refuse to be vaccinated. In addition, a vaccine can be in short supply, expensive to produce, or difficult to store."

How to cope with such conditions is the problem tackled by the three physicists: Meerson from the Hebrew University and Prof. Mark Dykman and Dr. Michael Khasin from Michigan State University in the US. (Although presently working in the US, Dr. Khasin earned his doctorate at the Hebrew University.)

The researchers made use of the fact that, even without vaccination, a disease ultimately becomes extinct on its own. But for large populations, the typical time it takes for the disease to disappear by itself can be very

long. Essentially, Meerson and colleagues suggested an optimal vaccination strategy that accelerates, in the maximum possible way, this natural process of disease disappearance.
In this strategy, the vaccine must be delivered to the most susceptible populations (say children in a particular class where a certain percentage of the pupils have come down with the flu) in the form of short but intensive vaccination periods, adjusted to match the "ups and downs" of waves that occur in the natural spread of infectious disease.
Also, when the disease has a seasonal variation (like the common cold), that factor must be taken into consideration in the vaccination timing calculations.
The question that still remains is why physicists took on a problem belonging to epidemiology? Meerson says that the mathematical model that he and his colleagues used in their analysis closely resembles a quantum-mechanical model that physicists use when analyzing the dynamics of microscopic particles (such as electrons) in miniature traps. By adjusting the size of the traps upwards or downwards, one increases or decreases the chances of the electrons escaping. It is this unexpected analogy that made it possible to make the surprising conclusions about the periodic vaccination protocol – that is, to show how targeted, selective vaccination can indeed limit the "escape" of infectious germs and allow the disease to die down through largely a natural process.
Meerson and colleagues have yet to model their periodic vaccination scheme using real-world data. But they say their calculations show that vaccinating just a few percent of the population could reduce the time it takes to eradicate a disease from, say, five months, to between three and four. The researchers hope to continue refining their work on this phenomenon.

http://www.alphagalileo.org/ViewItem.aspx?ItemId=92945&CultureCode=en

Not so bird-brained… 3D X-rays piece together the evolution of flight from fossils

Abertay Dundee, University of

3D X-ray scanning equipment is being used to help chart the evolution of flight in birds, by digitally reconstructing the size of bird brains using ancient fossils and modern bird skulls.

In a collaborative project between National Museums Scotland, the University of Abertay Dundee, and University of Lethbridge, Canada, researchers are using an incredibly sensitive CT (computerised tomography) scanner at Abertay to analyse whole skulls and fossilised fragments and recreate accurate 3D models of extinct birds' brains.

Bird skulls grow to a fixed size before they leave the nest, with the brain then growing to almost completely fill the cavity space. This means that bird skulls can be used to accurately calculate the size and shape of the brain.

By working this out, the size of part of the brain called the flocculus can be established. This small part of the cerebellum is responsible for integrating visual and balance signals during flight, allowing birds to focus on objects moving in three dimensions while they are flying.

Dr Stig Walsh, project leader and Senior Curator of Vertebrate Palaeobiology at National Museums Scotland, said: "By charting the relative size of parts of the avian brain we believe we can discover how the flocculus has evolved to deal with different flying abilities, giving us new information about when birds first evolved the power of flight."

The central research question is whether a larger flocculus is directly linked to a greater ability to process the visual and balance signals during flight. If proven, this could mark a major step forward in understanding bird

evolution, and may shed light on whether some remarkably bird-like dinosaurs were truly dinosaurs or actually secondarily flightless birds.

He added: “This research has only been recently made possible through advances in X-ray micro-CT scanning. Unlike medical scanners, which take a series of slice images through an object that may be up to 1.5 millimetres apart, the 3D scanner at Abertay University can be accurate up to 6 microns.

“By using such powerful equipment and around 100 different modern species we’re beginning to understand much, much more about the evolution of flight.”

The project is also looking at some of the rarest fossils in the world – including the only two skulls of a flightless sea bird from the Cretaceous Period around 100 million years ago.

What makes the fossils so rare is they were preserved in three dimensions in soft clay, not flattened by the pressure of earth above them like most bird fossils.

Patsy Dello Sterpaio, joint project researcher at Abertay University, said: “This is a hugely exciting project, which benefits greatly from Abertay’s high-powered micro-CT scanner. We hope that this joint project can produce not only incredible images, but also helps answer some of these important unresolved questions about the evolution of flight.”

Dr Wilfred Otten, leader of the X-ray CT scanning facility at Abertay University, added: “The CT facilities at Abertay University are part of the SIMBIOS Centre for understanding complex ecological and environmental issues, which has an impressive team of experienced and successful experimentalists and modellers supporting its activities.

“Building from our expertise in environmental and soil science, we’re able to offer unrivalled expertise in capturing and quantifying interior structures of a wide range of materials.”

The computer analysis digitally reconstructs the shape and size of the skull, and creates a 3D ‘virtual’ brain model from the cavity inside the skull that housed the brain in life.

The project is also looking at flightless birds such as the dodo, to see whether the flocculus has become smaller with the loss of flight. The researchers believe that the brain power required for flight may have become reduced in such species.

The project is scheduled to run until early 2012.

http://www.alphagalileo.org/ViewItem.aspx?ItemId=92936&CultureCode=en

UPC team presents a system for analyzing information on WikiLeaks

Pere Baleta and Josep Lluís Larriba

Universitat Politècnica de Catalunya

The Data Management Group of the Universitat Politècnica de Catalunya (DAMA-UPC) has designed a system for exploring information on networks or graphs that can complement internet search engines and is of particular interest in areas related to social media, the internet, biomedicine, fraud detection, education and advanced bibliographic searches.

According to Josep Lluís Larriba, director of DAMA-UPC, the technology can be used to extract information from WikiLeaks from two perspectives: one, to obtain generic indicators that provide information on whether the data network has the features of a social network and whether communities of data are created that can provide relevant information; and two, to use the documents hosted on the website to analyze how a topic evolves over time, how a person or a group relates to different topics and how the documents themselves interrelate.

High-speed complex queries

The new DEX technology patented by the UPC can be used to explore large volumes of networked data. The system offers high-speed processing, configurable data entry from multiple sources, and the management of networks with billions of nodes and connections from a desktop PC.

Users can quickly and easily identify interrelated records by formulating queries based on simple values such as names and keywords. Until now, this was possible to a certain extent using database technology, but DEX extracts new information from interrelated data and improves the speed and the capacity to perform complex queries in large data networks.

The DAMA-UPC group, which sees huge potential for the technology in the field of social media and the internet, proposes using the DEX system to analyze data on WikiLeaks, the international media organization that publishes anonymous reports and leaked documents on its website.

From fraud detection to the evolution of cancer

In what was the first major application of DEX, the Notary Certification Agency (ANCERT) used the technology to detect fraud in real estate transactions and the Catalan Institute of Oncology is using it to study the evolution of cancer in Catalonia. The DAMA-UPC group is now looking into how DEX technology can be applied to pharmaceutical data analysis to explore developments in the use of medicines.

The group is also conducting research into how information spreads across the internet and at what speed, and why some news spreads faster than others. The project is developed in the framework of the Social Media project, a strategic industrial research project funded by the National Strategic Consortia for Technical Research (CENIT) program.

In the field of e-learning, the team is working on a project under the RecerCaixa grant program aimed at recommending and exploring audiovisual content for primary and secondary schools.

Exploring scientific information

In addition to the fields of health, fraud detection, education and the internet, the technology created by the DAMA-UPC group also offers benefits to the scientific world.

The group has designed BIBEX (www.dama.upc.edu/bibex), a unique prototype for the Spanish Ministry of Science and Innovation aimed at exploring scientific publications and relating specific literature published worldwide. BIBEX also offers other advantages: scientists can recommend scientific articles and find reviewers to evaluate scientific publications. In the future, BIBEX will offer a tool for businesses to find research groups that are working in common areas of interest.

Technology transfer

Sparsity Technologies (www.sparsity-technologies.com) is a spin-off that was created in 2010 with the participation of the UPC to promote and market the technologies developed by the DAMA-UPC group.

http://www.upc.edu/saladepremsa/al-dia/mes-noticies/upc-team-presents-a-system-for-analyzing-information-on-wikileaks

http://www.alphagalileo.org/ViewItem.aspx?ItemId=92933&CultureCode=en

Prevention of bad lifestyle habits should be tackled even before 13 years, according to PhD thesis defended at University of the Basque Country

Ms Marta Arrue Mauleon, author of the PhD thesis

Elhuyar Fundazioa

Bad eating habits, ingestion of alcohol, sedentary lifestyles - all unhealthy life habits that are already being detected in early adolescence and that are especially predominant amongst women and young people between the ages of 19 and 26. The prevention campaigns should take very much into consideration these groups at risk and even take into account those less than 13 years. These are some of the conclusions that can be drawn from the PhD thesis presented at the University of the Basque Country (UPV/EHU) by researcher Marta Arrue, with the title, *Lifestyle habits and psychological factors in adolescence and youth in the Autonomous Community of the Basque Country (CAV-EAE).*

Ms Arrue studied 2,018 young people from the CAV-EAE who were asked to fill in various questionnaires. With the gathered data, she collated and analysed habits of life according to sex and age (adolescents from 13 to 17; young persons from 18 to 26).

16 years, crucial

The data point to the fact that young persons show more risk behaviour than expected, more even than they themselves perceive, believing that they are healthier than they really are. The least healthy habits turn out to be eating ones, followed by ingestion of alcohol, sedentarism, risks involving sexual relations, the consumption of tobacco and drugs and, finally, low quality or insufficient sleep.

By age, it is notable that risk behaviour presents itself in early adolescence and that all the habits, except sleep, worsen with the passing of the years. Ms Arrue concluded that special attention has to be paid to adolescents of 16 years: this is the point of no return, as it were; the age in which either healthy activities are opted for or risk behaviour patterns arise. With respect to gender, women show greater risk conduct than men. The weak point of women is sedentarism, tobacco, sleep, risk of becoming pregnant and sexually transmitted diseases. Men, on the other hand, show weaknesses with alcohol, illegal drugs and eating.

Ms Arrue also concluded that risk factors tend to be associated in a simultaneous manner, although healthy behaviour also. There is a correlation, for example, between physical activity or lack thereof with the consumption or otherwise of alcohol and tobacco. This means that the importance of a single risk habit by itself should not be minimised, as it can carry others along with it. But, at the same time, it also facilitates prevention campaigns, given that encouraging single healthy lifestyle habit can bring other good behaviour in its train.

Psychological factors

This thesis not only described habits of life, but also undertook a co-relational analysis between these and the psychological state of the persons studied, this being one of the main contributions of the PhD. The results show that adolescents and young people with healthy life habits have higher self-esteem, better psychological wellbeing, greater satisfaction with their bodies and fewer psychopathological indicators. Ms Arrue stated that there is a loop feedback effect between habits and psychological condition: good habits benefit psychological health; optimum psychological conditions facilitating having a healthy life.

Precisely, given positive correlations such as these, the researcher highlights the importance of taking into account the multiple variables surrounding the lifestyle habit when launching awareness/prevention campaigns. Apart from the psychological factor, she suggests that cultural and economic factors should be considered, as well as legal (the scant protection afforded to minors as regards alcohol and tobacco). Ms Arrue reminds us that tendency to bad habits is not due to lack of information, as has been borne out by the numerous campaigns undertaken, and so other factors must be involved.

Thus, the fight against bad lifestyle habits requires a multifactorial and pluridisciplinary approach, and behoves us to detect the problem as early as possible, especially taking into account the groups at risk (women and young people).

About the author

Ms Marta Arrue Mauleon (San Sebastián, 1971) is a graduate in Contemporary History and qualified in Nursing. She drew up her PhD thesis under the direction of Ms Carmen Maganto Mateo and Ms Maite Garaigordobil Landazabal, professors respectively at the Department of Personality and Evaluation and of Psychological Treatment at the Psychology Faculty of the UPV/EHU. In order to undertake her thesis, the researcher studied samples from various schools in the three provinces of the CAV-EAE (Álava-Araba, Bizkaia and Gipuzkoa), as well as from the UPV/EHU and the University of Deusto. Currently Ms Arrue is lecturer at the School of Nursing in the Leioa campus of the UPV/EHU.

http://www.basqueresearch.com/berria_irakurri.asp?Berri_Kod=3115&hizk=I

http://www.alphagalileo.org/ViewItem.aspx?ItemId=92903&CultureCode=en

Easy to bully digitally

The University of Stavanger

Two out of three children have experienced bullying via the Internet or mobile phones according to a survey made by Telenor in 2008 in Norway. The survey also shows that parents are uncertain about what to do about this kind of bullying.

Research Fellow Tove Flack at the Centre for Behavioural Research (SAF) at the University of Stavanger has extensive experience in counselling work in anti-bullying, which includes the centre's program zero, where zero tolerance for bullying and active involvement are important concepts. Zero gives schools advice on how to prevent, detect and solve problems and create continuity. She has also worked with cases of bullying and conducted bullying research in schools. In her research and practice, she has particularly focused on hidden bullying.

- For many victims of bullying cyber-bullying is just one of several ways in which they are being harassed. This may mean that they never have any protected place. At school, they are left out or maligned and when they come home they receive insults on mobile phones and net. Access to social media in recent years has unfortunately given us some new bullying tools," Flack says.

Lower Threshold

She explains that the term bullying means experiencing harassment on a regular basis over time. Also when it comes to cyber-bullying, it is important to distinguish between those who are often harassed and those who have experienced harassment only occasionally.

Cyber-bullying takes place both through image and text. Among today's youth many have experienced seeing a picture they would never have shown to anyone, spread to all and sundry. Images remain online forever. Others have had to read characterizations of themselves that are very offensive and know that such accounts are shared with the general public.

- The threshold to bully one another through social media might possibly be lower than to bully someone in more traditional ways. When friends sit together, it may seem easy and non-committal to send off an anonymous message with a disrespectful message to another person. It is not unknown that hate groups are formed online, where children or young people unite to hate a particular person. Digital bullying can result in

a person being frozen out by having that individual deleted from Facebook or from the contact list on one's mobile," Flack says.
- For adults it can be difficult enough to discover traditional bullying. Digital media create new and demanding challenges. It is important to have zero tolerance for bullying via the Internet in the same way as there should be zero tolerance for all types of harassment, she points out.
Girls most affected
The Data Inspectorate launched in March 2010 the service slettmeg.no. The service will help those who have had their identity violated online. Of a total of 508 inquiries about the site in June, July and August this year, 39.7 percent were about Facebook , Google came second (7.9 percent) and the press came third with 7.7 percent.
Twice as many girls as boys report having been bullied digitally, according to a survey conducted by TNS Gallup in connection with the campaign dubestemmer.no. The survey shows that social networking, SMS and instant messaging are the most widely used bully channels.
- Children and young people are normally not aware of how strongly it may affect the receiver. They do not consider that what they broadcast can be tracked down and that they may be accountable for their actions online. Many do not realize that they may be prosecuted when they violate or threaten others via the net, she said.
Schools must take action
Flack emphasizes that schools must take steps to gain control of bullying situations. She insists that different expertise about different forms of bullying is needed in order to succeed. Knowledge about the handling of digital bullying is included in SAF's anti-bullying program Zero, in which zero tolerance of bullying and active involvement are important concepts. Zero gives schools advice on how to prevent, detect and solve problems and create continuity.
- In order to detect traditional forms of bullying, schools must develop their ability to see and understand what is happening in communication and interaction between pupils. When it comes to cyber-bullying, special strategies are required," Flack says.
- Although cyber-bullying is largely an after-school problem, the schools have a great responsibility to contribute to prevention, detection and the stopping of bullying. They should take up the netiquette rules at an early stage and inform about the dangers. That should of course also parents do," she adds.
Warns against data refusal
In his doctoral work Research Fellow Arne Olav Nygard at the Reading Centre has followed the teaching in secondary schools. From his seat at the back of the classroom he has gained an insight into students' use of computers and mobile phones. Social media are frequently open on small and large screens according to his observations.
- Surveys show that Facebook is very important right now, specially the chat and wall functions. In addition, young people often play online games together. The students have an almost constant social discourse going with friends in other classes and at other schools. This is an extension of existing social networks, Nygard explains.
He warns against easy solutions in the fight against cyber-bullying. To deny students the use of technology at school or at home, is the wrong way to go," Nygard says, who has taught courses to parents and given them some simple rules they can stick to.
- We must be careful to turn bullying into a technological question. In my view, bullying is first and foremost a social problem. To remove the PC and mobile phone is the easiest solution, but it should be the last one, for that is not where the problem is. The only thing parents and teachers achieve in this way is to remove themselves from the real issues. Moreover, the curriculum states that students must master data," the research fellow says.
Nygard realizes that bullying will find new channels in the digital networks, and that it may have other and unintended consequences. He still believes that adults also need to engage in, observe and learn the logic of the digital world. This will make it difficult for children to have a secret digital life," he believes.
- Parents can achieve a lot by being present. One measure might be to put the computer in the living room or in another central room. When the children have to sit near adults, they also see that the adults are included. Children should also learn to use their full names on the network," Nygard says.

- We need to set the limits for mobile and computer usage, but the technology is not something to be afraid of. As a parent you can start to become friends with your kids on Facebook, even if they think it isn't cool.
Five pieces of advice to avoid cyber-bullying:
1. Take bullying through social media seriously
2. Talk with children and young people about Internet use and netiquette
3. Get involved in the children's Internet use and become friends with your children on Facebook
4. Remember to save harassment and threats on the hard disc and mobile device
5. Contact the police on suspicion of offenses
http://www.uis.no/news/article29781-50.html

http://www.alphagalileo.org/ViewItem.aspx?ItemId=92900&CultureCode=en

The too many faces of war - why the war in Afghanistan is so complex

MANY FACES: Norwegian soldiers chat with a local Afghan in Faryab Province, Afghanistan. (Photo by ISAF Public Affairs)

The University of Stavanger

Conflicting roles among military and civilian personnel is counterproductive to NATO's strategy for peace in Afghanistan, concludes PhD candidate Lillian Katarina Stene after six months in the country.

"We must differentiate better between military and civil tasks, and present ourselves more clearly," she says. The former army officer studies civil military coordination in conflicts at the University of Stavanger, Norways' Risk management and societal safety programme. She has interviewed military colleagues during her stay at the German NATO headquarter in Mazar e Sharif in the North of Afghanistan.

Through participant observation, she has gained access to the inner workings of the NATO forces.

"Since there is no unified way of doing things in Afghanistan, NATO has a problem," Stene says.

Different national caveats and ingrained practices, attitudes, training and interpretations conducts different operational modes among the countries working under the NATO umbrella, she asserts.

"While Americans like to act quickly, Germans and Scandinavians prefer to consider the long-term effects of civil military coordination. The Americans are likely to dig a well on the spot, while Germans prefer to let the Afghans dig the well themselves."

To connect local structures and military intentions, designated civil military coordination (CIMIC) units are set up within NATO. Their three core functions are to liaise, be a support to the civil environment and the military force. They contribute by assessment of villages and supporting basic infrastructure such as roads, water and bridges when needed.

"Civil military coordination is about working behind the scenes, and handing over tasks to the Afghans," says Stene. She worked as a CIMIC officer herself during her time in the country.

"It is vital to gain insight into people's real needs, and to involve local projects and contractors. Building schools may not always be the answer to everything," she says.

In her opinion, too little effort is put into long-term planning for reconstructing the country.

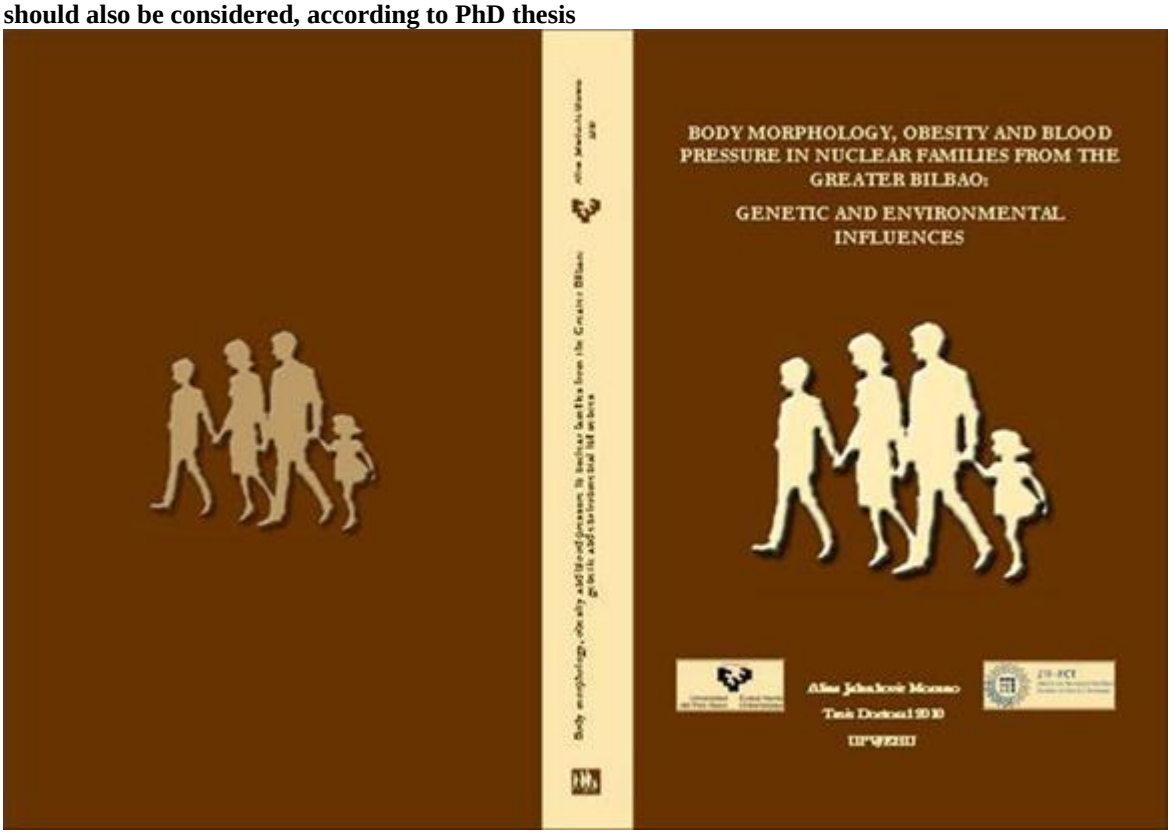
"If local structures are not sufficiently developed, I'm afraid we are building a house of cards which will fall down after we have left," she says.

"There are only political solutions to crises and conflicts. The Afghan people itself, through its leaders and representatives, must take the lead in finding a solution. Which is quite a challenge as the international

community – meaning the UN, NATO's coalition forces and numerous governmental and non-governmental organisations – are all deeply involved in the development of the country," says Stene.
She believes the military alliance's 'comprehensive approach' is counterproductive to both civilian and military parties operating in Afghanistan, since this strategy enables role conflicts among them.
"The military is the prolonged arm of politics, but soldiers are neither politicians nor aid workers. Never the less, the NATO strategy presupposes interference with civilian life. This gives rise to concern, and it is not an easy task to win the 'hearts and minds' of local people," Stene asserts.
As long as war skirmishes are taking place within and among local inhabitants, many will maintain that there is no alternative to this strategy. This perception is maybe the greatest challenge of all, according to Stene.
When grey zones between military and civilian participants appear, it is harder for locals to separate the two groups, and to establish who does what. Aid workers, whose safety depends on being trusted by the local communities, may be seen as representatives of the occupation force, and thus become more vulnerable. A case in point is the dramatic increase in the killing of aid workers over the last years.
"It is vital to separate between strictly humanitarian organizations, whose task it is to supply basic utilities such as water, food and medicines to everyone in need – regardless of who they are – and international or independent organizations which are building schools and infrastructure and cultivate land in compliance with the international community's or the Afghan government's development plans," Stene says.
When some of these organizations profess to be impartial, while simultaneously running development projects paid for by Afghan authorities and the international community, they are not considered neutral by local inhabitants. Such organizations suffer more frequent attacks, and their security situation is deteriorating.
As military forces continue to build infrastructure and cooperate closely with large civilian organizations, it may be very difficult for local people to distinguish between the different actors' roles and mandates. Since many civilians have lost their lives during the war, this fact has of course contributed to the growing skepticism towards the international community among Afghans.
Although Afghanistan is a war-torn country with war-weary inhabitants, Stene thinks there is light at the end of the tunnel. But the key to a peaceful solution does not necessarily lie in the withdrawal of foreign troops, as President Hamid Karzai and NATO's leadership now have agreed on. She thinks stability is possible to enforce with more troops present. In Stene's opinion, NATO is too top-heavy today.
"We are missing boots on the ground," the former major says.
Compared to the number of NATO soldiers present in Kosovo, there are far fewer soldiers in an area the same size in Afghanistan. Another challenge for the alliance is the extensive rotation of staff. Short stays inhibit cooperation and the building of trust between the parties.
"Building trust takes time. In order to succeed in Afghanistan, we have to spend time in the country and perform our tasks in accordance with the Afghans' terms," Stene says.
http://www.uis.no/news/article29775-50.html

http://www.alphagalileo.org/ViewItem.aspx?ItemId=92894&CultureCode=en

Besides body mass being taken into account in the fight against obesity, the amount of adipose tissue should also be considered, according to PhD thesis



Elhuyar Fundazioa

Obesity is seen as the great pandemia of the XXI century. Recent data point to more than a billion adults in the world suffering from overweight, of which 300 million are clinically obese. What is more, the rates of child obesity show a worrying increase, with more than 155 million children and adolescents being overweight, of which 40 million are clearly obese.

Biologist Aline Jelenkovic analysed to what point corporal morphology was influenced by genetics, on the one hand and, on the other, by the environment. To this end, she studied nuclear families in Greater Bilbao, with children of between 2 and 19 years of age. She corroborated that the environmental factor influenced the amount of adipose tissue (tissue containing fat accumulating cells) very considerably and that this is, in turn, linked to blood pressure. Its control would seem, therefore, key to fighting against obesity. This is the conclusion of the PhD thesis, defended at the University of the Basque Country (UPV/EHU) and entitled *Body morphology, obesity and blood pressure in nuclear families from the Greater Bilbao area: genetic and environmental influences*.

Genetics and the environment, both relevant

According to the data in the thesis, it is estimated that the characteristics or phenotypes defining the height, the shape and the adipose tissue of the human body are hereditary at a rate that goes from moderate to high (0.28-0.69). The environment also plays a relevant role. In fact, human morphology is partly determined by genetic factors and partly by environmental ones which occur in common in the corresponding phenotypes. The influence of both is notable in the phenotypes related to obesity, but it is also significant that genetics does not affect all of them equally.

In the concrete case of the phenotypes that determine adipose tissue, the hereditary factor is less and the environmental one gains importance. Moreover, the thesis explains that the general increase in body mass observed amongst this sample can be understood on the basis of the increase in adipose tissue (the phenotypes that determine body mass are closely linked to those determining the amount of fat). The thesis concludes,

thus, that controlling the amount of adipose tissue, and not only total body mass, is key in the fight against obesity.
In fact, body fat is not only key because it is related to mass, but also because it is linked to another component that is equally characteristic of obesity: blood pressure. Blood pressure (and the pulse in particular) shows itself to be considerably influenced by the environmental factor, and less determined by genetic factors (0.14-0.31).
There are no common genetic and environmental factors that prove a proportional relation between blood pressure and obesity. What can be observed, however, is that the quantity of body fat has genetic effects on blood pressure phenotypes, corroborating the relationship between the two.
Biodemographic and socioeconomic factors
Ms Jelenkovic also characterised the link between corporal morphology and the family, the thesis considering it be a significant factor, but not especially influential. The researcher observed that, for example, siblings share more environmental factors that influence their corporal morphology than parents and children. As regards mothers, the thesis concludes that the children of young mothers tend to have more body mass and fat, and that the age of the mother when she has her first child and parental education are more closely linked to obesity-related phenotypes than other family factors.
Neither is the socioeconomic factor particularly significant, but it does throw up some interesting data. For example, greater economic status also means being taller and having less adipose tissue. Moreover, socioeconomic status has more influence on phenotypes related to adipose tissue than to body mass.
http://www.basqueresearch.com/berria_irakurri.asp?Berri_Kod=3114&hizk=I

http://www.alphagalileo.org/ViewItem.aspx?ItemId=92885&CultureCode=en

Persistent organic pollutants affect the stress hormone cortisol

Cross section of an adrenal gland from a sheep foetus. Exposure to PCB through foetal life caused changes in adrenal cortex thickness and its ability to produce the stress hormone cortisol

Norwegian School of Veterinary Science

Karin E Zimmer's PhD research shows that persistent organic pollutants (POPs), such as PCB and mixtures of different POPs, affect the way the adrenal cortex functions and thereby the synthesis of the stress hormone cortisol.

Cortisol plays an important role in normal foetal development and, later in life, in retaining normal body functions during periods of stress. Less research has been carried out on the effects of POPs on cortisol levels than on sex hormones.

POPs are widespread in nature and all animals and humans are exposed to them daily, mainly through food. There have been great concerns regarding the potential ability of these pollutants to affect the body's hormone balance. Zimmer's thesis sheds light on how exposure during early life stages interferes with hormone levels and may therefore cause harm to health later in life. Zimmer also investigated how the production of hormones such as cortisol and sex hormones were affected by environmental mixtures of POPs extracted from fish.

The thesis reveals that exposure to PCBs during foetal life and the suckling period caused altered cortisol levels in the blood of both foetuses and adult animals. This indicates that exposure during these sensitive, initial stages of life may have long-term consequences. Her findings are important because altered cortisol balance during early life may lead to a predisposition to develop several diseases in adulthood, such as diabetes and cardiovascular diseases.

Knowledge about how POPs work and how different POPs act together is important for the assessment of human health risks. Zimmer used human hormone-producing cells in her study. High levels of brominated

flame retardants in a POP mixture extracted from fish in Lake Mjøsa in Norway did not make this mixture more potent as regards increasing hormone synthesis than a similar fish mixture from another lake with considerably lower levels. Another POP mixture extracted from crude, unprocessed cod liver also had a pronounced affect on the synthesis of cortisol and sex hormones, whereas a mixture from processed, commercial cod liver oil, which is frequently consumed as a dietary supplement, was shown to have only limited effects.

Karin Zimmer concludes that cortisol synthesis appears to be a sensitive target for POPs and that efforts should be made to find out to what degree this may threaten human and animal health.

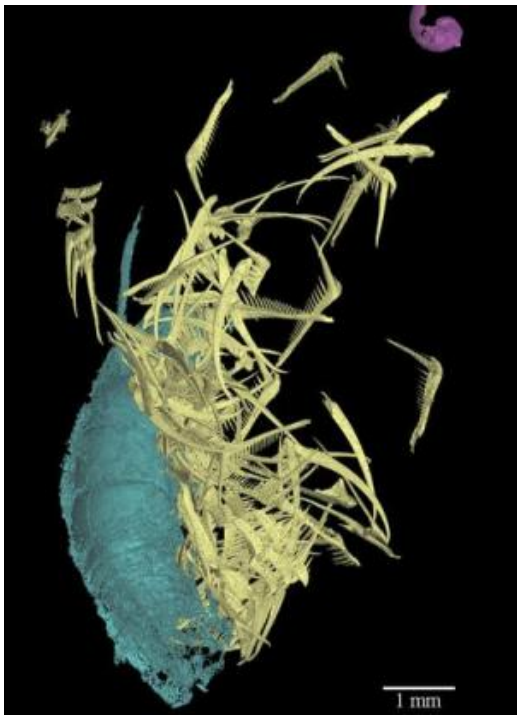
Karin Zimmer Cand.med.vet. defended her thesis entitled “Persistent organic pollutants as endocrine disruptors: effects on adrenal development and steroidogenesis” at The Norwegian School of Veterinary Science on 2nd December 2010.

Credit: Gunn C. Østby

http://veths.episerverhosting.com/en/Home/News/News-stories/Persistent-organic-pollutants-affect-the-stress-hormone-cortisol/

http://www.alphagalileo.org/ViewItem.aspx?ItemId=92879&CultureCode=en

Ammonites' Last Meal: New Light on Past Marine Food Chains



This is a 3-D reconstruction of the radula (tongue-like anatomical structure of mollusks for feeding) of a Baculites fossil. Teeth are depicted in yellow and the fragments of the fossil's last meal, caught between the jaws, in blue (for a crustacean) and pink (for a snail), respectively. (Credit: I. Kruta/MNHN)

ScienceDaily (Jan. 6, 2011) — Scientists have discovered direct evidence of the diet of one of the most important group of ammonites, distant relatives of squids, octopuses and cuttlefishes. The discovery may bring a new insight on why they became extinct 65.5 million years ago, at the end of the Cretaceous.

Ammonites are among the world's most well known fossils but until now, there has been no experimental evidence of their place in the food chain. Using synchrotron X-rays, a Franco-American team of scientists led by Isabelle Kruta has discovered exceptionally preserved mouth organs of ammonites, along with the remains of a meal that show that these ammonites dined on plankton. Plankton was largely destroyed in the wake of the same asteroid impact that led to the demise of the dinosaurs and other species. After losing their source of food, ammonites and many other marine groups could not survive this cataclysmic event.

The findings are published in *Science*.

Ammonites are extinct relatives of the squid and octopus. The Nautilus, a present-day marine invertebrate, is similar in appearance to many ammonites but is a more distant relative. Ammonites appeared about 400 million years ago (the Early Devonian) and experienced a population explosion in the early Jurassic. In fact, ammonites became such an abundant and diverse part of the marine fauna that they are used by paleontologists as classic "index" fossils to determine the relative ages of marine Mesozoic rocks in which they are found.

The team of researchers, led by Isabelle Kruta (MNHN, CNRS, UPMC), used the ESRF to perform X-ray scans of exceptional quality of Baculites fossils found on AMNH expeditions to the Great Plains in the United States. Results suggests that the large group of ammonites to which Baculites belongs, had jaws and radula (a kind of tongue covered with teeth) adapted for eating small prey floating in the water.

The study used synchrotron X-ray microtomography to check the presence, and then digitally reconstruct the mouths of three fossils found in South Dakota. The three-dimensional reconstructions are of such high quality that the jaws and teeth are revealed in their complete form. In addition, one specimen has a tiny snail and three tiny crustaceans in its mouth, one of them having been cut into two parts. Because these planktonic

fossils are not found anywhere else on the specimen, the team thinks that the specimen died while eating its last meal rather than being scavenged by these organisms after death.
"I was astonished when I saw the teeth for the first time, and when I found the tiny plankton in the mouth," Isabelle Kruta (MNHN). "For the first time we were able to observe the delicacy of these exceptionally well preserved structures and use high quality details to obtain information on the ecology of these enigmatic animals."
"When you take into consideration the large lower jaws of ammonites in combination with this new information about their teeth, you realize that these animals must have been feeding in a different way from modern carrion-eating Nautilus," says Neil Landman (AMNH). "Ammonites have a surprisingly large lower jaw with slender teeth, but the effect is opposite to that of the wolf threatening to eat Little Red Riding Hood. Here, the bigger mouth facilitates feeding on smaller prey."
"X-ray synchrotron microtomography is currently the most sensitive technique for non-destructive investigations of internal structures of fossils. It started ten years ago with primate teeth, but is now widely applied in paleontology," says Paul Tafforeau (ESRF). " We made a first test on one of the Ammonite specimens after a test with a conventional scanner failed, and the results were so impressive that we scanned all the other available samples, discovering nearly each time a radula and for one of them, many other structures."
Ammonite jaws lie just inside the body chamber. The research team's new scans of Baculites, a straight ammonite found world-wide, confirms older research that ammonites had multiple cusps on their radula teeth. The radula can now be seen in exquisite detail: the tallest cusp is 2 mm high, tooth shape varies from saber to comb-like, and teeth are very slender. The jaw is typical of this group of ammonites (the aptychophorans) in that the lower jaw is larger than the upper jaw and consists of two halves separated along a midline.
Until recently, the role of ammonites in the marine food web was unknown, although some clues were provided by Landman and colleagues on the shape of the jaw, as well as a 1992 paper by Russian scientists that reconstructed some of the internal structures by slicing fossils..
"The plankton in the Baculites jaws is the first direct evidence of how these uncoiled ammonites fed. This helps in understanding their evolutionary success in the Cretaceous." says Fabrizio Cecca (UPMC).
"Our research suggests several things. First, the radiation of aptychophoran ammonites might be associated with the radiation of plankton during the Early Jurassic," say Landman. "In addition, plankton were severely hit at the Cretaceous-Tertiary boundary, and the loss of their food source probably contributed to the extinction of ammonites. This research has implications for understanding carbon cycling during this time."
Isabelle Rouget (UPMC) agrees, adding that "we now realize that ammonites occupied a different niche in the food chain than we previously thought."
This research was supported by the Centre National de la Recherche Scientifique (CNRS, France), the Museum National d´Histoire Naturelle (MNHN, Paris, France) , the Université Pierre et Marie Curie (UPMC, Paris, France), the American Museum of Natural History (AMNH, New York, USA) and the European Synchrotron Radiation Facility (ESRF, Grenoble, France).

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **European Synchrotron Radiation Facility**.

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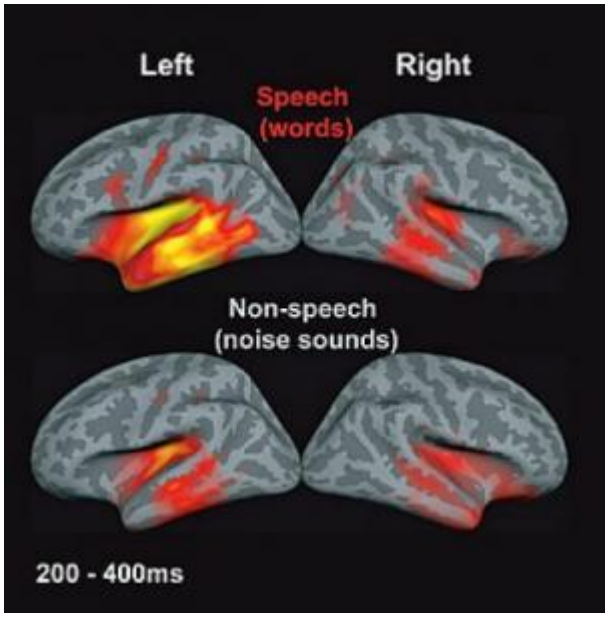
Babies Process Language in a Grown-Up Way



This graphic shows estimated brain activity (indicated by bright colors) in four infants. (Credit: UC San Diego School of Medicine)

ScienceDaily (Jan. 6, 2011) — Babies, even those too young to talk, can understand many of the words that adults are saying -- and their brains process them in a grown-up way.

Combining the cutting-edge technologies of MRI and MEG, scientists at the University of California, San Diego show that babies just over a year old process words they hear with the same brain structures as adults, and in the same amount of time. Moreover, the researchers found that babies were not merely processing the words as sounds, but were capable of grasping their meaning.

This study was jointly led by Eric Halgren, PhD, professor of radiology in the School of Medicine, Jeff Elman, PhD, professor of cognitive science in the Division of Social Sciences, and first author, Katherine E. Travis, of the Department of Neurosciences and the Multimodal Imaging Laboratory, all at UC San Diego. The work is published this week in the Oxford University Press journal *Cerebral Cortex*.

"Babies are using the same brain mechanisms as adults to access the meaning of words from what is thought to be a mental 'database' of meanings, a database which is continually being updated right into adulthood," said Travis.

Previously, many people thought infants might use an entirely different mechanism for learning words, and that learning began primitively and evolved into the process used by adults. Determining the areas of the brain responsible for learning language, however, has been hampered by a lack of evidence showing where language is processed in the developing brain.

While lesions in two areas called Broca's and Wernicke's (frontotemporal) areas have long been known to be associated with loss of language skills in adults, such lesions in early childhood have little impact on language development. To explain this discordance, some have proposed that the right hemisphere and inferior frontal regions are initially critical for language, and that classical language areas of adulthood become dominant only with increasing linguistic experience. Alternatively, other theories have suggested that the plasticity of an infant's brain allows other regions to take over language-learning tasks if left frontotemporal regions are damaged at an early age.

In addition to studying effects of brain deficits, language systems can be determined by identifying activation of different cortical areas in response to stimuli. In order to determine if infants use the same functional networks as adults to process word meaning, the researchers used MEG -- an imaging process that measures tiny magnetic fields emitted by neurons in the brain -- and MRI to noninvasively estimate brain activity in 12 to 18-month old infants.

In the first experiment, the infants listened to words accompanied by sounds with similar acoustic properties, but no meaning, in order to determine if they were capable of distinguishing between the two. In the second phase, the researchers tested whether the babies were capable of understanding the meaning of these words. For this experiment, babies saw pictures of familiar objects and then heard words that were either matched or mismatched to the name of the object: a picture of a ball followed by the spoken word ball, versus a picture of a ball followed by the spoken word dog.

Brain activity indicated that the infants were capable of detecting the mismatch between a word and a picture, as shown by the amplitude of brain activity. The "mismatched," or incongruous, words evoked a characteristic brain response located in the same left frontotemporal areas known to process word meaning in the adult brain. The tests were repeated in adults to confirm that the same incongruous picture/word combinations presented to babies would evoke larger responses in left frontotemporal areas.

"Our study shows that the neural machinery used by adults to understand words is already functional when words are first being learned," said Halgren, "This basic process seems to embody the process whereby words are understood, as well as the context for learning new words." The researchers say their results have implications for future studies, for example development of diagnostic tests based on brain imaging which could indicate whether a baby has healthy word understanding even before speaking, enabling early screening for language disabilities or autism.

Additional contributors include Matthew K. Leonard, Timothy T. Brown, Donald J. Hagler, Jr., Megan Curran, and Anders M. Dale, all of UC San Diego School of Medicine.

The research was funded in part by the National Institutes of Health.

Journal Reference:

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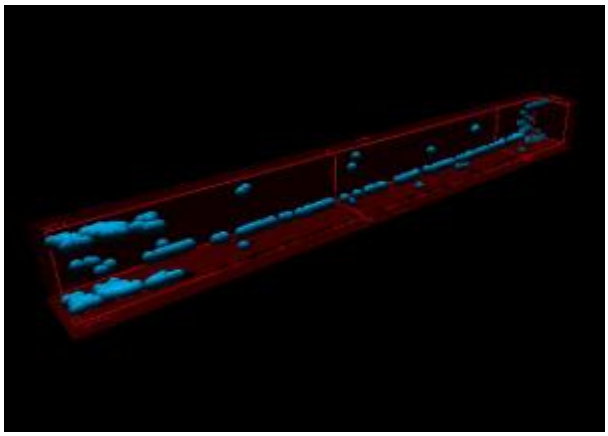
http://www.sciencedaily.com/releases/2011/01/110107094908.htm

'Timing Is Everything' in Ensuring Healthy Brain Development



Still image from an animation showing the growth of the neuronal network with neurons being added at each stage. (Credit: Image courtesy of Newcastle University)

ScienceDaily (Jan. 6, 2011) — Work published shows that brain cells need to create links early on in their existence, when they are physically close together, to ensure successful connections across the brain throughout life.

In people, these long-distance connections enable the left and right side of the brain to communicate and integrate different kinds of information such as sound and vision. A change in the number of these connections has been found in many developmental brain disorders including autism, epilepsy and schizophrenia.

The Newcastle University researchers Dr Marcus Kaiser and Mrs Sreedevi Varier carried out a sophisticated computer analysis relating birth-time associated data to connectivity patterns of nerve cells in the roundworm, *Caenorhabditis elegans*. They demonstrated that when two nerve cells develop close together, they form a connection which then stretches out when the two nerve cells move apart as the organism grows. This creates a link across the brain known as a long-distance connection.

Publishing in *PLoS Computational Biology*, the researchers have demonstrated for the first time that this is the most frequent successful mechanism by which long distance connections are made.

Dr Marcus Kaiser, at Newcastle University, says: "You can draw parallels with childhood friendships carrying on into adulthood. For example, two children living close to each other could become friends through common activities like school or playing at the park. The friendship can last even if one of them moves further away, while, beginning a lasting friendship with someone already far away, is much more difficult."

Mrs Sreedevi Varier adds: "Although it's too early for this research to have direct clinical applications, it adds to our understanding of the structural changes in the brain and raises some interesting questions as to how these connections can become faulty. In further studying this mechanism, we may eventually contribute towards insights into the diagnosis and possibly the treatment of patients with epilepsy and autism."

It has long been understood that the first connections in the brain created in the early days of development can be formed over long distances using guidance signals to direct nerve fibres to their correct positions -- known as axonal guidance. Subsequently, other connections can follow those pioneer fibres to a target location creating connections between distant parts of the brain. Through these long-distance connections different kinds of information, such as sound and vision, can be integrated.

This EPSRC-funded research showed that most neurons are able to create a connection early on in their development when they were physically close together, potentially giving them more time to host and establish connections. These developed into a long-distance connection, the two cells pulling apart as the organism grows larger.

Studying the connections in the neuronal network of the roundworm *Caenorhabditis elegans* the Newcastle scientists -- who are also affiliated with Seoul National University, Korea -- found that most neurons with a long-distance connection had developed in this way.

This new mechanism differs from the previous model for long-distance connectivity. An axon is a fibre that is extended from one nerve cell and, after travelling through the tissue, can contact several other nerve cells. Normally, axons would grow in a straight line. For several targets, however, the axon has to travel around obstacles, as a straight connection is not possible. In such cases, cells along the way can release guidance cues that either attract or repulse the travelling axon. One example of bended fibres is the visual pathway that at several points takes a sharp 90-degree turn to arrive at the correct target position.
Instead, establishing potential links early on when neurons are spatially nearby might reduce the need for such guidance cues. This reduces costs in producing guidance cues but potentially also for genetically encoding a wider range of cues. An early mechanism opens up the possibility that changes in long-distance brain connectivity, that are observed in children and young adults with brain disorders, arise earlier during brain development than previously thought. These are questions that the team continue to work on through data analysis and computer simulations of brain development.

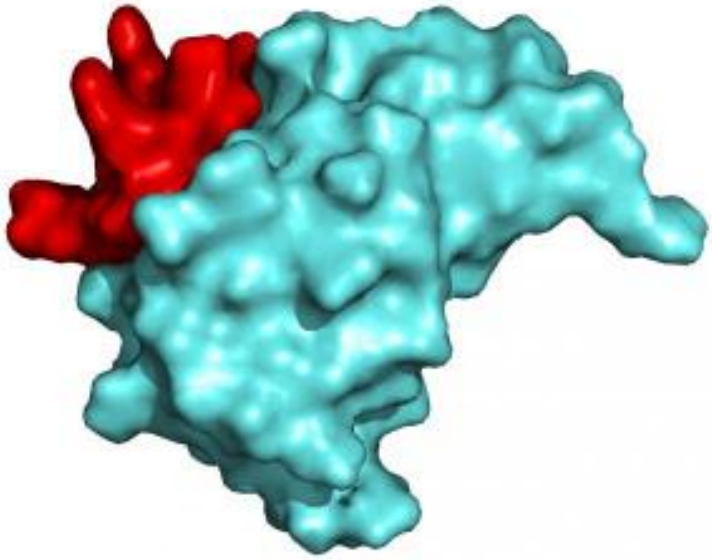
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Newcastle University**, via EurekAlert!, a service of AAAS.

Journal Reference:

1. Sreedevi Varier, Marcus Kaiser. **Neural development features: Spatio-temporal development of the Caenorhabditis elegans neuronal network**. *PLoS Computational Biology*, 2010; DOI: 10.1371/journal.pcbi.1001044

http://www.sciencedaily.com/releases/2011/01/110106192029.htm

Herpes Virus' Tactical Maneuver Visualized in 3-D



An image of a human cellular protein (white) with a herpes virus protein docked (red) showing the details of the interaction leading to increased export of viral genetic material from the cell nucleus, so as to build a new generation of viruses. (Credit: Copyright Drs. Alexander Golovanov and Richard Tunnicliffe, The University of Manchester)

ScienceDaily (Jan. 6, 2011) — For the first time, researchers have developed a 3-D picture of a herpes virus protein interacting with a key part of the human cellular machinery, enhancing our understanding of how it hijacks human cells to spread infection and opening up new possibilities for stepping in to prevent or treat infection. This discovery uncovers one of the many tactical maneuvres employed by the virus.

The Biotechnology and Biological Sciences Research Council (BBSRC)-funded team, led by The University of Manchester, have used NMR -- a technique related to the one used in MRI body scanners and capable of visualizing molecules at the smallest scales -- to produce images of a herpes virus protein interacting with a mouse cellular protein. These images were then used to develop a 3-D model of this herpes virus protein interacting with human protein. The research is published in *PLoS Pathogens*.

Lead researcher Dr. Alexander Golovanov from Manchester's Interdisciplinary Biocentre and Faculty of Life Sciences said: "There are quite a few types of herpes viruses that cause problems as mild as cold sores through to some quite serious illnesses, such as shingles or even cancer. Viruses cannot survive or replicate on their own -- they need the resources and apparatus within a human cell to do so. To prevent or treat diseases caused by viruses we need to know as much as possible about how they do this so that we can spot weak points or take out key tactical maneuvres."

The 3-D model shows how the viral protein piggybacks onto the molecular machinery components inside human cells, promoting virus replication and spread of infection through the body.

"When you look at the image, it's like a backpack on an elephant: the small compact fragment of viral protein fits nicely on the back of the human protein," said Dr. Golovanov.

By studying the images along with biochemical experiments using the human version of the cellular protein, the team has uncovered the mechanism by which the viral and cellular proteins work together to guide the viral genetic material out of the cell's nucleus. Once there, the genetic material can be utilized to make proteins that are used as building blocks for new viruses. The researchers have also confirmed that this relationship between the two proteins exists for related herpes viruses that infect monkeys.

Dr. Golovanov continued: "Our discovery gives us a whole step more detail on how herpes viruses use the human cell to survive and replicate. This opens up the possibilities for asking new questions about how to prevent or treat the diseases they cause."

Professor Janet Allen, BBSRC Director of Research said: "This new research gives us an important piece of the jigsaw for how a particular viral infection works on a molecular level, which is great news. Understanding the relationship between a human, animal or plant -- the host -- and the organisms that cause disease -- pathogens -- is a fundamental step toward successful strategies to minimize the impact of infection. To study host-pathogen relationships we have to look in detail at the smallest scale of molecules -- as this study does -- and also right through to the largest scale of how diseases work in whole systems -- a crop disease in the context of a whole area of agricultural land, for example. BBSRC's broad portfolio of research into host-pathogen relationships facilitates this well."

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Biotechnology and Biological Sciences Research Council**, via EurekAlert!, a service of AAAS.

Journal Reference:

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http://www.sciencedaily.com/releases/2011/01/110106192027.htm

Extracting Cellular 'Engines' May Aid in Understanding Mitochondrial Diseases

Extracting mitochondria from a human cell is a tricky process. NIST researchers recently developed techniques that can surgically remove these tiny cellular engines, potentially enabling new ways to explore the link between mitochondrial DNA and a host of diseases. (Credit: NIST)

ScienceDaily (Jan. 6, 2011) — Medical researchers who crave a means of exploring the genetic culprits behind a host of neuromuscular disorders may have just had their wish granted by a team working at the National Institute of Standards and Technology (NIST), where scientists have performed surgery on single cells to extract and examine their mitochondria.

The scientists reached into these cells and extracted their "engines" -- the mitochondria that are in large part responsible for our metabolism. Many human cells contain hundreds of mitochondria, which were thought to be free-swimming organisms millions of years ago and which still possess their own DNA. Mutations in this mitochondrial DNA (mtDNA) are directly related to a large class of mitochondrial-based diseases, which have a range of symptoms that include early onset blindness, seizures, hearing loss, dementia, etc. In the general population, one out of every 200 people possesses a mtDNA mutation that may develop into a mitochondrial disease.

Investigating more deeply has been problematic, though, because the way mitochondria mix and spread their DNA within and among cells is poorly understood. "The trouble is that it's very difficult to extract single mitochondria from an individual cell," says NIST physicist Joseph Reiner. "For years, the best technique has been to break open a group of cells and collect the mitochondria from all of them in a kind of soup. As you might guess, it's hard to determine which mitochondria came from what cells -- yet that's what we need to know."

The research team, which also includes scientists from Gettysburg College, has potentially solved this problem by realizing that several devices and techniques can be used together to extract a single mitochondrion from a cell that possesses a genetic mutation. They employed a method previously used to extract single chromosomes from isolated rice cells where a laser pulse makes an incision in a cell's outer membrane. Another laser is used as a "tweezer" to isolate a mitochondrion, which then can be extracted by a tiny pipette whose tip is less than a micrometer wide.

This approach allowed the team to place a single mitochondrion into a small test tube, where they could explore the mitochondrion's genetic makeup by conventional means. The team found the mutation present throughout the entire cell was also found within individual mitochondria, a find suggesting that broad genetic research on mitochondrial disease may be possible at last.

"Getting an object as tiny as this from tweezer to test tube is not easy," says Koren Deckman, a biochemist from Gettysburg College. "But by building on more than a decade of work that has gone on at NIST and elsewhere, we now have a way to see the mitochondria we extract all the way through the transfer process, meaning we can be sure the sample came from a very specific cell. This could give medical scientists the inroad they need for understanding these diseases."

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

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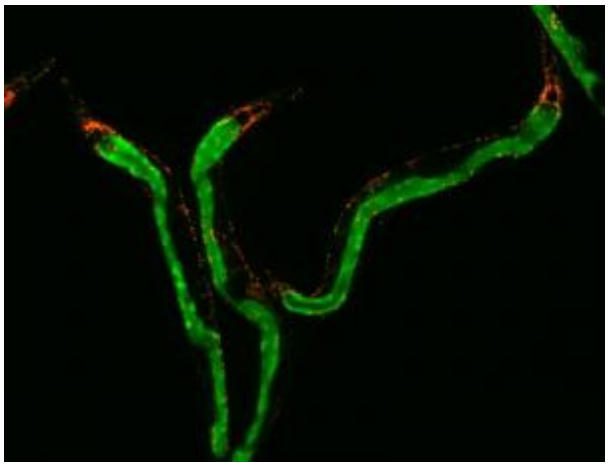
http://www.sciencedaily.com/releases/2011/01/110106145303.htm

How Mitochondrial Signals Extend Lifespan



Disturbing mitochondrial function in intestine (shown in green) or nerve cells (shown in red) extends lifespan in roundworms. (Credit: Courtesy of Kristen Berendzen, Salk Institute for Biological Studies)

ScienceDaily (Jan. 6, 2011) — In making your pro-longevity resolutions, like drinking more red wine and maintaining a vibrant social network, here's one you likely forgot: dialing down your mitochondria. It turns out that slowing the engines of these tiny cellular factories could extend your life-an observation relevant not only to aging research but to our understanding of how cells communicate with each another.

So report researchers at the Salk Institute for Biological Studies in the Jan. 7, 2011, issue of *Cell*. Howard Hughes Medical Institute investigator Andrew Dillin, Ph.D., and his colleagues used the roundworm Ceanorhabditis elegans to show that perturbing mitochondrial function in subsets of worm cells sent global signals governing longevity of the entire organism.

"In this study we show how signals sent from distressed mitochondria are communicated to distant tissues to promote survival and enhance longevity," says Dillin, an associate professor in the Molecular and Cell Biology Laboratory.

The identity of the signal sent from mitochondrially-distressed cells-a hypothetical factor Dillin calls a "mitokine" -remains unknown. Nonetheless, he speculates that mitokines could one day be lobbed as messengers from healthy to unhealthy tissues to treat degenerative conditions.

"Imagine if we could perturb mitochondria in the liver, and make them send a mitokine to degenerating neurons," he says. "Instead of trying to get a drug into the brain, we could exploit the body's ability to send out a natural rescue signal."

It may seem paradoxical that reducing mitochondrial activity increases longevity because mitochondria, particles classically described as energy-producing "powerhouses," seem like good guys. How could keeping powerhouses humming along briskly be anything but a plus?

But it turns out that many investigators, Dillin included, have observed puzzling relationships between mitochondria, energy generation and longevity-interactions that suggest that living long does not necessarily require prospering at the subcellular level.

"As a postdoctoral fellow I did a screen looking for worm genes that increased longevity," says Dillin citing a 2002 Science study that inspired the current work. "Many genes were related to mitochondrial function. If you disabled them, worms lived longer, although their respiration or metabolism was reduced. We wondered whether this is why animals lived longer."

The current *Cell* study shows it's not that simple. Dillin and graduate students Jenni Durieux, Ph.D., first author, and Suzanne Wolff, Ph.D., engineered "transgenic" worms in which a gene named cco-1 was disabled. cco-1 encodes a protein essential for biochemical reactions known collectively as the Electron Transport Chain (ETC), which are required for mitochondria to generate energy-and thus, for cells to live.

A key finding was that worms with ETC selectively impaired by cco-1 loss in either intestine or nerve cells lived longer than normal worms, while worms with ETC perturbed in muscle, skin or the germline did not,

suggesting that a unique signal emanating from damaged mitochondria in nerve or gut, and communicated at a distance, extended lifespan.

"Curiously, ETC manipulation had to occur within a critical time window in a worm's lifespan to get the maximal effect," says Dillin, noting that effects were long-lasting. "It was like you could manipulate mitochondria in a 30-year-old human and get an extra 15 years, while in an 80-year-old, you might only gain two or three years."

To determine how cells respond to the pro-longevity cue, the group monitored a cellular emergency plan called the Unfolded Protein Response (UPR). Cells mount it when proteins accumulate excessively and begin to unravel-or "misfold"-which is toxic to cells. To avert cell death, the UPR mobilizes a team of helpers who, like sales clerks at a Gap sweater table, refold accumulating misfolded proteins piling up inside a cell.

When Dillin and colleagues fed worms reagents blocking the UPR, they found that disruption of cco-1 in neurons or intestine no longer had a lifespan-enhancing effect. This dramatic finding illustrates that initiating refolding of proteins, in this case in response to faraway mitochondrial stress, is in fact the very activity that enhances longevity.

Before 2000, biology textbooks defined mitochondria solely in terms of energy production. "We were caught up in mitochondrial metabolic function," says Dillin, remarking that pro-longevity signals characterized in the current study aren't strictly metabolic. "But we now recognize numerous other critical activities performed by mitochondria."

For example, a "metabolic" explanation for enhanced longevity, known as the "rate of living" theory, goes like this: revved up mitochondria burn cells' energy candle at both ends, leading to (your) premature demise. Conversely, cells that parsimoniously spend energy-possibly due to compromised mitochondrial output-live longer.

Dillin's study refutes this scenario. "We show that it all comes down to protein folding," says Dillin. "That's become the unifying theme in my lab."

This study was funded by grants from the Glenn Foundation for Medical Research, the NIH and by the Howard Hughes Medical Institute.

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

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http://www.sciencedaily.com/releases/2011/01/110106144531.htm

The 'Mad' Egyptian Scholar Who Proved Aristotle Wrong

ScienceDaily (Jan. 6, 2011) — Ibn al-Haytham's 11th-century *Book of Optics*, which was published exactly 1000 years ago, is often cited alongside Newton's *Principia* as one of the most influential books in physics. Yet very little is known about the writer, considered by many to be the father of modern optics.
January's *Physics World* features a fanciful re-imagining of the 10-year period in the life of the medieval Muslim polymath, written by Los Angeles-based science writer Jennifer Ouellette.
The feature covers the time when al-Haytham -- banished from society and deprived of books -- came up with his revolutionary theories about the form and passage of light.
Ouellette brings detail to the skeletal plot of al-Haytham's life, from the awe and intimidation felt when he was summoned by the Caliph to use his engineering prowess to overcome the annual flooding of the Nile, to his fear of punishment when he realised he had failed in his task.
Al-Haytham was only able to escape a death sentence from the notoriously brutal Caliph by pretending he had gone mad. The Caliph instead incarcerated Al-Haytham, imprisoning him under house arrest to a cell. Confined and alone, it was here that Al-Haytham carried out the work that was to make him famous.
In 11th-century Egypt, Aristotle's ancient thought that visible objects and our own eyes emit rays of light to enable our vision still held.
Ouellette imagines al-Haytham lying alone in his darkened room questioning why the objects in the room are not emitting light and asking 'Is it possible that the ancients were mistaken?'
The question providing the crux, al-Haytham was spurred into experimental action with the candles and copper in his bare room to conclude that there is no mysterious "form" that all objects emit; rather there are sources of primary light that are reflected by other objects.
As Ouellette writes, "This is a work of fiction -- a fanciful re-imagining of a 10-year period in the life of Ibn al-Haytham, considered by many historians to be the father of modern optics. Living at the height of the golden age of Arabic science, al-Haytham developed an early version of the scientific method 200 years before scholars in Western Europe."
Released from prison after the Caliph's death, Al-Haytham (AD 965-1040) went on to make contributions to astronomy, mathematics, engineering and medicine, as well as physics. But it his seven-volume *Book of Optics*, which he wrote while imprisoned, that remain his most famous contributions to science, covering visual perception, psychology and physical optics.

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Institute of Physics**, via AlphaGalileo.

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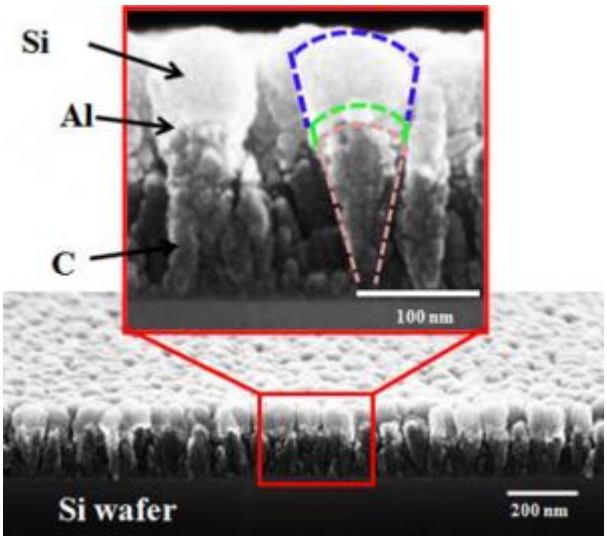
http://www.sciencedaily.com/releases/2011/01/110106144254.htm

'Nanoscoops' Could Spark New Generation of Electric Automobile Batteries



Researchers at Rensselaer Polytechnic Institute developed an entirely new type of nanomaterial that could enable the next generation of high-power rechargeable lithium (Li)-ion batteries for electric automobiles, laptop computers, mobile phones, and other devices. The material, called a "nanoscoop" because it resembles a cone with a scoop of ice cream on top, is shown in the above scanning electron microscope image. Nanoscoops can withstand extremely high rates of charge and discharge that would cause today's Li-ion batteries to rapidly deteriorate and fail. (Credit: Image courtesy of Rensselaer Polytechnic Institute)

ScienceDaily (Jan. 5, 2011) — An entirely new type of nanomaterial developed at Rensselaer Polytechnic Institute could enable the next generation of high-power rechargeable lithium (Li)-ion batteries for electric automobiles, as well as batteries for laptop computers, mobile phones, and other portable devices.

The new material, dubbed a "nanoscoop" because its shape resembles a cone with a scoop of ice cream on top, can withstand extremely high rates of charge and discharge that would cause conventional electrodes used in today's Li-ion batteries to rapidly deteriorate and fail. The nanoscoop's success lies in its unique material composition, structure, and size.

The Rensselaer research team, led by Professor Nikhil Koratkar, demonstrated how a nanoscoop electrode could be charged and discharged at a rate 40 to 60 times faster than conventional battery anodes, while maintaining a comparable energy density. This stellar performance, which was achieved over 100 continuous charge/discharge cycles, has the team confident that their new technology holds significant potential for the design and realization of high-power, high-capacity Li-ion rechargeable batteries.

"Charging my laptop or cell phone in a few minutes, rather than an hour, sounds pretty good to me," said Koratkar, a professor in the Department of Mechanical, Aerospace, and Nuclear Engineering at Rensselaer. "By using our nanoscoops as the anode architecture for Li-ion rechargeable batteries, this is a very real prospect. Moreover, this technology could potentially be ramped up to suit the demanding needs of batteries for electric automobiles."

Batteries for all-electric vehicles must deliver high power densities in addition to high energy densities, Koatkar said. These vehicles today use supercapacitors to perform power-intensive functions, such as starting the vehicle and rapid acceleration, in conjunction with conventional batteries that deliver high energy density for normal cruise driving and other operations. Koratkar said the invention of nanoscoops may enable these two separate systems to be combined into a single, more efficient battery unit.

Results of the study were detailed in the paper "Functionally Strain-Graded Nanoscoops for High Power Li-Ion Battery Anodes," published Thursday by the journal *Nano Letters*.

The anode structure of a Li-ion battery physically grows and shrinks as the battery charges or discharges. When charging, the addition of Li ions increases the volume of the anode, while discharging has the opposite effect. These volume changes result in a buildup of stress in the anode. Too great a stress that builds up too quickly, as in the case of a battery charging or discharging at high speeds, can cause the battery to fail

prematurely. This is why most batteries in today's portable electronic devices like cell phones and laptops charge very slowly -- the slow charge rate is intentional and designed to protect the battery from stress-induced damage.

The Rensselaer team's nanoscoop, however, was engineered to withstand this buildup of stress. Made from a carbon (C) nanorod base topped with a thin layer of nanoscale aluminum (Al) and a "scoop" of nanoscale silicon (Si), the structures are flexible and able to quickly accept and discharge Li ions at extremely fast rates without sustaining significant damage. The segmented structure of the nanoscoop allows the strain to be gradually transferred from the C base to the Al layer, and finally to the Si scoop. This natural strain gradation provides for a less abrupt transition in stress across the material interfaces, leading to improved structural integrity of the electrode.

The nanoscale size of the scoop is also vital since nanostructures are less prone to cracking than bulk materials, according to Koratkar.

"Due to their nanoscale size, our nanoscoops can soak and release Li at high rates far more effectively than the macroscale anodes used in today's Li-ion batteries," he said. "This means our nanoscoop may be the solution to a critical problem facing auto companies and other battery manufacturers -- how can you increase the power density of a battery while still keeping the energy density high?"

A limitation of the nanoscoop architecture is the relatively low total mass of the electrode, Koratkar said. To solve this, the team's next steps are to try growing longer scoops with greater mass, or develop a method for stacking layers of nanoscoops on top of each other. Another possibility the team is exploring includes growing the nanoscoops on large flexible substrates that can be rolled or shaped to fit along the contours or chassis of the automobile.

Along with Koratkar, authors on the paper are Toh-Ming Lu, the R.P. Baker Distinguished Professor of Physics and associate director of the Center for Integrated Electronics at Rensselaer; and Rahul Krishnan, a graduate student in the Department of Materials Science and Engineering at Rensselaer.

This study was supported by the National Science Foundation (NSF) and the New York State Energy Research and Development Authority (NYSERDA).

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

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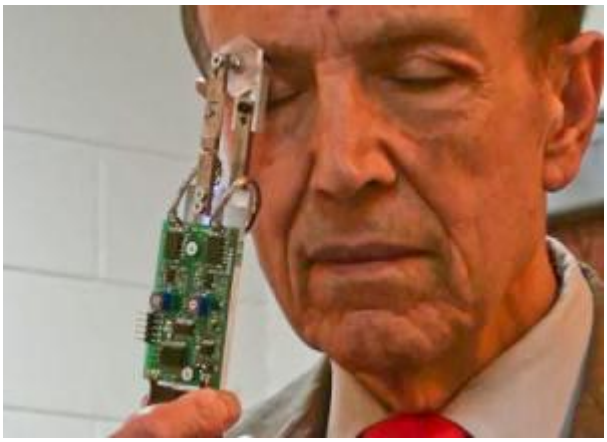
http://www.sciencedaily.com/releases/2011/01/110104101328.htm

New Glaucoma Test Allows Earlier, More Accurate Detection



Phoenix ophthalmologist Dr. Gholan Peyman demonstrates a prototype glaucoma test instrument that's noninvasive and simpler to use than current procedures. It can also be used in situations that are difficult or impossible with current tests. (Credit: Image courtesy of University of Arizona College of Engineering)

ScienceDaily (Jan. 5, 2011) — Cumbersome glaucoma tests that require a visit to the ophthalmologist could soon be history thanks to a home test developed by a UA engineer.

The self-test instrument has been designed in Eniko Enikov's lab at the UA College of Engineering. Gone are the eye drops and need for a sterilized sensor. In their place is an easy-to-use probe that gently rubs the eyelid and can be used at home.

"You simply close your eye and rub the eyelid like you might casually rub your eye," said Enikov, a professor of aerospace and mechanical engineering. "The instrument detects the stiffness and, therefore, infers the intraocular pressure." Enikov also heads the Advanced Micro and Nanosystems Laboratory.

While the probe is simple to use, the technology behind it is complex, involving a system of micro-force sensors, specially designed microchips, and math-based procedures programmed into its memory.

Enikov began working on the probe four years ago in collaboration with Dr. Gholan Peyman, a Phoenix ophthalmologist. "We went through several years of refinement and modifications to arrive at the current design," Enikov noted.

The National Science Foundation has funded the work, and Enikov and Peyman now are seeking investors to help fund final development and commercialization of the product.

In addition to screening for glaucoma, an eye disease that can lead to blindness if left untreated, the device corrects some problems with the current procedure, and can be used to measure drainage of intraocular fluid.

"Eye pressure varies over a 24-hour cycle," Enikov said. "So it could be low at the doctor's office and three hours later it might be high. With only a single test, the doctor might miss the problem. Having the ability to take more frequent tests can lead to earlier detection in some cases."

Once the diagnosis is made, several treatments are available. The question then is: How effective are they? Patients could use the probe at home to trace how much the pressure decreases after using eye drop medications, for instance.

"One of the reasons pressure builds up in the eye is because fluid doesn't drain properly," Enikov noted. "Currently, there are no methods available to test drainage."

Current tests require applying pressure directly to the cornea, but only very light pressure is safe to use, and it doesn't cause the fluid to drain.

"Our technique allows us to apply slightly greater pressure, but it's still not uncomfortable," he said. "It's equivalent to rubbing your eye for a brief period to find out if the pressure changes. If it does, we know by how much and if there is a proper outflow of intraocular fluid."

Sometimes, a surgical shunt is used to help fluid drain from the eye. "The problem with glaucoma shunts is they can plug up over time," Enikov noted. "Or if they're not properly installed, they may drain too quickly. So you would want to know how well the shunt is working and if it is properly installed. Our device could help answer those questions."

In another scenario, certain patients cannot be tested for glaucoma using currently available procedures. "If a patient had cataract surgery or some other surgery through the cornea, the cornea sometimes thickens," Enikov said. "The cornea's structure is different, but our test remains accurate because it's not applied to the cornea."
Instead, it presses the entire eyeball, much as you might press a balloon to determine its stiffness.
"The innovation with our device is that it's noninvasive, simpler to use and applies to a variety of situations that are either difficult to address or impossible to test using the current procedures," Enikov said. "That's why we're so excited about this probe. It has great potential to improve medical care, and significant commercial possibilities, as well."

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **University of Arizona College of Engineering**. The original article was written by Ed Stiles.

http://www.sciencedaily.com/releases/2011/01/110104101331.htm

Oceanic 'Garbage Patch' Not Nearly as Big as Portrayed in Media

Larger plastic pieces can harbor microbes, both beneficial and harmful, scientists have discovered. (Credit: Photo courtesy of C-MORE project)

ScienceDaily (Jan. 5, 2011) — There is a lot of plastic trash floating in the Pacific Ocean, but claims that the "Great Garbage Patch" between California and Japan is twice the size of Texas are grossly exaggerated, according to an analysis by an Oregon State University scientist.

Further claims that the oceans are filled with more plastic than plankton, and that the patch has been growing tenfold each decade since the 1950s are equally misleading, pointed out Angelicque "Angel" White, an assistant professor of oceanography at Oregon State.

"There is no doubt that the amount of plastic in the world's oceans is troubling, but this kind of exaggeration undermines the credibility of scientists," White said. "We have data that allow us to make reasonable estimates; we don't need the hyperbole. Given the observed concentration of plastic in the North Pacific, it is simply inaccurate to state that plastic outweighs plankton, or that we have observed an exponential increase in plastic."

White has pored over published literature and participated in one of the few expeditions solely aimed at understanding the abundance of plastic debris and the associated impact of plastic on microbial communities. That expedition was part of research funded by the National Science Foundation through C-MORE, the Center for Microbial Oceanography: Research and Education (http://cmore.soest.hawaii.edu/).

The studies have shown is that if you look at the actual area of the plastic itself, rather than the entire North Pacific subtropical gyre, the hypothetically "cohesive" plastic patch is actually less than 1 percent of the geographic size of Texas.

"The amount of plastic out there isn't trivial," White said. "But using the highest concentrations ever reported by scientists produces a patch that is a small fraction of the state of Texas, not twice the size."

Another way to look at it, White said, is to compare the amount of plastic found to the amount of water in which it was found. "If we were to filter the surface area of the ocean equivalent to a football field in waters having the highest concentration (of plastic) ever recorded," she said, "the amount of plastic recovered would not even extend to the 1-inch line."

Recent research by scientists at the Woods Hole Oceanographic Institution found that the amount of plastic, at least in the Atlantic Ocean, hasn't increased since the mid-1980s -- despite greater production and consumption of materials made from plastic, she pointed out.

"Are we doing a better job of preventing plastics from getting into the ocean?" White said. "Is more plastic sinking out of the surface waters? Or is it being more efficiently broken down? We just don't know. But the data on hand simply do not suggest that 'plastic patches' have increased in size. This is certainly an unexpected conclusion, but it may in part reflect the high spatial and temporal variability of plastic concentrations in the ocean and the limited number of samples that have been collected."
The hyperbole about plastic patches saturating the media rankles White, who says such exaggeration can drive a wedge between the public and the scientific community. One recent claim that the garbage patch is as deep as the Golden Gate Bridge is tall is completely unfounded, she said.
"Most plastics either sink or float," White pointed out. "Plastic isn't likely to be evenly distributed through the top 100 feet of the water column."
White says there is growing interest in removing plastic from the ocean, but such efforts will be costly, inefficient, and may have unforeseen consequences. It would be difficult, for example, to "corral" and remove plastic particles from ocean waters without inadvertently removing phytoplankton, zooplankton, and small surface-dwelling aquatic creatures.
"These small organisms are the heartbeat of the ocean," she said. "They are the foundation of healthy ocean food chains and immensely more abundant than plastic debris."
The relationship between microbes and plastic is what drew White and her C-MORE colleagues to their analysis in the first place. During a recent expedition, they discovered that photosynthetic microbes were thriving on many plastic particles, in essence confirming that plastic is prime real estate for certain microbes.
White also noted that while plastic may be beneficial to some organisms, it can also be toxic. Specifically, it is well-known that plastic debris can adsorb toxins such as PCB.
"On one hand, these plastics may help remove toxins from the water," she said. "On the other hand, these same toxin-laden particles may be ingested by fish and seabirds. Plastic clearly does not belong in the ocean."
Among other findings, which White believes should be part of the public dialogue on ocean trash:

- Calculations show that the amount of energy it would take to remove plastics from the ocean is roughly 250 times the mass of the plastic itself;

- Plastic also covers the ocean floor, particularly offshore of large population centers. A recent survey from the state of California found that 3 percent of the southern California Bight's ocean floor was covered with plastic -- roughly half the amount of ocean floor covered by lost fishing gear in the same location. But little, overall, is known about how much plastic has accumulated at the bottom of the ocean, and how far offshore this debris field extends;

- It is a common misperception that you can see or quantify plastic from space. There are no tropical plastic islands out there and, in fact, most of the plastic isn't even visible from the deck of a boat;

- There are areas of the ocean largely unpolluted by plastic. A recent trawl White conducted in a remote section of water between Easter Island and Chile pulled in no plastic at all.

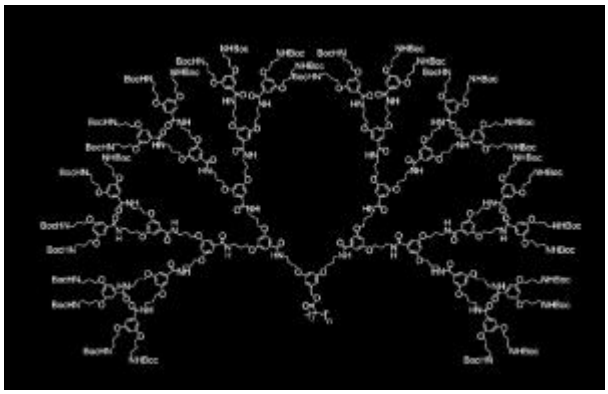
There are other issues with plastic, White said, including the possibility that floating debris may act as a vector for introducing invasive species into sensitive habitats.
"If there is a takeaway message, it's that we should consider it good news that the 'garbage patch' doesn't seem to be as bad as advertised," White said, "but since it would be prohibitively costly to remove the plastic, we need to focus our efforts on preventing more trash from fouling our oceans in the first place."

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

http://www.sciencedaily.com/releases/2011/01/110104151146.htm

Tree-like giant is largest molecule ever made

- 18:43 07 January 2011 by **Djuke Veldhuis**



PG5 could store drugs within its complex, tree-like folds (Image: Angewandte Chemie)

Meet PG5, the largest stable synthetic molecule ever made.

With a diameter of 10 nanometres and a mass equal to 200 million hydrogen atoms, this huge molecule festooned with tree-like appendages, paves the way to sophisticated structures capable of storing drugs within their folds, or bonding to a wide variety of different substances.

Complex macromolecules abound in nature and PG5 is about the same size as tobacco mosaic virus. But making such large molecules in the lab is tough, as they tend to fall apart while they are being made.

"Synthetic chemistry so far was simply not capable of approaching the size range of such functional units," says Dieter Schlüter at the Swiss Federal Institute of Technology in Zürich. Previously, polystyrene was the largest stable synthetic molecule, at 40 million hydrogen masses.

To create their molecular giant, Schlüter and his colleagues started with standard polymerisation, in which smaller molecules join up to form a long chain. To this carbon and hydrogen backbone, they added branches made of benzene rings and nitrogen, as well as carbon and hydrogen.

They then performed several similar cycles, adding sub-branches to each existing branch, to build tree-like structures. The result was PG5. In total, the whole synthesis required 170,000 bond formations, Schlüter says.

Outrageous trick

Klaus Mullen of the Max Planck Institute for Polymer Research in Mainz, Germany, is impressed by the feat and calls it an "outrageous" trick.

To synthesise PG5, Schlüter combined standard polymerisation reactions, which assemble small molecules into a long chain or backbone, with reactions from other areas of organic chemistry which attached groups of atoms to the backbone in a radial fashion.

Schlüter says that because both techniques are standard, his team's work should encourage other researchers to create synthetic macromolecules that they were previously "not brave enough" to attempt.

He says molecules like PG5 could find applications in delivering drugs, which could either dock to their surface via the different branches, or nestle in the spaces produced by the molecule folding in on itself. "There is not a single entity that can challenge the loading capacity of our PG5," he says.

Journal reference: *Angewandte Chemie*, DOI: 10.1002/anie.201005164

http://www.newscientist.com/article/dn19931-treelike-giant-is-largest-molecule-ever-made.html?full=true&print=true

Nanotube yarns let smart clothing survive the laundry

- 19:00 06 January 2011 by **Paul Marks**

(Image: Altrendo Images/Getty)

One of the biggest hurdles in the way of "smart clothing" may finally have been jumped. Nanotechnologists have developed conducting fabrics that can survive a washing machine.

Garment makers would like to introduce novel materials into textiles to create conducting paths that, say, connect sports performance sensors or your music player to your phone.

"But until now, such multifunctional applications have been limited by the ability to spin important materials into yarns and make sure they stay there even after washing," says Ray Baughman of the Alan G. MacDiarmid NanoTech Institute at the University of Texas in Dallas.

To solve this problem, his team set about making a yarn that could be peppered with "guest" particles of interest – titanium dioxide to create self-cleaning fabrics, for instance – and hold onto them through a hot dunking in detergent. What better way to do that, they thought, than to wrap the particles up in a tightly scrolled web?

Nanoforestry

When a commercially produced "forest" of multiwalled carbon nanotubes is cut into with a razor, drawing the blade out slowly pulls out an exquisitely fine web of nanotubes held together by intramolecular van der Waals forces.

"As you pull, nanotubes stick to the blade, and that pulls the next nanotube, and that one the next, and so on," says Baughman. "So you end up with a sheet, a web of nanotubes. And once you have drawn out a sheet, you can twist it into a yarn."

But the researchers don't spin straight away: first they need to introduce the guest particles they want to trap within their yarn. To do this, they take their nanotube web – which is 1 centimetre wide and just 50 nanometres thick – and place it on a filter paper soaked in a solution of the guest material. Or the solution can be deposited as an aerosol from an electrostatic paint gun.

Once the particle-populated nanoweb is dry, it is clamped at one end while the other is twisted by a spinning magnet, of the type used to stir fluids in the lab (see video above). The result: a yarn that holds onto the guest particles within it and can be woven alongside woollen and cotton threads for clothing manufacture.

Appliance of science

Would the guest material be released and lost in the washing machine, though? To find out, Baugham ran tests in a Maytag washing machine at standard 40 °C washing temperatures – but also in a three-hour soak at 80 °C. In neither case did they find guest material to have been depleted.

They plan more tests, however, because different physical stresses that are used in spinning change the way the yarn is "scrolled up" – and that may affect guest particle retention.

The Texan team have now made yarns containing titanium dioxide, various conductors and even "high-temperature" superconductors such as magnesium diboride.

Jobs for yarns

Why a superconducting yarn? Because this is not all about clothes: there could be many engineering applications for smart yarns in superconducting linear motors, batteries, supercapacitors and hydrogen storage systems.

Theoretically the thin conducting skins that could be woven with this material could also have applications in stealth aircraft, as the material would be an ultralight radio-frequency radiation absorber that could foil radar. Baugham wouldn't comment on whether that is a target application, though he says aerospace firms are interested.

The team have lodged an international patent filing on the idea and are now working with what Baugham describes as "an agency" on the most immediate applications for it.

Journal reference: *Science*, DOI: 10.1126/science.1195912

http://www.newscientist.com/article/dn19923-nanotube-yarns-let-smart-clothing-survive-the-laundry.html

Getting medieval: The first firefights

- 06 January 2011 by **Mick Hamer**
- Magazine issue 2792.

Firebombs and cannon would have ended the siege much quicker (Image: Courtesy Everett Collection/Rex Features)

Flame-throwing lances and fiery arrows: all in a day's work for a medieval armourer. But what was the secret of their inflammatory art?

A BLIZZARD of flaming arrows blazes through the air. Upon impact, the arrows send out great jets of fire, setting light to everything nearby. For the inhabitants of Oran, under siege by the Spanish in 1404, it is a terrifying attack, causing immense destruction. "The noise and cries which came from the town were very great by reason of the havoc that was wrought," wrote one observer in what is now Algeria's second city.

The Middle Ages were a significant time for armourers in the Middle East and Europe. Gunpowder, invented by the Chinese in the first millennium, arrived here in the latter half of the 13th century, and the first gunpowder weapons to hit the battlefield in this part of the world were incendiary devices such as fire arrows. Projectile weapons - guns and cannons - took a little longer to catch on, and were not in common use until the 1350s.

That much we know, but in general it is no easy task to trace the development of gunpowder weapons in Europe and the impact they made. That siege of Oran, for instance: were those arrows really so effective, or was the story concocted as a piece of early Spanish PR? Medieval chroniclers, the war reporters of their day, are rarely to be trusted. "They wrote what they were told to," says Kelly DeVries, a specialist in medieval warfare at Loyola University, Maryland. Even serious accounts may have been distorted by translators.

The only way to know for sure is to test the weapons first-hand - just what the Medieval Gunpowder Research Group, of which DeVries is a member, have been doing for the past 10 years. The group carry out much of their work at the Danish Medieval Centre, a folk museum in Nykøbing. Here they recreate and try out each weapon in turn to find out what worked, and how well.

For all its destructive potential, gunpowder sounds simple enough to make. It has just three key ingredients - charcoal, saltpetre (potassium nitrate) and sulphur. The team's first task was to get hold of them, medieval-style.

Charcoal was easy - it would have been in ready supply throughout Europe. Sulphur was said to have been mined in volcanic areas, so the team braved the Námafjall region of Iceland, with its boiling mud pools and steaming gas vents. By collecting rock samples, melting them in a metal bucket with a small amount of cooking oil and scooping out the impurities, the team obtained sulphur of roughly 50 per cent purity. This suggested that sulphur supplies were not a hurdle for medieval warfare.

Saltpetre proved more problematic. The team's early attempts at manufacturing it the medieval way, from fermented animal dung, produced results that were only a few per cent potassium nitrate. It turns out the pH of the dung is very important to the process (*New Scientist*, 5 November 2005, p 33), and it was unclear how anyone would have succeeded in medieval times without equipment to measure the pH.

Eventually, the team got a tip-off about a factory in the Agra district of India that was still making saltpetre for fertiliser using the traditional method. Like the medieval manufacturers, it uses animal dung as the raw material. The workers spray it with water to dissolve out the potassium nitrate, which filters through a porous floor. They then concentrate the solution by boiling it in a pan more than 3 metres across. "It was stunning," says Robert Smith, an independent researcher based in Leeds, UK, and a member of the gunpowder group. "The process was recognisably the same as those described in the 16th century." Judging the age and composition of the dung proved to be enough to control the pH and obtain potassium nitrate of high purity - 80 to 90 per cent, which is almost as good as can be achieved with modern industrial methods.

Having tested and confirmed that traditional methods could produce good gunpowder, the team were ready to recreate weapons with it. A couple of years ago they tried their hand at fire lances, a kind of medieval flame-thrower. Making one involves stuffing an incendiary mixture of saltpetre and sawdust down a hollow tube, according to the 16th-century Italian metallurgist Vannoccio Biringuccio. Unfortunately, he doesn't say how much of each ingredient to use, so the team had to make some daring guesses. They started cautiously, as anyone playing with fire should - and found their first attempt wouldn't even burn. A mixture containing 25 per cent sawdust eventually did the trick, shooting a red-hot flame that burned for 30 seconds.

Fire arrows were next on the list. As far as the team knew, no one had tried to make this weapon for the best part of 400 years. Would they work in the way the records described?

Johannes Bengedans, a military engineer in the pay of Christopher III, who ruled Denmark in the 1440s, seemed the most authoritative source. His instructions were straightforward enough: "Take 5 pound good saltpetre and apply 2 pounds of sulphur. Add 1 pound finely crushed coal... Mix it all with alcohol." You then had to tie a linen bag of the mixture around the arrow, insert a cotton fuse and coat the bag with pitch. In 2009, the group made nine fire arrows in this way and shot them at a timber target. "They lumbered rather than flew through the air," says Smith. "But when they hit the target the effect was dramatic. A very intense flame shot out of the front of the arrow with a whooshing sound, and it burned for 5 to 10 seconds." This isn't enough to set a timber building alight, but a more combustible material, such as a thatched roof, hay and animal bedding, would have been easily set on fire. "It would have been terrifying to have been anywhere near one of them," says Smith.

Admittedly the longer-range shots, at 40 metres, were a bit more hit and miss, the arrows wobbling and occasionally veering off course altogether. But they would have been an effective weapon all the same, says DeVries. For one thing, they would have forced besieged cities to use their precious supplies of water to put out the flames. And medieval warmongers were no strangers to the tactic of shock and awe. "What you have to remember about sieges in the Middle Ages is that the aim was capitulation," says DeVries. "You've got to terrorise people. Fire will cause terror." Fire arrows weren't decisive in the 1404 siege of Oran, however - the Spanish would not occupy the city for another 100 years.

The aim of sieges in the Middle Ages was capitulation. You've got to terrorise people

One big question stands out in all of this. Why didn't guns and cannons - arguably the most effective gunpowder weapons - catch on as soon as they were invented? In the mid-13th century the Franciscan friar

Roger Bacon wrote about using gunpowder to launch a projectile. Yet it was another 75 years or so before firearms were used in warfare, either in Europe or in China.
Some suggest that hitches in saltpetre production caused the delay. As the team discovered for themselves, making saltpetre is a tricky business; perhaps Europeans hadn't mastered the technique by the 13th century. "If I was a smart scientist in medieval times," says DeVries, "I would concentrate my efforts on making saltpetre. You could make a bunch of money."
Alternatively, it might have been down to the potentially lethal unreliability of early guns and cannons, given the rudimentary technology of the time. "My guess is that you had to wait for metallurgy to catch up," says DeVries. "If you tried to make a gun with a barrel made of wood you wouldn't want to be anywhere near it."
If any fiascos did occur when these weapons were tried out, there are no records to tell the tale. It's one of several areas ripe for investigation as the team enter their second decade of research.
Mick Hamer *plans to go out with a bang*

http://www.newscientist.com/article/mg20827920.600-getting-medieval-the-first-firefights.html?full=true&print=true

Intensive logging created New England's rich wetlands

- 07 January 2011 by **Sujata Gupta**
- Magazine issue 2794.

Loggers boosted fishermen's catches (Image: Ernst Haas/Getty)

THOSE who enjoy the wetlands and seafood of New England's coastline may be surprised by who they have to thank: the loggers of the 18th and 19th centuries. In clearing vast tracts of land, those prolific loggers released so much sand and dirt that open-water bays turned into swamps.

While logging devastated the landscape, it had the opposite effect on the coast. The wetlands it boosted buffer the coastline from storms, stop pollutants in the ocean from reaching the shore, and shelter marine organisms. "No wetlands, no seafood," says Matthew Kirwan of the US Geological Survey in Laurel, Maryland.

For purists who favour returning New England to its natural state - and restoration is a multibillion-dollar endeavour - the theory presents a conundrum. Many New England marshes are much bigger than they were before the arrival of European settlers, says Kirwan, so restoring the environment to a "natural" state would mean losing much of the marshland and its benefits.

To find out how old the marsh in the Plum Island estuary in Massachusetts is, Kirwan dated fossil plant rhizomes - found in marshes but not open water - from 45 sediment cores. The oldest ones were found at the marsh's edge and dated back some 4000 years. In the centre of the marsh, however, the oldest rhizomes were just 200 years old, suggesting that until then Plum Island estuary was half marsh, half open-water bay. The shift to full marsh coincides with an increase in logging, according to historic records. Only that sort of extensive land-use change can account for the bay's filling in, says Kirwan. He presented his findings at the American Geophysical Union conference in San Francisco last month.

The idea that what's bad for the land may be good for the sea is not unique to New England. Studies in the 1980s showed that Chesapeake Bay was built thanks in part to high sedimentation rates caused by logging and land clearance. Agricultural development along the Mississippi river is likely to have contributed to Louisiana's estuaries and bayous, and Kirwan suspects that mining bolstered California's coastal wetlands.

Dorothy Merritts, a geoscientist at Franklin & Marshall College in Lancaster, Pennsylvania, points out that whatever the inadvertent ecological benefits of logging, it still destroyed the coast's original ecosystem. "Many original wetlands were lost," she says.

http://www.newscientist.com/article/mg20927942.600-intensive-logging-created-new-englands-rich-wetlands.html?full=true&print=true

African vultures dying of poison

- 06 January 2011
- Magazine issue 2794.

Be careful what you eat (Image: Ferrero-Labat/Ardea)

AFRICAN vultures are starting to follow their Asian cousins on a deadly downward spiral.

Munir Virani and colleagues at the National Museums of Kenya, Nairobi, have reported that vultures in and around the Masai Mara National Reserve have suffered a population crash of over 50 per cent in the last 25 years (*Biological Conservation*, DOI: 10.1016/j.biocon.2010.10.024). Over the same period the number of livestock farmers near the park soared. The pattern of vulture deaths suggests their main threat comes from the farmers, who leave dead goats laced with the toxic pesticide Furadan to kill hyenas and lions.

In south Asia, griffon vultures have been driven to near-extinction by consuming accidentally poisoned cattle carcasses - cows that had been treated before death with drugs that happen to harm vultures. Because vultures range widely and eat communally, only 1 per cent of cattle need to be poisoned to affect the whole population. This makes the use of deliberately poisoned carcasses in Africa even more of a threat to the scavengers.

The irony, says Chris Bowden of the UK's Royal Society for the Protection of Birds, is that if the poisoned carcasses eliminate vultures, it will help the hyenas and lions that the farmers are trying to eliminate to flourish. That's because there will less competition for the carrion normally eaten by the birds.

http://www.newscientist.com/article/mg20927942.000-african-vultures-dying-of-poison.html?full=true&print=true

Last chance to hold Greenland back from tipping point

- 05 January 2011 by **Anil Ananthaswamy**
- Magazine issue 2794.

Going, going, gone... (Image: Broudy/Donohue Photography/Corbis)

New data and models show that Greenland's ice cap, the world's second largest, is on track to hit a point of no return in 2040

ON 4 AUGUST 2010, the Petermann glacier in Greenland sounded a warning. A gigantic slab of ice broke off and the glacier retreated 15 kilometres, leaving it further inland than it has been since observations began a century ago.

That warning went unheeded at the UN climate talks in Cancún, Mexico, last month. Delegates left without agreeing drastic cuts in greenhouse gas emissions, leaving the planet on course for 3.2 °C of global warming, and Greenland - the world's second largest ice cap - heading for a point of no return. The suggestion is that Greenland will reach a tipping point in the early 2040s. After that no amount of action on our part can save the ice sheet. Unless governments dramatically up their game, the only thing that will change that date is natural variations in the climate, which might either hasten or delay the tipping point.

Greenland's ice sheet holds enough ice to raise global sea levels by 7 metres. Ice melting at the surface and breaking off at the margins of the ice sheet is already adding up to about 300 gigatonnes each year. That accounts for about 25 per cent of the annual, global rise in sea levels.

Greenland's ice sheet holds enough ice to raise global sea levels by 7 metres

Last month's meeting of the American Geophysical Union in San Francisco highlighted the situation. Jason Box of Ohio State University in Columbus and colleagues listed Greenland's "biggest losers": the five glaciers and ice streams that lost the greatest area of ice in the past decade. The Petermann glacier topped the chart, with 500 square kilometres (see map).

But not all ice is created equal. Glaciers in the north like Petermann and Humboldt lost a lot of thin, floating ice that does not impede the outward flow of ice behind. That means the glaciers did not immediately surge seaward. But thicker ice was exposed to the ocean. Thicker ice acts like a cork in a bottle: take it away and the glaciers accelerate. "If we continue to lose ice, we'll start losing important ice," says team member Ian Howat, also at Ohio State University. "If these glaciers were to accelerate and mobilise the large amount of ice up in northern Greenland, it has the potential for a huge change."

It is the kind of change that has already been seen in Greenland, south of 70 degrees latitude. For instance, the speed at which the Jakobshavn glacier flows has more than doubled over the past 10 years. In July, its margin withdrew by about 1.5 kilometres, bringing its grounding line - where the glacier lifts off the bedrock and begins floating - to a knife edge, where bits can break off to form icebergs.

Beneath the ice, Greenland is built like a soup dish: the bedrock slopes down towards the interior and in the case of Jakobshavn bottoms out some 1600 metres below sea level. Jakobshavn's margin is now perched on

the edge of that dish. If it breaks up further, it would end up on a downward slope, with nothing to stop it slipping 80 kilometres inland.
"It would cause a huge embayment into the ice sheet, something that we have never seen before," says Howat. Jakobshavn is one of many glaciers perched on similar topography. "Once a glacier hits this point, the dynamics of the ice take over. No matter what climate does, whether it gets warmer or colder, that glacier is going to keep [retreating]," says Howat.

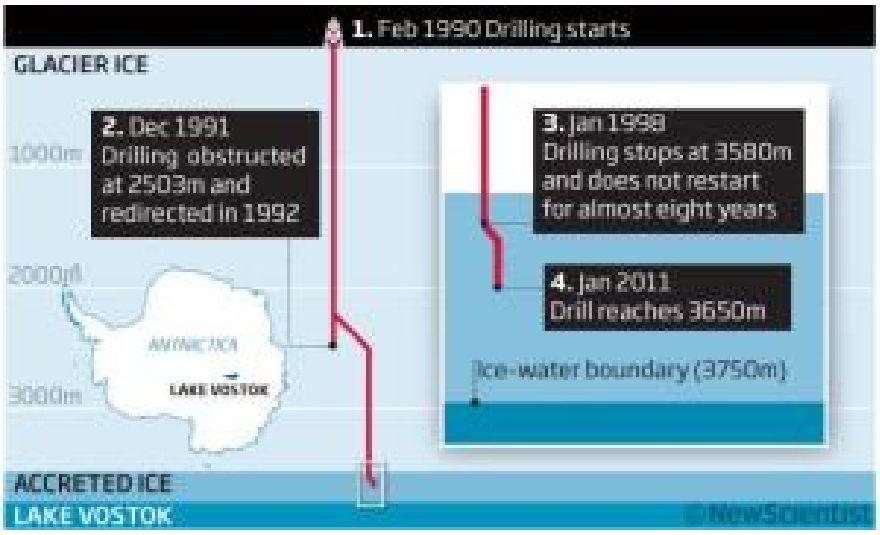
One-way ticket

Other factors could also put glaciers on a one-way ticket to extinction. Kristin Poinar of the University of Washington, Seattle, and colleagues have been studying the bottom of Jakobshavn. The ice there is slushy due to the enormous friction and pressure at those depths: friction within the glacier and against the bedrock generates enormous amounts of heat. Studies show this "temperate ice" layer is about 270 metres thick and acts like a conveyor belt, helping the ice slip faster into the sea.
Not only that, it could give glaciers some form of "memory" of past warm events, says Poinar.In the 1990s, warm ocean waters caused Jakobshavn to speed up dramatically, creating more temperate ice, which could stick around for decades. That means the consequences of sudden changes like Jakobshavn's increase in speed in the 1990s could be felt for tens or hundreds of years, says Poinar.
Thousands of smaller glaciers are also showing dramatic declines. Sebastian Mernild of the Los Alamos National Laboratory in New Mexico and colleagues have been studying one in south-east Greenland, close to the Sermilik fjord. From photographs going back to 1931, the team calculated that the glacier has retreated by 17 metres per year on average, but in 2010 it lost ground by 35 metres. "The same trend is happening to all the glaciers in east Greenland," says Mernild.
Last year was also a bad one for the ice sheet as a whole. By combining observations and modelling, Mernild's team calculated that 52 per cent of the ice sheet experienced surface melting. Natural annual variability can't be ruled out, says Mernild, "but if you check the trends, surface melt has been increasing since 1972, all the way up to 2010, and 2010 was a record year". South-west Greenland saw a dramatic increase in the number of melting days, about 50 days more than the average for the past 50 years. And three decades of measurements from the Watson river drainage basin in west Greenland show that surface runoff in 2010 was 30 to 40 per cent higher than average (*Cryosphere*, DOI: 10.5194/tc-4-231-2010).
More melting is in store, warns Mernild. His team's models show that Greenland's glaciers haven't fully responded to the temperature rises. In other parts of the world, including Antarctica and the Himalayas, glaciers are about 25 per cent out of equilibrium, meaning that even if warming were to stop today, the glaciers would continue to melt further before stopping. But temperatures in and around Greenland have been increasing faster than elsewhere, and the glaciers there are 70 per cent out of equilibrium, says Mernild.
Glaciers haven't fully responded to temperature rises. Even if warming stops, melting will go on
This worries Mernild. His team modelled the fate of Greenland, using a scenario for future human development outlined by the Intergovernmental Panel on Climate Change. The scenario assumes rapid economic growth, a global population that peaks in 2050, and rapid adoption of new, efficient technologies for energy use and generation. Given the outcome in Cancún last month, it is a likely scenario for the future. Mernild's models show that if it does play out, Greenland will reach a tipping point in about 30 years. After that nothing will prevent the ice cap from eventually vanishing entirely (*Journal of Hydrometeorology*, DOI: 10.1175/2009JHM1140.1).
"We can see which way the trend is going," says Mernild. "It doesn't look nice".

http://www.newscientist.com/article/mg20927942.200-last-chance-to-hold-greenland-back-from-tipping-point.html

Mysteries of Lake Vostok on brink of discovery

- 16:48 05 January 2011 by **Olivier Dessibourg**



For 14 million years, Antarctica's vast Lake Vostok has remained tantalisingly sealed off from the rest of the world, hidden under 4 kilometres of ice. What unique forms of life might have evolved in the hidden depths? After years of speculation we are about to find out, as a Russian drill nears the lake. The Antarctic Treaty Secretariat, the body set up to preserve the continent, has approved the comprehensive environmental evaluation carried out to ensure the reservoir is not polluted. Researchers from Russia's Arctic and Antarctic Research Institute (AARI) in St Petersburg expect to reach the water in late January.

The AARI's Valery Lukin says they have devised a clever method for sampling the lake without contaminating it. "Once the lake is reached, the water pressure will push the working body and the drilling fluid upwards in the borehole, and then freeze again," Lukin says. The following season, the team will go back to bore in that frozen water, take the sample out and analyse its contents.

"The Russians really did a good job in giving answers to all the fears raised that their actions would contaminate this unexplored environment," says Manfred Reinke, head of the ATS.

Unknown life?

Covering an area of 16 square kilometres, and reaching down 1050 metres, Lake Vostok is isolated from the other 150 subglacial lakes found in Antarctica. Anything living in the lake is either very old, or – potentially – an unknown form of life.

The Russian science team based at Vostok station have been ready to drill into ice above the lake since 1998. But the ATS wouldn't give the go-ahead until it was satisfied that a thorough environmental assessment had been conducted to avoid any pollution of the pristine reservoir.

"The bottom of the new borehole lies at 3650 metres, more or less 100 metres above the lake," says Lukin. "Beginning late December, we will first use a mechanical drill and the usual kerosene-freon to reach 3725 metres. Then, a newly developed thermal drill head, using a clean silicon-oil fluid and equipped with a camera, will go through the last 20 to 30 metres of ice."

Yves Frenot of the French Polar Institute Paul Emile Victor in Brest, France, doubts the Russians will penetrate the lake during this Antarctic summer. "In respect to the Antarctic Treaty, they should wait 60 days after having submitted their CEE, which would bring them almost to the end of the Antarctic season."

Lukin admits time is short but says that since the exact location of the ice-water boundary is not known, "the breakthrough could well happen in a few weeks."

http://www.newscientist.com/article/dn19918-mysteries-of-lake-vostok-on-brink-of-discovery.html

Calestous Juma: Why I'm optimistic about Africa

- 15 December 2010 by **Andy Coghlan**
- Magazine issue 2790.

Africa must learn from others' mistakes (Image: Martha Stewart)

Africa can feed its people within a generation, says the international development expert

How can African nations feed their people?

The power of science and technology linked to high-level coordination of agricultural production, from each country's president downwards. That's my magic formula. Is my minute up?

Not quite! What ingredients are needed?

Nations will need to learn how to use new technologies, including biotechnology and information systems. These are now becoming widely available in Africa. Take cellphones. Sixty per cent of Africans now have them and the uptake is increasing by 30 per cent each year. The impact on farming is massive. For example, farmers can take photos of diseased crops and post them on the internet to get a diagnosis. It will also enable the education of farmers and the exchange of market information.

But information alone can't grow crops...

Indeed. Rainwater and energy are vital, and Africa is in a position to make optimal use of both by avoiding the mistakes of others. In India, for example, they underestimated the impact of the green revolution on water resources. In Africa, this can be avoided with schemes to manage water more judiciously and by planting drought-tolerant crops. Africa has a great chance to lead the world on sustainable agriculture by learning from the mistakes of everyone else.

What else is needed?

Fertiliser and pest control. African soils are in a poor state because of the low use of fertiliser. Bingu wa Mutharika, Malawi's president, is showing the lead here. He is giving subsidies to farmers to buy fertiliser. Pest control is also critical, so pest-resistant crops will be essential. African countries have started to adapt: South Africa grows pest-resistant cotton and maize, and Burkina Faso grows pest-resistant cotton.

Who is going to make this approach work?

Presidents like Mutharika, a great role model. African leaders have to invest political capital into this, so that the interests of farmers are protected from the top. Countries can embed agricultural universities into their agriculture ministries, to educate farmers remotely - especially women, as they are the majority of Africa's farmers.

What can the rest of the world do to help?

Western countries have been offering the wrong thing. Providing food aid or money isn't enough because food is more than calories, it is a way of life. What Africa needs is technical help, and that is coming mainly from Brazil, India and China. China now has agricultural experts in 35 African countries, Brazil has supplied

knowledge from its own agricultural modernisation, and India is supplying technology to provide communications and land-based satellite information.

So it's onwards and upwards for Africa?

Absolutely. Africa can now go through its own enlightenment, at the same time avoiding the mistakes of richer countries.

Profile

Calestous Juma is Professor of the Practise of International Development at Harvard University's Kennedy School of Government. His new report, commissioned by a group of African presidents, is The New Harvest: Agricultural Innovation in Africa

http://www.newscientist.com/article/mg20827905.100-calestous-juma-why-im-optimistic-about-africa.html?full=true&print=true

Women's exercise linked to lower cognitive skill

- 07 January 2011
- Magazine issue 2794.

Swimming herself stupid?(Image: Steve Mason/Getty)

WOMEN who habitually take strenuous exercise might be at risk of damaging their cognitive function later in life.

Strenuous exercise is known to reduce oestrogen levels in women and girls. This can delay the start of menstruation, and can lead to irregular periods in adult women. Low levels of oestrogen in premenopausal women have been linked to impaired mental function in later life.

Mary Tierney at the University of Toronto, Canada, reasoned that strenuous exercise might therefore lead to impaired cognition in later life. She asked 90 healthy post-menopausal women to report their life-long exercise habits, and then tested their cognitive ability. The results, which will be reported in the *Journal of Alzheimer's Disease*, showed a statistically significant decrease in performance in various cognitive tasks in women who said that they exercised strenuously compared with those that had exercised moderately.

The overall benefits of regular exercise are well established, but Tierney says the possible impact of strenuous exercise on cognition should be investigated further to see if it is significant.

http://www.newscientist.com/article/mg20927943.600-womens-exercise-linked-to-lower-cognitive-skill.html

Finally, a fat-fighting drug that shows promise

- 16:36 07 January 2011 by **Debora MacKenzie**

Vicious circle (Image: Colin Gray/Getty)

Hands up everyone whose new year's resolution is to lose weight. Wouldn't it be great if we could just take a pill to shed fat? Time and again "diet pills" have turned out to be useless, dangerous or both – but now there may finally be a safe one that works.

Zafgen, a start-up drug company in Cambridge, Massachusetts, has announced that its first human test of a drug named ZGN-433 caused 24 obese women to lose, on average, a kilogram a week for a month – with no harmful side effects. The trial could not be extended past a month without initial safety tests at a range of doses – which was the purpose of this trial. The detailed results will be reported next week at a conference on obesity in Keystone, Colorado.

This is a stunning rate of weight loss, especially as the women ate normally and were not given exercise advice. It is almost the maximum rate considered safe, and nearly as effective as surgery to reduce stomach size. Many companies are searching for drugs to combat the rich world's obesity epidemic, but the researchers say no other tested so far has worked as well.

Fat makes you fatter

It isn't all your fault that it is so hard to lose weight. When you initially become fat, your body adapts in ways that make it harder to lose that fat. Some involve the brain's control of appetite, but others involve the molecular controls that determine how much of that food you turn into fat, or whether you burn fat for energy. "We believe we are overcoming these adaptations," says Zafgen CEO Tom Hughes.

In particular, fat makes you lose sensitivity to the hormone insulin, which normally promotes the burning of fat and opposes its synthesis. ZGN-433 blocks an enzyme called MetAP2; Hughes says that experiments in animals show that this blocking causes the inhibition of several key genes which would otherwise activate other genes that boost insulin resistance, the overproduction of fat and the inflammation that accompanies obesity and may cause its unhealthy effects.

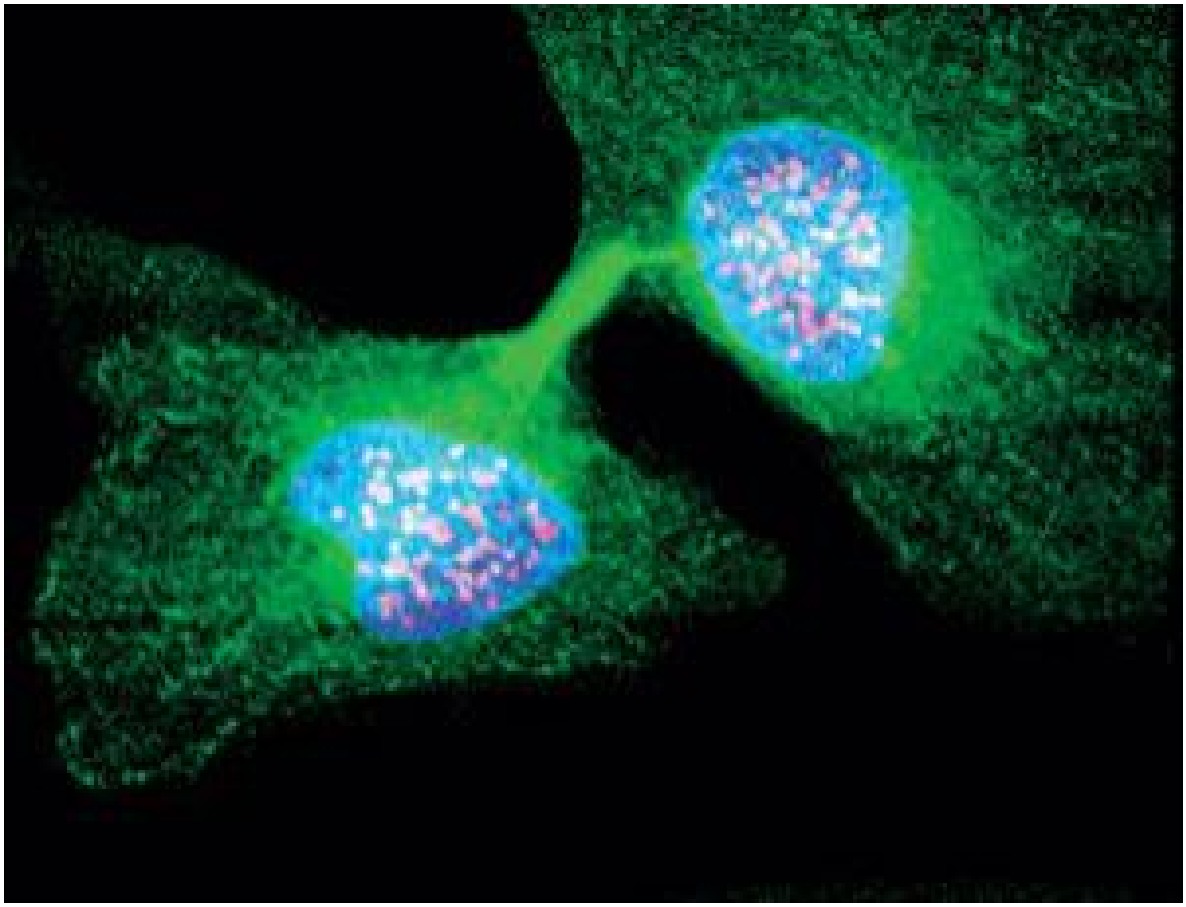
"We definitely see our treatment being used with diet and exercise," says Hughes. So no let-up on the hardest part of weight loss – but at least this could give diet and exercise more of a fighting chance.

"Indeed, it would appear that the drug increases the breakdown of fat," though the complete mechanism is not yet known, says Alan Cherrington of Vanderbilt University in Nashville, Tennessee, who has worked on a related drug, fumagillin, in animals but was not involved in Zafgen's tests in humans. "These are early days in the life of this molecule, but certainly the results to date are extremely encouraging."

http://www.newscientist.com/article/dn19929-finally-a-fatfighting-drug-that-shows-promise.html

Cluster model shows how first cells could have divided

- 06 January 2011 by **Kate McAlpine**
- Magazine issue 2794



Divide and conquer the world (Image: Matthew Daniels/Wellcome Images)

ONE of the great transitions in the history of life took shape when naked genetic material clothed itself and protocells were born. But try to recreate this moment and you quickly hit a stumbling block. A lipid-coated protocell doesn't have the machinery to easily divide in two when the genetic material replicates.

Now Kunihiko Kaneko and Atsushi Kamimura, both of the University of Tokyo, Japan, have devised a model which may solve the problem. They took inspiration from living things, in which DNA and RNA code for proteins, and proteins catalyse replication of the genetic material. They suggest a similar self-perpetuating system in which a cluster of two types of molecules catalyse replication for one another and demonstrate a rudimentary form of cell division.

Kaneko and Kamimura argue that natural selection acts on the cluster, improving copy fidelity and boosting the complexity of the protocell. "This may solve the origin of heredity and origin of compartmentalisation simultaneously," says Kaneko.

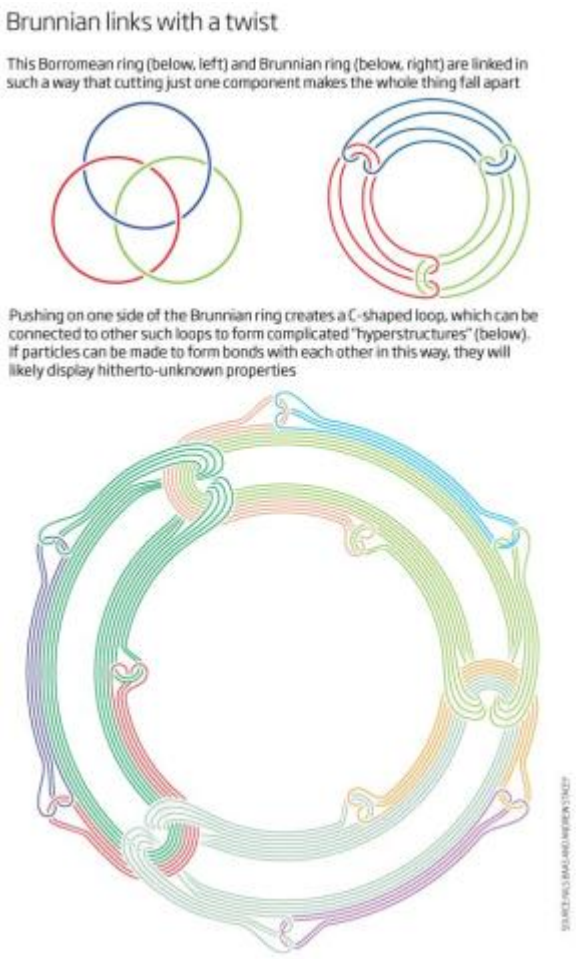
In their model, as with DNA, the genetic material - or heredity carrier as they call it - replicates much more slowly than the other cluster molecules and also takes longer to degrade, so it allows an entourage of the other molecule to accumulate. After the heredity carrier replicates, the copies drift away from one another, and the

molecules between them break down, automatically creating two separate entities. In effect, when the heredity carrier replicates and separates, the whole cluster divides.
Kaneko and Kamimura's cluster model isn't plagued by "parasitic molecules" either. These are selfish entities which may be catalysed by one of the molecules but do not in turn help it replicate. For example, a parasite molecule that only mimicked a heredity carrier wouldn't have a team of catalysers, so it wouldn't replicate as well as the true heredity carrier, and would therefore die off (arxiv.org/abs/1005.1142v1).
"This is an interesting model, although there are a couple challenges for a realistic application," says biologist Irene Chen of Harvard University. In real life, membrane lipids around an RNA molecule don't typically catalyse RNA replication, but she speculates that replacing the lipids with hydrophobic peptides might work in the way Kaneko and Kamimura propose. However, there is another challenge to overcome: you need access to a high concentration of chemical building blocks to generate the crowded cluster around the heredity carrier, Chen says.
She suggests that periodic wetting and drying - as you might find in tidal regions or clay ponds - could increase these concentrations. You would of course need experiments to demonstrate that real chemicals associated with life can divide as the team suggest, since Kaneko and Kamimura don't name specific molecules for their heredity carrier or cluster species.

http://www.newscientist.com/article/mg20927942.400-cluster-model-shows-how-first-cells-could-have-divided.html?full=true&print=true

Make way for mathematical matter

- 05 January 2011 by **Michael Brooks**
- Magazine issue 2794.



(Image: Nils Baas and Andrew Stacey)

WE ALREADY have solid, liquid, gas, plasma and Bose-Einstein condensate. Now it seems we may be on the verge of discovering a whole host of new forms of matter - all based on mathematics.

Nils Baas, a mathematician at the Norwegian University of Science and Technology in Trondheim, has unearthed a plethora of possibilities for the way the components of matter can link together.

He made the discoveries while researching the field of topology - the study of the properties that objects share because of their shape.

It is particularly concerned with the various shapes that can be formed while squashing and bending an object. A ring doughnut and a teacup share the same topology, for example: it is possible to squish the doughnut into a teacup shape without doing away with the hole, as it becomes the hole in the handle.

Baas was studying "Brunnian rings" - collections of rings that are linked together but can all be separated if only one ring is cut. Borromean rings are the most famous example. Each of three rings is threaded through only one other, and cutting one ring separates them all (see illustration).

Baas has shown that many more linkings are possible: not only are there Brunnian links of four or more components, there are also sets of Brunnian links which are themselves linked together in a Brunnian fashion to create what Baas calls "hyperstructures" (arxiv.org/abs/1012.2698).

In 1970, Vitaly Efimov, now at the University of Washington in Seattle, predicted that the topology of the Borromean rings would be reflected in nature as a hitherto-undiscovered form of binding between three particles. In the last five years, it has been shown that some of these links can indeed occur in physical systems. In 2006, researchers found this "Efimov state" in a gas of ultra-cold caesium atoms: each atom had a single link to one of the others, but picking up one moved all three (*Nature*, DOI: 10.1038/nature04626). Then, in 2010, Japanese researchers found Borromean rings in the bonds between atomic nuclei (*Physical Review Letters*, vol 104, p 062701). "These structures seem to act as a recipe for what you can construct in the real world," Baas says.

These structures seem to act as a recipe for what you can construct in the real world

But Baas's more complicated hyperstructures have radically different topologies from anything yet seen in nature. If groups of particles can be made to bond in this way, they would create matter with previously unseen properties, Baas reckons. "When you go to a higher level, something completely new happens mathematically - and I would suspect it does in the real world too," he says.

Baas has teamed up with Ned Seeman of New York University in New York City to figure out how to build the hyperstructures. "Mathematics seems to be a pretty good predictor of reality," says Seeman, who synthesised Borromean rings using DNA strands in 1997. "I have every suspicion that they'll work out."

Baas has plenty of other avenues to explore, too, including a new inroad into the fundamentals of quantum theory. Particles that interact can become curiously synchronised, even when separated, in a quantum process called entanglement. If the particles start out linked together in complex Brunnian ways, they might be able to affect each other even when separated, he says, providing new ways to create the spooky-action-at-a-distance connections like those observed in entangled systems.

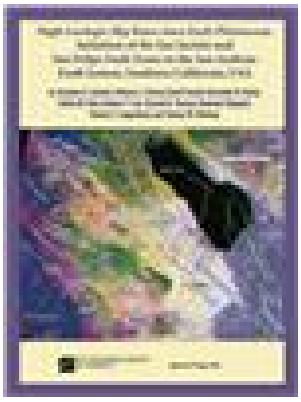
"Once [these links] have been pointed out from topology, then we can go back and look for them in the Schrödinger equation" that describes the mathematics of quantum theory, says Baas.

From there, it might be possible to create new quantum states in the lab. This in turn might provide new ways to build super-powerful quantum computers, which manipulate information carried in the quantum states of particles. Such quantum information can be in many states at once, so quantum computers can carry out enormous numbers of calculations simultaneously.

http://www.newscientist.com/article/mg20927942.300-make-way-for-mathematical-matter.html?full=true&print=true

New GSA Special Paper Tackels the San Jacinto Fault Zone

07 January 2011 Geological Society of America, The



- **Publication title:** High Geologic Slip Rates since Early Pleistocene Initiation of the San Jacinto and San Felipe Fault Zones in the San Andreas Fault System, Southern California, USA
- **Author:** Susanne U. Janecke, et al
- **Publication type:** Book (Paperback)
- **Publication date:** 07 January 2011
- **Number of pages:** 48
- **ISBN number:** 978-0-8137-2475-1
- **Price:** 40.00 USD US Dollars

Boulder, CO, USA - Gaining insight into the San Jacinto right-lateral strike-slip fault zone is crucial for understanding the plate-boundary dynamics, regional slip partitioning, and seismic hazards within Southern California's San Andreas fault system, yet conclusions about its age and average slip rate remain controversial. Authors from the U.S. and Utah Geological Surveys, Utah State University, University of Oregon, Fugro William Lettis & Associates, Western Washington University, and ExxonMobil combine their expertise to present five new estimates of displacement.

The authors develop these five estimates using offset successions of crystalline rocks; distinctive marker beds in the late Cenozoic basin fill; analysis of strike-slip-related fault-bend folds; quantification of strain in folds at the tips of dextral faults; and gravity, magnetic, and geomorphic data sets With these estimates, this synthesis of prior and new detailed studies in the western Salton Trough documents initiation of structural segments of the San Jacinto fault zone at or slightly before the 1.07 Ma base of the Jaramillo subchron.

Individual copies of the volume may be purchased through the Geological Society of America online bookstore, http://rock.geosociety.org/Bookstore/default.asp?oID=0&catID=9&pID=SPE475, or by contacting GSA Sales and Service, gsaservice@geosociety.org.

Book editors of earth science journals/publications may request a review copy by contacting Jeanette Hammann, jhammann@geosociety.org.

High Geologic Slip Rates since Early Pleistocene Initiation of the San Jacinto and San Felipe Fault Zones in the San Andreas Fault System, Southern California, USA

by Susanne U. Janecke, Rebecca J. Dorsey, David Forand, Alexander N. Steely, Stefan M. Kirby, Andrew T. Lutz, Bernard A. Housen, Benjamin Belgarde, Victoria E. Langenheim, and Tammy M. Rittenour

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University of Essex

Toxic gases – could a little bit of something bad really be good for us?

07 January 2011 Essex, University of
Scientists at the University of Essex have won a grant of more than £200,000 to help gain a better understanding of the role toxic gases play in the human body.
They will focus on three gases: nitric oxide (produced by cigarette smoke, car engines and power plants), hydrogen sulfide (present in crude petroleum, natural gas and) and carbon monoxide (made in industrial factories and malfunctioning home heating systems).
Although these gases are more usually associated with environmental pollution they have all – surprisingly – been suggested to play a key role in the normal functioning of all animals. Inside the cells of our body low concentrations of these gases are made all the time. Once made these gases can be used to control blood flow and blood pressure as well as being key components of the immune system's fight against disease.
However, at high concentrations these toxic gases would stop the body's ability to consume oxygen. What is not clear is how the body manages to make use of these molecules without falling foul of their toxicity.
Thanks to a grant of £208,395 grant from the Leverhulme Trust, Professor Chris Cooper, from the Department of Biological Sciences, will explore the role of three of these toxic gases in detail. In particular he will study their interaction with each other and with oxygen gas, focusing on the mitochondria - the small organelles inside every cell that enable us to use oxygen as a source of energy.
Explaining the project, Professor Cooper said: "Oxygen is at the heart of this story. How do we manage to make use of the oxygen gas in the air we breathe whilst at the same time making other gases that seem to stop it working? This is the riddle that we hope to have solved at the end of the two-year project."

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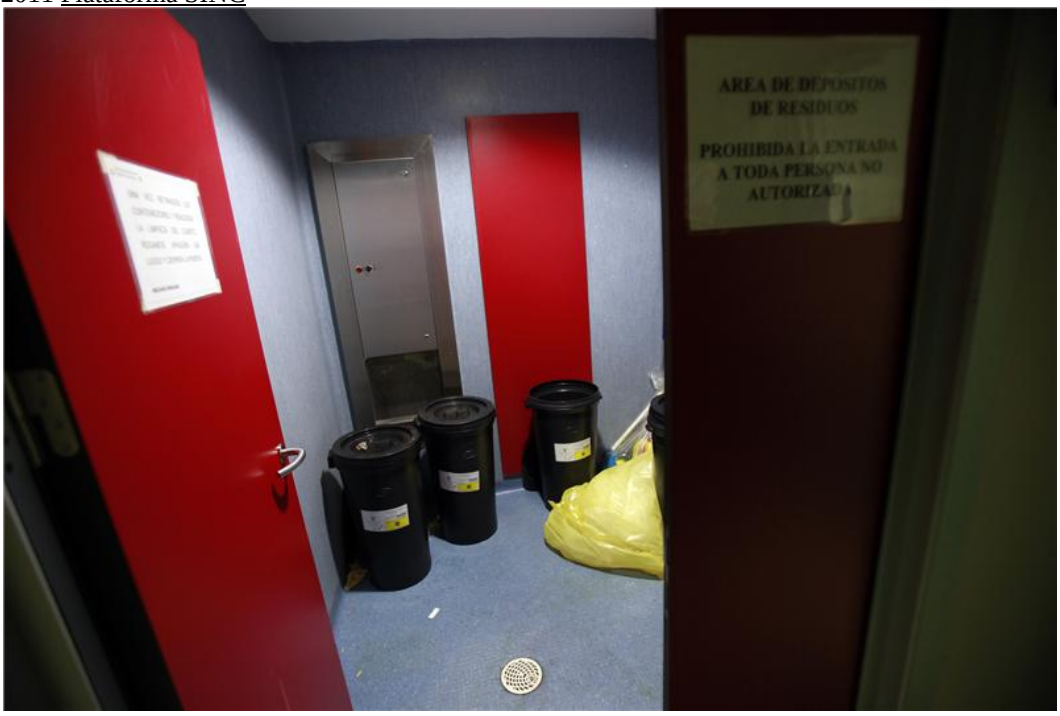
Clinical waste management needs specialised regulation

07 January 2011 Plataforma SINC



The study is published in the 'Resources, Conservation and Recycling' journal

A study carried out by the University of Granada (UGR) warns of the need to unify existing plans for clinical waste management in the different autonomous communities to improve recycling and waste disposal. There is currently no specific state-wide regulation, just a framework law that the Spanish Ministry of the Environment and Rural and Marine Affairs (MARM) is planning to reform.

"We carried out a comparison of the clinical waste management regulations and plans in place in the autonomous communities in 2008 to see if there were any differences. We observed distinctions that even affected the classification of waste, making it difficult to obtain global data on, for example, what different types of waste are generated in the clinical sector", explains Montserrat Zamorano, UGR researcher and co-author of the study, to SINC.

In Spain there is no specific legislation relating to clinical waste, hence its management is regulated by Law 10/98 on waste, as well as by specific regulations based on its classification, as is the case for hazardous and radioactive waste, among other types.

"Thirteen of the autonomous communities studied, however, have approved regulations or plans to regulate the management of this type of waste, some prior to the approval of Law 10/98, with the aim of guaranteeing environmental health and protection", highlights Zamorano.

The study analyses the differences and similarities between the ways in which waste is defined and classified, as well as the basic principles established for the distinct stages of its management. "When it comes to managing waste, problems may arise in communities where no reference standard exists, whereby health centres within the same province manage their waste differently if there is no agreement in place", points out the expert.

If it is not classified correctly, it is not recycled

Scientists found differences in the definition of the term 'clinical waste', in the classification of this type of waste, as well as in criteria prescribed for the presentation, collection, storage and treatment of the established categories. "Furthermore, at the time of the study, it was observed that some of the standards prior to the approval of Law 10/98 had not been adapted to the basic principles of management established therein.

"Neither is the practice of reduction, reuse, recycling and appraisal, as opposed to incineration and dumping, widespread; and consequently, owing to the excessive use of single-use material, the rate of generation of this type of waste has increased significantly", indicates the researcher.

According to the experts the differences observed, as well as the practices in place, could have implications both environmentally and economically in the management of this waste. "This situation could be avoided with the approval of some general management criteria on a national level", concludes the expert.

http://www.alphagalileo.org/ViewItem.aspx?ItemId=93170&CultureCode=en

Genes from the 18th century help patients of today

07 January 2011 Universität Mainz

An international research team, spearheaded by scientists from the London School of Medicine and Dentistry, has identified the genetic mutation responsible for a disease known as "gigantism" or acromegaly. The results of the study – conducted, among others, by the Paleogenetics Group of the Institute of Anthropology at Johannes Gutenberg University Mainz, Germany – were recently published in the renowned *New England Journal of Medicine*. It is hoped that these will help in the treatment of patients suffering from acromegaly. Gigantism is known to be caused by a tumor of the pituitary gland, a gland located at the base of the brain from where it releases hormones that regulate several functions of the body – one being growth. Pituitary tumors can cause tissues to grow abnormally resulting in certain changes in facial appearance, enlarged hands and feet, headache and sweating – eyesight too can be affected; this condition is called acromegaly.
Márta Korbonits, Professor of Endocrinology and Metabolism at Barts and the London School of Medicine and Dentistry, initially looked at the aryl hydrocarbon receptor interacting protein (AIP) gene. It has been known since 2006 that defects to this gene are associated with a predisposition to development of pituitary tumors, and Professor Korbonits was able to identify a specific genetic mutation in Irish patients with a family history of acromegaly. Leading international paleogenetics experts Professor Dr Joachim Burger and Martina Unterländer of the Institute of Anthropology at Johannes Gutenberg University Mainz, Germany subsequently extracted and analyzed the DNA from the skeleton of an 18th-century acromegaly patient preserved in the Hunterian Museum in London. The research team discovered exactly the same mutation as the one found in living patients. Further analyses of other DNA segments located in the vicinity of this gene led to the conclusion that the Hunterian Museum's so-called "Irish Giant" had inherited the mutation from a common ancestor that he shared with a number of living Irish families who are suffering from this hereditary disorder today. The subsequent complex biostatistical calculations showed that the original mutation developed around 1,500 years ago and has been passed on from generation to generation ever since. It is estimated that around 200 to 300 people still carry the mutation today.
"The ancient DNA from the skeleton has enabled us to confirm the hypothesis that there is indeed a link between the mutation and this disease, a disorder which in the past so often resulted in tragedy," explains Professor Joachim Burger from Mainz University. He continues: "The biomathematical calculations have even provided us with a highly accurate insight into the history of this illness." Márta Korbonits, head of the study, adds: " The most important clinical aspect of our study is that it is now possible to trace down carriers of this gene in time and treat patients before they grow to be a giant." Professor Patrick Morrison, co-author of the study, concludes: " The benefits to patients locally are that we now have a genetic blood test that families at risk of this condition can choose to have, which allows early detection and prevention of excessive growth."
http://www.uni-mainz.de/eng/13999.php

http://www.alphagalileo.org/ViewItem.aspx?ItemId=93164&CultureCode=en

Aquarium heralds exciting new era for coral research

06 January 2011 Essex, University of

An exciting new era of research has begun at the Coral Reef Research Unit at the University of Essex.
Its new tropical research aquarium facility is now up and running, and will greatly enhance the diversity of research undertaken at Essex.
The £50,000 aquarium doubles up as a research facility and a coral husbandry facility, taking away the need to buy coral for experiments and enabling the research unit to address key research questions under controlled laboratory conditions.
It is unique in terms of its experimental chambers where different environments can be created and will showcase the world-class coral research being carried out at the University.
Dr Dave Smith, Director of the Unit, said: "We now have total control over coral growth conditions and this will enable us to answer key questions from the molecular to the ecosystem level. It is a new era of research for us and UK coral science."
Projects currently being carried out at the aquarium include research funded by NERC (*Natural Environment Research Council) into how different environments affect coral mortality.*
A second project, funded by Mitsubishi's global coral taskforce initiative, is to better understand how the structure of a reef varies by climate change.
Explained Dr Smith. "It is very important to determine how reefs will most likely respond to climate change, how fundamental changes will influences coral reef diversity and productivity and therefore the effects of climate change on the numerous ecosystem services provided by reefs to the half a billion dependants globally.
"It is all about linking the biological implications with the social implications and ensuring that the Unit's research activities have maximum impact."

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Cyberspace When You're Dead

By ROB WALKER

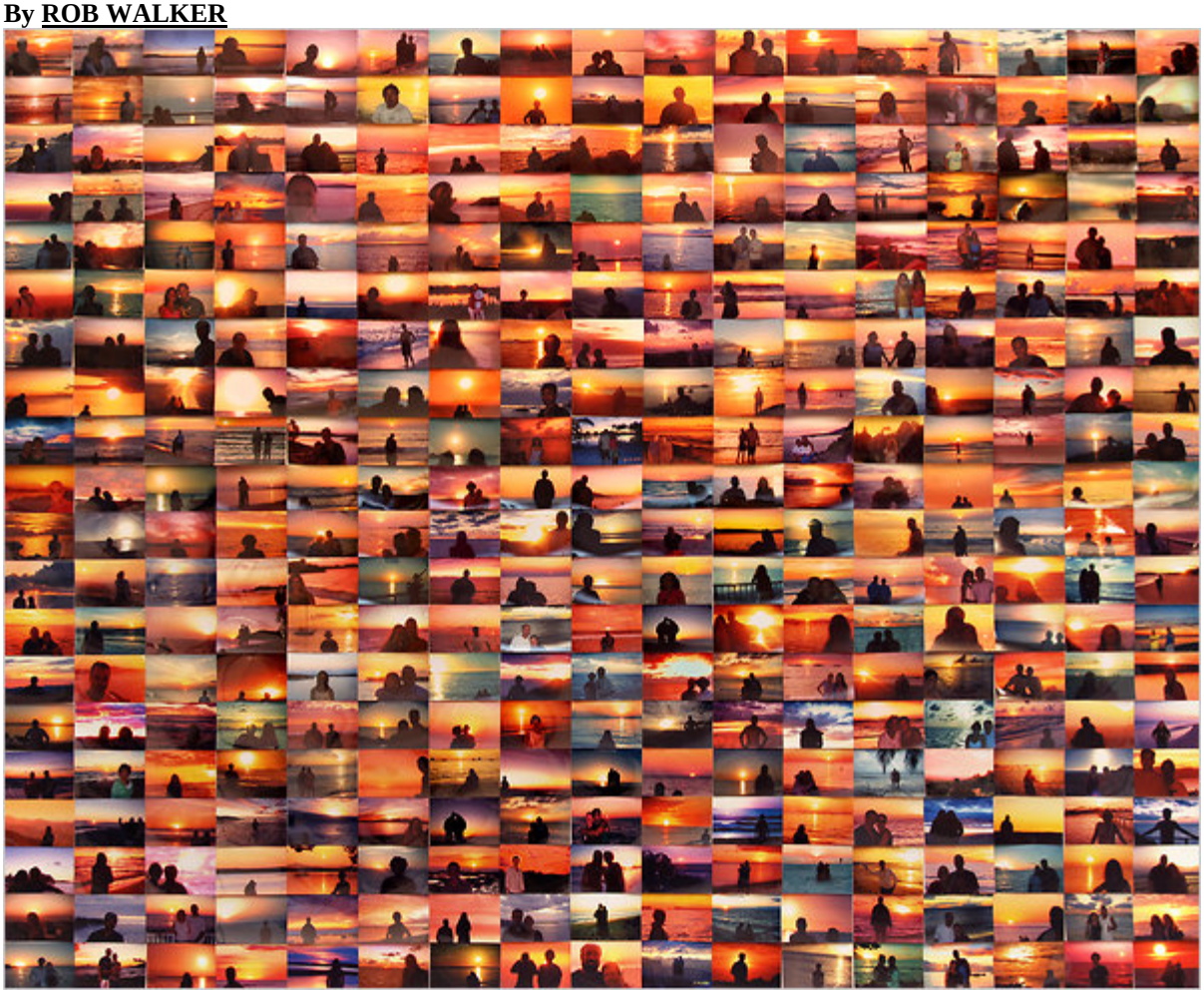


Photo Illustration by Penelope Umbrico for The New York Times
''Sunset Portraits, From 8,462,359 Sunset Pictures on Flickr, 12/21/10'

Suppose that just after you finish reading this article, you keel over, dead. Perhaps you're ready for such an eventuality, in that you have prepared a will or made some sort of arrangement for the fate of the worldly goods you leave behind: financial assets, personal effects, belongings likely to have sentimental value to others and artifacts of your life like photographs, journals, letters. Even if you haven't made such arrangements, all of this will get sorted one way or another, maybe in line with what you would have wanted, and maybe not.

But many of us, in these worst of circumstances, would also leave behind things that exist outside of those familiar categories. Suppose you blogged or tweeted about this article, or dashed off a Facebook status update, or uploaded a few snapshots from your iPhone to Flickr, and *then* logged off this mortal coil. It's now taken for granted that the things we do online are reflections of who we are or announcements of who we wish to be. So what happens to this version of you that you've built with bits? Who will have access to which parts of it, and for how long?

Not many people have given serious thought to these questions. Maybe that's partly because what we do online still feels somehow novel and ephemeral, although it really shouldn't anymore. Or maybe it's because pondering mortality is simply a downer. (Only about a third of Americans even have a will.) By and large, the major companies that enable our Web-articulated selves have vague policies about the fate of our digital

afterlives, or no policies at all. Estate law has only begun to consider the topic. Leading thinkers on technology and culture are understandably far more focused on exciting potential futures, not on the most grim of inevitabilities.

Nevertheless: people die. For most of us, the fate of tweets and status updates and the like may seem trivial (who cares — I'll be dead!). But increasingly we're not leaving a record of life by culling and stowing away physical journals or shoeboxes of letters and photographs for heirs or the future. Instead, we are, collectively, busy producing fresh masses of life-affirming digital stuff: five billion images and counting on Flickr; hundreds of thousands of YouTube videos uploaded every day; oceans of content from 20 million bloggers and 500 million Facebook members; two billion tweets a month. Sites and services warehouse our musical and visual creations, personal data, shared opinions and taste declarations in the form of reviews and lists and ratings, even virtual scrapbook pages. Avatars left behind in World of Warcraft or Second Life can have financial or intellectual-property holdings in those alternate realities. We pile up digital possessions and expressions, and we tend to leave them piled up, like virtual hoarders.

At some point, these hoards will intersect with the banal inevitability of human mortality. One estimate pegs the number of U.S. Facebook users who die annually at something like 375,000. Academics have begun to explore the subject (how does this change the way we remember and grieve?), social-media consultants have begun to talk about it (what are the legal implications?) and entrepreneurs are trying to build whole new businesses around digital-afterlife management (is there a profit opportunity here?). Evan Carroll and John Romano, interaction-design experts in Raleigh, N.C., who run a site called TheDigitalBeyond.com, have just published a tips-and-planning book, "Your Digital Afterlife," with advice about such matters as appointing a "digital executor."

Adele McAlear, a social-media and marketing consultant, became interested in this subject a few years ago, when one of her regular Twitter contacts died. A Web enthusiast who has created "Lord knows how many profiles" for herself in the course of road-testing various new services, she is an "advocate of creating content and putting it online." And yet, she continues, it "hadn't dawned on me, what happens to all of this stuff that you put out there, this digital litter that sort of accumulates." That may be particularly true for people like McAlear, who have thoroughly integrated their Web expressions into their identity. (Indeed, she explores her new interest on a blog, DeathandDigitalLegacy.com.) But you don't have to be a social-media consultant to live that way. More and more people do, as a matter of course. Millions of us are "sharing" our thoughts and tastes; our opinions and observations about WikiLeaks and "Glee" and the Tea Party and some weird dude on the subway this morning; and photographs of newborns and weddings and parties and — why not? — that weird dude on the subway. Maybe the momentous and the momentarily amusing add up to a pleasing means of real-time connection, but what do they add up to when we're gone? The legacy of a life you hope your survivors will remember? Or a jumble of "digital litter" for them to sort through?

ON OCT. 18, 2009, Mac Tonnies updated his blog, sent out some public tweets and private messages via Twitter, went to bed and died of cardiac arrhythmia. While he had experienced some symptoms that indicated potential heart problems, his sudden death came as a shock even to those who knew him well. He was 34. Tonnies lived in Kansas City, Mo. He was single and childless, owned two cats and paid his bills through workaday jobs, behind the counter at Starbucks or doing phone work for a small marketing agency. He was also a writer (he had just finished a draft of his third book) with an adventurous intellect. His audience was small, but devoted. Tonnies, who started his blog, Posthuman Blues, in 2003, was an extremely active user of online media and forged many friendships with people he never met in the physical world. Many of his interests were distinctly future-oriented, including speculative or fringe topics that sound to most people like science fiction. Often this was the common ground of those online relationships: a freewheeling consideration of the very nature of humanity.

Rita J. King, an expert on online identity and persona who is an "innovator in residence" for I.B.M., was introduced to Tonnies via e-mail in 2004, and they kept in frequent touch. "He is the one I had all my conversations with, early on, about technology and consciousness," she says. Possibly a typical venti latte buyer in Kansas City would have found that puzzling and dismissed some of Tonnies's other interests (U.F.O.'s, life on Mars, the paranormal) as flat-out weird. But online, he wasn't some guy with a lot of strange ideas. He was himself. And he attracted an eclectic group of similarly minded friends.

The last entry on Posthuman Blues was titled "Tritptych #15," a set of three images with no text. The first comment to this post came from an anonymous reader, wondering why Tonnies had not updated the blog or

tweeted for two days. Some similar comments followed, and then this: “Mac Tonnies passed away earlier in the week. Our condolences are with his family and friends in this time of grief.” The author of that comment was also anonymous. After a rapid back-and-forth about whether this startling news was true and some details of the circumstances, that post’s comment section transformed into a remarkable mix of tributes, grieving and commiseration. You can still read all this today, in a thread that runs to more than 250 comments.

“It was a very strange feeling,” Dana Tonnies, Mac’s mother, told me, describing how she and her husband became aware of the swirl of activity attaching to her son’s online self. “I had no control over what was being said about him, almost immediately.” Dana and Bob Tonnies were close to their only son — in fact they had coffee with him, in a regular Sunday ritual, the morning before he died — but they had little contact with his digital self. Sometimes he would show them his online writing, but he had to do so by literally putting his laptop in front of them. The Tonnies did not read blogs. In fact they did not own a computer.

In the months after their son’s death, Dana and Bob went about the difficult business of organizing his papers (letters, e-mail printouts, story drafts) and deciding which of his belongings to keep (like his thousand or so books) or to give to his friends (his leather jacket, his three watches). This painful process took awhile, and they were not really focused on his blog or Flickr account and the like. They also inherited their son’s computer and have since learned how to navigate it and the Internet. But by then, their son’s online circle had already taken action.

I spoke to a half dozen people Mac Tonnies met online and in some cases never encountered in the physical world. Each expressed a genuine sense of loss; a few sounded grief-stricken even more than a year later. Mark Plattner, who lives in St. Louis and met Tonnies a dozen years ago through the comments section of another blog, decided that Posthuman Blues needed to survive. He used software called Sitesucker to put a backup of the entire thing — pictures, videos, links included — on a hard drive. In all, Plattner has about 10 gigabytes of material, offering a sense of Tonnies’s “personality and who he was,” Plattner says. “That’s what we want to remember.” He intends to store this material through his own hosting account, just as soon as he finds time to organize it all.

Plattner was one of several online friends who got involved in memorializing Tonnies and his work. Dia Sobin, an artist who lives in Connecticut, met Tonnies online around 2006; they communicated often by e-mail and phone, but never met in person. She created art for Tonnies’s site and for the cover of what turned out to be his final book. Less than two weeks after he died, she started a blog called Post-Mac Blues. For more than a year, she filled it with posts highlighting passages of his writing, reminiscences, links to interviews he gave to podcasters and bloggers, even his Blip.fm profile (which dutifully records that he listened to a song from “Everything That Happens Will Happen Today,” by David Byrne and Brian Eno, at 4:16 p.m. on the last day he lived). Her site is “a map to Mac Tonnies,” Sobin says. “And a memorial.”

“I only ever knew him over Twitter,” Sarah Cashmore , a graduate student in Toronto, told me. She shared his enthusiasm for design and technology and learned of his death from Twitter contacts. “I was actually devastated,” she says. A few months later, she teamed up with several other members of Tonnies’s Twitter circle to start a second Tonnies-focused blog, Mac-Bots.

This outpouring of digital grief, memorial-making, documentation and self-expression is unusual, maybe unique, for now, because of the kind of person Tonnies was and the kinds of friends he made online. But maybe, his friend Rita King suggests, his story is also a kind of early signal of one way that digital afterlives might play out. And she doesn’t just mean this in an abstract, scholarly way. “I find solace,” she told me, “in going to Mac’s Twitter feed.”

Finding solace in a Twitter feed may sound odd, but the idea that Tonnies’s friends would revisit and preserve such digital artifacts isn’t so different from keeping postcards or other physical ephemera of a deceased friend or loved one. In both instances, the value doesn’t come from the material itself but rather from those who extract meaning from, and give meaning to, all we leave behind: our survivors.

The most remarkable set of connections to emerge from Tonnies’s digital afterlife isn’t among his online friends — it is between those friends and his parents, the previously computer-shunning Dana and Bob Tonnies. Dana, who told me that her husband now teases her about how much time she spends sending and answering e-mail (a good bit of it coming from her son’s online social circle), is presently going through Posthuman Blues, in order, from the beginning. “I still have a year to go,” she says. Reading it has been “amazing,” she continues — funny posts, personal posts, poetic posts, angry posts about the state of the

world. I ask her if what she is reading seems like a different, or specifically narrow, version of her son. “Oh, no, it’s him,” she says. “I can hear him when I read it.”

Mac Tonnies’s digital afterlife stands as a kind of best-case scenario for preserving something of an online life, but even his case hasn’t worked out perfectly. His “Pro” account on the photo-sharing service Flickr allowed him to upload many — possibly thousands — of images. But since that account has lapsed, the vast majority can no longer be viewed. Some were likely gathered in Plattner’s backup of Tonnies’s blog; others may exist somewhere on his laptop, though Dana Tonnies still isn’t sure where to look for them. All could be restored if Tonnies’s “Pro” account were renewed. But there’s no way to do that — or to delete the account, for that matter: no one has the password Tonnies used with Flickr, which is owned by Yahoo. He used Blogspot for Posthuman Blues; that’s a free Google product, and there are no fees to keep it updated or any immediate danger of it disappearing. On the other hand, there’s no guarantee of how long it will remain. Updating, altering or maintaining it would require Tonnies’s password, which he didn’t leave behind. Obtaining that password from Google would require providing the company with proof of death. As lovely and moving as the tributes and communal mourning that appeared in the comments to his final post are, it’s jarring to see the thread gradually infiltrated by spam-bots — pidgin-English comments followed by long lists for links for “cheap Ugg boots” and such. It’s like finding a flier for a dry cleaner stuck among flowers on a grave, except that it’s much harder to remove.

It’s unlikely the material Tonnies left online would have fared as well had it not been for his savvy and generous circle of Web friends. For most survivors, coping with the physical possessions and conventional assets of the departed can be overwhelming enough, but at least there are parameters and precedents. Even if a houseful of objects is liquidated through an estate sale or simply junked, mechanisms exist to ensure some sort of definitive outcome, even in the absence of a will. And there’s no way of ignoring or forgetting it: eventually the stuff will have to be dealt with.

Bit-based personal effects are different. Survivors may not be aware of the deceased’s full digital hoard, or they may not have the passwords to access the caches they do know about. They may be uncertain to the point of inaction about how to approach the problem at all. Any given e-mail account, for instance, can include communication as trivial as an “I’m running late” phone call or as thoughtful as a written letter — all jumbled together, by the hundreds or thousands. Similarly, let’s just say not all of us are discriminating curators in uploading pictures to Facebook, for instance, flinging more images from one weekend onto the Web than an earlier generation would have saved from a weeks-long vacation. When you inherit a physical scrapbook or even a diary, some choices have already been made — either by culling or by constraints of space — but accessing and then assessing the digital effects of a dead loved one entail a thicket of choices and challenges that many would simply rather avoid.

This has inspired a variety of entrepreneurs to place bets that, eventually, people will want control over the afterlife of their digital selves. Several promise to manage the details of your digital death — storing your passwords and your wishes for who gets access to what and integrating your content-related instructions into a kind of adjunct to a traditional will. Legacy Locker claims “around 10,000” people have signed up for its digital-estate-management service. Its rivals include DataInherit, a service of DSwiss, “the Swiss bank for information assets” (you can even update your digital-legacy data via its iPhone app), and Entrustet, of Madison, Wis. Last May these three firms sponsored Digital Death Day, an event tacked on to an annual online-identity conference near San Francisco.

The founders of Entrustet are surprisingly young. Jesse Davis , who is 23, was still a student at the University of Wisconsin when he wrote the original business plan in 2008. He came up with the idea after reading what has become one of the best-known stories on the complexities of digital assets and one of the few that has found its way into the courts. Justin Ellsworth, a Marine killed in Iraq in 2004, did not leave behind the password to his Yahoo e-mail account, and when the company refused to give his parents access to it, they sued. Eventually, under orders from a probate judge, Yahoo gave them a CD it said contained Ellsworth’s e-mail. Ellsworth’s story convinced Davis and his business partner, Nathan Lustig, 25, that there was a market for “digital estate planning” services. In the case of Entrustet, this means an automated system for storing passwords and instructions for all your digital assets.

Such businesses rest on a simple idea: Web, mobile and social-media use keeps exploding; everyone still dies. Meanwhile, much of the archiving of basic family life is becoming digital. It has become routine to have an online “presence” even as an infant, by way of a picture posted on a parent’s social-networking profile. Lustig

pointed me to a recent corporate study that identified "chief memory officer" as a kind of unofficial role taken on by someone (often mom) in many families — the person who is paying attention to the idea that there may be no physical scrapbook or set of journals to hand down to future generations and that bits-and-bytes memory objects need to be preserved somehow. Trendwatching.com has predicted a "burgeoning market" for products and services that protect the digital content that is "the nucleus of one's personal brand."

I spoke to a couple of Entrustet users, who said they particularly wanted to protect photos stored online, along with hosting and domain-registration information for personal and business sites. Entrustet also offers an "account incinerator," to obliterate content its users would prefer not to have linger on after them, and one person I spoke to mentioned having tagged a personal Twitter account for deletion — "it's just inside jokes, personal ranting and raving" — along with a Gmail account. "I don't need people judging the personal e-mails that I sent to my friends," he explained.

Given the degree to which the most popular online platforms involve promoting a quasi-public persona — the "you" who declares fandom of Bob Dylan and Flannery O'Connor, but not the "you" who binges on "Jersey Shore" reruns and TMZ.com — this instinct seems logical. If we try to control the way we are perceived in life, why not in death, too? It's not wholly unusual to do this with physical artifacts: letters to be opened only after death, or even to be destroyed. If you don't want your heirs figuring out that you had a secret Tumblog clogged with pictures of Natalie Portman, maybe you should just arrange for it to be "incinerated." If nothing else, those Entrustet users figure they are leaving behind some guidelines about which bits of their online lives matter, and which don't.

Most people do not leave such directives, making the fate of their digital lives uncertain. One of the better-known instances of a disappeared digital legacy involves Leslie Harpold, a Web pioneer who died unexpectedly in 2006, at age 40. Her writing and other online projects connected her with friends and admirers who were helping create the Internet's self-expression tool kit back in the mid-1990s. In early 2010, after her sites Harpold.com and Smug.com quietly disappeared, some of those friends lobbied Harpold's family to let them preserve her work. "Her work is her legacy," one admirer, Rogers Cadenhead, wrote to Harpold's niece, Melissa Krauskopf, an attorney who served as the personal representative of Harpold's estate. "I have corresponded with several of Leslie's friends about her sites all disappearing from the Web. For what it is worth, all of us believe that she would not have wanted that to happen."

This offer was declined. Harpold's niece replied that Harpold's legacy isn't in her online work but rather "is with every person who knew her and loved her." I spoke to Krauskopf briefly, and while she was cordial, she had little to add. Had her aunt left directives about her online work, they would of course have been honored, she said. But in their absence, the domains were part of the estate that went to Harpold's mother, and while Krauskopf appreciates the perspective of her aunt's Web friends, it was a family decision that doesn't require public explanation. "People need to appreciate that she was a real person," Krauskopf says, and the family prefers to "remember her as she was."

You might think that stories like that would inspire at least the most cutting-edge true believers in the importance of online expression to stampede digital-afterlife-management companies. But Entrustet and its rivals acknowledge facing a variety of challenges, from an estate-planning community that isn't particularly tech-forward to convincing potential customers that the start-up meant to deal with their digital afterlife will still be a going enterprise by the time they die. I tried out Entrustet myself. It seems to ease the unwieldy process of sorting out what to do with lots of online accounts with different passwords and so on, but I would add another challenge to the list: it's depressing. I made my wife my "digital executor," which meant that she received an e-mail about her responsibilities that she found jarring and a little chilling, even though I'd warned her. The idea of updating this thing every time I change a password or try out a new social Web tool that I may or may not keep using seemed even less enticing than cleaning out the attic.

Perhaps as a way around this problem, Entrustet is testing the waters on making deals with social-networking services. Its first partner in that approach is Broadjam, a service where musicians store and share their work. The idea is that Entrustet will function as a quietly integrated feature built into something you are happily using rather than being the go-to brand for everything you would rather not think about.

FOR NOW, THE DIGITAL identities of people whose Web contacts aren't sophisticated techie types are simply languishing, or quietly fading away, with no hubbub, controlled not by friends or family but by the defaults of the services that enable their creation. And maybe that's as it should be: what difference does it

make what happens to the mundane accumulated detritus that makes up so much of what we do online? Once the people who cared about our status updates are gone, who cares if the updates persist?

One answer to that question is future historians. They surely won't be poring over as many physical documents as today's historians do, and surely the granular documentation of life in the 21st century, in digital form, is unprecedented. Fragile digital selves, then, represent a potential loss to the future.

This point of view has been most convincingly articulated by Dave Winer, the software developer whose Scripting News site is regarded as one of the first examples of what would come to be called blogs. He has been writing about the issue of online content preservation — he calls it "future-safing" — for several years. His views are a surprise to anybody who assumes that expression preserved in bits is somehow more durable than expression preserved in atoms; in fact he has drawn the opposite conclusion, repeatedly pointing out that digital technologies can be surprisingly unstable or can change rapidly in ways that leave a trail of obsolete material in their wake or both. He has written about his own efforts to preserve the original specs and code for some of his most significant technological creations on a suitably reliable server that future historians and others will be able to access. In thinking about how to do the same for his (and others') online writing, he sounds pessimistic.

At one point he suggested a big company like Amazon or Google might be a suitable repository — maybe charging a flat fee to host content in perpetuity. But lately he has leaned more toward solutions involving institutions like universities or maybe the government. "What's needed," he wrote in early 2010, "is an endowment, a foundation with a long-term charter, that can take over the administration of a Web presence as a trust — before the author dies."

In general, the companies that have created the most popular places and tools for online expression don't exactly encourage users to stop and think about these subjects. Specific policies vary — details, buried in terms of service agreements, often involve a fair bit of effort, like providing a death certificate — and newer social-media services often have no particular policy at all. (Twitter established its guidelines only in August 2010.) The most prominent place this issue has come up, not surprisingly, is Facebook. For some time now, it has offered an option to request that a profile be switched to "memorial" mode when an individual dies. A post on the company blog explained that the issue first arose internally back in 2005, when one of its employees — there were only 40 at the time — died in a bike accident. ("When someone leaves us, they don't leave our memories or our social network," the post said.) Someone must put in a request for a profile to be memorialized, which deactivates certain features and resets various privacy controls, converting its function to a place where friends can leave remembrances. The process doesn't give much direct control to any heir or executor or similar figure, and as some have complained, it can mean wiping out meaningful material and replacing it with "a thousand 'sorry this happened' " messages, as one user put it.

To Winer, however, the issue goes beyond how a person is remembered by those he or she knew. And he's right that Web sites come and go — often vanishing in months, depending on the whims and intentions and attention span of their creators. One estimate from the late 1990s suggested that almost half the sites created disappear within one year. The Library of Congress has a program that saves slices of the Web and announced last year that it would archive all tweets. But in general its mission is less a comprehensive record than a representative one, built around themes and events, like Sept. 11. Efforts like Internet Archive's WaybackMachine are, while impressive, not intended to be complete. Richard Oram, associate director of the Harry Ransom Center at the University of Texas at Austin, recently discussed on NPR the problems of tending archival material stored on old floppy discs. Similarly, saving census data that was once stored on Univac computers was a costly effort, and images recorded by early space missions and stored in now-obsolete formats have simply been lost.

"This is a huge gap in the Web we're building today," Winer has written. "Eventually it's going to catch up with us when we lose a huge amount of stuff we thought we couldn't lose."

Cameron Hunt is one of the few people I encountered who is actively trying to preserve his digital identity. A 38-year-old Tampa resident who works in the military-contracting industry, Hunt attended Digital Death Day last year. Many of those who attended had some professional interest in the subject — academics, consultants, entrepreneurs. Hunt's interest is more personal. He wants to leave a definitive, and stable, digital legacy behind — "a master repository of me," as he puts it.

His motivations aren't obvious: he is in good health; he's divorced and has no children; and unlike Tonnies he is not engaged in traditional acts of creative expression, like writing books. Raised a Mormon, he never really

connected to that church's penchant for genealogy, which always struck him as a bunch of dry lists of names and dates. Then, a couple of years ago, his grandmother died, and he was given a copy of various family stories she had written. "Reading them as an adult, I was able to read between the lines," he says, "to understand things in a rich way, and see how the stories and the experiences had influenced down through multiple generations." Something else happened at the same time: the family realized that a big batch of slides in his grandmother's possession had faded beyond recognition. Hunt was stunned. "Memories that were precious to me — not just living them, but after that going back and revisiting them — and now it's gone," he recalls. "I thought: I really need to do something."

Hunt uses Twitter and Facebook; in fact, he has no privacy restrictions on his Facebook account, which lists his address and cellphone number. "I do that as part of my persona," he told me when I suggested that it was a bad idea. "My friends know — if there's an image that maybe I've cultivated, it's 'Cam's crazy, he won't be afraid to do it.' Therefore opportunities come to me or people confide in me."

In any case, while he's also a user of Flickr, LinkedIn, Foursquare and various other online services, the core of his digital legacy is a collection of e-mail dating back to 1994. He has come to realize that achieving his goal is going to take serious effort. "I want to fund a bank account," he says, "so that when I die, a curator can be paid to digitize anything that may not have been digitized, manage the collection, maybe do some research, help people find stuff if they're looking for it.

"You know," he adds with a chuckle, "all these ego-driven things of not being a famous man yet treating my digital afterlife as if I were famous."

Admittedly, Hunt's thinking sounds over the top. But part of the reason it seems so audacious is that there is so much to preserve, compared with, say, the physical material his grandmother left behind. A side effect of digital life is that the border between the real-time self-expressive object and the durable memory object has become porous.

Consider Gordon Bell, a famous computer engineer whose innovations date back to the 1960s. More recently he undertook a project under the auspices of Microsoft Research called MyLifeBits, which included not only the totality of his e-mail correspondence but also digital records of Web pages visited, scanned versions of paper notes, recordings of routine conversations and tens of thousands of snapshots taken every 30 seconds by a digital camera that dangles from his neck. Bell suggests that this in fact is ultimately what digital technology is for: "to capture one's entire life." As he once told ComputerWorld magazine, the point is not to share it all in real time but to give the individual a tool to "leave a personal legacy — a record of your life."

Viktor Mayer-Schönberger, in his book "Delete: The Virtue of Forgetting in the Digital Age," notes Bell as an extreme example of a general cultural drift. It is only relatively recently, he argues, that our tools for recording what we see, experience and think have become so easy to use, inexpensive and effective that it is easier to let information accumulate in our "digital external memories" than it is to bother deleting it. "Forgetting has become costly and difficult, while remembering is inexpensive and easy," he writes. This is so even though a great deal of our digital expression is simple communication about the present, "intentionally ephemeral." But because it's more trouble to delete old blog posts, digital pictures and tweets than it is to make new ones, "society's ability to forget has become suspended, replaced by perfect memory."

Mayer-Schönberger is only glancingly concerned with the notion of legacy; he is mostly making a point about privacy and personal information, not about what happens after life ends. So in the long run, his contention that the digital memory is "perfect" is doubtful. And as he notes, even in real time, digital memory can be flawed and misleading: it often merely seems perfect but can be incomplete or even altered.

Stacey Pitsillides, now finishing a graduate degree in design at Goldsmiths, University of London, has been researching digital afterlife issues for a few years now, drawn specifically to the question of what the piles of identity that we're building up online will ultimately amount to. "We just see it as this infinity," she says, but it isn't. "There are certain costs, financial costs, physical and social costs, to keeping this amount of data. One of the social costs is that we kind of lose the ability to begin to choose and arrange what we want to say about ourselves, and instead get lost in this wash of information.

"If every object you've ever owned was a memory object," she continues, "and we gave that to a family member and said, 'You have to remember this person by all of these objects,' then what position would we be in, and how would we ever remember everyone?"

It is possible that technology will answer this question with new ways for organizing, sifting and coping with masses of preserved personal data. Richard Banks, an interaction designer for Microsoft Research in

Cambridge, England, has made some “technology heirloom” prototypes that collect, say, tweets or Flickr pictures in new physical devices that would automatically organize them (chronologically or thematically) for heirs or others. And a few nascent businesses have lately floated services that aspire to something closer to Cameron Hunt’s “master repository of me” or Gordon Bell’s vision of total memory forever. Something called Lifenaut.com has a product called a MindFile, “a database of personal reflections captured in video, image, audio and documents about yourself that can be saved, searched, downloaded and shared with friends.” This information is meant to be filtered through an “interactive avatar,” modeled on you, “that becomes more intelligent as you add more information.” The site welcomes you with a sweeping, ominous tone; the company’s tag line is “Eternalize.” VirtualEternity.com, from a company called Intellitar, also claims to convert the personal data you provide into an avatar — sort of like one of those chatbots that some online companies use for automated but more humanish customer service. “We want to give users the gift of immortality,” an Intellitar founder has said.

That, to put it mildly, is a hard claim to take seriously. For now, the less pie-in-the-sky issue is whether most people scattering digital objects across the Web have strong feelings about their persistence, or whether, as Mayer-Schönberger suggests, it simply isn’t worth the time to dispose of them. To Hunt, his own project is perfectly consistent with any effort to preserve analog mementos of life, just as his family (and many others) have for many years. “I’m just part of another generation,” he says. “I really don’t think it’s different in instinct or desire from what other people have done — except that so much of that information is quasi-public already.” He has a point there: even if we aren’t obsessing about the persistence of online expression and memory materials, we sure are cranking it out. What’s really surprising is how few Cameron Hunts there are, actively working out which of the digital self-traces they want to preserve, and how to go about it. All he is really trying to do is have some say in how he’s remembered.

My favorite digital-mortality business, DeathSwitch.com, gives the idea of speaking from beyond the grave a Web-era update. DeathSwitch was founded in 2006 by the neuroscientist and writer David Eagleman to coincide with a short story he wrote for Nature, titled “A Brief History of Death Switches.” The story imagines an automated service that allowed its users to send messages after they die. People use it to reveal secret bank accounts to heirs, confess to sins or settle scores from beyond the grave. Over time, uses for this fictional death switch become so elaborate that it is hard to tell that the sender of the message is deceased. That last part hasn’t happened yet, but otherwise the service offered by DeathSwitch.com, in real life, is basically the same as the fictional one: some final words from you, to whomever, after you’ve gone. DeathSwitch.com has enough subscribers to cover costs, according to Eagleman. It keeps tabs on users by sending a periodic e-mail to make sure they are still alive. I suggested to Eagleman that I would find this regular reminder of my own mortality pretty unnerving, and he seemed perplexed. “If you allow the fact that you are going to pass away,” he replied, “and there are smart things you can do before you pass away to keep everybody in your family happy and well, then it’s as useful as a will, or a do-not-resuscitate.”

Eagleman is an interesting character. He is an assistant professor of neuroscience and psychiatry at Baylor College of Medicine, in Houston, and “Death Switch” is among the short stories collected in a slim, pleasing book he wrote in his spare time, “Sum: Forty Tales From the Afterlives.” As the title suggests, each story imagines some fictional variation on what might come after this life. It’s often quite funny and, as Eagleman points out, can be read as fundamentally hopeful in its willingness to wonder openly and imaginatively about life’s end.

His speculative afterlives end up offering provocative takes on what mortality and legacy really mean. One story posits that there are three deaths, the last coming when your name is spoken for the final time. In another, there is a hell in which you see yourself as others saw you; and in yet another, we sit in the afterlife looking back at life for evidence of our influence, as long as it lingers. “Death Switch,” the story, suggests that there is no afterlife as we think of it but that “a version of us” lives on in the endlessly sophisticated last notes we each send out, creating a strange network of “transactions with no one to read them.” The afterlife isn’t some other place or state of being. “Instead an afterlife occurs for that which exists between us.”

MAC TONNIES’S MANY eclectic intellectual pursuits included at least a passing interest in the notion of cyberimmortality. The idea of the self escaping bodily death by transforming into an age-proof, sickness-proof essence that can be uploaded into a computer or network dates back at least to Vernor Vinge’s 1981 novella “True Names.” A year after that, William Gibson gave us the word “cyberspace” to describe a new place where humans might exist, potentially forever, outside the physical world. By the 1990s, as the Internet

became a familiar presence in many people's lives, some began to suggest that this was no mere science-fiction scenario; it was the future. Vinge was among those (along with, notably, Ray Kurzweil) to discuss the transformation of humans by technology, coming in a matter of decades, referred to as "the singularity." The Carnegie Mellon robotics expert Hans Moravec, the artificial-intelligence pioneer Marvin Minsky, the computer scientist Rudy Rucker and others articulated visions of a future in which technology might truly free us from "the bloody mess of organic matter," to use a phrase of Minsky's. In her 1999 book, "The Pearly Gates of Cyberspace," Margaret Wertheim contextualized such speculations as attempts to, in effect, "construct a technological substitute for the Christian space of heaven."

Wertheim pointed out that cyberspace had become a new kind of place, where alternate (or at least carefully curated or burnished) identities could be forged, new forms of collectivity and connection explored, all outside the familiar boundaries of the physical world, like the body and geography. It's not such a long journey to follow those assertions to the "view that man is defined not by the atoms of his body but by an information code," as Wertheim wrote. "This is the belief that our essence lies not in our matter but in a pattern of data." She called this idea the "cybersoul," a "posited immortal self, this thing that can supposedly live on in the digital domain after our bodies die."

And that, essentially, is what is implied by Gordon Bell's assertion that his MyLifeBits project is a way to "leave a personal legacy — a record of your life." Or to put it more prosaically, it's the same thing Trendwatching.com meant by calling your digital traces on social networks the "nucleus of one's personal brand." It's what the uncanny avatars of Lifenaut and Virtual Eternity hope one day to encapsulate. It's at the heart of "singularity" theory.

Wertheim, it should be noted, saw the cybersoul notion as both flawed and troubling, and I would agree. Life's essence reduced to captured data is an uninspiring, and unconvincing, resolution to the centuries-old question of where, in mind and in body, the self resides. At least other imagined versions of immortality (from the Christian heaven to the Hindu wheel of life) suggested a reconciliation, or at least a connection, with the manner in which a physical life is lived; the cybersoul's theoretically eternal and perfect persistence ignores this concept. Most of all, though, fantasizing about living forever — in heaven or in a preserved pattern of data — strikes me as just another way of avoiding any honest confrontation with the fact of death.

Avoiding that confrontation isn't merely a stumbling block for those digital-afterlife start-ups. I was struck by how many of the people I spoke to who professed a keen interest in the issue of preserving a digital legacy had in fact done absolutely nothing about it for themselves. "Hmm, that's a good question," one of the organizers of that Digital Death Day event, a Web-identity expert, replied when I asked her why she had not taken steps to plan for the future of her digital creations. "I'm probably afraid of resolving the issue," another online-expression enthusiast offered (before joking that all he really wanted to do is "save my work better than my enemies save theirs"). Actually, I completely empathize. I'm not anxious to resolve the issue either, at least not by making any prolonged and thoughtful effort centered on the extended contemplation of my demise.

For me, at least, pondering the digital afterlife made me rethink digital *life*. We're encouraged to record and express everything, all the time. In real time, we can record and distribute the most important moments of our existence, and some of the least. For the generations growing up in the Web era, this mode of being is more or less taken for granted. But the tools we use privilege the moment, not the long term; they also tend to make everything feel roughly equal in importance and offer us little incentive to comb back through our digital scribblings and sort out what might have lasting meaning from what probably doesn't. The results are pretty much the opposite of a scrapbook carefully edited to serve as a memory object but could end up serving that function by default.

If "digital litter" is all around us, then thinking about how to clean it up in real time — or producing less of it in the first place — might be more productive. Rita King, the online-identity expert who was a friend of Mac Tonnies's, is clearly pleased to have access to his online effects and generally optimistic about new forms of remembering that digital technologies might enable. At the same time, though, she expressed some caution about the mindless expression of everything, the default veneration of "sharing" over "curating." While she's clearly an online-life enthusiast, she's also careful about what she discloses in that new form of space. "If people thought about dying more often," she observed, "they'd think about living differently."

I found myself wondering, oddly enough, about what Mac Tonnies's take might be. The last of his friends to whom I spoke was Paul Kimball, a filmmaker who lives in Nova Scotia. He met Tonnies online about a

decade ago; they corresponded for six years before meeting in person, when Kimball came to Kansas City to interview Tonnies for a documentary. They ended up becoming close, even collaborating on a play (swapping drafts via e-mail) that was staged at the Boulder International Fringe Festival.

Among their shared interests, it turns out, was the relationship among technology, consciousness and mortality. Their play, based on a science-fiction story Tonnies had written in college, involves two women who turn out not to be, strictly speaking, creatures of organic matter: one is an artificial-intelligence program, the other a human consciousness uploaded into a form that could survive a centuries-long space journey. The very title of Tonnies's Posthuman Blues blog, Kimball points out, hints at ambivalence about these subjects. But that was the place, he says, where his generally private friend "revealed himself," post by post. The fact that the blog persists, in public, is what makes it distinct from, say, a journal Kimball owns that belonged to his grandfather and that has been read by perhaps 20 people.

The day before we spoke, Kimball continued, he had linked to an old Posthuman Blues post on his Facebook page, seeking reactions from his own online circle. "So I'm still having this conversation" with his friend Tonnies, he told me, "even though he's been dead for more than a year." Eventually, Kimball added, such situations may be routine. "We're entering a world where we can all leave as much of a legacy as George Bush or Bill Clinton. Maybe that's the ultimate democratization," he said. "It gives all of us a chance at immortality."

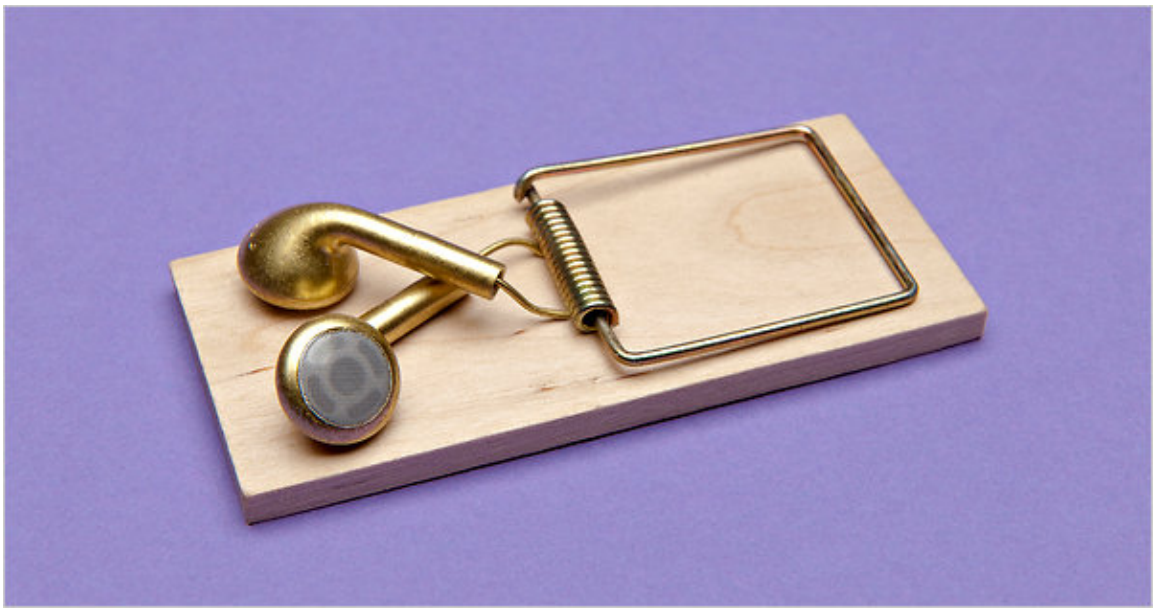
After talking to Kimball, I ended up watching a couple of interview clips of Tonnies on YouTube. In one, he discussed "transhumanism," the techno-scientific quest to transcend the traditional limits of the human animal, death included, whether through merging with machines or fiddling with our genes. Skeptics or opponents of transhumanism are missing the point that it's well underway, he argued: medicine is transhuman, in that it thwarts mortality. While I didn't find this wholly convincing, I will concede that it was interesting to find myself in a position to listen to his arguments at all. It made me wish I could offer Tonnies my counterpoints — but of course I can't. So I'll give him the last word. "I like to think of death as a glorified terminal illness," Mac Tonnies said, and will continue to say, for as long as this particular collection of bits remains available for someone to watch and listen to. "If we can escape the boundaries of death, maybe we'll be O.K."

Rob Walker, who writes the Consumed column, is the author of "Buying In."

http://www.nytimes.com/2011/01/09/magazine/09Immortality-t.html?_r=1&ref=magazine

Against Headphones

By VIRGINIA HEFFERNAN



Photograph by Kevin Van Aelst

One in five teenagers in America can't hear rustles or whispers, according to a study published in August in The Journal of the American Medical Association. These teenagers exhibit what's known as slight hearing loss, which means they often can't make out consonants like T's or K's, or the plinking of raindrops. The word "talk" can sound like "aw." The number of teenagers with hearing loss — from slight to severe — has jumped 33 percent since 1994.

Given the current ubiquity of personal media players — the iPod appeared almost a decade ago — many researchers attribute this widespread hearing loss to exposure to sound played loudly and regularly through headphones. (Earbuds, in particular, don't cancel as much noise from outside as do headphones that rest on or around the ear, so earbud users typically listen at higher volume to drown out interference.) Indeed, the August report reinforces the findings of a 2008 European study of people who habitually blast MP3 players, including iPods and smartphones. According to that report, headphone users who listen to music at high volumes for more than an hour a day risk permanent hearing loss after five years.

Maybe the danger of digital culture to young people is not that they have hummingbird attention spans but that they are going deaf.

The history of headphones has always been one of unexpected uses and equally unexpected consequences. Headphones were invented a century ago — the brainchild of Nathaniel Baldwin, a tinkerer from Utah who grew frustrated when he couldn't hear Mormon sermons over the noise of the crowds at the vast Salt Lake Tabernacle. Baldwin's device, which was designed first as an amplifier, came to incorporate two sound receivers connected by an operator's headband. Within each earphone was, according to legend, a *mile* of coiled copper wiring and a mica diaphragm to register the wire's signals with vibrations. When the Navy put in an order for 100 such Baldy Phones in 1910, Baldwin abandoned his kitchen workbench, hastily opened a factory and built the prosperous Baldwin Radio Company. His innovations were the basis of "sound powered" telephones, or phones that required no electricity, which were used during World War II.

It's not incidental that Baldwin imagined headphones first as a way to block out crowd noise and hear sermons. Workers and soldiers have long used them to mute the din of machinery or artillery while receiving one-way orders from someone with a microphone. From the beginning, it seems, headphones have been a technology of submission (to commands) and denial (of commotion).

When World War II ended, submission-and-denial was exactly what returning veterans craved when they found themselves surrounded by the clamor and demands of the open-plan family rooms of the postwar suburbs. By then, they knew what device provided it. In the ’50s, John C. Koss invented a set of stereo headphones designed explicitly for personal music consumption. In that decade, according to Keir Keightley, a professor of media studies at the University of Western Ontario, middle-class men began shutting out their families with giant headphones and hi-fi equipment. Further, they recalled the sonar systems they saw at war. The Walkman appeared in 1979, the invention of Sony, and headphones became part of a walking outfit. Headphones and earbuds are now used with MP3 players, mobile phones, tablet computers and laptops.
Most discussions of the transformation of music by digital technology focus on the production end. But headphones transform sound for the consumer too. Headphones are packed with technology. When an audio current passes through the device’s voice coil, it creates an alternating magnetic field that moves a stiff, light diaphragm. This produces sound. If you think about all the recordings, production tricks, conversions and compressions required to turn human voices and acoustic instruments into MP3 signals, and *then* add the coil-magnet-diaphragm magic in our headphones, it’s amazing that the intensely engineered frankensounds that hit our eardrums when we listen to iPhones are still called music.
Whatever you call it, children are listening to *something* on all these headphones — though “listening” is too limited a concept for all that headphones allow them to do. Indeed, the device seems to solve a real problem by simultaneously letting them have private auditory experiences and keeping shared spaces quiet. But the downside is plain, too: it’s antisocial. As Llewellyn Hinkes Jones put it not long ago in The Atlantic: “The shared experience of listening with others is not unlike the cultural rituals of communal eating. Music may not have the primal necessity of food, but it is something people commonly ingest together.”
Headphones work best for people who need or want to hear one sound story and no other; who don’t want to have to choose which sounds to listen to and which to ignore; and who don’t want their sounds overheard. Under these circumstances, headphones are extremely useful — and necessary for sound professionals, like intelligence and radio workers — but it’s a strange fact of our times that this rarefied experience of sound has become so common and widespread. In the name of living a sensory life, it’s worth letting sounds exist in their audio habitat more often, even if that means contending with interruptions and background sound.
Make it a New Year’s resolution, then, to use headphones less. Allow kids and spouses periodically to play music, audiobooks, videos, movie, television and radio audibly. Listen to what they’re listening to, and make them listen to your stuff. Escapism is great, and submission and denial, too, have their places. But sound thrives amid other sounds. And protecting our kids’ hearing is not just as important as protecting their brains; it *is* protecting their brains.

Points of Entry: This Week’s Recommendations

POLYPHONIC

Who will make the biopic of Nathaniel Baldwin, the inventor of headphones? He was a polygamy defender who blew his fortune on gonzo polygamy-oriented causes but was himself married only once. Read all about him at history.utah.gov.

SKULL AND PHONES

In the great Utah gadget tradition, Skullcandy, the leading-edge American headphones retailer, is based in Park City. Skullcandy.com showcases the thrills and risks of the headphoned life; it also sells some of the best headsets around. Use in moderation.

YOUNG EARS

It’s a Noisy Planet is a campaign by the National Institute on Deafness and Other Communication Disorders aimed at kids 8 to 12. See **noisyplanet.**nidcd.nih.gov for facts and advice on protecting their hearing.

http://www.nytimes.com/2011/01/09/magazine/09FOB-medium-t.html?ref=magazine

Journal's Paper on ESP Expected to Prompt Outrage

By BENEDICT CAREY

Heather Ainsworth for The New York Times

One of psychology's most respected journals has agreed to publish a paper presenting what its author describes as strong evidence for extrasensory perception, the ability to sense future events.

The decision may delight believers in so-called paranormal events, but it is already mortifying scientists.

Advance copies of the paper, to be published this year in The Journal of Personality and Social Psychology, have circulated widely among psychological researchers in recent weeks and have generated a mixture of amusement and scorn.

The paper describes nine unusual lab experiments performed over the past decade by its author, Daryl J. Bem, an emeritus professor at Cornell, testing the ability of college students to accurately sense random events, like whether a computer program will flash a photograph on the left or right side of its screen. The studies include more than 1,000 subjects.

Some scientists say the report deserves to be published, in the name of open inquiry; others insist that its acceptance only accentuates fundamental flaws in the evaluation and peer review of research in the social sciences.

"It's craziness, pure craziness. I can't believe a major journal is allowing this work in," Ray Hyman, an emeritus professor of psychology at the University Oregon and longtime critic of ESP research, said. "I think it's just an embarrassment for the entire field."

The editor of the journal, Charles Judd, a psychologist at the University of Colorado, said the paper went through the journal's regular review process. "Four reviewers made comments on the manuscript," he said, "and these are very trusted people."

All four decided that the paper met the journal's editorial standards, Dr. Judd added, even though "there was no mechanism by which we could understand the results."

But many experts say that is precisely the problem. Claims that defy almost every law of science are by definition extraordinary and thus require extraordinary evidence. Neglecting to take this into account — as conventional social science analyses do — makes many findings look far more significant than they really are, these experts say.

"Several top journals publish results only when these appear to support a hypothesis that is counterintuitive or attention-grabbing," Eric-Jan Wagenmakers, a psychologist at the University of Amsterdam, wrote by e-mail. "But such a hypothesis probably constitutes an extraordinary claim, and it should undergo more scrutiny before it is allowed to enter the field."

Dr. Wagenmakers is co-author of a rebuttal to the ESP paper that is scheduled to appear in the same issue of the journal.

In an interview, Dr. Bem, the author of the original paper and one of the most prominent research psychologists of his generation, said he intended each experiment to mimic a well-known classic study, "only time-reversed."

In one classic memory experiment, for example, participants study 48 words and then divide a subset of 24 of them into categories, like food or animal. The act of categorizing reinforces memory, and on subsequent tests people are more likely to remember the words they practiced than those they did not.

In his version, Dr. Bem gave 100 college students a memory test before they did the categorizing — and found they were significantly more likely to remember words that they practiced later. "The results show that practicing a set of words after the recall test does, in fact, reach back in time to facilitate the recall of those words," the paper concludes.

In another experiment, Dr. Bem had subjects choose which of two curtains on a computer screen hid a photograph; the other curtain hid nothing but a blank screen.

A software program randomly posted a picture behind one curtain or the other — but only after the participant made a choice. Still, the participants beat chance, by 53 percent to 50 percent, at least when the photos being posted were erotic ones. They did not do better than chance on negative or neutral photos.

"What I showed was that unselected subjects could sense the erotic photos," Dr. Bem said, "but my guess is that if you use more talented people, who are better at this, they could find any of the photos."

In recent weeks science bloggers, researchers and assorted skeptics have challenged Dr. Bem's methods and his statistics, with many critiques digging deep into the arcane but important fine points of crunching numbers. (Others question his intentions. "He's got a great sense of humor," said Dr. Hyman, of Oregon. "I wouldn't rule out that this is an elaborate joke.")

Dr. Bem has generally responded in kind, sometimes accusing critics of misunderstanding his paper, others times of building a strong bias into their own re-evaluations of his data.

In one sense, it is a historically familiar pattern. For more than a century, researchers have conducted hundreds of tests to detect ESP, telekinesis and other such things, and when such studies have surfaced, skeptics have been quick to shoot holes in them.

But in another way, Dr. Bem is far from typical. He is widely respected for his clear, original thinking in social psychology, and some people familiar with the case say his reputation may have played a role in the paper's acceptance.

Peer review is usually an anonymous process, with authors and reviewers unknown to one another. But all four reviewers of this paper were social psychologists, and all would have known whose work they were checking and would have been responsive to the way it was reasoned.

Perhaps more important, none were topflight statisticians. "The problem was that this paper was treated like any other," said an editor at the journal, Laura King, a psychologist at the University of Missouri. "And it wasn't."

Many statisticians say that conventional social-science techniques for analyzing data make an assumption that is disingenuous and ultimately self-deceiving: that researchers know nothing about the probability of the so-called null hypothesis.

In this case, the null hypothesis would be that ESP does not exist. Refusing to give that hypothesis weight makes no sense, these experts say; if ESP exists, why aren't people getting rich by reliably predicting the movement of the stock market or the outcome of football games?

Instead, these statisticians prefer a technique called Bayesian analysis, which seeks to determine whether the outcome of a particular experiment "changes the odds that a hypothesis is true," in the words of Jeffrey N. Rouder, a psychologist at the University of Missouri who, with Richard D. Morey of the University of Groningen in the Netherlands, has also submitted a critique of Dr. Bem's paper to the journal.

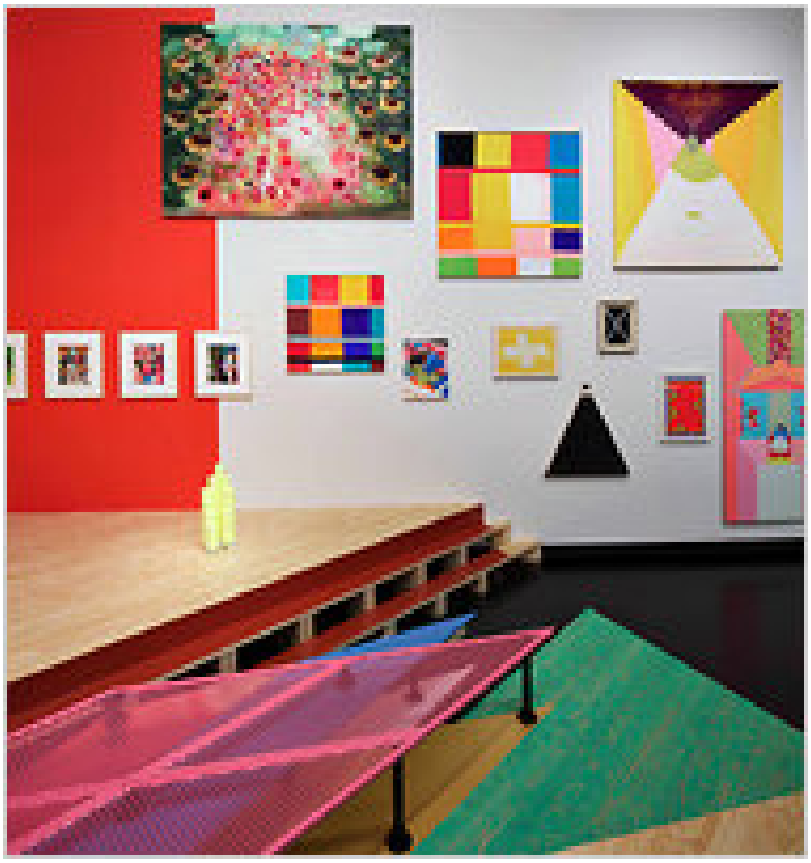
Physics and biology, among other disciplines, overwhelmingly suggest that Dr. Bem's experiments have not changed those odds, Dr. Rouder said.

So far, at least three efforts to replicate the experiments have failed. But more are in the works, Dr. Bem said, adding, "I have received hundreds of requests for the materials" to conduct studies.

http://www.nytimes.com/2011/01/06/science/06esp.html?ref=science

New Sparkle for an Abstract Ensemble

By HOLLAND COTTER



Arthur Evans

"The Jewel Thief": Top row, from left, Joan Snyder's "And Always Searching for Beauty," Stanley Whitney's "Tango" and Michael Lazarus's "Again" at the Tang Museum.

SARATOGA SPRINGS, N.Y. — In the echo chamber that is the New York art world, where one voice can give the illusion of being many, the crusading cry of late is "We need more painting!" As if there were a dearth. Is there? Walk through any of the city's art museums, and what do see? Paintings everywhere. Visit contemporary galleries all over town, and what do you find? They're painting packed. But still the cry goes on.

This is especially puzzling because much of the plenteous new work, while expertly schooled, looks unadventurous, like so many slightly rearranged cover versions of hit styles from the past: Geometric Abstraction, Surrealism, Hallmark Cards Expressionism, etc. Maybe we're wrong to expect more. Maybe that's all that painting, in New York at least now, can yield.

Or maybe we have a display problem. Exhibitions, which are intensely calculated events, can make powerful arguments for art. Ambitious, imaginatively conceived group shows in particular can significantly raise the interest level of even ordinary material and make the better than ordinary soar.

Such exhibitions are always hard to find, but there's one on view now at the Frances Young Tang Teaching Museum and Art Gallery at Skidmore College here in upstate New York. Consisting mostly of paintings, and with work by 60 artists, it's called "The Jewel Thief." Piece by piece it's a modest affair, but as an ensemble it's vibrant. It makes even minimally interesting components feel vivacious.

Abstraction is the show's unifying principle, but that covers a wide swath, and sets up some useful confusions. Painting dominates. Some of it is old (a 1950s Joan Mitchell, a 1970s Nicholas Krushenick), but most is from the last 10 years, and by artists of different generations. (Joan Snyder was born in 1940, Francesca DiMattio in 1981.) Stylistically the work is all over the map, and generally speaking innovation isn't the point. Nuance is.

That nuance extends to how forms are defined. There are, for example, drawings in the show that look like painting, like a beautiful puff-of-smoke graphite piece by Jerry Phillips, and painting, like Richard Woods's faux-wood floorboards, that is basically tinted drawing.

More surprisingly, there's sculpture that's distinctly painterly and draftsmanly. A ceramic piece by Kathy Butterly, covered with flowing and dripping glazes, is a knot of expressionistic color and gesture. The surface of a Styrofoam bench by James Hyde incorporates photographic details of a Stuart Davis painting. Three tall, thin, black wooden sculptures by Rico Gatson, set high on a balcony, read like ink strokes against a white wall.

Architecture plays a role in this game of identity switching. White cubes of different sizes are scattered around the Tang's main gallery. The smaller ones serve as straightforward pedestals for sculptures like Ms. Butterly's, but the larger ones are multipurpose. They function as space dividers, as walls for hanging paintings and, when covered with a hand-painted mural like Jim Hodges's camouflage-patterned "Oh Great Terrain," as art objects.

In this boundary-free environment no surface is pure, no form is sacrosanct. Thin lines of ripped fabric in a wall piece by Elana Herzog appear to be burning, like corrosive acid, in the cube they're stapled to. And here and there art piles up on top of other art. In one case a small pencil drawing by the amazing Gary Batty — he's the Michelangelo of near-microscopic crosshatching — is hung directly on a panel covered with an assertively patterned design in ink by Victoria Palermo.

Such doublings up point out a major strategy, and strength, of the show, organized by the Tang curator Ian Berry and the sculptor Jessica Stockholder. Throughout the installation, objects are placed in what promises to be clashing and undermining proximity, without any damage occurring. To the contrary, almost everything picks up something useful, often something it lacks — weirdness, beauty, weight, humility — from being in mixed company.

Ms. Stockholder's sculpture has always operated within this dynamic, and does in two pieces she contributes to the exhibition. The smaller of them, "Chandelier of Sand and Oil," an assemblage of electrical cords, fluorescent bulbs, drinking glasses and sea shells suspended from a thick metal chain, succinctly embodies her signature mix of found material, constructed form, and painterly color.

But it is her second and larger piece, called "The Jewel Thief," that most fully expands on the show's overarching aesthetic, an aesthetic that puts a premium on formal diversity and interdependence, and that questions the sovereign value assigned to the stand-alone art object in an object-glutted world.

Ms. Stockholder's piece consists of several wooden and steel platforms that suggest small stages or disassembled bleachers. They're clearly made for standing and sitting — a version of the piece was installed as an outdoor sculpture in Manhattan in 2009 — though one platform also serves as an outsize shelf for displaying two diminutive sculptures by Richard Rezac. One is a cluster of tubular maple uprights shaped like candles or organ pipes; the other, a kind of aluminum tray holding red and blue polyurethane cylinders that could be chess pieces or gemstones.

Above this platform hang jewel-like paintings in salon-style profusion: glowing grids of orange and red by Stanley Whitney; a shower of blossoms by Ms. Snyder; a tanka-type piece by Michael Lazarus with a citrus-and-dried-blood palette and little faces with cut-out eyes. One artist, Roy Dowell, is represented by several works: a half-dozen loquacious paint-pencil-and-collage pieces that dress Juan Gris in floral-print slip-cover fabrics and that capture the show's high-low, serious-kidding, pretty-ugly soul.

Ordinarily I don't find Mr. Dowell's art all that gripping; there's something generic about its slightly updated modernism. I feel the same about several other painters in the show who, to my eye, rejigger old models without adding much to them. But within the exhibition environment cooked up by Mr. Berry and Ms. Stockholder everybody takes on some sparkle, like guests mingling at a good party.

Mr. Dowell's floral patterns, for instance, link up with and complement Mr. Hyde's vinyl-covered Stuart Davis sofa: art museum meets suburban living room. And their work is gently lifted up — made more

complex and joyous — by its connection to the spidery Christmas-lights chandelier by Virgil Marti hanging from the gallery ceiling, a marriage of grace and kitsch in excelsis.

Mr. Marti titles his work “Hybrid.” And that is, of course, what the Tang show is, though a hybrid so carefully shaped and thought through that it becomes something more. It’s essentially a big piece of Conceptual Art, one that messes with given definitions of painting, drawing, sculpture and architecture, and by doing so breaks those forms open. At the Museum of Modern Art in Manhattan, a smart exhibition called “On Line: Drawing Through the Twentieth Century” is doing much the same thing by recasting modern and contemporary drawing as a trans-disciplinary phenomenon encompassing painting, sculpture and performance.

Such shows, whatever flaws they may have in execution, make art history, past and present, bigger and richer. They bring more guests — some still strangers — to the table. And they assure that art in its many forms is productively refreshed and promoted. Given all of that, a dogged push for painting-only-painting, as if painting were the only art that’s really art, seems like an unnecessary, and deeply conservative crusade.

THE JEWEL THIEF

WHEN AND WHERE Through Feb. 27; Frances Young Tang Teaching Museum and Art Gallery, Skidmore College, 815 North Broadway, Saratoga Springs, N.Y.

MORE INFO (518) 580-8080, tang.skidmore.edu.

DINING IN SARATOGA SPRINGS Little India, 60 Court Street, (518) 583-4151, saratogalittleindiarestaurant.com; Maestro’s, 371 Broadway, (518) 580-0312, saratogamaestros.com; Ravenous, 21 Phila Street, (518) 581-0560, ravenouscrepes.com.

http://www.nytimes.com/2011/01/07/arts/design/07thief.html?ref=design

Border Collie Comprehends Over 1,000 Object Names as Verbal Referents

A border collie, similar to the one above, was trained to comprehend the names of over 1000 objects. (Credit: iStockphoto)

ScienceDaily (Jan. 6, 2011) — Researchers at Wofford College discovered that a border collie comprehends the names of over 1,000 objects, differentiating between names of objects and orders to fetch them. This research deepens the findings of researchers in Germany, who had discovered a dog that knew the names of a couple of hundred objects. Important questions were left open as to how far a dog could go, and whether the dog really understood that the object names were nouns and not commands to retrieve the object.

John Pilley and Alliston Reid answered two central questions with their research: How large can a dog's vocabulary become if given extensive training? What do dogs actually understand when we use human language to communicate with them? These findings are published in the Elsevier journal *Behavioural Processes.*

The authors demonstrated that their dog, Chaser, learned the names of 1,022 objects -- no upper limit is apparent -- they stopped training the dog after three years due to their time constraints, not because the dog could not learn more names. This study demonstrates Chaser's ability to learn the names of proper nouns, and her extensive vocabulary was tested repeatedly under carefully controlled conditions. The authors admitted that she remembered the names of each of her 1022 toys better than they could. Chaser's ability to learn and remember more than 1000 proper nouns, each mapped to a unique object, revealed clear evidence of several capacities necessary for learning receptive human language: the ability to discriminate between 1,022 different sounds representing names of objects, the ability to discriminate many objects visually, an extensive vocabulary, and a substantial memory system that allowed the mapping of many auditory stimuli to many visual stimuli.

Their second experiment demonstrated that Chaser really understands that these are names, and not commands to fetch the object. In order to test independence of meaning of nouns and commands, the authors randomly combined nouns with commands to see if Chaser would produce the correct behavior toward the correct object in each trial. Without special training, Chaser responded to each combination correctly, even on the first trial, demonstrating that Chaser understood that the commands and proper-noun names had independent meanings. The dog understands that names refer to particular objects, independent of the action requested involving that object.

Their third experiment demonstrated that the dog also understands names for categories of objects or common nouns, and not just individual names or proper nouns. For instance, she learned that name "toy" referred to the 1022 objects she was allowed to play with, each with a proper-noun name. By forming categories represented by common nouns, Chaser mapped one label onto many objects. Chaser also demonstrated that she could map up to three labels onto the same object without error. For example, Chaser knew the proper-noun names of all objects used in the research. Chaser also mapped the common noun "toy" onto these same objects. Her additional success with the two common nouns "ball" and "frisbee" demonstrates that she mapped a third label onto these objects. Her demonstrations of one-to-many and many-to-one noun/object mappings reveal flexibility in the referential nature of words in border collies.

Each of these experiments showed that the dog could learn names using procedures involving associative learning. Their fourth experiment demonstrated that Chaser could also learn names by exclusion -- inferred the name of a novel object by exclusion of familiar already-named objects. Retention of these names using this procedure was limited to short periods, however, just as usually observed with children.
According to Alliston Reid, "This research is important because it demonstrates that dogs, like children, can develop extensive vocabularies and understand that certain words represent individual objects and other words represent categories of objects, independent in meaning of what one is asked to do with those objects." Additional research is needed to determine whether these impressive language abilities are shared by other breeds of dogs. This work encourages research into how the historical relationships between humans and dogs may have influenced the abilities of dogs to communicate with humans, and whether this influence is unique to dogs.

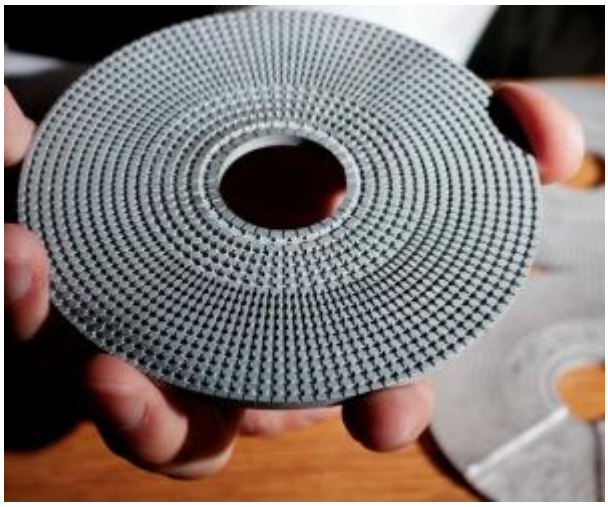
Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Elsevier**, via AlphaGalileo.

Journal Reference:

1. John W. Pilley, Alliston K. Reid. **Border collie comprehends object names as verbal referents**. *Behavioural Processes*, 2010; DOI: 10.1016/j.beproc.2010.11.007

http://www.sciencedaily.com/releases/2011/01/110106144252.htm

Newly Developed Cloak Hides Underwater Objects from Sonar



Fang's team designed a two-dimensional cylindrical cloak made of 16 concentric rings of acoustic circuits structured to guide sound waves. Each ring has a different index of refraction, meaning that sound waves vary their speed from the outer rings to the inner ones. (Credit: Photo by L. Brian Stauffer)

ScienceDaily (Jan. 6, 2011) — In one University of Illinois lab, invisibility is a matter of now you hear it, now you don't. Led by mechanical science and engineering professor Nicholas Fang, Illinois researchers have demonstrated an acoustic cloak, a technology that renders underwater objects invisible to sonar and other ultrasound waves.

"We are not talking about science fiction. We are talking about controlling sound waves by bending and twisting them in a designer space," said Fang, who also is affiliated with the Beckman Institute for Advanced Science and Technology. "This is certainly not some trick Harry Potter is playing with."

While materials that can wrap sound around an object rather than reflecting or absorbing it have been theoretically possible for a few years, realization of the concept has been a challenge. In a paper accepted for publication in the journal *Physical Review Letters*, Fang's team describe their working prototype, capable of hiding an object from a broad range of sound waves.

The cloak is made of metamaterial, a class of artificial materials that have enhanced properties as a result of their carefully engineered structure. Fang's team designed a two-dimensional cylindrical cloak made of 16 concentric rings of acoustic circuits structured to guide sound waves. Each ring has a different index of refraction, meaning that sound waves vary their speed from the outer rings to the inner ones.

"Basically what you are looking at is an array of cavities that are connected by channels. The sound is going to propagate inside those channels, and the cavities are designed to slow the waves down," Fang said. "As you go further inside the rings, sound waves gain faster and faster speed."

Since speeding up requires energy, the sound waves instead propagate around the cloak's outer rings, guided by the channels in the circuits. The specially structured acoustic circuits actually bend the sound waves to wrap them around the outer layers of the cloak.

The researchers tested their cloak's ability to hide a steel cylinder. They submerged the cylinder in a tank with an ultrasound source on one side and a sensor array on the other, then placed the cylinder inside the cloak and watched it disappear from their sonar.

Curious to see if the hidden object's structure played a role in the cloaking phenomenon, the researchers conducted trials with other objects of various shapes and densities. "The structure of what you're trying to hide doesn't matter," Fang said. "The effect is similar. After we placed the cloaked structure around the object we wanted to hide, the scattering or shadow effect was greatly reduced."

An advantage of the acoustic cloak is its ability to cover a broad range of sound wavelengths. The cloak offers acoustic invisibility to ultrasound waves from 40 to 80 KHz, although with modification could theoretically be tuned to cover tens of megahertz.

"This is not just a single wavelength effect. You don't have an invisible cloak that's showing up just by switching the frequencies slightly," Fang said. "The geometry is not theoretically scaled with wavelengths. The nice thing about the circuit element approach is that you can scale the channels down while maintaining the same wave propagation technology."

Next, the researchers plan to explore how the cloaking technology could influence applications from military stealth to soundproofing to health care. For example, ultrasound and other acoustic imaging techniques are common in medical practice, but many things in the body can cause interference and mar the image. A metamaterial bandage or shield could effectively hide a troublesome area so the scanner could focus on the region of interest.

The cloaking technology also may affect nonlinear acoustic phenomena. One problem plaguing fast-moving underwater objects is cavitation, or the formation and implosion of bubbles. Fang and his group believe that they could harness their cloak's abilities to balance energy in cavitation-causing areas, such as the vortex around a propeller.

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. Shu Zhang, Chunguang Xia, Nicholas Fang. **Broadband Acoustic Cloak for Ultrasound Waves**. *Physical Review Letters*, 2011; (accepted)

http://www.sciencedaily.com/releases/2011/01/110105152004.htm

Scientists Construct Synthetic Proteins That Sustain Life

Michael Hecht, a professor of chemistry at Princeton University, has led a team of researchers who have for the first time constructed artificial proteins that enable the growth of living cells. The synthetic proteins were designed from scratch and expressed from artificial genes. He is holding samples of living bacteria containing the synthetic proteins. (Credit: Photo by Brian Wilson)

ScienceDaily (Jan. 7, 2011) — In a groundbreaking achievement that could help scientists "build" new biological systems, Princeton University scientists have constructed for the first time artificial proteins that enable the growth of living cells.

The team of researchers created genetic sequences never before seen in nature, and the scientists showed that they can produce substances that sustain life in cells almost as readily as proteins produced by nature's own toolkit.

"What we have here are molecular machines that function quite well within a living organism even though they were designed from scratch and expressed from artificial genes," said Michael Hecht, a professor of chemistry at Princeton, who led the research. "This tells us that the molecular parts kit for life need not be limited to parts -- genes and proteins -- that already exist in nature."

The work, Hecht said, represents a significant advance in synthetic biology, an emerging area of research in which scientists work to design and fabricate biological components and systems that do not already exist in the natural world. One of the field's goals is to develop an entirely artificial genome composed of unique patterns of chemicals.

"Our work suggests," Hecht said, "that the construction of artificial genomes capable of sustaining cell life may be within reach."

Nearly all previous work in synthetic biology has focused on reorganizing parts drawn from natural organisms. In contrast, Hecht said, the results described by the team show that biological functions can be provided by macromolecules that were not borrowed from nature, but designed in the laboratory.

Although scientists have shown previously that proteins can be designed to fold and, in some cases, catalyze reactions, the Princeton team's work represents a new frontier in creating these synthetic proteins.

The research, which Hecht conducted with three former Princeton students and a former postdoctoral fellow, is described in the online journal *PLoS ONE*, published by the Public Library of Science.

Hecht and the students in his lab study the relationship between biological processes on the molecular scale and processes at work on a larger magnitude. For example, he is studying how the errant folding of proteins in the brain can lead to Alzheimer's disease, and is involved in a search for compounds to thwart that process. In work that relates to the new paper, Hecht and his students also are interested in learning what processes drive the routine folding of proteins on a basic level -- as proteins need to fold in order to function -- and why certain key sequences have evolved to be central to existence.

Proteins are the workhorses of organisms, produced from instructions encoded into cellular DNA. The identity of any given protein is dictated by a unique sequence of 20 chemicals known as amino acids. If the

different amino acids can be viewed as letters of an alphabet, each protein sequence constitutes its own unique "sentence."
And, if a protein is 100 amino acids long (most proteins are even longer), there are an astronomically large number of possibilities of different protein sequences, Hecht said. At the heart of his team's research was to question how there are only about 100,000 different proteins produced in the human body, when there is a potential for so many more. They wondered, are these particular proteins somehow special? Or might others work equally well, even though evolution has not yet had a chance to sample them?
Hecht and his research group set about to create artificial proteins encoded by genetic sequences not seen in nature. They produced about 1 million amino acid sequences that were designed to fold into stable three-dimensional structures.
"What I believe is most intriguing about our work is that the information encoded in these artificial genes is completely novel -- it does not come from, nor is it significantly related to, information encoded by natural genes, and yet the end result is a living, functional microbe," said Michael Fisher, a co-author of the paper who earned his Ph.D. at Princeton in 2010 and is now a postdoctoral fellow at the University of California-Berkeley. "It is perhaps analogous to taking a sentence, coming up with brand new words, testing if any of our new words can take the place of any of the original words in the sentence, and finding that in some cases, the sentence retains virtually the same meaning while incorporating brand new words."
Once the team had created this new library of artificial proteins, they inserted those proteins into various mutant strains of bacteria in which certain natural genes previously had been deleted. The deleted natural genes are required for survival under a given set of conditions, including a limited food supply. Under these harsh conditions, the mutant strains of bacteria died -- unless they acquired a life-sustaining novel protein from Hecht's collection. This was significant because formation of a bacterial colony under these selective conditions could occur only if a protein in the collection had the capacity to sustain the growth of living cells.
In a series of experiments exploring the role of differing proteins, the scientists showed that several different strains of bacteria that should have died were rescued by novel proteins designed in the laboratory. "These artificial proteins bear no relation to any known biological sequences, yet they sustained life," Hecht said.
Added Kara McKinley, also a co-author and a 2010 Princeton graduate who is now a Ph.D. student at the Massachusetts Institute of Technology: "This is an exciting result, because it shows that unnatural proteins can sustain a natural system, and that such proteins can be found at relatively high frequency in a library designed only for structure."
In addition to Hecht, Fisher and McKinley, other authors on the paper include Luke Bradley, a former postdoctoral fellow in Hecht's lab who is now an assistant professor at the University of Kentucky, and Sara Viola, a 2008 Princeton graduate who is now a medical student at Columbia University.
The research 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 **Princeton University**. The original article was written by Kitta MacPherson.

Journal Reference:

1. Mark Isalan, Michael A. Fisher, Kara L. McKinley, Luke H. Bradley, Sara R. Viola, Michael H. Hecht. **De Novo Designed Proteins from a Library of Artificial Sequences Function in Escherichia Coli and Enable Cell Growth**. *PLoS ONE*, 2011; 6 (1): e15364 DOI: 10.1371/journal.pone.0015364

http://www.sciencedaily.com/releases/2011/01/110106145311.htm

Lice DNA Study Shows Humans First Wore Clothes 170,000 Years Ago

In this photo taken Nov. 4, 2010, University of Florida researcher David Reed is lead investigator on a five-year study following the evolution of lice that found modern humans first began wearing clothes about 170,000 years ago, a technology which enabled them to successfully migrate out of Africa. Reed, assistant curator of mammals at the Florida Museum of Natural History on the UF campus, is pictured in front of the museum's "Northwest Florida: Waterways and Wildlife" exhibit. The loose-fitting clothing worn by Native Americans depicted in the exhibit is similar to garments lice would have first inhabited about 170,000 years ago. (Credit: Photo by Jeff Gage, Florida Museum of Natural History)

ScienceDaily (Jan. 7, 2011) — A new University of Florida study following the evolution of lice shows modern humans started wearing clothes about 170,000 years ago, a technology which enabled them to successfully migrate out of Africa.

Principal investigator David Reed, associate curator of mammals at the Florida Museum of Natural History on the UF campus, studies lice in modern humans to better understand human evolution and migration patterns. His latest five-year study used DNA sequencing to calculate when clothing lice first began to diverge genetically from human head lice.

Funded by the National Science Foundation, the study is available online and appears in this month's print edition of *Molecular Biology and Evolution*.

"We wanted to find another method for pinpointing when humans might have first started wearing clothing," Reed said. "Because they are so well adapted to clothing, we know that body lice or clothing lice almost certainly didn't exist until clothing came about in humans."

The data shows modern humans started wearing clothes about 70,000 years before migrating into colder climates and higher latitudes, which began about 100,000 years ago. This date would be virtually impossible to determine using archaeological data because early clothing would not survive in archaeological sites.

The study also shows humans started wearing clothes well after they lost body hair, which genetic skin-coloration research pinpoints at about 1 million years ago, meaning humans spent a considerable amount of time without body hair and without clothing, Reed said.

"It's interesting to think humans were able to survive in Africa for hundreds of thousands of years without clothing and without body hair, and that it wasn't until they had clothing that modern humans were then moving out of Africa into other parts of the world," Reed said.

Lice are studied because unlike most other parasites, they are stranded on lineages of hosts over long periods of evolutionary time. The relationship allows scientists to learn about evolutionary changes in the host based on changes in the parasite.

Applying unique data sets from lice to human evolution has only developed within the last 20 years, and provides information that could be used in medicine, evolutionary biology, ecology or any number of fields, Reed said.

"It gives the opportunity to study host-switching and invading new hosts -- behaviors seen in emerging infectious diseases that affect humans," Reed said.

A study of clothing lice in 2003 led by Mark Stoneking, a geneticist at the Max Planck Institute in Leipzig, Germany, estimated humans first began wearing clothes about 107,000 years ago. But the UF research includes new data and calculation methods better suited for the question.

"The new result from this lice study is an unexpectedly early date for clothing, much older than the earliest solid archaeological evidence, but it makes sense," said Ian Gilligan, lecturer in the School of Archaeology and Anthropology at The Australian National University. "It means modern humans probably started wearing clothes on a regular basis to keep warm when they were first exposed to Ice Age conditions."

The last Ice Age occurred about 120,000 years ago, but the study's date suggests humans started wearing clothes in the preceding Ice Age 180,000 years ago, according to temperature estimates from ice core studies, Gilligan said. Modern humans first appeared about 200,000 years ago.

Because archaic hominins did not leave descendants of clothing lice for sampling, the study does not explore the possibility archaic hominins outside of Africa were clothed in some fashion 800,000 years ago. But while archaic humans were able to survive for many generations outside Africa, only modern humans persisted there until the present.

"The things that may have made us much more successful in that endeavor hundreds of thousands of years later were technologies like the controlled use of fire, the ability to use clothing, new hunting strategies and new stone tools," Reed said.

Study co-authors were Melissa Toups of Indiana University and Andrew Kitchen of The Pennsylvania State University, both previously with UF. Co-author Jessica Light of Texas A&M University was formerly a post-doctoral fellow at the Florida Museum. The researchers completed the project with the help of Reed's NSF Faculty Early Career Development Award, which is granted to researchers who exemplify the teacher-researcher role.

The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **University of Florida**. The original article was written by Danielle Torrent.

Journal Reference:

1. M. A. Toups, A. Kitchen, J. E. Light, D. L. Reed. **Origin of Clothing Lice Indicates Early Clothing Use by Anatomically Modern Humans in Africa**. *Molecular Biology and Evolution*, 2010; 28 (1): 29 DOI: 10.1093/molbev/msq234

http://www.sciencedaily.com/releases/2011/01/110106164616.htm

Gulf Oil Spill: Methane Gas Concentrations in Gulf of Mexico Quickly Returned to Near-Normal Levels, Surprising Researchers

This shows the deployment of the CTD Rosette system for collecting water samples. (Credit: Texas A&M University and NOAA)

ScienceDaily (Jan. 7, 2011) — Calling the results "extremely surprising," researchers from the University of California, Santa Barbara and Texas A&M University report that methane gas concentrations in the Gulf of Mexico have returned to near normal levels only months after a massive release occurred following the Deepwater Horizon oil rig explosion.

Findings from the research study, led by oceanographers John Kessler of Texas A&M and David Valentine of UCSB, were recently published in the journal *Science.* The findings show that Mother Nature quickly saw to the removal of more than 200,000 metric tons of dissolved methane through the action of bacteria blooms that completely consumed the immense gas plumes the team had identified in mid-June. At that time, the team reported finding methane gas in amounts 100,000 times above normal levels. But, about 120 days after the initial spill, they could find only normal concentrations of methane and clear evidence of complete methane respiration.

"What we observed in June was a horizon of deep water laden with methane and other hydrocarbon gases," Valentine said. "When we returned in September and October and tracked these waters, we found the gases were gone. In their place were residual methane-eating bacteria, and a 1 million ton deficit in dissolved oxygen that we attribute to respiration of methane by these bacteria."

Kessler added: "Based on our measurements from earlier in the summer and previous other measurements of methane respiration rates around the world, it appeared that (Deepwater Horizon) methane would be present in the Gulf for years to come. Instead, the methane respiration rates increased to levels higher than have ever been recorded, ultimately consuming it and prohibiting its release to the atmosphere."

While the scientists' research documents the changing conditions of the Gulf waters, it also sheds some light on how the planet functions naturally.

"This tragedy enabled an impossible experiment," Valentine said, "one that allowed us to track the fate of a massive methane release in the deep ocean, as has occurred naturally throughout Earth's history."

Kessler noted: "We were glad to have the opportunity to lend our expertise to study this oil spill. But also we tried to make a little good come from this disaster and use it to learn something about how the planet functions naturally. The seafloor stores large quantities of methane, a potent greenhouse gas, which has been suspected to be released naturally, modulating global climate. What the Deepwater Horizon incident has

taught us is that releases of methane with similar characteristics will not have the capacity to influence climate."

The Deepwater Horizon offshore drilling platform exploded on April 20, 2010, about 40 miles off the Louisiana coast. The blast killed 11 workers and injured 17 others. Oil was gushing from the site at the rate of 62,000 barrels per day, eventually spilling an estimated 170 million gallons of oil into the Gulf. The leak was capped on July 15, and the well was permanently sealed on Sept. 19.

The research team collected thousands of water samples at 207 locations covering an area of about 36,000 square miles. The researchers based their conclusions on measurements of dissolved methane concentrations, dissolved oxygen concentrations, methane oxidation rates, and microbial community structure.

Their work was funded by the National Oceanic and Atmospheric Administration (NOAA) through a contract with Consolidated Safety Services Inc., the Department of Energy, and the National Science Foundation.

Other members of the research team from UCSB include postdoctoral researcher Molly Redmond; graduate students Stephanie Mendes and Stephani Shusta; and undergraduate students Christie Villanueva and Lindsay Werra.

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

Journal Reference:

1. John D. Kessler et al. **A Persistent Oxygen Anomaly Reveals the Fate of Spilled Methane in the Deep Gulf of Mexico**. *Science*, Jan 6, 2011 DOI: 10.1126/science.1199697

http://www.sciencedaily.com/releases/2011/01/110106145436.htm

Longstanding Mystery of Sun's Hot Outer Atmosphere Solved

Narrow jets of material, called spicules, streak upward from the Sun's surface at high speeds. (Credit: NASA)

ScienceDaily (Jan. 7, 2011) — One of the most enduring mysteries in solar physics is why the Sun's outer atmosphere, or corona, is millions of degrees hotter than its surface.

Now scientists believe they have discovered a major source of hot gas that replenishes the corona: jets of plasma shooting up from just above the Sun's surface.

The finding addresses a fundamental question in astrophysics: how energy is moved from the Sun's interior to create its hot outer atmosphere.

"It's always been quite a puzzle to figure out why the Sun's atmosphere is hotter than its surface," says Scott McIntosh, a solar physicist at the High Altitude Observatory of the National Center for Atmospheric Research (NCAR) in Boulder, Colo., who was involved in the study.

"By identifying that these jets insert heated plasma into the Sun's outer atmosphere, we can gain a much greater understanding of that region and possibly improve our knowledge of the Sun's subtle influence on the Earth's upper atmosphere."

The research, results of which are published in the journal *Science*, was conducted by scientists from Lockheed Martin's Solar and Astrophysics Laboratory (LMSAL), NCAR, and the University of Oslo. It was supported by NASA and the National Science Foundation (NSF), NCAR's sponsor.

"These observations are a significant step in understanding observed temperatures in the solar corona," says Rich Behnke of NSF's Division of Atmospheric and Geospace Sciences, which funded the research.

"They provide new insight about the energy output of the Sun and other stars. The results are also a great example of the power of collaboration among university, private industry and government scientists and organizations."

The research team focused on jets of plasma known as spicules, which are fountains of plasma propelled upward from near the surface of the Sun into the outer atmosphere.

For decades scientists believed spicules could send heat into the corona. However, following observational research in the 1980s, it was found that spicule plasma did not reach coronal temperatures, and so the theory largely fell out of vogue.

"Heating of spicules to millions of degrees has never been directly observed, so their role in coronal heating had been dismissed as unlikely," says Bart De Pontieu, the lead researcher and a solar physicist at LMSAL.

In 2007, De Pontieu, McIntosh, and their colleagues identified a new class of spicules that moved much faster and were shorter-lived than the traditional spicules.

These "Type II" spicules shoot upward at high speeds, often in excess of 100 kilometers per second, before disappearing.

The rapid disappearance of these jets suggested that the plasma they carried might get very hot, but direct observational evidence of this process was missing.

The researchers used new observations from the Atmospheric Imaging Assembly on NASA's recently launched Solar Dynamics Observatory and NASA's Focal Plane Package for the Solar Optical Telescope (SOT) on the Japanese Hinode satellite to test their hypothesis.

"The high spatial and temporal resolution of the newer instruments was crucial in revealing this previously hidden coronal mass supply," says McIntosh.

"Our observations reveal, for the first time, the one-to-one connection between plasma that is heated to millions of degrees and the spicules that insert this plasma into the corona."
The findings provide an observational challenge to the existing theories of coronal heating.
During the past few decades, scientists proposed a wide variety of theoretical models, but the lack of detailed observation significantly hampered progress.
"One of our biggest challenges is to understand what drives and heats the material in the spicules," says De Pontieu.
A key step, according to De Pontieu, will be to better understand the interface region between the Sun's visible surface, or photosphere, and its corona.
Another NASA mission, the Interface Region Imaging Spectrograph (IRIS), is scheduled for launch in 2012 to provide high-fidelity data on the complex processes and enormous contrasts of density, temperature and magnetic field between the photosphere and corona. Researchers hope this will reveal more about the spicule heating and launch mechanism.
The LMSAL is part of the Lockheed Martin Space Systems Company, which designs and develops, tests, manufactures and operates a full spectrum of advanced-technology systems for national security and military, civil government and commercial customers.

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

Journal Reference:

1. B. De Pontieu, S. W. Mcintosh, M. Carlsson, V. H. Hansteen, T. D. Tarbell, P. Boerner, J. Martinez-Sykora, C. J. Schrijver, A. M. Title. **The Origins of Hot Plasma in the Solar Corona**. *Science*, 2011; 331 (6013): 55-58 DOI: 10.1126/science.1197738

http://www.sciencedaily.com/releases/2011/01/110106164621.htm

Emotional Signals Are Chemically Encoded in Tears, Researchers Find

Scientists have found that certain emotional signals are chemically encoded in tears. (Credit: iStockphoto/Arpad Nagy-Bagoly)

ScienceDaily (Jan. 7, 2011) — Emotional crying is a universal, uniquely human behavior. When we cry, we clearly send all sorts of emotional signals. In a paper published online January 6 in *Science* Express, scientists at the Weizmann Institute have demonstrated that some of these signals are chemically encoded in the tears themselves. Specifically, they found that merely sniffing a woman's tears -- even when the crying woman is not present -- reduces sexual arousal in men.

Humans, like most animals, expel various compounds in body fluids that give off subtle messages to other members of the species. A number of studies in recent years, for instance, have found that substances in human sweat can carry a surprising range of emotional and other signals to those who smell them.

But tears are odorless. In fact, in a first experiment led by Shani Gelstein, Yaara Yeshurun and their colleagues in the lab of Prof. Noam Sobel in the Weizmann Institute's Neurobiology Department, the researchers first obtained emotional tears from female volunteers watching sad movies in a secluded room and then tested whether men could discriminate the smell of these tears from that of saline. The men could not.

In a second experiment, male volunteers sniffed either tears or a control saline solution, and then had these applied under their nostrils on a pad while they made various judgments regarding images of women's faces on a computer screen. The next day, the test was repeated -- the men who were previously exposed to tears getting saline and vice versa. The tests were double blinded, meaning neither the men nor the researchers performing the trials knew what was on the pads. The researchers found that sniffing tears did not influence the men's estimates of sadness or empathy expressed in the faces. To their surprise, however, sniffing tears negatively affected the sex appeal attributed to the faces.

To further explore the finding, male volunteers watched emotional movies after similarly sniffing tears or saline. Throughout the movies, participants were asked to provide self-ratings of mood as they were being monitored for such physiological measures of arousal as skin temperature, heart rate, etc. Self-ratings showed that the subjects' emotional responses to sad movies were no more negative when exposed to women's tears, and the men "smelling" tears showed no more empathy. They did, however, rate their sexual arousal a bit lower. The physiological measures, however, told a clearer story. These revealed a pronounced tear-induced drop in physiological measures of arousal, including a significant dip in testosterone -- a hormone related to sexual arousal.

Finally, in a fourth trial, Sobel and his team repeated the previous experiment within an fMRI machine that allowed them to measure brain activity. The scans revealed a significant reduction in activity levels in brain areas associated with sexual arousal after the subjects had sniffed tears.

Sobel said, "This study raises many interesting questions. What is the chemical involved? Do different kinds of emotional situations send different tear-encoded signals? Are women's tears different from, say, men's

tears? Children's tears? This study reinforces the idea that human chemical signals -- even ones we're not conscious of -- affect the behavior of others."
Human emotional crying was especially puzzling to Charles Darwin, who identified functional antecedents to most emotional displays -- for example, the tightening of the mouth in disgust, which he thought originated as a response to tasting spoiled food. But the original purpose of emotional tears eluded him. The current study has offered an answer to this riddle: Tears may serve as a chemosignal. Sobel points out that some rodent tears are known to contain such chemical signals. "The uniquely human behavior of emotional tearing may not be so uniquely human after all," he says.
The work was authored by Shani Gelstein, Yaara Yeshurun, Liron Rozenkrantz, Sagit Shushan, Idan Frumin, Yehudah Roth and Noam Sobel, was conducted in collaboration with the Edith Wolfson Medical Center, Holon.
Prof. Noam Sobel's research is supported by the James S. McDonnell Foundation 21st Century Science Scholar in Understanding Human Cognition Program; the Minerva Foundation; the European Research Council; and Regina Wachter, NY.
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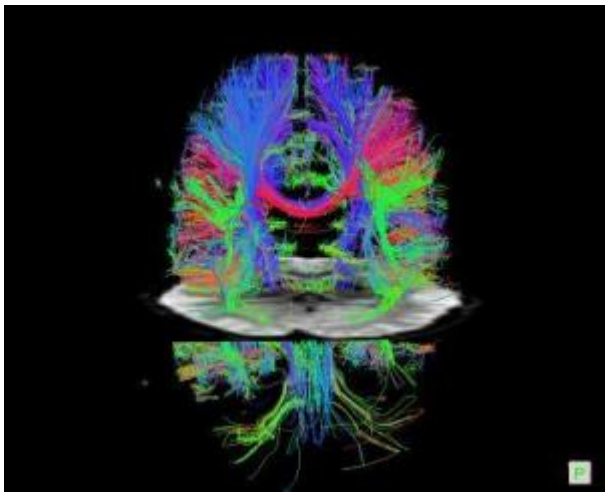
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **Weizmann Institute of Science**.

Journal Reference:

1. Shani Gelstein, Yaara Yeshurun, Liron Rozenkrantz, Sagit Shushan, Idan Frumin, Yehudah Roth, and Noam Sobel. **Human Tears Contain a Chemosignal**. *Science*, 6 January 2011 DOI: 10.1126/science.1198331

http://www.sciencedaily.com/releases/2011/01/110106144741.htm

Major Advance in MRI Allows Much Faster Brain Scans



The new technique accelerates diffusion MRI as well as functional MRI. The colored tracks show the direction of nerve fiber bundles, providing a 3-D image of the axonal pathways in the white matter (cortex) of a resting human brain. A normal structural cross sectional image of the brain (fMRI) bisects the diffusion 3-D fibertrack image. The entire 3-D image was scanned in 8.5 minutes instead of 30 minutes. (Credit: David Feinberg)

ScienceDaily (Jan. 6, 2011) — An international team of physicists and neuroscientists has reported a breakthrough in magnetic resonance imaging that allows brain scans more than seven times faster than currently possible.

In a paper that appeared Dec. 20 in the journal *PLoS ONE*, a University of California, Berkeley, physicist and colleagues from the University of Minnesota and Oxford University in the United Kingdom describe two improvements that allow full three-dimensional brain scans in less than half a second, instead of the typical 2 to 3 seconds.

"When we made the first images, it was unbelievable how fast we were going," said first author David Feinberg, a physicist and adjunct professor in UC Berkeley's Helen Wills Neuroscience Institute and president of the company Advanced MRI Technologies in Sebastopol, Calif. "It was like stepping out of a prop plane into a jet plane. It was that magnitude of difference."

For neuroscience, in particular, fast scans are critical for capturing the dynamic activity in the brain.

"When a functional MRI study of the brain is performed, about 30 to 60 images covering the entire 3-D brain are repeated hundreds of times like the frames of a movie but, with fMRI, a 3-D movie," Feinberg said. "By multiplexing the image acquisition for higher speed, a higher frame rate is achieved for more information in a shorter period of time."

"The brain is a moving target, so the more refined you can sample this activity, the better understanding we will have of the real dynamics of what's going on here," added Dr. Marc Raichle, a professor of radiology, neurology, neurobiology, biomedical engineering and psychology at Washington University in St. Louis who has followed Feinberg's work.

Because the technique works on all modern MRI scanners, the impact of the ultrafast imaging technique will be immediate and widespread at research institutions worldwide, Feinberg said. In addition to broadly advancing the field of neural-imaging, the discovery will have an immediate impact on the Human Connectome Project, funded last year by the National Institutes of Health (NIH) to map the connections of the human brain through functional MRI (fMRI) and structural MRI scans of 1,200 healthy adults.

"At the time we submitted our grant proposal for the Human Connectome Project, we had aspirations of acquiring better quality data from our study participants, so this discovery is a tremendous step in helping us accomplish the goals of the project," said Dr. David Van Essen, a neurobiologist at Washington University and co-leader of the project. "It's vital that we get the highest quality imaging data possible, so we can infer accurately the brain's circuitry -- how connections are established, and how they perform."

The faster scans are made possible by combining two technical improvements invented in the past decade that separately boosted scanning speeds two to four times over what was already the fastest MRI technique, echo planar imaging (EPI). Physical limitations of each method prevented further speed improvements, "but together their image accelerations are multiplied," Feinberg said. The team can now obtain brain scans substantially faster than the time reductions reported in their paper and many times faster than the capabilities of today's machines.

Magnetic resonance imaging works by using a magnetic field and radio waves to probe the environment of hydrogen atoms in water molecules in the body. Because hydrogen atoms in blood, for example, respond differently than atoms in bone or tissue, computers can reconstruct the body's interior landscape without the use of penetrating X-rays.

Nearly 20 years ago, however, a new type of MRI called functional MRI (fMRI) was developed to highlight areas of the brain using oxygen, and thus presumably engaged in neuronal activity, such as thinking .Using echo planar imaging (EPI), fMRI vividly distinguishes oxygenated blood funneling into working areas of the brain from deoxygenated blood in less active areas.

As with standard MRI, fMRI machines create magnetic fields that vary slightly throughout the brain, providing a different magnetic environment for hydrogen atoms in different areas. The differing magnetic field strengths make the spin of each hydrogen atom precess at different rates, so that when a pulse of radio waves is focused on the head, the atoms respond differently depending on location and on their particular environment. Those that absorb radio energy and then release the energy are detected by magnetic coils surrounding the head, and these signals, or "echoes," are used to produce an image of the brain.

With EPI, a single pulse of radio waves is used to excite the hydrogen atoms, but the magnetic fields are rapidly reversed several times to elicit about 50 to 100 echoes before the atoms settle down. The multiple echoes provide a high-resolution picture of the brain.

In 2002, Feinberg proposed using a sequence of two radio pulses to obtain twice the number of images in the same amount of time. Dubbed simultaneous image refocusing (SIR) EPI, it has proved useful in fMRI and for 3-D imaging of neuronal axonal fiber tracks, though the improvement in scanning speed is limited because with a train of more than four times as many echoes, the signal decays and the image resolution drops.

Another acceleration improvement, multiband excitation of several slices using multiple coil detection, was proposed in the U.K. at about the same time by David Larkmann for spinal imaging. The technique was recently used for fMRI by Steen Moeller and colleagues at the University of Minnesota. This technique, too, had limitations, primarily because the multiple coils are relatively widely spaced and cannot differentiate very closely spaced images.

In collaboration with Essa Yacoub, senior author on the paper, and Kamil Ugurbil, director of the University of Minnesota's Center for Magnetic Resonance Research and co-leader of the Human Connectome Project, Feinberg combined these techniques to get significantly greater acceleration than either technique alone while maintaining the same image resolution.

"With the two methods multiplexed, 10, 12 or 16 images the product of their two acceleration factors were read out in one echo train instead of one image," Feinberg said. "The new method is in the optimization phase and is now substantially faster than the scan times reported in this paper."

The ability to scan the brain in under 400 milliseconds moves fMRI closer to electroencephalography (EEG) for capturing very rapid sequences of events in the brain.

"Other techniques which capture signals derived from neuronal activity, EEG or MEG, have much higher temporal resolution; hundred microsecond neuronal changes. But MRI has always been very slow, with 2 second temporal resolution," Feinberg said. "Now MRI is getting down to a few hundred milliseconds to scan the entire brain, and we are beginning to see neuronal network dynamics with the high spatial resolution of MRI."

The development will impact general fMRI as well as diffusion imaging of axonal fibers in the brain, both of which are needed to achieve the main goal of the Human Connectome Project. Diffusion imaging reveals the axonal fiber networks that are the main nerve connections between areas of the brain, while fMRI shows which areas of the brain are functionally connected, that is, which areas are active together or sequentially during various activities.

"While it simply is not possible to show the billions of synaptic connections in the live human brain, the hope is that understanding patterns of how the normal brain is functionally interacting and structurally connected will lead to insights about diseases that involve miswiring in the brain," Feinberg said.
"We suspect several neurologic and psychiatric disorders, such as autism and schizophrenia, may be brain connectivity disorders, but we don't know what normal connectivity is," Feinberg added. "Although the fMRI and neuronal fiber images do not have the resolution of an electron microscope, the MRI derived Connectome reveals the live human brain and can be combined with genetic and environmental information to identify individual differences in brain circuitry."
Raichle, a collaborator in the NIH Human Connectome project, is one of the pioneers of "resting state" MRI, in which brain scans are taken of patients not involved in any specific task. He believes that the ongoing spontaneous activity discovered during such scans will tell us about how the brain remains flexible and maintains a degree of homeostatis so that "you know who you are."
"Being able to sample this ongoing activity at increasing temporal fidelity and precision becomes really important for understanding how the brain is doing this," Raichle said. "David is superclever at this kind of technical stuff, and I have been cheering him along, saying that the faster we can go, the better we can understand the brain's spontaneous activity."
The other authors of the *PLoS ONE* paper are Steen Moeller and Edward Auerbach of the Center for Magnetic Resonance Research at the University of Minnesota Medical School; Sudhir Ramanna of Advanced MRI Technologies; Matt F. Glasser of Washington University; and Karla L. Miller and Stephen M. Smith of the Oxford Centre for Functional MRI of the Brain at the University of Oxford. Feinberg is also affiliated with the UC San Francisco Department of Radiology.
The work was supported by the NIH's Human Connectome Project and by other grants from the NIH and from Advanced MRI Technologies.

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Journal Reference:

1. Pedro Antonio Valdes-Sosa, David A. Feinberg, Steen Moeller, Stephen M. Smith, Edward Auerbach, Sudhir Ramanna, Matt F. Glasser, Karla L. Miller, Kamil Ugurbil, Essa Yacoub. **Multiplexed Echo Planar Imaging for Sub-Second Whole Brain FMRI and Fast Diffusion Imaging**. *PLoS ONE*, 2010; 5 (12): e15710 DOI: 10.1371/journal.pone.0015710

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Widespread, Persistent Oxygen-Poor Conditions in Earth's Ancient Oceans Impacted Early Evolution of Animals

Researcher Benjamin Gill near the top of a stratigraphic section at Lawsons Cove, Utah. (Credit: Steve Bates.)

ScienceDaily (Jan. 6, 2011) — The conventional view of the history of the Earth is that the oceans became oxygen-rich to approximately the degree they are today in the Late Ediacaran Period (about 600 million years ago) after staying relatively oxygen-poor for the preceding four billion years. But biogeochemists at the University of California, Riverside have found evidence that shows that the ocean went back to being "anoxic" or oxygen-poor around 499 million years ago, soon after the first appearance of animals on the planet, and remained anoxic for 2-4 million years. What's more, the researchers suggest that such anoxic conditions may have been commonplace over a much broader interval of time, with their data capturing a particularly good example.

The researchers argue that such fluctuation in the ocean's oxygenation state is the most likely explanation for what drove the rapid evolutionary turnover famously recognized in the fossil record of the Cambrian Period (540 to 488 million years ago).

They report in the Jan. 6 issue of *Nature* that the transition from a generally oxygen-rich ocean during the Cambrian to the fully oxygenated ocean we have today was not a simple turn of the switch, as has been widely accepted until now.

"Our research shows the ocean fluctuated between oxygenation states 499 million years ago," said co-author Timothy Lyons, a professor of biogeochemistry, whose lab led the research, "and such fluctuations played a major, perhaps dominant, role in shaping the early evolution of animals on the planet by driving extinction and clearing the way for new organisms to take their place."

Oxygen is a staple for animal survival, but not for the many bacteria that thrive in and even demand life without oxygen.

Understanding how the environment changed over the course of Earth's history can clue scientists to how exactly life evolved and flourished during the critical, very early stages of animal evolution.

"Life and the environment in which it lives are intimately linked," said Benjamin Gill, the first author of the research paper, who worked in Lyons's lab as a graduate student. Gill explained that when the ocean's oxygenation states changed rapidly in Earth's history, some organisms were not able to cope. Further oceanic oxygen affects cycles of other biologically important elements such as iron, phosphorus and nitrogen. "Disruption of these cycles is another way to drive biological crises," he said. "Thus both directly and indirectly a switch to an oxygen-poor state of the ocean can cause major extinction of species."

The researchers are now working on finding an explanation for why the oceans became oxygen-poor about 499 million years ago.

"What we have found so far is evidence that it happened," Gill said. "We have the 'effect,' but not the 'cause.' The oxygen-poor state persisted for 2-4 million years, likely until the enhanced burial of organic matter, originally derived from oxygen-producing photosynthesis, resulted in the accumulation of more oxygen in the atmosphere and ocean. As a kind of negative feedback, the abundant burial of organic material facilitated by anoxia may have bounced the ocean to a more oxygen-rich state."

Gill stressed that understanding past events in Earth's distant history can help refine our view of changes happening on the planet presently.

"Today, some sections of the world's oceans are becoming oxygen-poor -- the Chesapeake Bay and the so-called 'dead zone' in the Gulf of Mexico are just two examples," he said. "We know the Earth went through similar scenarios in the past. Understanding the ancient causes and consequences can provide essential clues to what the future has in store for our ocean."

In the study, Lyons, Gill and their team examined the carbon, sulfur and molybdenum contents of rocks they collected from localities in the United States, Sweden, and Australia. Combined, these analyses allowed the team to infer the amount of oxygen present in the ocean at the time the limestones and shales were deposited. By looking at successive rock layers, they were able to compile the biogeochemical history of the ocean.

Lyons and Gill were joined in the research by Seth A. Young of Indiana University, Bloomington; Lee R. Kump of Penn State University; Andrew H. Knoll of Harvard University; and Matthew R. Saltzman of Ohio State University. Currently, Gill is a postdoctoral researcher at Harvard University.

The study was funded by a grant from the U.S. National Science Foundation.

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Atmosphere's Self-Cleaning Capacity Surprisingly Stable

Aidan Colton at NOAA's Mauna Loa Observatory (MLO) demonstrates how early flask samples were filled at the site. Air collected year-round at MLO and eight other remote sites around the world has been analyzed for the industrial solvent methyl chloroform. Variability in the decay of this chemical has helped scientists understand the oxidizing or cleansing power of the global atmosphere and its sensitivity to natural and human-induced perturbations. (Credit: NOAA)

ScienceDaily (Jan. 6, 2011) — An international, NOAA-led research team took a significant step forward in understanding the atmosphere's ability to cleanse itself of air pollutants and some other gases, except carbon dioxide. The issue has been controversial for many years, with some studies suggesting the self-cleaning power of the atmosphere is fragile and sensitive to environmental changes, while others suggest greater stability. And what researchers are finding is that the atmosphere's self-cleaning capacity is rather stable.

New analysis recently published in the journal *Science* shows that global levels of the hydroxyl radical, a critical player in atmospheric chemistry, do not vary much from year to year. Levels of hydroxyl, which help clear the atmosphere of many hazardous air pollutants and some important greenhouse gases -- but not carbon dioxide -- dip and rise by only a few percent every year; not by up to 25 percent, as was once estimated.

"The new hydroxyl measurements give researchers a broad view of the 'oxidizing' or self-cleaning capacity of the atmosphere," said Stephen Montzka, the study's lead author and a research chemist at the Global Monitoring Division of NOAA's Boulder, Colo., laboratory.

"Now we know that the atmosphere's ability to rid itself of many pollutants is generally well buffered or stable," said Montzka. "This fundamental property of the atmosphere was one we hadn't been able to confirm before."

The new finding adds confidence to projections of future air pollutant loads. The hydroxyl radical, comprised of one oxygen atom and one hydrogen atom, is formed and broken down so quickly in the atmosphere that it has been extremely difficult to measure on global scales.

"In the daytime, hydroxyl's lifetime is about one second and is present at exceedingly low concentrations," said Montzka. "Once created, it doesn't take long to find something to react with."

The radical is central to the chemistry of the atmosphere. It is involved in the formation and breakdown of surface-level ozone, a lung- and crop-damaging pollutant. It also reacts with and destroys the powerful greenhouse gas methane and air pollutants including hydrocarbons, carbon monoxide and sulfur dioxide. However, hydroxyl radicals do not remove carbon dioxide, nitrous oxide or chlorofluorocarbons.

To estimate variability in global hydroxyl levels -- and thus the cleansing capacity of the atmosphere -- researchers turned to studying longer-lived chemicals that react with hydroxyl.
The industrial chemical methyl chloroform, for example, is destroyed in the atmosphere primarily by hydroxyl radicals. By comparing levels of methyl chloroform emitted into the atmosphere with levels measured in the atmosphere, researchers can estimate the concentration of hydroxyl and how it varies from year to year.
This technique produced estimates of hydroxyl that swung wildly in the 1980s and 1990s. Researchers struggled to understand whether the ups and downs were due to errors in emissions estimates for methyl chloroform, for example, or to real swings in hydroxyl levels. The swings would be of concern: Large fluctuations in hydroxyl radicals would mean the atmosphere's self-cleaning ability was very sensitive to human-caused or natural changes in the atmosphere.
To complicate matters, when scientists tried to measure the concentration of hydroxyl radical levels compared to other gases, such as methane, they were seeing only small variations from year to year. The same small fluctuation was occurring when scientists ran the standard global chemistry models.
An international agreement helped resolve the issue. In response to the Montreal Protocol -- the international agreement to phase out chemicals that are destroying the Earth's protective stratospheric ozone layer -- production of methyl chloroform all but stopped in the mid 1990s. As a result, emissions of this potent ozone-depleting gas dropped precipitously.
Without the confounding effect of any appreciable methyl chloroform emissions, a more precise picture of hydroxyl variability emerged based on the observed decay of remaining methyl chloroform. The scientists studied hydroxyl radicals both by making measurements of methyl chloroform from NOAA's international cooperative air sampling program and also by modeling results with state-of-the-art models.
The group's findings improve confidence in projecting the future of Earth's atmosphere.
"Say we wanted to know how much we'd need to reduce human-derived emissions of methane to cut its climate influence by half," Montzka said. "That would require an understanding of hydroxyl and its variability. Since the new results suggest that large hydroxyl radical changes are unlikely, such projections become more reliable."

Story Source:
The above story is reprinted (with editorial adaptations by Science*Daily* staff) from materials provided by **National Oceanic and Atmospheric Administration**.

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