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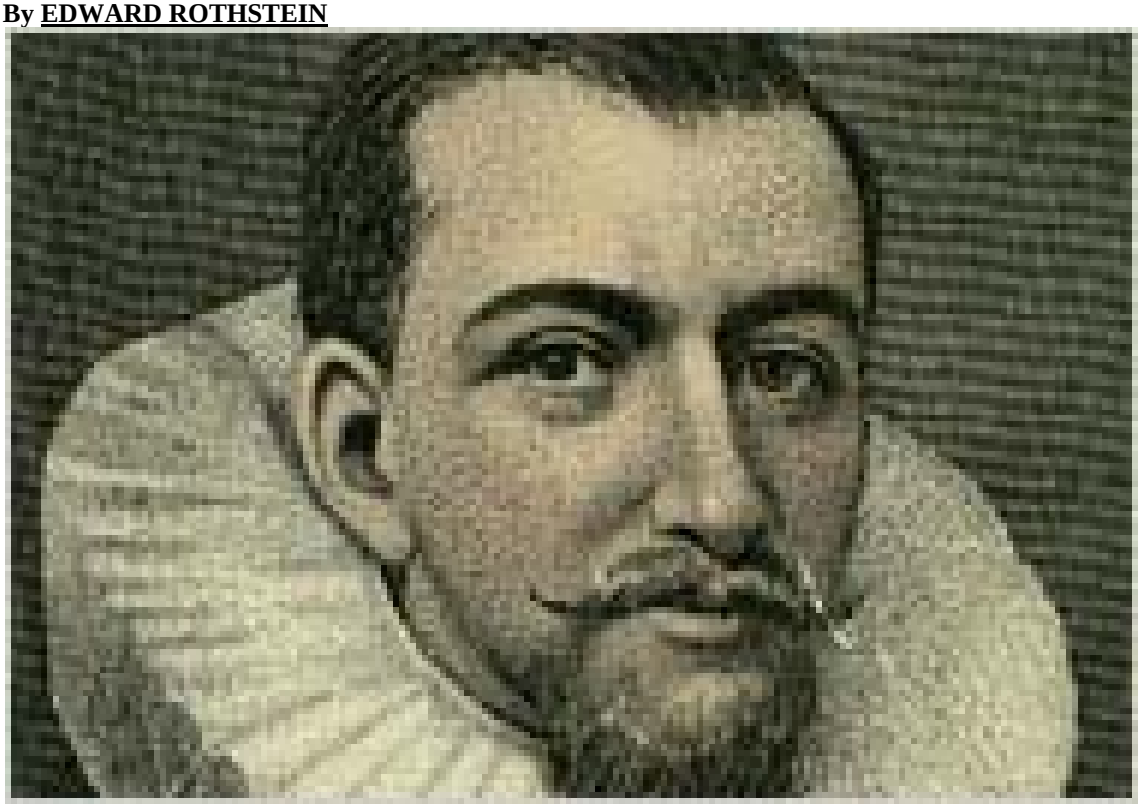


A lot has changed in the century since New York celebrated the tricentennial of Henry Hudson's pioneering 1609 voyage up the river that bears his name. A half-million visitors came to New York in 1909 to watch a spectacular naval parade that included a model of Hudson's boat, de Halve Maen (the Half Moon), along with a flotilla of floats portraying an encyclopedic array of Americana, from the Statue of Liberty to Rip Van Winkle, from precolonial Indian ceremonies to the Dutch purchase of Manhattan for a reported 60 guilders.

The New York Times reported that more than a million incandescent lights were outlining the city's bridges and buildings, making "the town and its environs one glorious beam of light."
With the quadricentennial upon us, though, the planned festivities are far more modest. Who today, after all, recalls much about Hudson, apart from his river, which now seems just a part of New York geography?

Even biographically, the northern Hudson Bay was far more consequential than the river: that was near where, in 1611, a mutinous crew, fed up with the explorer's 10-month ice-bound search for a Northwest passage to Asia, set Hudson, his son John and seven others adrift in a life boat, which was never seen again.

But we must take our celebrations as they come, and a new exhibition at the Museum of the City of New York — "Amsterdam/New Amsterdam: The Worlds of Henry Hudson" — may not offer the sensations of earlier commemorations, but it is so rich in texts and rare objects from the Netherlands and local museums, and so ambitious in its explanatory material, that it restores Henry Hudson's place in the American hall of origins.

Well, maybe not Hudson himself, since so little is really known about him, and his explorations were not intrinsically remarkable. What was important was that on this particular journey, he made it possible for

the Dutch to claim land stretching from contemporary Delaware to Connecticut, a colony that became known as New Netherland. But the exhibition makes the case that Dutch rule, which ended in 1674 as the British solidified their hold, was far more important than we generally acknowledge.
This is one reason that the show has an array of public and private sponsors with interests in Dutch-American relations. New scholarly information about the period has also been emerging, as Charles T. Gehring, the director of the New Netherland Project (nnp.org), has been translating 12,000 pages of Dutch colonial records stored in Albany. A new collection of scholarly essays, "Explorers, Fortunes and Love Letters: A Window on New Netherland," edited by Martha Dickinson Shattuck, draws on that work and shares the exhibition's perspective.

It takes some care to work through the show, which argues the importance of Dutch rule through an accumulation of details. It was created by an international curatorial team, led by Sarah M. Henry, that included the writer Kathleen Benson and Jaap Jacobs, author of "New Netherland," which is to be published in the fall. And its design is striking: we seem to be entering the galley of a ship bound by curved wood, with white sails hung above. Like Hudson's vessel (a model of which is on display), the space is about 70 feet long.

The exhibition's own journey begins with a chronicle of global exploration (including a remarkable 1623 compendium of world maps begun by the Flemish cartographer Gerardus Mercator). It continues with a look at New Netherland's institutions and the sudden growth of its mercantile elite.
The show's main section is a finely detailed examination of New Netherland's culture (including objects linked to Indian relations and slavery in the colony), cataloging its customs and conflicts (even noting objections to a practice known as "pulling the goose," in which "a live goose was hung upside down, while riders on horseback tried to pull off its greased head"). And it ends with an account of the 1909 revels and the lasting influence of Dutch rule.

That influence, the exhibition shows, is not just a matter of archaeological evidence (though there is a swivel cannon here bearing the mark of the Dutch East India Company, which was discovered during construction of the World Trade Center in 1967). Nor is it simply a matter of names (though it is astonishing to see local areas in their original spellings, not just Breuckelen and Haarlem, but also Midwout, Nieuw Utrecht, Gavesande).

The impact is also more widespread than what was most evident from the images of the 1909 celebrations, which grew out of a late-19th-century movement by distinguished families with Dutch heritage (like the Roosevelts) to associate themselves with one of the oldest and deepest strains of American authority.

The exhibition suggests that these strains are subtle and profound. New Netherland was the first Dutch settlement colony, developing just a few generations after the Netherlands had won freedom from Spain, becoming, the show explains, "one of the modern world's first republics." (A 1581 pamphlet of the Dutch Declaration of Independence is on display.) For the Dutch, the age of exploration, generally viewed as "an age of unbounded possibility," was also associated with a new political order.

It was held together not by the church or the nobility but by a mercantile class that saw a parallel world in this coastal region on a new continent. It was a new Netherland. In some ways the colony began as its early-17th-century rival did at Jamestown: as the creation of a company granted monopolistic commercial powers.

And, as the show relates, "In its early years the colony was run almost like a fleet at sea, concentrating on trade with the locals, relying on supplies brought in aboard ships, and with most of the inhabitants in the direct employ of the company."

But then something different took shape, provoked perhaps by the cosmopolitan and tolerant atmosphere of Amsterdam. The exhibition says that this reputation for openness should not be idealized: "Dutch toleration, mixed as it was, did not pertain to the people they encountered in the areas that they

colonized." Slave labor was used, and New Netherland's growth was disrupted by wars with American Indian tribes.
Moreover, the colony was not so enlightened as to allow the Pilgrims to settle under Dutch rule. Peter Stuyvesant, the director general of the Dutch colony in the mid-17th century, also wanted Jews barred. But one document from 1646 cited in the show points out, "On the island of Manhate, and in its environs, there may well be four or five hundred men of different sects and nations" speaking about "eighteen different languages." And despite the Dutch Reformed Church's dominance, the exhibition shows, there was enough leeway to allow for uncommon variety.

This was partly because New Amsterdam "was founded as a place to do business," and the kind of trade practiced by the Dutch was international: the conformity demanded was ultimately rational, one of trust, at home in diversity. So the heritage of Dutch rule is not a set of philosophical ideas like those from England about rights and liberty that so inspired the founding fathers, but something more pragmatic and worldly. Theory takes a back seat to compromise and trade.

This colony is no democracy, but its civil order, the show notes, developed without a monarch, perhaps shaping a libertarian tendency that English rule did not eradicate.

In recent decades the primary foundational experiences of the United States have tended to be identified with Plymouth Rock and Jamestown, where religious freedom and pioneering enterprise have been highlighted, one growing out of English dissent, the other out of English opportunity. Also emerging into fuller view have been American Indians and enslaved Africans, whose experiences required a modification of traditional idealizations.

But this exhibition demonstrates that the Dutch heritage needs to be dealt with in constructing the pantheon of our past. That heritage neither promised inalienable rights nor threatened their complete elimination. Instead of high ideals, it held out another powerful possibility: the diverse pursuit of commerce and contentment.

"Amsterdam/New Amsterdam: The Worlds of Henry Hudson" is on view through Sept. 27 at the Museum of the City of New York, Fifth Avenue at 103rd Street; (212) 534-1672, mcny.org.

http://www.nytimes.com/2009/05/09/arts/design/09huds.html

'STORM KING WAVEFIELD'
Where the Ocean Meets the Mountains
By HOLLAND COTTER

MOUNTAINVILLE, N.Y. — When the painter Winslow Homer left New York City for this Hudson Valley hamlet in the summer of 1878, he was reported to be "a little under the weather." He was probably suffering a nervous breakdown. Whether the cause was a failed romance or despair at seeing the Gilded Age shatter around him, we don't know. But he felt unmoored and clung to the natural world. The dozens of watercolors he did that summer were landscape-filled, with sloping pastures and wall-like mountains dwarfing human figures, idylls so perfect that they look unreal.

The New York State Thruway buzzes through that landscape now. Most of the pastures are gone, but the mountains are still here: Schunnemunk, behind a series of ridges; Storm King, running high and long before dropping into the Hudson. And recently, some new additions, baby mountains, have appeared: seven undulating, grass-covered ranges of them.

These mini-Catskills were conceived and built — molded is really the word — by the artist Maya Lin as a permanent installation at the Storm King Art Center, the 500-acre sculpture park that for almost half a century has been devoted to the display of outdoor works either designed for the location or too large or strange to fit comfortably elsewhere
.
Ms. Lin's ambitious piece, "Storm King Wavefield," was commissioned by the center, and installation of it, under the supervision of David R. Collens, an artist and Storm King's director, began two years ago. Set in a shallow, amphitheaterlike depression, once a gravel pit supplying material for the Thruway, it covers 11 acres. Its seven parallel rows of rolling, swelling peaks were inspired by the forms of midocean waves but echo the mountains and hills around them.

Marine references make sense in a part of the world carved and smoothed by glaciers, and terrestrial themes have been central to Ms. Lin's art. "My affinity has always been toward sculpting the earth," she wrote in her autobiographical book "Boundaries" (2000). "This impulse has shaped my entire body of work."

That impulse was little remarked upon at the beginning of her career, when she was known mostly as a creator of urban commemorative sculptures, the first and most famous being her Vietnam Veterans

Memorial for the Mall in Washington. Designed when she was still a graduate student in architecture at Yale, this long, low chevron of buffed black granite inscribed with names of the war dead was as much a monument to healing and humility as to heroics, and it became a flashpoint for American feelings about a divisive war and a disorienting era.

A few years later she completed the Civil Rights Memorial for the Southern Poverty Law Center in Montgomery, Ala., again using black stone, this time a circular, tablelike slab of it incised with a historical timeline and rinsed by fountain water. In 1993 she returned to that format for her "Women's Table" at Yale. Dedicated to the many women who had been underacknowledged presences at the university since the 19th century, the stone was carved with an open-ended spiral of numbers, each marking the enrollment of women in the university in a given year, with 1969 footnoted: "Yale admitted women into the undergraduate college."

Initially, the political content of these works defined them. Now it is possible to step back and reassess them in light of Ms. Lin's subsequent career, which took her out of the memorial business and in the more directly earth-sculpturing direction, a direction that, it turns out, she had been following all along.
Ms. Lin's originating image for the Vietnam memorial, with its plain, straight slant like a Hudson Valley hillside, was of a blade slicing into and wounding the earth. The Civil Rights Memorial and "Women's Table" were both based on a single natural process: the slow but certain shaping of earth, in the form of stone, by water. All three pieces were meant to interact organically, even sensually, with their viewers, inviting them to run their hands over stone, feel and hear the trickle of water.

In short, Ms. Lin was making a species of "earth art" from the start. And she has done so unequivocally since, most strikingly in a small series of "wave" pieces formed from piled and packed soil.
The first, "Wave Field," installed at the University of Michigan, Ann Arbor, in 1995, is a 10,000-square-foot grouping of earthen mounds, the highest six feet, their shapes based on those of scientifically measured ocean waves. The second piece, "Flutter," covers 30,000 square feet of a plot near the Federal Courthouse in Miami; the undulant shapes, child-size at three to four feet high, were inspired by the textures made in sand by the action of waves.

Small working models for these works are on view, along with several indoors pieces, in the exhibition "Maya Lin: Bodies of Water" in the Storm King Art Center Museum.

The "Storm King Wavefield" is the third and last of the series and by far the largest at 240,000 square feet, with heights of 15 feet. Like its predecessors, it is made of natural materials: dirt and grass. Like any landscape, it is a work in progress. Vegetation is still coming in, drainage issues are in testing mode, and there are unruly variables: woodchucks have begun converting one wave into an apartment complex.
But the piece is already a classic. It has the gravity of Ms. Lin's commemorative sculptures and the sociability of the earlier "wave" pieces, which lent themselves to picnics, play and privacy. And, more immediately than almost any of her other outdoor projects, it is inextricable from nature, which is where, as I say, all her art starts.

Born in 1959, Ms. Lin was raised in rural Ohio, and as a child visited the great Serpent Mound and other American Indian earthworks in the Midwest. Through her father, a ceramicist who grew up in a Japanese-style house in China, she developed an affinity for the nature-saturated, but also nature-framing, aesthetic embodied in the Zen rock-and-sand garden, and in the Chinese ink-and-brush landscape, with its misted and surreally scaled vistas.

As a distillation of nature, the Zen garden is highly controlled: you view it from a fixed point and from a distance; you don't physically enter it. In that sense, it is an image rather than an environment. By contrast, the "Storm King Wavefield" is embracingly environmental.

Seen from a slight elevation, it complements its hilly setting but interrupts it. (There is, after all, something a little freakish about these slinky, reptilian swellings in the ground.) Because the work does both, it sharpens your eye to existing harmonies and asymmetries otherwise overlooked.

When you descend into the troughs between the lines of waves, you may experience an entirely different set of sensations. You lose sight of all the other waves and of the larger prospects beyond them. Now you are down in the earth; it is rising over you, not you over it. You're suddenly smaller, but also protected. Outside sounds are muffled, large-scale distractions reduced. The grand vision of hills upon hills, recession upon recession, drops away.

With it gone, you're encouraged to concentrate on the details of what's around you. That's what, I suspect, all of Ms. Lin's outdoor work is asking you to do: touch the stone, feel the water, smell the air, see how that patch of grass is different from another.

I suspect that the search for a similar kind of focus, and the relief from boundlessness it brings, is what Homer was after in Mountainville that summer. Whether he found it, I don't know. He ended his life in a very different landscape, on the coast of Maine, where he produced painting after painting of waves crashing on rocks, water demolishing land, ceaseless natural destruction frozen in time.
In its own way, some of Ms. Lin's most recent work has a similarly adamant, end-time character. I refer to the long-planned, multipart project she calls "The Last Memorial," with which, over decades, she plans to monitor globally the corruption and demise of the natural environment that has been her subject and source.

What forms she will call on remain to be seen. But "Storm King Wavefield" is a different kind of work. Neither fatalistic nor utopian, commemorative nor history-free, natural nor artificial, unstable nor fixed, it is a puzzle to ponder but also — first things last — a soul-soothing place of retreat.
"Storm King Wavefield" is on permanent view at Storm King Art Center, Old Pleasant Hill Road, Mountainville, N.Y.; (845) 534-3115, stormking.org. "Maya Lin: Bodies of Water" remains on view at the Storm King Art Center Museum through Nov. 15. A traveling survey of Ms. Lin's work, "Maya Lin: Systematic Landscapes," organized by the Henry Art Gallery of the University of Washington, Seattle, is on view at the Corcoran Gallery of Art, Washington, through July 12.
This article has been revised to reflect the following correction:

http://www.nytimes.com/2009/05/08/arts/design/08lin.html

The new science of measuring happiness has transformed self-help. Now scholars suggest it could transform society.

By Drake Bennett | May 10, 2009

IF YOU WERE given the choice, and you wanted to reduce human suffering by as much as possible, would you cure blindness or back pain? It seems a silly question. The thought of losing one's sight is, to most people, as frightening as it is depressing: we would no longer be stirred by sunsets or landscapes or the expressions on the faces of our loved ones. Everyday chores would become more difficult, crossing the street perilous. Many sports and pastimes would simply be off-limits, and we would lose a good deal of our independence.

Back pain, on the other hand, is just back pain.

But in fact, it's back pain that causes more misery. Most blind people would like to be able to see, of course, but once they've figured out how to live a sightless life, their blindness doesn't really make them unhappy. Chronic pain, on the other hand, sours our mood with every new twinge, and we never really adapt to it.

In recent years, cognitive scientists have turned in increasing numbers to the study of human happiness, and one of their central findings is that we are not very good at predicting how happy or unhappy something will make us. Given time, survivors of tragedies and traumas report themselves nearly as happy as they were before, and people who win the lottery or achieve lifelong dreams don't see any long-term increase in happiness. By contrast, annoyances like noise or chronic pain bring down our happiness more than you'd think, and having friends or an extra hour of sleep every night can raise it dramatically.

These findings have fed the growth of a burgeoning "positive psychology" movement focused on helping people enrich their own lives. But now some scholars are starting to ask a bigger question: shouldn't this new understanding affect policy, too? A huge range of social systems, from tort law to urban planning to medical care, are built on assumptions about what makes people happy. Now, for the first time, researchers are claiming to be actually measuring happiness, to actually know what causes it. In a society whose founding document asserts a basic right to the pursuit of happiness, that new knowledge could have far-reaching implications.

What we're learning, these thinkers argue, should make us reconsider some of the basic rules by which government regulates behavior: how we litigate lawsuits and write contracts; how we zone neighborhoods; which medical research we fund, and how we prioritize healthcare. The findings of happiness researchers offer a new and potentially powerful set of tools to compare the impacts of various laws: how does it change everybody's happiness if the minimum wage is raised, if the speed limit is lowered, if divorce laws are loosened?

Because serious happiness research is still new, these proposals remain broad, even speculative. But underlying all of them is the likelihood that if our longtime assumptions about happiness are wrong, they have led to ineffective, even counterproductive, laws and policies.

"This work challenges not only the way the legal system works, but a lot of the assumptions that we've been making about the way people act and think and behave and feel," says Jeremy Blumenthal, an associate professor at the Syracuse University College of Law.

Some skeptics think it's premature to let happiness research dictate policy: much of the data is still provisional, and some findings seem to contradict each other. And, more fundamentally, some argue that no amount of data could justify the sort of paternalism that would be required for the government to force people into some happiness-maximizing choices. It's part of a broader debate that has preoccupied thinkers since the dawn of philosophy but been rekindled by the new research: how do we define happiness, anyway, and how much should we value it?

The patron saint of the happiness maximizers is Jeremy Bentham, the English philosopher who two centuries ago gave the world the ethical theory known as utilitarianism. The theory itself is simple: in any situation, the best thing to do is that which brings the greatest aggregate pleasure or happiness. Bentham imagined a "hedonic calculus": a systematic reckoning that weighed factors like intensity of feeling, duration, purity and the number of people affected. One of his disciples, Francis Edgeworth, wrote hopefully of a future when utilitarians could use a device he called a "hedonimeter" to simply read out a person's happiness level.

Since then, social scientists and policymakers have tended to reject Bentham's ideas as unusably vague. The "hedonic calculus" seemed too riddled with subjectivity to base real-world social policies on.

But some psychologists have begun to argue that you can, in fact, reliably measure happiness: all you need to do is ask people. Because we so badly mispredict and misremember how happy something made us, however, the trick is to ask people to rate their current happiness, and then track the changes over time. Many recent studies have subjects keep happiness diaries; others give them beepers and have them rate their happiness whenever beeped. These studies, matched up with research that relies on more general happiness self-reporting, have begun to provide a consistent, and occasionally surprising, portrait of what really feeds and impedes happiness.

Perhaps the best known study in the literature was published in 1978 by the psychologists Philip Brickman, Dan Coates, and Ronnie Janoff-Bulman. They compared the self-reported happiness levels of lottery winners, paralyzed accident victims (both paraplegics and quadriplegics), and people who were neither. What they found was that lottery winners didn't report themselves appreciably happier than the control group, and while the paralyzed did report themselves less happy than the controls, the difference was not as dramatic as the researchers had expected. More recent and rigorous studies have yielded results broadly similar: getting married or getting a raise or a new house all give a boost to our happiness, but eventually we drop to levels near where we were before. By contrast, happiness dips and then rebounds after people lose a limb, their sight or even - though the data is more conflicting here - a loved one.

For Daniel Gilbert, a Harvard psychologist and leading happiness researcher, the implications for policymaking are straightforward. Lawmakers, judges, doctors and managers alike should take the growing happiness literature into account as they decide what behavior they want to encourage or discourage. "Before we get people to do X, we ought to know that X is actually a source of happiness for them," he says.

The field that has taken this most to heart so far is the law. A few scholars have begun arguing, for example, that the damages we award in lawsuits need to be rethought in light of work like Gilbert's. Last year Cass R. Sunstein, a Harvard Law School professor who is now the Obama administration's nominee

for "regulatory czar," published a law review article in which he argued that our inability to predict how well people adapt to traumas leads to excessively large awards in personal injury lawsuits. Jurors and judges overcompensate plaintiffs for their suffering, he argued, because they are unable to believe that a disabled life can be a happy one. At the same time, Sunstein pointed to evidence that people are actually better at adapting to physical disabilities than to mental illness or chronic pain - conditions that, because they are not visible, don't tend to elicit the same sort of reaction from juries. Because of that, he argued, our misunderstanding of happiness shortchanges those plaintiffs.

As a solution, Sunstein proposed a set of civil damages guidelines that would take into account what psychologists are learning about which conditions people are better and worse at emotionally acclimating themselves to.

Other legal scholars are concerned not with the misallocation of award money, but with how the legal process itself may hurt people who have already suffered a trauma by impeding their natural ability to adapt. Samuel Bagenstos and Margo Schlanger, law professors at Washington University in St. Louis, co-wrote a law review article in 2007 suggesting that the emphasis on lost enjoyment of life in jury awards actually makes it harder for the plaintiff to recover. Better, they argue, to focus remedies not on the lost happiness, which in many cases will take care of itself, but on specific lost capabilities, and on mitigating their effects through rehabilitation. And to the extent that disabilities do cause unhappiness, it's often from social factors like isolation and discrimination - so paying people off just for their disability may be counterproductive, since it can leave the real causes of unhappiness unaddressed.

"It's actually the inability to have access to the community that makes people with disabilities less happy," says Bagenstos. "If you just compensate them for the disability, you're providing a form of forced charity rather than equality and integration."

In the legal world, these ideas have triggered some pushback. Among the more specific critiques was one offered by Peter Huang, a law professor at Temple, and Rick Swedloff, a visiting associate professor at Rutgers. In a law review article published this spring, they take on what they call the "legal hedonists," cautioning that happiness research was still too uncertain to justify large-scale legal changes. What's more, they argue, juries and judges often display a subtler intuitive understanding of hedonic adaptation than Sunstein allows.

"I think the research is getting better, but it's still early," says Huang. "That's why I think people shouldn't be rushing to apply it."

The law is the first obvious place where happiness studies could bring changes, since it deals with questions of long-term emotional impact, but other realms of policy are starting to begin their own versions of this argument.

Public health experts, for example, are using happiness research to try to help refine the discussion around ethically fraught issues like end-of-life care. Peter Ditto, a psychologist at the University of California, Irvine, has found that, because healthy people are so bad at predicting how they'll emotionally react to being gravely ill, living wills that they make when healthy often don't reflect their wishes when they actually become sick.

Another implication is in the allocation of research and treatment dollars. Peter Ubel, a professor of medicine and a behavioral scientist at the University of Michigan, points out that people, even as they overestimate the amount of emotional damage a lost leg will bring, regularly underestimate the emotional harm that mental health problems cause. Paying more attention to aggregate happiness, he suggests, might shift a balance of national priorities that right now skews heavily toward dealing with physical ailments.

"We don't fund mental health research or treatments as well as we should, and yet mental health has such a huge effect on people's lives," he says. "We systematically undervalue the benefits of things that would improve mental health and instead we spend a lot of money just trying to push off death."

Others have begun to think about how happiness data might change where people live. For example, the trade-off between house size and commute length is familiar to every suburbanite, but as Cornell economist Robert Frank has pointed out, the two things affect our mood in different ways. While we quickly adapt to a bigger house and start taking it for granted, research suggests that a long, trafficky commute is something we never adjust to, and that even grows more onerous with time. Work like this could give added heft to arguments for policy measures like higher gas taxes, and for zoning laws that concentrate housing and cut down on traffic and commuting distances - arguments that now tend to be cast chiefly in environmental terms, but which also might push people toward decisions that make them happier in the long term.

Not all scholars who embrace the new happiness research have particular changes in mind. Some see it primarily as a very useful diagnostic tool.

"I'm excited about the idea that in five years, when we study the effect of a legal change, we will study not only employment changes or price adjustments but also effects on well-being," says Christine Jolls, a Yale law professor who is also trained as an economist.

But even a far fuller understanding of happiness than what we have now won't resolve some of the most difficult questions. The issue of how to define happiness, after all, is as philosophical as it is scientific. Happiness can mean, among other things, simply being in a good mood, or it can mean being broadly satisfied with one's life. Which one we choose to focus on changes the sorts of policies we pursue.

"Thousands of years of philosophers have struggled to define this term," points out Swedloff. "Do we mean, 'How do I feel right now? Am I in a pleasurable state or in an unpleasurable state?' Or we might mean, 'Am I flourishing? Am I becoming the best that I could be?' A heroin addict who's just had a fix, there's very little doubt that she's happy, but is she flourishing?"

As a result, studies in which quadriplegics report themselves nearly as happy as when they had the full use of their bodies, Swedloff argues, may be revealing as much about the limitations of our communal emotional vocabulary as about the subjects themselves.

And, as even happiness researchers are quick to concede, happiness isn't everything. If people routinely throw roadblocks in the way of their own happiness, it may not be simply out of ignorance. It may be because there are other things they value more.

"Part of what it means to be human is to have a range of emotions, which includes positive emotions and negative emotions," says George Loewenstein, an economist at Carnegie Mellon whose own work has illustrated many of the irrational tendencies of human economic behavior. "There are so many things that people care about other than happiness - capabilities and functioning, richness of experience and meaning - and that's very legitimate."

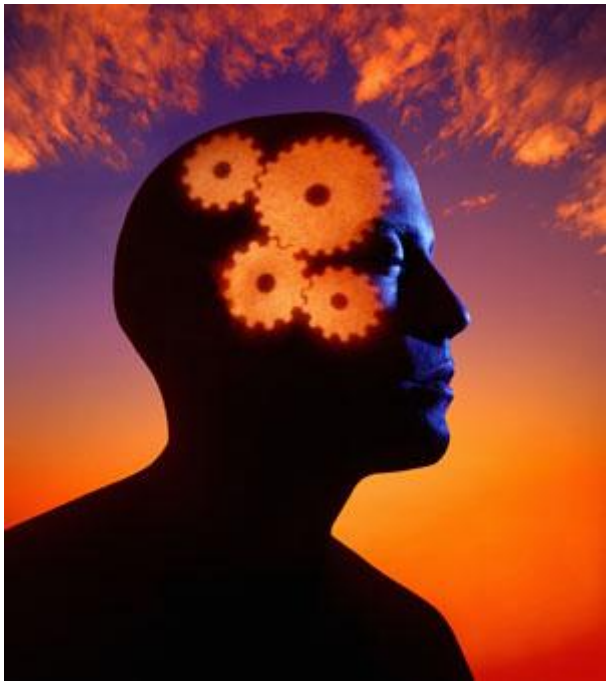
Still, there's little doubt that happiness, by some definition, lies at the center of many of our decisions, and that we're often disappointed by the things we thought would make us happy. "People make mistakes about what they want," says John Bronsteen, an assistant professor at Loyola University School of Law who has co-written a series of articles on happiness research and the law. To him, and to other like-minded scholars, knowing that people get it so wrong gives the law a new chance to get it right.

Drake Bennett is the staff writer for Ideas. E-mail drbennett@globe.com. ■

http://www.boston.com/bostonglobe/ideas/articles/2009/05/10/perfectly_happy/

Brainy men may be healthier men

- 12:34 08 May 2009 by **Ewen Callaway**



Health and intelligence may be the result of the same genetic factors (Image: Don Hammond / Design Pics Inc. / Rex Features)

In addition to checking blood pressure and heart rate, doctors may want to test their patients' IQs to get a good measure of overall health.

A new study of 3654 Vietnam War veterans finds that men with lower IQs are more likely to suffer from dozens of health problems – from hernias, to ear inflammation, to cataracts – compared with those showing greater intelligence.

This offers tantalising – yet preliminary – evidence that health and intelligence are the result of common genetic factors, and that low intelligence may be an indication of harmful genetic mutations.

"It poses the question to epidemiologists: why is it that intelligence is a predictor for things that seem so very far removed from the brain," says Rosalind Arden, a psychologist at King's College London, who led the study.

Lifestyle choices

One obvious counter-argument is that intelligent people make healthier choices. "You could say: 'look, brighter people make better health decisions – they give up smoking when they find it's bad for you, they take up exercise when they find out its good for you, and they eat a lot of salad'," Arden says.

That's probably true, she says, yet her team found that indicators of healthy living, such as a low body mass index and not smoking, do not correlate with overall health of veterans as well as several tests of intelligence.

The researchers analysed data from a 1985 to 1986 study of Vietnam veterans led by the US Centers for Disease Control and Prevention into links between chemicals such as Agent Orange and health problems. Participants received thorough physical exams and took several intelligence tests.

Harmful mutations?

Arden's team is aiming to find more evidence that health and intelligence are driven by common genetic factors. They previously showed, in the same group of Vietnam veterans, that more intelligent men produce healthier sperm, and they are currently working on a direct genetic test of their theory.

"I find the work pretty fascinating," says Mark Prokosch, a psychologist at Elon University in North Carolina. He agrees that finding a link between harmful genetic mutations, health and intelligence will make a better case for Arden's theory.

"I don't think they have quite driven the nail in the coffin that there is clear evidence of this mutation load found in all of us that contributes to a fitness factor," he says.

Journal reference: *Intelligence* (DOI: 10.1016/j.intell.2009.03.008)

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http://www.newscientist.com/article/dn17098

Men 'suffering recession blues'

Men are struggling to cope with the emotional impact of the recession, a mental health charity has warned.

Almost 40% of men admit to feeling low at the moment with job security, work and money playing on their minds, a Mind survey of 2,000 adults found.

Yet men are less likely than women to seek help from their GP or a counsellor, the results suggested.

The charity said 2.7m men in England currently have a mental health problem such as depression, anxiety or stress.

Men responding to the survey seemed to be more reluctant to talk about when they were feeling stressed or low than women.

Only 29% of men would talk to friends about their problems compared with 53% of women and they were also less likely to talk to their family.

Men were also less likely to seek out professional help and a third would feel embarrassed about it.

" **The recession is clearly having a detrimental impact on the nation's mental health but men in particular are struggling with the emotional impact** "
Paul Farmer, Mind

And 5% of men said they had experienced suicidal thoughts compared with 2% of women.

A report from Mind, has called for the government to produce a men's mental health strategy and for employers to do more to help stressed male workers.

Mind said even though men and women experience mental health problems in roughly equal numbers, men are much less likely to be diagnosed and treated for it.

The recession could make the situation much worse, with research showing one in seven men develop depression within six months of losing their jobs.

Some minority ethnic groups are at a higher risk of mental distress than others, Mind said.

For example African Caribbean men are three times more likely than white men to be formally detained under the Mental Health Act and are also more likely to be inpatients on mental health wards and to receive invasive medical treatments.

Identity

Paul Farmer, chief executive at Mind, said: "The recession is clearly having a detrimental impact on the nation's mental health, but men in particular are struggling with the emotional impact.

"Being a breadwinner is something that is still crucial to the male psyche so if a man loses his job he loses a large part of his identity putting his mental wellbeing in jeopardy.

"The problem is that too many men wrongly believe that admitting mental distress makes them weak and this kind of self stigma can cost lives."

He added that the NHS must become more "male-friendly" offering treatments that appeal to men, like exercise on prescription or computerised therapy and advertising their services in places men frequent.

Stephen Fry who is supporting the Mind campaign to encourage men to seek help, said: "For so long I tried to get on with my life and career, somehow coping with the huge highs and lows I experienced.

"If I had felt able to get it off my chest when I was younger I could have got more of the support I needed."

Peter Cooper, spokesman for the British Psychological Society, said the fact that men were less likely to talk about feelings added to anxiety and depression and unhealthy behaviours such as drinking.

"With men there's much more shame about say the loss of a job or the loss of a home.

"The type of help that men need includes psychotherapy but what they are also desperate for is pragmatic practical help."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8040699.stm

Published: 2009/05/10 23:42:50 GMT

Infection killing cancer children

By Emma Wilkinson
Health reporter, BBC News

More needs to be done to prevent children with cancer dying from infection, researchers say.

Analysis of death certificates in England and Wales over a two-year period found infection was the cause of death in 82 child cancer patients.

Such deaths could well be preventable if better strategies were in place to avoid, diagnose and treat infections, the UK researchers said.

The findings appear in the journal Pediatric Blood and Cancer.

Treatment of child cancer has improved drastically in the past few decades and so have survival rates.

" **Some of the infections we found we should be able to treat - we have good antibiotics and we have good protocols - so it does raise the question why this small group of children is succumbing to that** "

Dr Jessica Bate, study leader

But increasingly aggressive chemotherapy means patients are vulnerable to other illnesses.

The study of children under 15 with cancer who died between 2003 and 2005 found that in 25% of blood cancers, such as leukaemia the cause of death was infection rather than the cancer itself.

In children with solid tumours the figure was 5%.

Children with blood cancers are more susceptible to infection because the disease itself can affect the production of white blood cells, a key part of the immune system, and harsh treatments can make them even more vulnerable.

The researchers said the figures in the study were likely to be an underestimate of the numbers dying due to infection because of the limits of the data they had available to them.

Survival

Study leader Dr Jessica Bate, a clinical lecturer in child health at St George's University of London, said better treatments meant children were far more likely to survive cancer than previously but at the same time the nature of the treatment meant the immune system was weakened to a greater extent.

"Survival rates are so much better than they have been, most children are surviving now and that's great but what we don't want is that they die from infections because that's something we should be able to do something about."

She added: "Some of the infections we found we should be able to treat - we have good antibiotics and we have good protocols - so it does raise the question why this small group of children is succumbing to that."

"The thing we need to think about the future is whether we diagnose them properly.

"And the big thing that came out was fungal infections and that's an area where we really need to improve how we diagnose them and how we treat them."

Liz Baker, senior science information officer at Cancer Research UK, said: "Incredible progress has been made in treating children's cancer more effectively.

"Sadly, these treatments can sometimes weaken the immune system.

"Targeted therapies with fewer side effects on the immune system and preventative strategies in hospitals will help to reduce this problem."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8040546.stm

Published: 2009/05/09 23:07:21 GMT

Blue Whales Re-establishing Former Migration Patterns

A blue whale spouts off Moresby Island, British Columbia, Canada. (Credit: John Calambokidis, Cascadia Research Collective)

ScienceDaily (May 12, 2009) — The planet's largest animal may be returning to pre-whaling feeding grounds. Scientists have documented the first known migration of blue whales from the coast of California to areas off British Columbia and the Gulf of Alaska since the end of commercial whaling in 1965.

In the scientific journal *Marine Mammal Science*, researchers from Cascadia Research Collective in Washington state, NOAA's Southwest Fisheries Science Center in California, and Canada's Department of Fisheries and Oceans identified 15 separate cases where blue whales were seen off British Columbia and the Gulf of Alaska. Four of the whales were identified as animals previously observed off the coast of California, suggesting a re-establishment of a historical migration pattern.

Researchers made this identification by comparing photographs of blue whales taken in the north Pacific Ocean since 1997 with a library of nearly two thousand photographs of blue whales off the West Coast. A positive match was determined based on pigmentation patterns in skin color and shape of the dorsal fin.

Blue whales were severely depleted during commercial whaling activities during the early 1900's in the north Pacific and along the West Coast as far south as Baja California.

Formerly large populations of blue whales in the north Pacific never rebounded after commercial whaling ended while those animals off southern California have apparently fared much better.

Scientists are still not certain exactly why blue whales are now beginning to migrate from southern California to the north Pacific Ocean although changing ocean conditions may have shifted their primary food source of krill further north.

Blue whales are thought to be the largest animal ever to have existed on earth, reaching lengths of nearly 100 feet. They were nearly hunted to extinction throughout the world and are currently listed as endangered under the U.S. Endangered Species Act and as endangered on the red list of the International Union for the Conservation of Nature. There are an estimated 5,000 to 12,000 animals remaining today, with the largest population of approximately 2,000 off the U.S. West Coast.

Journal reference:

1. John Calambokidis, Jay Barlow, John K. B. Ford, Todd E. Chandler, Annie B. Douglas. **Insights into the population structure of blue whales in the Eastern North Pacific from recent sightings and photographic identification**. *Marine Mammal Science*, 2009; DOI: 10.1111/j.1748-7692.2009.00298.x

Adapted from materials provided by NOAA National Marine Fisheries Service.

http://www.sciencedaily.com/releases/2009/05/090511140953.htm

Terahertz Waves Are Effective Probes For Integrated Circuit Heat Barriers

ScienceDaily (May 12, 2009) — By modifying a commonly used commercial infrared spectrometer to allow operation at long-wave terahertz frequencies, researchers at the National Institute of Standards and Technology (NIST) discovered an efficient new approach to measure key structural properties of nanoscale metal-oxide films used in high-speed integrated circuits.

Their technique, described in a recent paper, could become an important quality-control tool to help monitor semiconductor manufacturing processes and evaluate new insulating materials.

Chip manufacturers deposit complicated mazes of layered metallic conductor and semiconconductor films interlaced with insulating metal oxide nanofilms to form transistors and conduct heat. Because high electrical leakage and excess heat can cause nanoscale devices to operate inefficiently or fail, manufacturers need to know the dielectric and mechanical properties of these nanofilms to predict how well they will perform in smaller, faster devices.

Manufacturers typically assay the structure of metal oxide films using X-ray spectroscopy and atomic force microscopy, both tedious and time-consuming processes. NIST researchers discovered that they could extract comparable levels of detail about the structural characteristics of these thin films by measuring their absorption of terahertz radiation, which falls between the infrared and microwave spectral regions.

Although terahertz spectroscopy is known to be very sensitive to crystal and molecular structure, the degree to which the metal oxide films absorbed the terahertz light was a surprise to NIST researchers.

“No one thought nanometer-thick films could be detected at all using terahertz spectroscopy, and I expected that the radiation would pass right through them,” says Ted Heilweil, a NIST chemist and co-author of the paper. “Contrary to these expectations, the signals we observed were huge.”

The NIST team found that the atoms in the films they tested move in concert and absorb specific frequencies of terahertz radiation corresponding to those motions. From these absorbed frequencies the team was able to extrapolate detailed information about the crystalline and amorphous composition of the metal oxide films, replete with structures that could affect their function.

The team’s experiments showed that a 40 nanometer thick hafnium oxide film grown at 581 kelvin (307 degrees Celsius) had an amorphous structure with crystalline regions spread throughout; nanofilms grown at lower temperatures, however, were consistently amorphous. According to Heilweil, an approximately 5 nanometer film thickness is the detection limit of the terahertz method, and the efficacy of the technique depends to some degree on the type of metal oxide, though the group noted that all metal-oxide materials surveyed exhibit distinct spectral characteristics.

Journal reference:

1. Heilweil et al. **Characterization of metal oxide nanofilm morphologies and composition by terahertz transmission spectroscopy**. *Optics Letters*, 2009; 34 (9): 1360 DOI: 10.1364/OL.34.001360

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

http://www.sciencedaily.com/releases/2009/05/090508135005.htm

Seniors Should Watch For Drug Interactions When Taking Multiple Medications

Taking decongestants in allergy and flu formulas can raise blood pressure in some people. (Credit: University of Michigan Health System)

ScienceDaily (May 12, 2009) — A recent study found that more than 80 percent of adults age 57 and older take at least one prescription drug a day and that about half of them regularly mix drugs with over-the-counter medications and supplements.

Interactions between prescription medications and over-the-counter medications are somewhat common and fairly mild as long as people are aware of them and taking appropriate steps to use the medication safely. Occasionally, problems arise. A recent study found that about 1 in 25 older adults may be experiencing a major drug interaction.

"To protect themselves from the harm of drug interactions make sure that anyone who is advising someone to take medications is fully aware of all medicines that person is taking and that includes prescription medicines, over-the-counter medicines and dietary supplements," says University of Michigan Geriatrics Center pharmacist Tami Remington.

Remington suggests that getting all prescription drugs filled at a single pharmacy allows the pharmacist to do a thorough drug interaction check each time a new one is filled.

Consulting a pharmacist periodically to ensure medications aren't interacting with other medications is also a good idea, she adds.

Pharmacists are also worried about over-the-counter drugs. Taking decongestants in allergy and flu formulas can raise blood pressure in some people. High blood pressure is common among older adults in the United States. Many medications can further raise blood pressure in people who already suffer and are on medication for it.

Remington warns that many older adults also take blood thinners, which are used for conditions like blood clots but also for preventing heart attacks and stroke. The strongest blood thinner is Warfarin. It's

well-known that Warfarin interacts negatively with many medications. A drug interaction with Warfarin can be extremely dangerous because people on the medication need thin blood although blood that's too thin could result in bleeding complications.

Other drugs that interact with Warfarin can make a person's blood too thick, increasing their risk of blood clots and stroke. Because of the high risks involved when taking Warfarin, anyone who is currently taking the medication should consult with a pharmacist or physician to ensure its safety.

The effect of medication on memory has also received wide attention. Medications in the valium family such as Ativan, Atarax, Restoril, Halcion and some of the sleeping pills like Ambien and Lunesta have a negative effect on people who are concerned about memory problems.

"These medications can prevent you from being able to form new memories and so even in small doses, particularly in older adults, they can make memory problems worse," Remington says.

Over-the-counter or prescription medicines that Remington is most uncomfortable with "are the ones that have sleepy-type side effects to them such as medications for urinary incontinence to help avoid accidents." Remington suggests limiting usage of these medications so that peoples daily lives and experience won't be significantly changed due to medications.

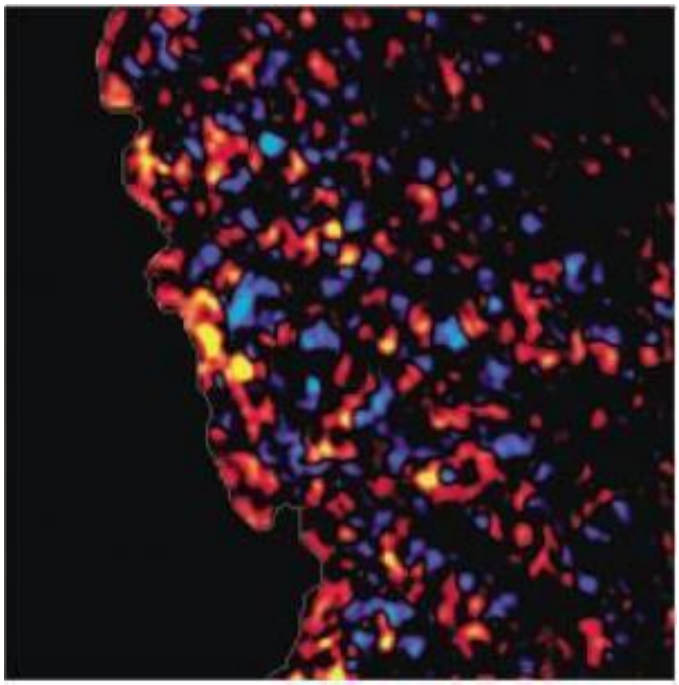
Not all drug interactions are safe and require monitoring, says Remington.

"People need to protect themselves against serious drug interactions that happen and a physician or a pharmacist is a great place to receive help," she says.

Adapted from materials provided by University of Michigan Health System.

http://www.sciencedaily.com/releases/2009/05/090504211341.htm

How Cells Move: Cooperative Forces Boost Collective Mobility Of Cells



Collective cell mobility is the result of a cooperative process. (Credit: Image courtesy of Universidad de Barcelona)

ScienceDaily (May 11, 2009) — Research by scientists in Spain and their colleagues offers for the first time an experimental answer to the question of how cells move during biological processes as diverse as the development, metastasis, or regeneration of tissues.

The work addresses the issue of collective mobility of cells, that is to say, how cells are moved within tissues, and what is the prevalent form of movement inside living organisms.

"Research into collective cell mobility is very active due to the direct implications it has on fields such as embryologic development, organ regeneration, and cancer. For example, if we could find a way to control cell mobility during metastasis, cancer would be a curable disease in the majority of cases," says Dr. Xavier Trepat, senior researcher of the cellular and respiratory biomechanics group and researcher in the Department of Physiological Sciences at the University of Barcelona, and in the Networking Biomedical Research Centre for respiratory diseases (CIBER).

Up until now, scientists had proposed various mechanisms to explain collective cell migration. One hypothesis for example, suggests that the cells move collectively due to the existence of "leader" cells, which stretch out in the rest of the group, like a train pulls carriages behind it. Another hypothesis suggests that each cell moves independently to those around it, like cars on the motorway during a traffic jam, or like soldiers in a military parade. "We have rejected both these possibilities," says Trepat.

According to his research, collective cell mobility is the result of a cooperative process in which each cell contributes to the movement of the group, stretching to those around it. "It is a mechanism similar to a tug-of-war game, in which two teams pull a rope by its extremes and the team that pulls the hardest wins. During the game, each player generates force and transmits it to the rope, so that the tension in the rope is the sum of the forces generated by each member of the team. Cells do the same. Each cell generates force to stretch to its neighbours in the direction of the movement» explains the researcher.

Journal reference:

1. Xavier Trepat, Michael R. Wasserman, Thomas E. Angelini, Emil Millet, David A. Weitz, James P. Butler & Jeffrey J. Fredberg. **Physical forces during collective cell migration**. *Nature Physics*, 2009; DOI: 10.1038/nphys1269

Adapted from materials provided by Universidad de Barcelona, via AlphaGalileo.

http://www.sciencedaily.com/releases/2009/05/090506152803.htm

Solar-Powered Irrigation System Unveiled At U.S. National Arboretum

The first solar-powered irrigation system at the U.S. National Arboretum was installed by students from Alfred State College and workshop participants. A model for more energy-efficient landscape gardening, the new system will help cut energy costs and conserve resources. (Credit: Photo courtesy of USDA)

ScienceDaily (May 11, 2009) — The U.S. National Arboretum is "going green" with the installation of its first solar-powered drip irrigation system that will save electricity and water at the 446-acre facility operated by the Agricultural Research Service (ARS) in Washington, DC.

The new system is part of a long-range plan to update and improve the arboretum grounds. Future plans include installing a larger solar collector near the National Capitol Columns and solar shingles on the Arbor House, which houses the gift shop and visitor restrooms.

Installation of the new system marked the end of a week-long workshop conducted by students and faculty from Alfred State College of the State University of New York. The workshop—attended by arboretum staff, contractors and homeowners—provided hands-on instruction on how to construct and use the system and its many benefits.

Located in Nursery 5, which is used to conduct research aimed at the development of improved trees for landscape use, the new system consists of six solar panels that collect sunlight, a battery that stores the energy, and a converter box that converts the stored energy into electricity used to run the nursery's drip-irrigation system. Because of the nursery's remote location, installing solar panels was less expensive than running an electrical line from the main power source, approximately a half mile away. As a result, the arboretum will see immediate savings on costs.

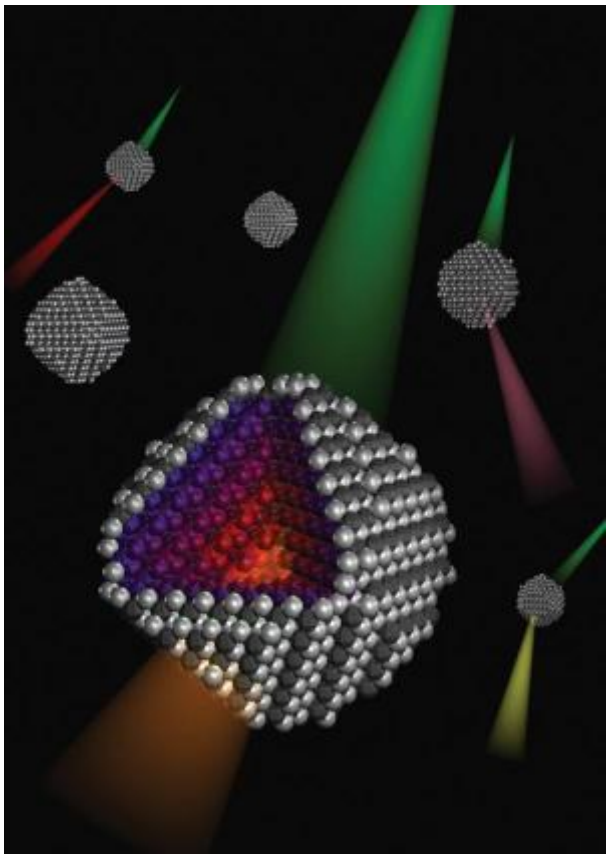
The latest project is a staff-driven effort to cut energy costs and conserve resources. The new system took less than one year to complete. Arboretum Director Tom Elias first met Alfred State representatives during the U.S. Department of Agriculture's (USDA) Bio Energy Awareness Days (BEAD II) exhibition held at the arboretum last June. The meeting led to a five-year cooperative agreement to develop and install green technologies that will help the arboretum reduce its carbon footprint.

The arboretum's new system serves as a model for more energy-efficient landscape gardening. Solar power can be used in urban and suburban areas and is applicable to all types of power systems. Gardeners can use it to power water features, such as fountains and waterfalls, and irrigation systems.

Adapted from materials provided by USDA/Agricultural Research Service.

http://www.sciencedaily.com/releases/2009/05/090502083917.htm

New Nanocrystals Show Potential For Cheap Lasers, New Lighting



Todd Krauss' new "non-blinking" nanocrystals. (Credit: Image courtesy of University of Rochester)

ScienceDaily (May 11, 2009) — For more than a decade, scientists have been frustrated in their attempts to create continuously emitting light sources from individual molecules because of an optical quirk called "blinking," but now scientists at the University of Rochester have uncovered the basic physics behind the phenomenon, and along with researchers at the Eastman Kodak Company, created a nanocrystal that constantly emits light.

The findings, detailed online in the journal *Nature*, may open the door to dramatically less expensive and more versatile lasers, brighter LED lighting, and biological markers that track how a drug interact with a cell at a level never before possible.

Many molecules, as well as crystals just a billionth of a meter in size, can absorb or radiate photons. But they also experience random periods when they absorb a photon, but instead of the photon radiating away, its energy is transformed into heat. These "dark" periods alternate with periods when the molecule can radiate normally, leading to the appearance of them turning on and off, or blinking.

"A nanocrystal that has just absorbed the energy from a photon has two choices to rid itself of the excess energy—emission of light or of heat," says Todd Krauss, associate professor of chemistry at the University of Rochester and lead author on the study. "If the nanocrystal emits that energy as heat, you've essentially lost that energy."

Krauss worked with engineers at Kodak and researchers at the Naval Research Laboratory and Cornell University to discover the new, non-blinking nanocrystals.

Krauss, an expert in nanocrystals, and Keith Kahen, senior principal scientist of Kodak and an expert in optoelectronic materials and devices, were exploring new types of low-cost lighting similar to organic light-emitting diodes, but which might not suffer from the short lifespans and manufacturing challenges inherent in these diodes. Kahen, with help from Megan Hahn, a postdoctoral fellow in Krauss' laboratory, synthesized nanocrystals of various compositions.

Xiaoyong Wang, another postdoctoral fellow in Krauss laboratory, inspected one of these new nanocrystals and saw no evidence of the expected blinking phenomenon. Remarkably, even after four hours of monitoring, the new nanocrystal showed no sign of a single blink—unheard of when blinks usually happen on a scale of miliseconds to minutes.

After a lengthy investigation, Krauss and Alexander Efros from the Naval Research Laboratory concluded that the reason the blinking didn't occur was due to the unusual structure of the nanocrystal. Normally, nanocrystals have a core of one semiconductor material wrapped in a protective shell of another, with a sharp boundary dividing the two. The new nanocrystal, however, has a continuous gradient from a core of cadmium and selenium to a shell of zinc and selenium. That gradient squelches the processes that prevent photons from radiating, and the result is a stream of emitted photons as steady as the stream of absorbed photons.

With blink-free nanocrystals, Krauss believes lasers and lighting could be incredibly cheap and easy to fabricate. Currently, different color laser light is created using different materials and processes, but with the new nanocrystals a single fabrication process can create any color laser. To alter the light color, an engineer needs only to alter the size of the nanocrystal, which Krauss says is a relatively simple task.

The same is true of what could one day be OLED's successor, says Krauss. Essentially, "painting" a grid of differently sized nanocrystals onto a flat surface could create computer displays as thin as paper, or a wall that lights a room in any desired color.

This research was funded by the Eastman Kodak Company, the U.S. Department of Energy, the National Science Foundation, the University of Rochester Center for Electronic Imaging Systems, the Cornell Center for Nanoscale Systems, the Office of Naval Research, and the Alexander von Humboldt Foundation.

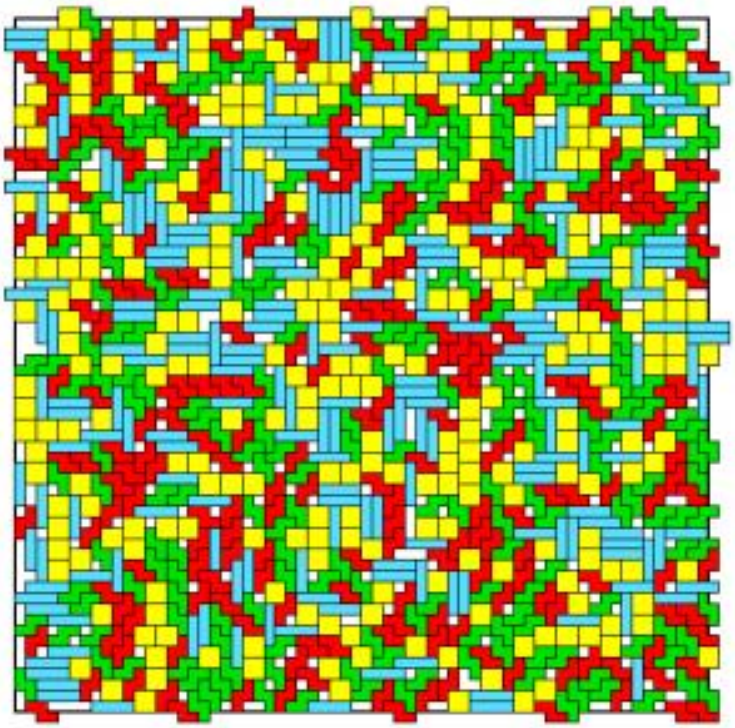
Journal reference:

1. Xiaoyong Wang, Xiaofan Ren, Keith Kahen, Megan A. Hahn, Manju Rajeswaran, Sara Maccagnano-Zacher, John Silcox, George E. Cragg, Alexander L. Efros & Todd D. Krauss. **Non-blinking semiconductor nanocrystals**. *Nature*, 2009; DOI: 10.1038/nature08072

Adapted from materials provided by University of Rochester.

http://www.sciencedaily.com/releases/2009/05/090510142559.htm

Particles, Molecules Prefer Not To Mix



WUSTL chemists headed by Lev Gelb simulated the motions and behavior of particles on a lattice and found "birds of a feather flock together." It's plainly evident that, in this four-component mixture of squares, rods, S shapes and Z shapes, the shapes all make little clusters, rather than completely mixing together. Tetris, anyone? (Credit: Image courtesy of Washington University in St. Louis)

ScienceDaily (May 11, 2009) — In the world of small things, shape, order and orientation are surprisingly important, according to findings from a new study by chemists at Washington University in St. Louis.

Lev Gelb, WUSTL associate professor of chemistry, his graduate student Brian Barnes, and postdoctoral researcher Daniel Siderius, used computer simulations to study a very simple model of molecules on surfaces, which looks a lot like the computer game "Tetris." They have found that the shapes in this model (and in the game) do a number of surprising things.

WUSTL chemists headed by Lev Gelb simulated the motions and behavior of particles on a lattice and found "birds of a feather flock together." It's plainly evident that, in this four-component mixture of squares, rods, S shapes and Z shapes, the shapes all make little clusters, rather than completely mixing together. Tetris, anyone?

"First, different shapes don't mix very well with each other; each shape prefers to associate with others of the same kind," Gelb says. "When you put a lot of different shapes together, they separate from each other on microscopic scales, forming little clusters of nearly pure fluids. This is true even for the mirror-image shapes.

"Second, the structures of the pure (single-shape) fluids are quite complex and not what we might have predicted. There is a very strong tendency for some of the shapes, like rods and S- and Z- shapes, to align in the same direction. Finally, how `different looking' the shapes are isn't a good predictor for how well they mix; it turns out that the hard-to-predict characteristic structures of the fluids are more important than the shapes themselves, in this regard."

The researchers used Monte Carlo computer simulations of a simple lattice model (think of the lattice as a checkerboard), on which are placed "tetrominoes," which are S-, Z-, L-, J-, T-, rod- and square-shaped pieces.

Gelb and his colleagues use simulations to develop an atomic-scale understanding of the behavior of complex systems. They want to understand how molecules and nanoparticles of different shapes interact with each other to gain a better understanding of self-assembly, which is important in the development of new, strong materials for one, and designed catalysts for another.

Lining up

Gelb says that there has long been interest in self-assembly and in designing things that will assemble into predictable structures. Most researchers try to hold simple shapes together energetically, using some sort of chemical lock and key, such as DNA or hydrogen bonds. But if the particles have more shape to them, surprising things can happen.

"People have known for a long time when you make round nanoparticles and deposit them on a surface and you do it well, they make a nice, crystalline lattice," Gelb says. "If you do mixtures of two sizes you can get a number of different patterns with them. But if the particles aren't round, if they are short rods or things with more structure, it gets much more complicated quickly, and there's much less known about that."

The chemists also studied all 21 mixtures of two different shapes, as well as many combinations of three or more shapes.

"In all of the binary mixtures you get small-scale phase separation, which is counterintuitive," Gelb says. "It's not that the shapes repel each other. When there's no special repulsion between things or no stronger interaction between things of the same shape, you expect things to mix really well. In fact, that's not what happens."

Using ideas from classical thermodynamics and solution theory, the team was able to understand this separation using two different quantities. One is the virial coefficient, which measures the overlap between two shapes. They found that the shapes adopt alignments that minimize this overlap. Another is the volume of mixing. If you mix two liquids together, the volume of the mixture isn't necessarily the same as the volume of pure liquids you started with. In a mixture of water and ethanol, for instance, the volume of the mixture is smaller by about five percent than the sum of the original volumes. They found that in this model the volume always goes up when mixing different shapes.

Small world

"That's another indication that they don't mix well," Gelb says. "They take up more space when you mix them than when you allow them to be separate."

The model provides information on a very small world.

"If you think of the shapes as molecules sticking to a crystalline surface they would be a few Angstroms wide," says Barnes. "If you relate the model to nanoparticles, the shapes would be much larger, on the scale of tens of nanometers across."

In explaining the alignment phenomenon, Siderius offers the analogy of a roomful of people trying to circulate among each other.

"If they're all randomly placed, they'd bump shoulders frequently," he says. "But if they aligned a bit, everyone could move around more freely, which increases the entropy. In the past, we'd think of an ordered system as being low in entropy, but in this case the ordered state is high entropy."

Does it have anything to do with Tetris?

"Well, it suggests that one of the reasons the game is difficult is that the shapes don't fit together as well as we might think," says Gelb. "That, and they come down too fast."

The results were published in the on-line edition of the journal Langmuir on April 27, 2009

Journal reference:

1. Barnes et al. **Structure, Thermodynamics, and Solubility in Tetromino Fluids**. *Langmuir*, 2009; 090427084503036 DOI: 10.1021/la900196b

Adapted from materials provided by Washington University in St. Louis.

http://www.sciencedaily.com/releases/2009/05/090504161701.htm

Battery-powered Vehicles To Be Revolutionized By New Technology

This is Dean MacNeil, a professor at the Université de Montréal's Department of Chemistry and new NSERC-Phostech Lithium Industrial Research Chair in Energy Storage and Conversion, at wheel of battery-powered car with Süd-Chemie team. (Credit: Université de Montréal)

ScienceDaily (May 11, 2009) — Thousands of small electric scooters, bicycles and wheelchairs throughout Europe and Asia are powered by LifePO4 –- a material used in advanced lithium-ion batteries developed by Université de Montréal researchers.

"It's a revolutionary battery because it is made from non-toxic materials abundant in the Earth's crust. Plus, it's not expensive,'" says Michel Gauthier, an invited professor at the Université de Montréal Department of Chemistry and co-founder of Phostech Lithium, the company that makes the battery material. "This battery could eventually make the electric car very profitable."

The theory will soon be tested, since the 100 percent electric Microcar that's set to debut in Europe this year will be and powered by the LifePO4 battery.

Phostech Lithium's production plant in St. Bruno, Quebec, produces the black LifePO4 powder, which is shipped across the world in tightly sealed barrels.

"The theoretical principle behind the battery was patented by a University of Texas professor in 1995. However, without the work of local chemists such as Nathalie Ravet, we couldn't have developed it," says Phostech Lithium engineer Denis Geoffroy.

Süd-Chemie, a leading specialty chemistry company based in Germany, first invested in Phostech Lithium in 2005. Now, just four years later, Süd-Chemie's total Canadian investments have reached $13 million and it stands as the 100% owner of Phostech Lithium. Phostech's St. Bruno plant began to produce LiFePO4 in 2006 with 20 employees and a 400 metric-ton capacity. Since then, Phostech has nearly doubled its staff.

"It is a battery that is much more stable and much safer," says Dean MacNeil, a professor at the Université de Montréal's Department of Chemistry and new NSERC-Phostech Lithium Industrial Research Chair in Energy Storage and Conversion. "In addition, it recharges much faster than previous batteries."

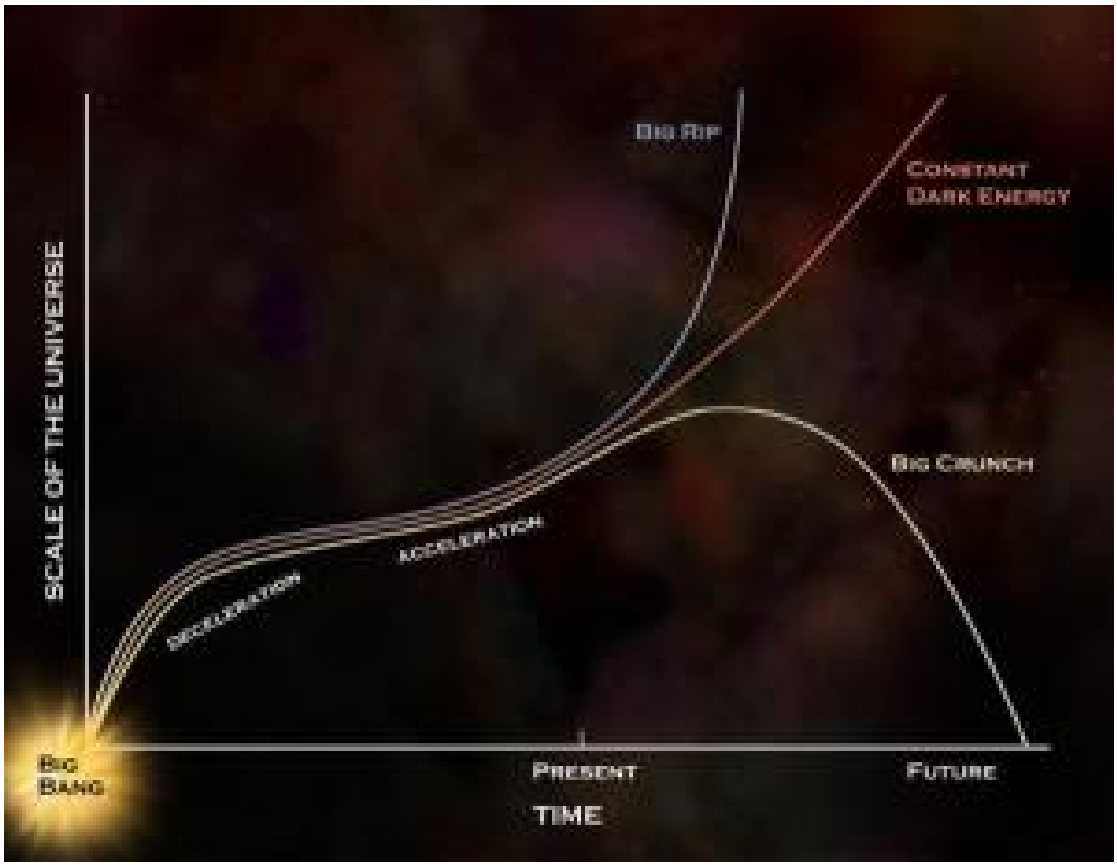
The NSERC Research Chair, funded in part by Phostech Lithium, will help investigate ways to improve the LifePO4 battery.

For Gauthier, Phostech Lithium is the product of academia and the business world coming together. "Even if we knew that lithium, iron and phosphate were theoretically promising materials, we had to make them efficient. We had to find the right voltage and maintain the right charging and discharging properties. This is where the university played a major role."

Adapted from materials provided by University of Montreal.

http://www.sciencedaily.com/releases/2009/05/090505124756.htm

The Day The Universe Froze: New Model For Dark Energy



The ultimate fate of the universe depends on the exact nature of dark energy. Depending on its properties, the universe may fly apart (the big rip) or the current expansion might reverse into contraction (the big crunch) or anything in between. (Credit: NASA/CXC/M. Weiss)

ScienceDaily (May 11, 2009) — Imagine a time when the entire universe froze. According to a new model for dark energy, that is essentially what happened about 11.5 billion years ago, when the universe was a quarter of the size it is today.

The model, published online May 6 in the journal *Physical Review D*, was developed by Research Associate Sourish Dutta and Professor of Physics Robert Scherrer at Vanderbilt University, working with Professor of Physics Stephen Hsu and graduate student David Reeb at the University of Oregon.

A cosmological phase transition — similar to freezing — is one of the distinctive aspects of this latest effort to account for dark energy — the mysterious negative force that cosmologists now think makes up more than 70 percent of all the energy and matter in the universe and is pushing the universe apart at an ever-faster rate.

Another feature that distinguishes the new formulation is that it makes a testable prediction regarding the expansion rate of the universe. In addition, the micro-explosions created by the largest particle colliders should excite the dark energy field and these excitations could appear as exotic, never-seen-before sub-atomic particles.

"One of the things that is very unsatisfying about many of the existing explanations for dark energy is that they are difficult to test," says Scherrer, "We designed a model that can interact with normal matter and so has observable consequences."

The model associates dark energy with something called vacuum energy. Like a number of existing theories, it proposes that space itself is the source of the repulsive energy that is pushing the universe apart. For many years, scientists thought that the energy of empty space averaged zero. But the discovery of quantum mechanics changed this view. According to quantum theory, empty space is filled with pairs of "virtual" particles that spontaneously pop into and out of existence too quickly to be detected.

This sub-atomic activity is a logical source for dark energy because both are spread uniformly throughout space. This distribution is consistent with evidence that the average density of dark energy has remained constant as the universe has expanded. This characteristic is in direct contrast to ordinary matter and energy, which become increasingly dilute as the universe inflates.

The theory is one of those that attribute dark energy to an entirely new field dubbed quintessence. Quintessence is comparable to other basic fields like gravity and electromagnetism, but has some unique properties. For one thing, it is the same strength throughout the universe. Another important feature is that it acts like an antigravity agent, causing objects to move away from each other instead of pulling them together like gravity.

In its simplest form, the strength of the quintessence field remains constant through time. In this case it plays the role of the cosmological constant, a term that Albert Einstein added to the theory of general relativity to keep the universe from contracting under the force of gravity. When evidence that the universe is expanding came in, Einstein dropped the term since an expanding universe is a solution to the equations of general relativity. Then, in the late 90's, studies of supernovae (spectacular stellar explosions so powerful that they can briefly outshine entire galaxies consisting of millions of stars) indicated that the universe is not just expanding but also that the rate of expansion is speeding up instead of slowing down as scientists had expected.

That threw cosmologists for a loop since they thought gravity was the only long-range force acting between astronomical objects. So they had no idea what could possibly be pushing everything apart. The simplest way to account for this bizarre phenomenon was to bring back Einstein's cosmological constant with its antigravity properties. Unfortunately, this explanation suffers from some severe drawbacks so physicists have been actively searching for other antigravity agents.

These antigravity agents (dubbed "dark energy models" in the technical literature) usually invoke quintessence or even more exotic fields. Because none of these fields have been detected in nature; however, their proponents generally assume that they do not interact significantly with ordinary matter and radiation.

One of the consequences of allowing quintessence to interact with ordinary matter is the likelihood that the field went through a phase transition — froze out — when the universe cooled down to a temperature that it reached 2.2 billion years after the Big Bang. As a result, the energy density of the quintessence field would have remained at a relatively high level until the phase transition when it abruptly dropped to a significantly lower level where it has remained ever since.

This transition would have released a fraction of the dark energy held in the field in the form of dark radiation. According to the model, this dark radiation is much different than light, radio waves, microwaves and other types of ordinary radiation: It is completely undetectable by any instrument known to man. However, nature provides a detection method. According to Einstein's theory of general relativity, gravity is produced by the distribution of energy and momentum. So the changes in net energy and momentum caused by the sudden introduction of dark radiation should have affected the gravitational field of the universe in a way that has slowed its expansion in a characteristic fashion.

In the next 10 years or so, the large astronomical surveys that are just starting up to plot the expansion of the universe by measuring the brightness of the most distant supernovas should be able to detect the slowdown in the expansion rate that the model predicts. At the same time, new particle accelerators, like

the Large Hadron Collider nearing operation in Switzerland, can produce energies theoretically large enough to excite the quintessence field and these excitations could appear as new exotic particles, the researchers say.

The research was funded by grants from the U.S. Department of Energy.

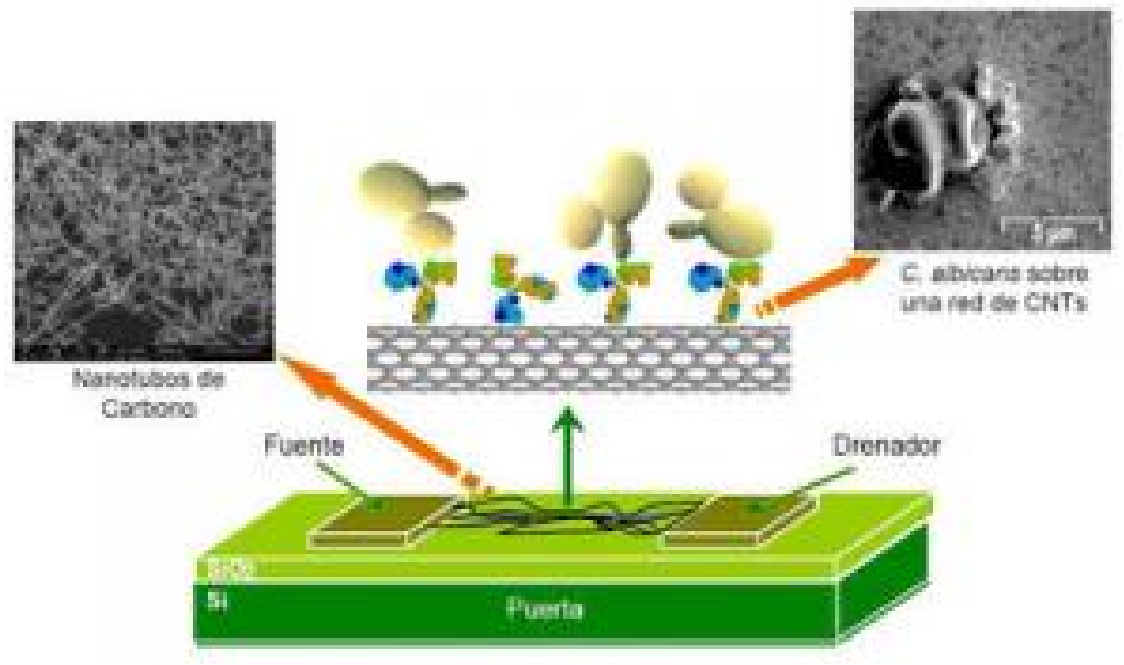
Journal reference:

1. Sourish Dutta, Emmanuel N. Saridakis, and Robert J. Scherrer. **Dark energy from a quintessence (phantom) field rolling near a potential minimum (maximum)**. *Physical Review D*, 2009; 79 (10): 103005 DOI: 10.1103/PhysRevD.79.103005

Adapted from materials provided by Vanderbilt University. Original article written by David F. Salisbury.

http://www.sciencedaily.com/releases/2009/05/090508190416.htm

Sexually Transmitted Infections: Transistors Used To Detect Fungus Candida Albicans



The Nanosensors group from the URV has created a biosensor, an electrical and biological device, which is able to selectively detect the Candida albicans yeast in very small quantities of only 50 cfu/ml (colony-forming units per millilitre). (Credit: Copyright SINC/Villamizar et al)

ScienceDaily (May 11, 2009) — The Nanosensors group from the Universidad Rovira i Virgili has created a biosensor, an electrical and biological device, which is able to selectively detect the Candida albicans yeast in very small quantities of only 50 cfu/ml (colony-forming units per millilitre).

"The technique uses field-effect transistors (electronic devices that contain an electrode source and a draining electrode connected to a transducer) based on carbon nanotubes and with Candida albicans-specific antibodies", Raquel A. Villamizar, lead author of the study said.

The Candida samples, which can be obtained from blood, serum or vaginal secretions, are placed directly on the biosensor, where the interaction between antigens and antibodies changes the electric current of the devices. This change is recorded and makes it possible to measure the amount of yeast present in a sample.

"Thanks to the extraordinary charge transference properties of the carbon nanotubes, the fungus detection process is direct, fast, and does not require the use of any marker", remarks Villamizar, who is co-author of a study that provides details of the biosensor and was published recently in the journal *Sensors and Actuators B: Chemical.*

To date, conventional diagnosis of Candida has been carried out using microbial cultures, serological tests, PCR molecular biology techniques (polymerase chain reactions used to amplify DNA), or immunoassays such as ELISA (Enzyme Linked Inmunoabsorbent Assay).

These techniques require long analysis times and sometimes give rise to false positives and negatives. ELISA also requires the use of markers (compounds that must be added to detect the presence of yeast by fluorescence and other techniques).

The new carbon nanotubes biosensor, however, "makes it possible to improve some of the quality parameters of the traditional methods, for example the speed and simplicity of measurements, and it is an alternative tool that could be used in routine sample analysis", explains Villamizar.

The researcher adds that by using this biosensor "it will be possible in future to obtain a rapid diagnosis of infection with this pathogen, which will help to ensure administration of the correct prophylactic treatments".

The Candida albicans fungus exists naturally in the skin, mouth, the mucous membranes lining the digestive tract, and the respiratory and genitourinary systems. This yeast can cause anything from simple mycosis of the skin to complicated cases of candidiasis. It is much more commonly found in patients suffering from immunodeficiency, tumours, diabetes and lymphomas, among other diseases.

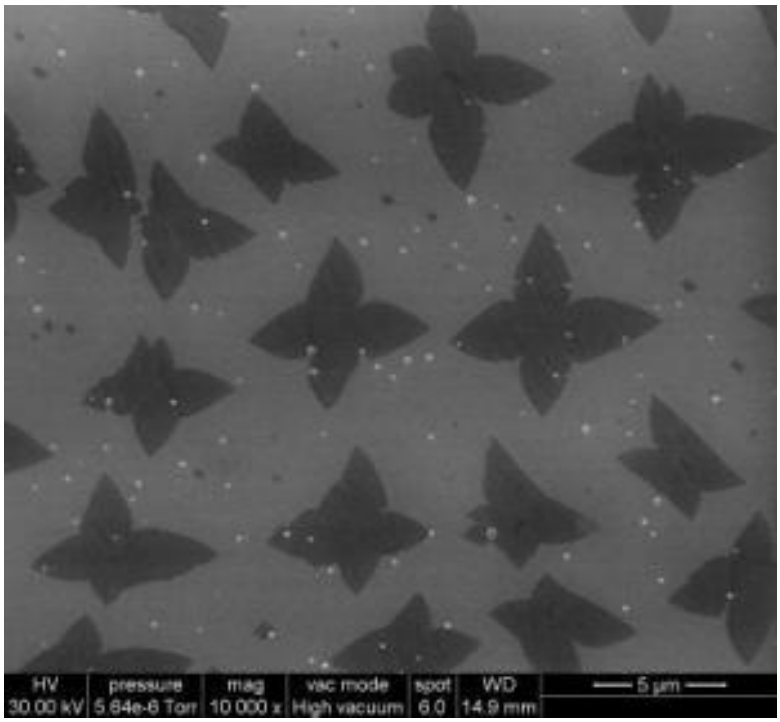
Journal reference:

1. Villamizar et al. **Improved detection of Candida albicans with carbon nanotube field-effect transistors**. *Sensors and Actuators B Chemical*, 2009; 136 (2): 451 DOI: 10.1016/j.snb.2008.10.013

Adapted from materials provided by Plataforma SINC.

http://www.sciencedaily.com/releases/2009/05/090507094308.htm

Faster Computers, Electronic Devices Possible After Scientists Create Large-area Graphene On Copper



Scanning electron microscope image of graphene "seeds" on copper foil. Credit: Xuesong Li and Weiwei Cai (Credit: Image courtesy of University of Texas at Austin)

ScienceDaily (May 11, 2009) — The creation of large-area graphene using copper may enable the manufacture of new graphene-based devices that meet the scaling requirements of the semiconductor industry, leading to faster computers and electronics, according to a team of scientists and engineers at The University of Texas at Austin.

"Graphene could lead to faster computers that use less power, and to other sorts of devices for communications such as very high-frequency (radio-frequency-millimeter wave) devices," said Professor and physical chemist Rod Ruoff, one of the corresponding authors on the *Science* article. "Graphene might also find use as optically transparent and electrically conductive films for image display technology and for use in solar photovoltaic electrical power generation."

Graphene, an atom-thick layer of carbon atoms bonded to one another in a "chickenwire" arrangement of hexagons, holds great potential for nanoelectronics, including memory, logic, analog, opto-electronic devices and potentially many others. It also shows promise for electrical energy storage for supercapacitors and batteries, for use in composites, for thermal management, in chemical-biological sensing and as a new sensing material for ultra-sensitive pressure sensors.

"There is a critical need to synthesize graphene on silicon wafers with methods that are compatible with the existing semiconductor industry processes," Ruoff said. "Doing so will enable nanoelectronic circuits to be made with the exceptional efficiencies that the semiconductor industry is well known for."

Graphene can show very high electron- and hole-mobility; as a result, the switching speed of nanoelectronic devices based on graphene can in principle be extremely high. Also, graphene is "flat" when placed on a substrate (or base material) such as a silicon wafer and, thus, is compatible with the wafer-processing approaches of the semiconductor industry. The exceptional mechanical properties of graphene may also enable it to be used as a membrane material in nanoelectromechanical systems, as a sensitive pressure sensor and as a detector for chemical or biological molecules or cells.

The university researchers, including post-doctoral fellow Xuesong Li, and Luigi Colombo, a TI Fellow from Texas Instruments, Inc., grew graphene on copper foils whose area is limited only by the furnace used. They demonstrated for the first time that centimeter-square areas could be covered almost entirely with mono-layer graphene, with a small percentage (less than five percent) of the area being bi-layer or tri-layer flakes. The team then created dual-gated field effect transistors with the top gate electrically isolated from the graphene by a very thin layer of alumina, to determine the carrier mobility. The devices showed that the mobility, a key metric for electronic devices, is significantly higher than that of silicon, the principal semiconductor of most electronic devices, and comparable to natural graphite.

"We used chemical-vapor deposition from a mixture of methane and hydrogen to grow graphene on the copper foils," said Ruoff. "The solubility of carbon in copper being very low, and the ability to achieve large grain size in the polycrystalline copper substrate are appealing factors for its use as a substrate -- along with the fact that the semiconductor industry has extensive experience with the use of thin copper films on silicon wafers. By using a variety of characterization methods we were able to conclude that growth on copper shows significant promise as a potential path for high quality graphene on 300-millimeter silicon wafers."

The university's effort was funded in part by the state of Texas, the South West Academy for Nanoelectronics (SWAN) and the DARPA CERA Center. Electrical and computer engineering Professor Sanjay Banerjee, a co-author of the Science paper, directs both SWAN and the DARPA Center.

"By having a materials scientist of Colombo's caliber with such extensive knowledge about all aspects of semiconductor processing and now co-developing the materials science of graphene with us, I think our team exemplifies what collaboration between industrial scientists and engineers with university personnel can be," said Ruoff, who holds the Cockrell Family Regents Chair #7. "This industry-university collaboration supports both the understanding of the fundamental science as well its application."

Other co-authors of the work not previously mentioned include: research associate Richard Piner of the Department of Mechanical Engineering; Assistant Professor Emanuel Tutuc of the Department of Electrical and Computer Engineering; post-doctoral fellows Jinho An, Weiwei Cai, Inhwa Jung, Aruna Velamakanni and Dongxing Yang in the Department of Mechanical Engineering; and graduate students Seyoung Kim and Junghyo Nah in the Department of Electrical and Computer Engineering.

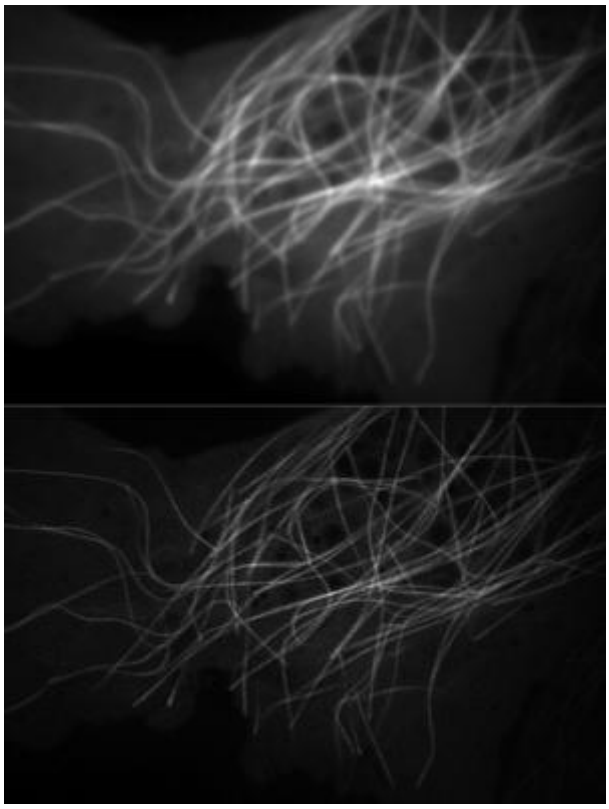
Journal reference:

1. Li et al. **Large-Area Synthesis of High-Quality and Uniform Graphene Films on Copper Foils**. *Science*, 2009; DOI: 10.1126/science.1171245

Adapted from materials provided by University of Texas at Austin, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/05/090507141402.htm

Microscope Capable Of Live Imaging At Double The Resolution Of Fluorescence Microscopy Developed



Images of GFP-labeled microtubules. Top: the conventional image. Bottom: at 100nm resolution with structured illumination. (Credit: Image courtesy of University of Georgia)

ScienceDaily (May 11, 2009) — A crucial tool in the evolution of scientific capability in bioscience, the fluorescence microscope has allowed a generation of scientists to study the properties of proteins inside cells. Yet as human capacity for discovery has zoomed to the nanoscale, fluorescence microscopy has struggled to keep up. Now, a team that includes UGA engineer Peter Kner has developed a microscope that is capable of live imaging at double the resolution of fluorescence microscopy using structured illumination.

The laws of physics have limited the resolution of fluorescence microscopy, whereby a fluorescent marker is used to distinguish specific proteins, to about 200 nanometers. At this resolution significant detail is lost about the activity within a cell. The increased resolution by structured illumination is an engineering feat that will help scientists learn more about cell behavior and study mechanisms important for human disease.

"Our understanding of what is going on inside cells and our ability to manipulate them has advanced so much that it has become more and more important to see them at a better resolution," said Kner, who joined UGA this spring semester. Kner built the structured illumination microscope with colleagues at the University of California, San Francisco.

This work follows on at least a decade of research building on the nearly fifty-year history of fluorescence microscopy. The technology has been a multi-disciplinary springboard of optical engineering, chemistry and biology, in which the disciplines have all contributed to visualizing fluorescent dyes attached to proteins, advancing our understanding of cellular activity. The importance of fluorescence microscopy was recently recognized with the 2008 Nobel Prize for Chemistry which was awarded for the

development of the green fluorescent protein (GFP), which has played a crucial role in our identification and understanding of proteins.

"What we've done is develop a much faster system that allows you to look at live cells expressing GFP, which is a very powerful tool for labeling inside the cell," Kner explained.

"It would be difficult to overstate the importance of bio-imaging to ongoing research in human health," said Dale Threadgill, director of the UGA Faculty of Engineering. "The ability to shine a light on the leading-edge of scientific discovery will define the route to entirely new regimens of health management at the intersections of science and engineering, and Dr. Kner has joined a distinguished cadre at UGA to continue working at that interface," Threadgill added.

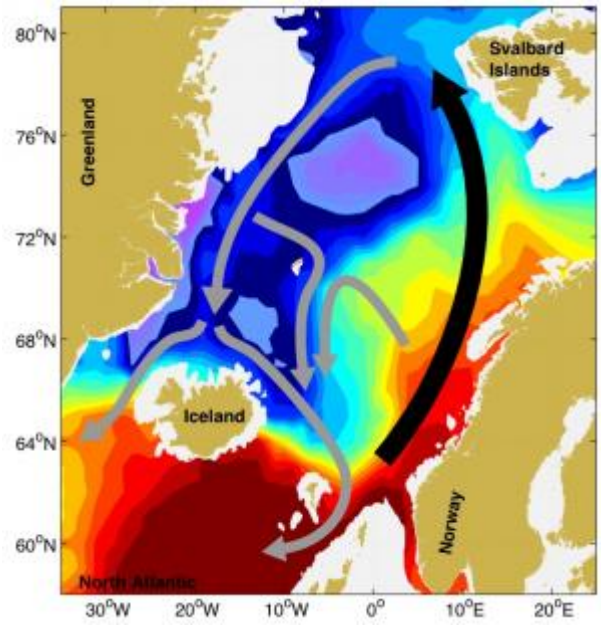
Journal reference:

1. Kner et al. **Super-resolution video microscopy of live cells by structured illumination**. *Nature Methods*, 2009; 6 (5): 339 DOI: 10.1038/nmeth.1324

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

http://www.sciencedaily.com/releases/2009/05/090504161706.htm

Unique Survey Of Ocean Climate May Improve Climate Predictions



The overturning from warm (red) into cold water masses (blue) in the Nordic Seas. The black arrow indicate the extension of the Gulf Stream into the Norwegian Sea, and the gray arrows the cold return flow at depth. (Credit: Image courtesy of University of Bergen)

ScienceDaily (May 11, 2009) — A research team from the Nansen Environmental and Remote Sensing Center, and the Bjerknes Centre for Climate Research, both in Bergen, Norway, has studied observed anomalies in ocean climate, and identified the anomalies' progression with the circulation of the Nordic Seas, and the Norwegian Sea in particular.

The Nordic Seas have been much surveyed by, e.g., Norwegian, Faroese, Icelandic, and (Soviet) Russian research vessels since 1950.

The present study is the first large-scale synthesis of this rich observational documentation on annual to decadal time scales.

"The traditional and common understanding is that variability in the exchange of water masses between the Nordic Seas and the North Atlantic Ocean is governed by changes in the northern deep waters. Our analysis does not support this concept. We find that anomalies can be traced back to the extension of the Gulf Stream into the Norwegian Sea," says the lead author of the study, dr. Tor Eldevik of the Nansen Center.

The Norwegian study improves the understanding of the Atlantic Ocean's overturning circulation from a warm Gulf Stream in the surface to a cold return flow at depth. The analysis thus offer a new benchmark for evaluating which ocean regions and observations are the more appropriate for understanding past and present climate change. The study provides an observational basis for the development of future monitoring or model systems for climate prediction covering the North Atlantic/Nordic Seas region.

"It is a prerequisite for predicting future climate to identify and understand the climate variability of recent decades as documented by the instrumental record. Our study will hopefully be a valuable reference for identifying future change," says Eldevik.

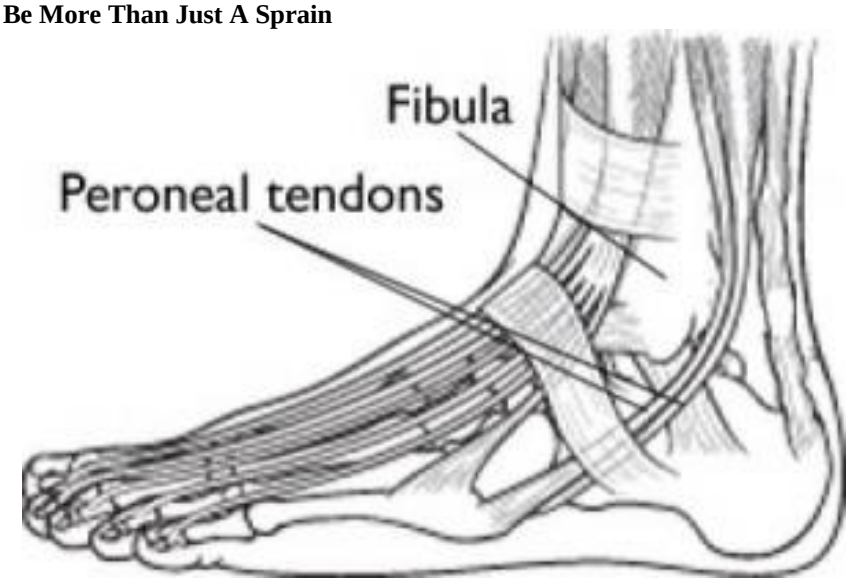
Journal reference:

1. Eldevik et al. **Observed sources and variability of Nordic seas overflow**. *Nature Geoscience*, 2009; DOI: 10.1038/ngeo518

Adapted from materials provided by University of Bergen, via AlphaGalileo.

http://www.sciencedaily.com/releases/2009/05/090504121923.htm

Chronic Ankle Pain May Be More Than Just A Sprain



Line drawing of an ankle, showing where the peroneal tendons are located. (Credit: Copyright American Academy of Orthopaedic Surgeons)

ScienceDaily (May 11, 2009) — Ankle sprains are a common injury after a fall, sudden twist or blow to the ankle joint. Approximately 40 percent of those who suffer an ankle sprain will experience chronic ankle pain, even after being treated for their initial injury.

A review article published in the May 2009 issue of the *Journal of the American Academy of Orthopaedic Surgeons* (JAAOS) explains that tendon injuries to the ankle can be a possible cause for this chronic pain. In some cases, the condition is untreated or overlooked which prolongs the pain and the problem.

"When patients injure their ankles, the injury may not seem serious at first," explains Terrence Philbin, DO, lead author of the article and Fellowship Director of the Orthopedic Foot and Ankle Center in Columbus, Ohio. "People may not seek medical attention and they can think it will just get better on its own. I think that is why this condition often goes undiagnosed."

The authors of the article describe how in some cases chronic ankle pain may actually be the result of injuries to the peroneal tendons.

The peroneal tendons are located behind the outside portion of the anklebone (called the fibula). The tendons help to stabilize the foot and ankle.

Tendon injuries can include tendonitis or swelling around the tendons. In more severe cases, the peroneal tendons can actually tear or there can be a swelling of the tendons behind the fibula bone. This can cause the ligament that holds the tendons together to stretch out and tear, or even rupture.

Symptoms associated with peroneal tendon injuries can include:

- Ankle pain that is not responding to treatment
- Swelling and tenderness around the outside of the ankle
- Pain behind the anklebone
- Pain that transmits from the ankle down into the foot

The use of magnetic resonance imaging (MRI) or ultrasound can be helpful when identifying and diagnosing peroneal tendon injuries and disorders. "These imaging techniques offer a more complete look

at the peroneal tendons," noted Philbin. "One might consider getting an MRI or ultrasound especially if you have chronic ankle pain."

If the condition is caught early, non-operative treatment options can include:

- Rest, ice and elevation
- Anti-inflammatory medication
- Immobilization in a cast or brace
- Physical therapy

More serious injuries of the peroneal tendons, including tears or ruptures, will very likely require surgery.

Peroneal tendon injuries can happen suddenly or can develop over time. The injury is most common among athletes involved in sports that require repetitive ankle motion and in individuals who have high arches of the foot.

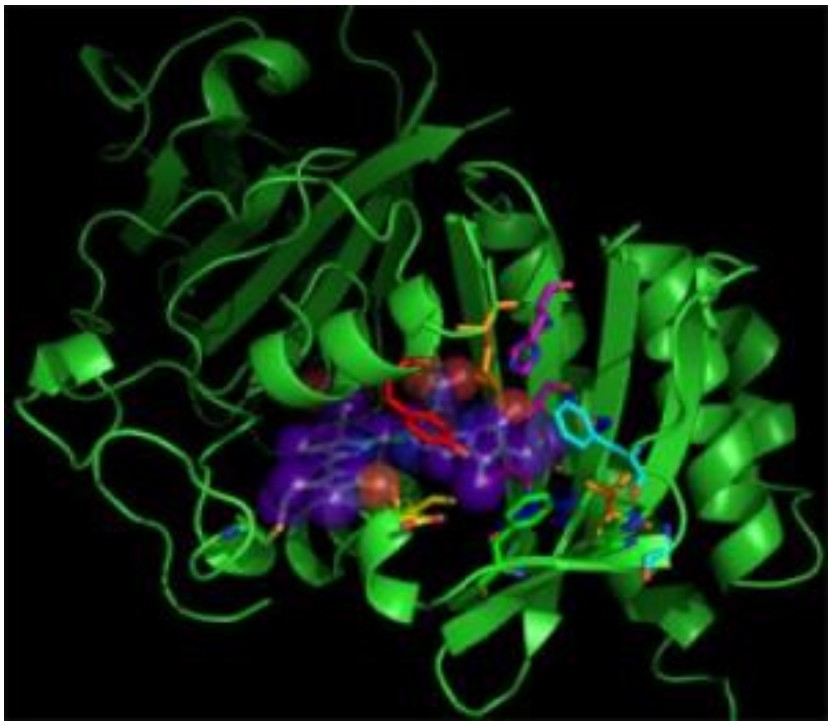
A proper diagnosis is essential in order to treat peroneal tendon injuries correctly and to help alleviate chronic pain. Philbin reminds patients, "If you have ankle pain and it is not getting better, do not ignore it. Get it evaluated by a physician who has experience treating foot and ankle injuries."

Terrence Philbin, DO, and the co-authors of this article received no compensation for this review article.

Adapted from materials provided by American Academy of Orthopaedic Surgeons.

http://www.sciencedaily.com/releases/2009/05/090501090931.htm

Expression Of Infrared Fluorescence Engineered In Mammals



This is the structure of an infrared fluorescent protein. (Credit: UC San Diego School of Medicine)

ScienceDaily (May 16, 2009) — Researchers at the University of California, San Diego – led by 2008 Nobel-Prize winner Roger Tsien, PhD – have shown that bacterial proteins called phytochromes can be engineered into infrared-fluorescent proteins (IFPs). Because the wavelength of IFPs is able to penetrate tissue, these proteins are suitable for whole-body imaging in small animals. Their findings will be published in the May 8 edition of the journal *Science*.

"The development of IFPs may be important for future studies in animals – to find out how cancers develop, how infections grow or diminish in mice, or perhaps how neurons are firing in flies," said Tsien, professor of pharmacology, chemistry and biochemistry at UC San Diego and a Howard Hughes Medical Institute investigator. Tsien was one of three scientists awarded the 2008 Nobel Prize in Chemistry for discovery of the Green Fluorescent Protein (GFP) and a series of important developments which have led to its use as a tagging tool in bioscience.

The limitation of using GFP in living mammals is that its wave lengths are not long enough to allow light to penetrate far enough to allow inner cells to glow with fluorescent light.

First author Xiaokun Shu, PhD, of the UC San Diego School of Medicine's Department of Pharmacology and the Howard Hughes Medical Institute, coerced the phytochrome from the bacteria Deinococcus radiodurans to fluoresce – the first protein to glow in infrared and work in mouse models. A phytochrome is a photoreceptor – a pigment that plants and bacteria use to detect light – which is sensitive to light in the red and far-red region of the visible spectrum.

"IFPs express well in mammalian cells and spontaneously incorporate biliverdin, a green pigment that is present in humans and other mammals," said Tsien. Biliverdin is the substance responsible for the yellowish-green color of a bruise as it fades, for example. Biliverdin normally has negligible fluorescence. However, Shu was able to coax the biliverdin-containing protein to fluoresce by cutting off the parts of the phytochrome that divert the energy of the light.

"We hoped that by doing so, the light's energy wouldn't go anywhere else but would instead go out and become fluorescent," Shu said, adding that the protein is "moderately fluorescent, but we still have a long way to go."

Tsien stated that, while this work is promising for future studies in animal models, he doesn't think it will be applied directly to imaging in humans for several reasons.

"First, all fluorescent proteins derived from corals, jellyfish, and now bacteria are powerful in basic research because they are encoded by a gene," said Tsien. "Introducing such genes into people would pose big scientific and ethical problems."

He explained that, secondly, humans are still too thick and opaque for the infrared fluorescence to get deep inside our bodies, although scientists can now see faintly through a mouse with infrared, because mice are so much smaller.

The Tsien lab is working on a different project to develop a technique without these limitations, one that can be used for imaging in humans. His hope is that, one day, people will be able to go in for their annual check ups and know if they have cancer because tumors will light up by magnetic resonance imaging of diagnostic molecules.

But for now, Tsien, Shu and their colleagues at UC San Diego hope that the prototype they have developed can be used to make other, improved fluorescent bacterial proteins from among the huge numbers harnessed from other organisms – IFPs that can be used in important animal studies.

This technology (SD2008-303) and related technologies are available for licensing and commercial development through the UCSD Technology Transfer Office.

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

http://www.sciencedaily.com/releases/2009/05/090507141353.htm

Rational Design Of Vaccines: A Long But Essential Journey

ScienceDaily (May 16, 2009) — The holy grail of the defence mechanism against infectious diseases and tumours has not yet been discovered. In the search for a 'master switch' in the immune apparatus of humans and animals, many strategies still need to be explored before the enormous potency of this complex system can be activated and controlled in the right manner.

In contrast to what happened in the past, a rational approach is the best way forward – according to Professor Virgil Schijns in his inaugural speech, to be given on 14 May, on the occasion of accepting the office of 'Professor by special appointment' in Immune Intervention at Wageningen University.

The extremely complex defence mechanism of humans and other animals has, to a certain extent, been discovered by trial and error. In 430 BC, for example, the Greek Thucydides* described how the plague in Athens did not affect those who had recovered from it previously. Those people were therefore able to look after the sick "because they knew they would never be struck down a second time". The first vaccinations in human beings probably took place in China and India in the seventh century when powder from pock scabs was inserted into the nose. In Western Europe it was the English country doctor Edward Jenner who, in 1798, described a trial-and-error experiment which established him as founder of vaccinology. He took pus from a skin wound in a milkmaid who had been infected with the harmless cowpox virus and then injected it into an eight-year-old boy. After all, he already knew that milkmaids were resistant to the pox. Two months later, Jenner infected the boy with the real virus and the boy turned out to be immune – no surprise to Jenner, but he was nevertheless pleased.

An experimental approach of this kind could have ended quite differently as it did not conform to the ethically responsible route that researchers are expected to emulate these days. That is why the trial-and-error method now belongs to the past.

Rational design

The new way of exploring the potency of the immune system is to deploy rational vaccine design, Professor Schijns declared in his inaugural speech, Immune Intervention. It is a question of pressing the right buttons. "Producing vaccines in a rational way means making their functioning and safety more predictable".

The fundamental question ('the holy grail') in immunological research is how to include antigens (that invoke reactions in the body) in the vaccines in such a way that they produce the correct defence reaction by, for example, recruiting and manufacturing specialised cells that can attack the intruders.

In his function as Chair of Immune Intervention, Professor Schijns will try to discover the essential steps in and components of the biochemical reactions involved and, in addition, to deploy them for rational design of vaccines. This will not, however, mean that a preventive or therapeutic remedy has been discovered. Various hurdles have to be overcome, such as the production method, costs, the half-life (the gradual decrease in effectiveness of the drug) and an efficient way of getting the drug to exactly the right place in the body.

That is why Professor Schijns' research group will be focusing on the cells and molecules which are still being discovered continually and which play a role in the defence mechanism. However, the group will also be focusing on known stimulants, the functioning of which is still unknown.

Adapted from materials provided by Wageningen University and Research Centre.

http://www.sciencedaily.com/releases/2009/05/090515084045.htm

Ancient Trading Raft Sails Anew

Students from Professor of Archeology and Ancient Technology Dorothy Hosler's class work on making the full-size authentic replica of a pre-Columbian South American balsa oceangoing raft on the Charles river. Here Leslie Dewan and Feng Wu work. (Credit: Photo / Donna Coveney)

ScienceDaily (May 15, 2009) — For the first time in nearly 500 years, a full-size balsa-wood raft just like those used in pre-Columbian Pacific trade took to the water on Sunday, May 10. Only this time, instead of the Pacific coast between Mexico and Chile where such rafts carried goods between the great civilizations of the Andes and Mesoamerica as long as a millennium ago, the replica raft was floated in the Charles River basin.

The faithful reproduction of the ancient sailing craft, built from eight balsa logs brought from Ecuador for the project, was created in less than six weeks by 30 students in the Ancient Materials class taught by Professor of Archeology and Ancient Technology Dorothy Hosler of the department of Materials Science and Engineering. The replica was based on an analysis carried out by Hosler and her former student Leslie Dewan '06, which was published last year in the *Journal of Anthropological Research.*

Based on drawings and descriptions recorded by Spanish, Portuguese and Dutch explorers, Dewan and Hosler figured out the dimensions and construction methods that most likely were used for the ancient craft, and reproduced these as accurately as possible. While some other attempts have been made to reproduce the ancient craft, including a one-third scale version built by Dewan and other students five years ago, none had previously copied the ancient designs and materials so precisely. No modern materials were used in the construction.

The full-size replica was built to confirm the computer analysis of the craft's size, capacity and construction, and to prove that such a vessel really is seaworthy and could have made the voyages of thousands of miles indicated by Hosler's research on similarities in the metalwork design and manufacture between the Andean and Mesoamerican cultures. The reproduction was financed through a donation from Alcan-Beltec Corp.The raft will undergo a series of tests over the summer, but so far performed very well, Hosler says. Although there were high winds that caused problems for many sailboats on the Charles on Sunday, the raft with nine students aboard remained very stable, she said.

Journal reference:

1. Leslie Dewan and Dorothy Hosler. **Ancient Maritime Trade on Balsa Rafts: An Engineering Analysis**. *Journal of Anthropological Research*, 2008; 64 (1) [link]

Adapted from materials provided by Massachusetts Institute of Technology.

http://www.sciencedaily.com/releases/2009/05/090513183516.htm

Managing Douglas-fir Forests For Diversity

Fir trees. (Credit: iStockphoto/Lori Howard)

ScienceDaily (May 15, 2009) — Creating diverse forests for multiple uses is important to natural resource managers and landowners. A study conducted in southwestern Oregon provides forest managers with information that offers choices when managing land for a variety objectives that may include a high level of wood production, a moderate level of wood production with some wildlife habitat features, or low wood production that provides cover and forage for a wider variety of wildlife species.

"Land managers need effective approaches for creating and modifying forest stand structures to satisfy a broad range of objectives," explains Tim Harrington, a research forester at the Forest Service's Pacific Northwest Research Station. "Silvicultural treatments can be used to shift competitive interactions between conifers and hardwoods to create the desired balance between wood production and wildlife habitat."

Harrington and John Tappeiner, an emeritus Oregon State University forestry professor, initiated a study in 1983 in southwestern Oregon on Douglas-fir plantations near Cave Junction and Glendale, Oregon. During the first phase of the study, when the plantations were 1 or 2 years old, a single herbicide treatment was used to reduce hardwood density to several levels. The Douglas-fir were thinned at age 15 to leave densities of 120 to 220 dominant trees per acre.

About 8 years later (ages 23 to 25), the scientists found that:

- Three very different stand structures emerged.

1. Highly productive, pure stands of Douglas-fir, 39 to 52 feet tall, occurred where hardwoods were completely removed at age 2 years.
2. Where 25 percent of the original hardwood density was retained, moderately productive stands developed with two distinct canopy layers: Douglas-fir (39 feet tall) growing above hardwoods (23 feet tall).
3. Where the original hardwood density was retained, Douglas-fir and hardwoods occupy the same canopy layer, 26 to 30 feet tall, in mixed stands that are low in productivity but may have the potential to provide cover and forage for a range of wildlife species.

- Each of the stand structures had different potentials for habitat and for wood production.
- Douglas-fir stand volume where all hardwoods were removed was about three times that where hardwoods were not removed, and these stands may provide wildlife cover for shade in summer and warmth in the winter.
- The stands with hardwoods will provide hardwood seeds for wildlife food, and birds can use hardwood layers in the understory for nesting and foraging.
- Douglas-fir mortality from black stain root disease was greater where all hardwoods were removed than where some hardwoods were retained. The disease is known to be spread during precommercial thinning operations because the fresh slash from thinning is colonized by insects, which carry the disease.
- It is unknown how long these stand structures will persist given future competitive interactions; however, differences in Douglas-fir yield among the three stand structures are likely to remain stable or even increase as the taller-growing species continues to exert its dominance.

"Managing stands with moderate hardwood densities enables a stratified structure to develop with conifers and hardwoods occupying dominant and intermediate canopy layers, respectively," explains Harrington. "Combining high hardwood densities with precommercial thinning of Douglas-fir creates a codominant stand structure with conifers and hardwoods occupying the same canopy layer. Managers may also want to retain some hardwoods in areas prone to black stain root disease, since the hardwoods may reduce mortality of planted Douglas-fir following thinning."

Journal reference:

1. Harrington et al. **Long-term effects of tanoak competition on Douglas-fir stand development**. *Canadian Journal of Forest Research*, 2009; 39 (4): 765 DOI: 10.1139/X09-004

Adapted from materials provided by USDA Forest Service, Pacific Northwest Research Station, via EurekAlert!, a service of AAAS

http://www.sciencedaily.com/releases/2009/05/090508135007.htm

Neandertals Sophisticated And Fearless Hunters, New Analysis Shows

Model of the Neanderthal man. Exhibited in the Dinosaur Park Münchehagen, Germany. (Credit: iStockphoto/Klaus Nilkens)

ScienceDaily (May 14, 2009) — Neandertals, the 'stupid' cousins of modern humans were capable of capturing the most impressive animals. This indicates that Neandertals were anything but dim. Dutch researcher Gerrit Dusseldorp analysed their daily forays for food to gain insights into the complex behaviour of the Neandertal. His analysis revealed that the hunting was very knowledge intensive.

Although it is now clear that Neandertals were hunters and not scavengers, their exact hunting methods are still something of a mystery. Dusseldorp investigated just how sophisticated the Neandertals' hunting methods really were. His analysis of two archaeological sites revealed that Neandertals in warm forested areas preferred to hunt solitary game but that in colder, less forested areas they preferred to hunt the more difficult to capture herding animals.

The Neandertals were not easily intimated by their game. Rhinoceroses, bisons and even predators such as the brown bear were all on their menu. Dusseldorp established that just as for modern humans, the environment and the availability of food determined the choice of prey and the hunting method adopted. If the circumstances allowed it, Neandertals lived in large groups and even the most attractive and difficult to catch prey were within their reach.

Coordination and communication

Although herding animals are difficult to surprise and isolate, many such game lived on the open steppes. This large supply attracted large groups of Neandertals. That the Neandertals were capable of hunting down such elusive game demonstrates that they had good coordination skills and could communicate well with each other.Each prey has a specific cost-benefit scenario. For example, game that are more difficult to catch yield more calories and have a more usable, thick fleece. Dusseldorp used these data to examine the Neandertal's preferences. He also analysed the prey of hyenas in the same manner. Hyenas were important competitors of Neandertals as they had a similar dietary pattern.

Dusseldorp demonstrated that Neandertals, thanks to their intelligence, even surpassed hyenas at capturing the strongest game. All things being considered, the Neandertals were skilled and highly intelligent hunters. So the idea that Neandertals were brute musclemen can be dismissed.This study was part of NWO project "Thoughtful Hunters? The Archaeology of Neandertal Communication and Cognition." Dusseldorp is continuing his research with a postdoc position in Johannesburg. There he shall focus on the modern humans that evolved in Africa.

Adapted from materials provided by Netherlands Organization for Scientific Research, via AlphaGalileo.

http://www.sciencedaily.com/releases/2009/05/090514084115.htm

Working On The Railroad? Using Concrete Could Help Environment

Concrete railway cross ties could be an eco-friendly alternative to those made of wood, scientists report. (Credit: Tomasz Sienicki)

ScienceDaily (May 14, 2009) — Wood or concrete? Railroads around the world face that decision as they replace millions of deteriorating cross ties, also known as railway sleepers, those rectangular objects used as a base for railroad tracks. A new report concludes that emissions of carbon dioxide — one of the main greenhouse gases contributing to global warming — from production of concrete sleepers are up to six times less than emissions associated with timber sleepers.

In the study, Robert Crawford points out that there have been long-standing concerns about environmental consequences of manufacturing railway sleepers because it involves harvesting large amounts of timber. Reinforced concrete sleepers are an alternative that offer greater strength, durability and long-term cost savings, he said. Critics of using concrete sleepers have charged that their manufacture increases greenhouse gas emissions as it involves higher consumption of fuel when compared to production of wood sleepers.

Crawford studied the greenhouse gas emissions of wooden and reinforced concrete sleepers based on one kilometer (0.62 miles) length of track over a 100-year life cycle. He found that emissions from reinforced concrete sleepers can be from two to six times lower than those from timber. "The results suggest strongly that reinforced concrete sleepers result in lower life cycle greenhouse emissions than timber sleepers," the report states.

Journal reference:

1. Crawford et al. **Greenhouse Gas Emissions Embodied in Reinforced Concrete and Timber Railway Sleepers**. *Environmental Science & Technology*, 2009; 090417083833050 DOI: 10.1021/es8023836

Adapted from materials provided by American Chemical Society.

http://www.sciencedaily.com/releases/2009/05/090511115055.htm

Can Happiness Be Inherited?

Can Happiness Be Inherited? Hormones and chemicals resulting from happiness, depression and other mental states can affect our eggs and sperm, resulting in lasting changes in our children at the time of their conception. (Credit: iStockphoto/Quavondo Nguyen)

ScienceDaily (May 14, 2009) — A new study suggests that our feelings in our lifetime can affect our children.

Dr. Halabe Bucay suggests that a wide range of chemicals that our brain generates when we are in different moods could affect 'germ cells' (eggs and sperm), the cells that ultimately produce the next generation. Such natural chemicals could affect the way that specific genes are expressed in the germ cells, and hence how a child develops.

In his article in the latest issue of *Bioscience Hypotheses*, Dr Alberto Halabe Bucay of Research Center Halabe and Darwich, Mexico, suggested that the hormones and chemicals resulting from happiness, depression and other mental states can affect our eggs and sperm, resulting in lasting changes in our children at the time of their conception.

Brain chemicals such as endorphins, and drugs, such as marijuana and heroin are known to have significant effects on sperm and eggs, altering the patterns of genes that are active in them.

"It is well known, of course, that parental behavior affects children, and that the genes that a child gets from its parents help shape that child's character." said Dr. Halabe Bucay. "My paper suggests a way that the parent's psychology before conception can actually affect the child's genes."

"This is an intriguing idea" commented Dr. William Bains, Editor of Bioscience Hypotheses. "We wanted to publish it to see what other scientists thought, and whether others had data that could support or disprove it. That is what our journal is for, to stimulate debate about new ideas, the more groundbreaking, the better."

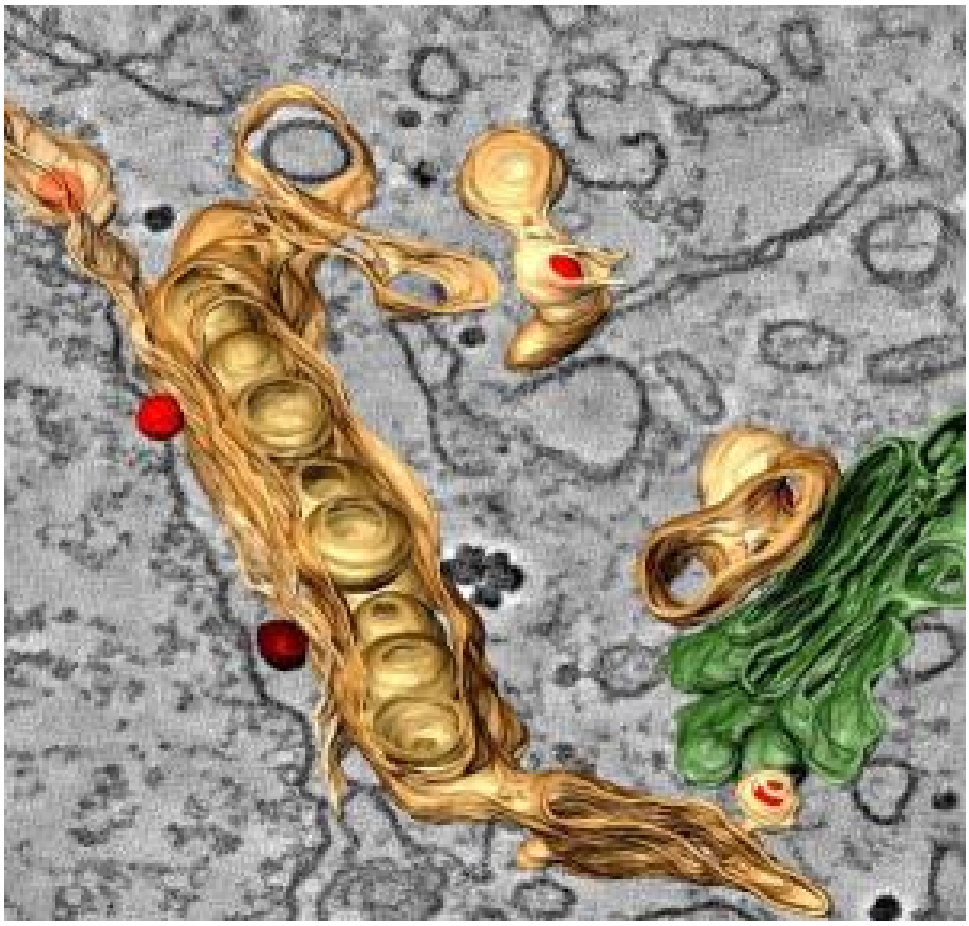
Journal reference:

1. Halabe Bucay et al. **Endorphins, personality, and inheritance: Establishing the biochemical bases of inheritance**. *Bioscience Hypotheses*, May 7, 2009; DOI: 10.1016/j.bihy.2009.03.003

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

http://www.sciencedaily.com/releases/2009/05/090514101937.htm

Visualizing Virus Replication In Three Dimensions



The gray background is a normal, two-dimensional image of the virus on an electron microscope. The 3D model is superimposed. The tubules of the endoplasmic reticulum and inside them the balloon-like vesicles where the dengue virus replicates its genome can be seen. (Credit: Hygiene Institute at Heidelberg University Hospital)

ScienceDaily (May 14, 2009) — Dengue fever is the most common infectious disease transmitted by mosquitoes – some 100 million people around the world are infected. Researchers at the Hygiene Institute at Heidelberg University Hospital are the first to present a three-dimensional model of the location in the human cell where the virus is reproduced.

Their research provides an insight into the exact process of viral replication and serves as a model for other viruses whose replication is still unclear, such as the hepatitis C virus. In addition, it offers new approaches for developing measures to prevent or treat dengue fever. Up to now, neither a vaccine nor a specific antiviral therapy exists.

Professor Dr. Ralf Bartenschlager, director of the Department of Molecular Virology at the Heidelberg Hygiene Institute and his team, working in cooperation with colleagues from the European Molecular Biology Laboratory (EMBL) have published their study in the latest issue of the prestigious journal Cell Host & Microbes.

Viruses do not have a metabolism and cannot produce proteins from their genetic material (RNA or DNA) on their own. They can replicate only inside a host cell – but where and how exactly does this take place? The answer to this question is crucial for developing therapy.

Viruses transform human cell membranes for their purposes

Dengue viruses reproduce in what is known as the endoplasmic reticulum, a membrane network interconnected with the nuclear envelope; this is where proteins are synthesized. The dengue virus uses this membrane network and transforms it for its own use.

"We now know that viral RNA is replicated in vesicles in the endoplasmic reticulum and is secreted through tiny pores. We were also able to show that replication of the virus genome and its encapsulation in new virus particles are directly linked," said Professor Bartenschlager. The new virus genomes are secreted through pores into the intracellular space where they are incorporated into pre-stages of viruses and then penetrate the endoplasmic reticulum a second time. There they are enveloped in a membrane that disguises them for the cell so that they can be secreted like normal cellular material. The reproduction cycle can begin again.

Journal reference:

1. Welsch et al. **Composition and Three-Dimensional Architecture of the Dengue Virus Replication and Assembly Sites**. *Cell Host & Microbe*, 2009; 5 (4): 365 DOI: 10.1016/j.chom.2009.03.007

Adapted from materials provided by University Hospital Heidelberg.

http://www.sciencedaily.com/releases/2009/05/090507113412.htm

One In Five Obese Women Select Overweight Or Obese Silhouettes As Their Ideal Body Image

An extremely good body image can take its toll on a woman's health. (Credit: iStockphoto/Lisa F. Young)

ScienceDaily (May 14, 2009) — For many women, body image is a constant struggle; a poor self-image can lead to a host of both mental and physical health problems. But a new study out of Temple University finds that an extremely good body image can also take its toll on a woman's health.

In research published in the May issue of the *American Journal of Obstetrics and Gynecology*, Temple researchers studied the body image perceptions of 81 underweight, normal weight, overweight or obese women in the North Philadelphia area and found that as their body mass index (BMI) increased, two-thirds of the women still felt they were at an ideal body size.

"So the question for doctors then becomes, 'How can we effectively treat our overweight and obese patients, when they don't feel they're in harm's way?'" said study researcher Marisa Rose, M.D., assistant professor of Obstetrics, Gynecology and Reproductive Sciences in the Temple University School of Medicine. "It stresses a need for culturally sensitive education for this population."

All participants were measured for height and weight and completed an anonymous survey to determine their self-perceived, current and ideal body sizes. Each woman was then shown an illustration of different-sized women that correlated with increasing BMIs, and were asked which size they felt they were at currently, and what their ideal would be.

While most of the participants selected illustrations of women in the normal to overweight range, about 20 percent of the obese women selected an overweight or obese silhouette as their ideal body shape. Further, 68 percent (15 out 22) of overweight participants and 84 percent (26 of 31) of obese women underestimated their current BMI. African-American and Hispanic women had significantly underestimated their current body size, while the white women overestimated.

Rose and her fellow researchers say this is the first study to evaluate body image discrepancy specifically in the inner-city population of women seeking gynecologic care.

"For this group, gynecologists often serve as the primary care provider as well," said Rose. "As more women become obese and overweight, it becomes critical for gynecologists to know how to talk to their patients about the adverse effects of obesity."

The researchers say that their next course of action is to determine from a more diverse population whether the trend of women incorrectly perceiving their body size extends to most underweight, overweight and obese women or whether the trend is specific to the inner-city population.

"Informing our patients about the dangers of obesity, even when they feel they're not at risk, can help empower them to change their lifestyles and lead healthier lives," said Rose.

Other authors on the study were: Sushma Potti, M.D.; Marina Milli, M.D.; Stacey Jeronis, M.D.; and John P. Gaughan, Ph.D of Temple University School of Medicine.

Adapted from materials provided by Temple University.

http://www.sciencedaily.com/releases/2009/05/090507145747.htm

Ivory Venus Figurine From The Swabian Jura Rewrites Prehistory

The Venus of Hohle Fels. (Credit: Photo by H. Jensen; Copyright: Universität Tübingen)

ScienceDaily (May 14, 2009) — The 2008 excavations at Hohle Fels Cave in the Swabian Jura of southwestern Germany recovered a female figurine carved from mammoth ivory from the basal Aurignacian deposit. This figurine, which is the earliest depiction of a human, and one of the oldest known examples of figurative art worldwide, was made at least 35,000 years ago. This discovery radically changes our views of the context and meaning of the earliest Paleolithic art.

Between September 5 and 15, 2008 excavators at Hohle Fels near the town of Schelklingen recovered the six fragments of carved ivory that form the Venus. The importance of the discovery became apparent on September 9 when an excavator recovered the main piece of the sculpture that represents the majority of the torso. The figurine lay about 3 meters below the current surface of the cave in an area about 20 meters from the cave's entrance. The finds come from a single quarter meter and were recovered from within 8 cm in the vertical dimension. The Venus from Hohle Fels is nearly complete with only the left arm and shoulder missing. The excellent preservation and the close stratigraphic association of the pieces of the figurine indicate that the Venus experienced little disturbance after deposition.

The figurine originates from a red-brown, clayey silt at the base of about one meter of Aurignacian deposits.The Venus lay in pieces next to a number of limestone blocks with dimension of several decimeters. The find density in the area of the Venus is moderately high with much flint knapping debris, worked bone and ivory, bones of horse, reindeer, cave bear, mammoth, ibex, as well as burnt bone.

Radiocarbon dates from this horizon span the entire range from 31,000 – 40,000 years ago. The fact that the venus is overlain by five Aurignacian horizons that contain a dozen stratigraphically intact anthropogenic features with a total thickness of 70 – 120 cm, suggests that figurine is indeed of an age corresponding to the start of the Aurignacian around 40,000 years ago.

Although much ivory working debris has been recovered from the basal Aurignacian deposits at Hohle Fels and the nearby site of Geißenklösterle, this sculpture is the first example of figurative art recovered from the basal Aurignacian in Swabia. The discovery of the Venus of Hohle Fels refutes claims that figurative representations and other symbolic artifacts first appear the later phases of the Swabian Aurignacian.

The Venus shows a range of entirely unique features as well as a number of characteristics present in later female figurines. The Venus of Hohle Fels lacks a head. Instead an off-centered, but carefully carved ring is located above the broad shoulders of the figurine. This ring, despite being weathered, preserves polish

suggesting that the figurine was worn as a pendant. Beneath the shoulders, which are roughly as thick as they are wide, large breasts project forward. The figurine has two short arms with two carefully carved hands with visible fingers resting on the upper part of the stomach below the breasts.

The Venus has a short and squat form with a waist that is slightly narrower than the broad shoulders and wide hips. Multiple deeply incised horizontal lines cover the abdomen from the area below the breast to the pubic triangle. Several of these horizontal lines extend to the back of the figurine and are suggestive of clothing or a wrap of some sort. Microscopic images show that these incisions were created by repeatedly cutting along the same lines with sharp stone tools.

The legs of the Venus are short and pointy. The buttocks and genitals are depicted in more details. The split between the two halves of the buttocks is deep and continues without interruption to the front of the figurine where the vulva is visible between the open legs. There can be no doubt that the depiction of oversized breast, exentuated buttocks and genetalia result from the deliberate exaggeration of the sexual features of the figurine. In addition to the many carefully depicted anatomical features, the surface of the Venus preserves numerous lines and deliberate markings.

Many of the features, including the emphasis on sexual attributes and lack of emphasis on the head, face and arms and legs, call to mind aspects of the numerous Venus figurines well known from the European Gravettien, which typically date between 22 and 27 ka BP. The careful depiction of the hands is reminiscent of those of Venuses including that of archetypal Venus of Willendorf, which was discovered 100 years earlier in summer of 1908. Despite the far greater age of the Venus of Hohle Fels, many of its attributes occur in various forms throughout the rich tradition of Paleolithic female representations.

The new figurine from Hohle Fels radically changes our view of origins of Paleolithic art. Prior to this discovery, animals and therianthropic imagry dominated the over two dozen figurines from the Swabian Aurignacian. Female imagry was entirely unknown. With this discovery, the notion that three dimensional female imagry developed in the Gravettian can be rejected. Also the interpretations suggesting that strong, aggressive animals or shamanic depictions dominate the Aurignacian art of Swabia, or even Europe as a whole, need to be reconsidered. Although there is a long history of debate over the meaning of Paleolithic Venuses, their clear sexual attributes suggest that they are a direct or indirect expression of fertility. The Venus of Hohle Fels provides an entirely new view of the art from the early Upper Paleolithic and reinforces the arguments that have been made for innovative cultural manifestations accompanying the rise of the Swabian Aurignacian.

While many researchers, including Nicholas Conard, assume that the Aurignacian artworks were made by early modern humans shortly after their migration into Europe, this assumption can neither be confirmed or refuted based on the available skeletal data from the Swabian caves.

The Venus of Hohle Fels forms a center piece for a major exhibit in Stuttgart entitled Ice Age Art and Culture, which will run from September 18, 2009 – January 10, 2010.

Journal reference:

1. Nicholas J. Conard. **A female figurine from the basal Aurignacian deposits of Hohle Fels Cave in southwestern Germany**. *Nature*, 2009; 459 (7244): 248 DOI: 10.1038/nature07995

Adapted from materials provided by Universitaet Tuebingen, via AlphaGalileo.

http://www.sciencedaily.com/releases/2009/05/090514084126.htm

Ginseng: Nature's Anti-inflammatory?

Laboratory experiments have demonstrated the immunological effects of ginseng. Researchers have now shown that the herb, much used in traditional Chinese and other Asian medicine, has anti-inflammatory effects. (Credit: iStockphoto/Chen Chih-Wen)

ScienceDaily (May 14, 2009) — Laboratory experiments have demonstrated the immunological effects of ginseng. Researchers have now shown that the herb, much used in traditional Chinese and other Asian medicine, has anti-inflammatory effects.

Allan Lau led a team of researchers from the University of Hong Kong who identified seven ginseng constituents, ginsenosides, which showed immune-suppressive effects. He said, "The anti-inflammatory role of ginseng may be due to the combined effects of these ginsenosides, targeting different levels of immunological activity, and so contributing to the diverse actions of ginseng in humans".

The scientists treated human immune cells with different extracts of ginseng. They found that of the nine ginsenosides they identified, seven could selectively inhibit expression of the inflammatory gene CXCL-10. Lau concludes, "Further studies will be needed to examine the potential beneficial effects of ginsenosides in the management of acute and chronic inflammatory diseases in humans".

Uniquely, the researchers were able to holistically test the ginseng extract's immune effects by using sophisticated purification technologies to identify individual constituents and define their bioactivity using genomics and bioactivity assays. After that, they reconstituted them back into a whole extract with definable individual ginsenosides for re-confirmation of effects. This potentially opens up a vigorous methodology to study medicinal herbs with state-of-the-art technologies.

Journal reference:

1. Davy CW Lee, Cindy LH Yang, Stanley CC Chik, James CB Li, Jian-hui Rong, Godfrey CF Chan and Allan SY Lau. **Bioactivity-guided identification and cell signaling technology to delineate the immunomodulatory effects of Panax ginseng on human promonocytic U937 cells**. *Journal of Translational Medicine*, (in press)

Adapted from materials provided by Journal of Translational Medicine, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/05/090513215410.htm

Spitzer Catches Star Cooking Up Comet Crystals

The image shows a young sun-like star encircled by its planet-forming disk of gas and dust. The silicate that makes up most of the dust would have begun as non-crystallized, amorphous particles. (Credit: NASA/JPL-Caltech)

ScienceDaily (May 14, 2009) — Scientists have long wondered how tiny silicate crystals, which need sizzling high temperatures to form, have found their way into frozen comets, born in the deep freeze of the solar system's outer edges. The crystals would have begun as non-crystallized silicate particles, part of the mix of gas and dust from which the solar system developed.

A team of astronomers believes they have found a new explanation for both where and how these crystals may have been created, by using NASA's Spitzer Space Telescope to observe the growing pains of a young, sun-like star. Their study results, which appear in the May 14 issue of *Nature*, provide new insight into the formation of planets and comets.

The researchers from Germany, Hungary and the Netherlands found that silicate appears to have been transformed into crystalline form by an outburst from a star. They detected the infrared signature of silicate crystals on the disk of dust and gas surrounding the star EX Lupi during one of its frequent flare-ups, or outbursts, seen by Spitzer in April 2008. These crystals were not present in Spitzer's previous observations of the star's disk during one of its quiet periods.

"We believe that we have observed, for the first time, ongoing crystal formation," said one of the paper's authors, Attila Juhasz of the Max-Planck Institute for Astronomy in Heidelberg, Germany. "We think that the crystals were formed by thermal annealing of small particles on the surface layer of the star's inner disk by heat from the outburst. This is a completely new scenario about how this material could be created."

Annealing is a process in which a material is heated to a certain temperature at which some of its bonds break and then re-form, changing the material's physical properties. It is one way that silicate dust can be transformed into crystalline form.

Scientists previously had considered two different possible scenarios in which annealing could create the silicate crystals found in comets and young stars' disks. In one scenario, long exposure to heat from an infant star might anneal some of the silicate dust inside the disk's center. In the other, shock waves induced by a large body within the disk might heat dust grains suddenly to the right temperature to crystallize them, after which the crystals would cool nearly as quickly.

What Juhasz and his colleagues found at EX Lupi didn't fit either of the earlier theories. "We concluded that this is a third way in which silicate crystals may be formed with annealing, one not considered before," said the paper's lead author, Peter Abraham of the Hungarian Academy of Sciences' Konkoly Observatory, Budapest, Hungary.

EX Lupi is a young star, possibly similar to our sun four or five billion years ago. Every few years, it experiences outbursts, or eruptions, that astronomers think are the result of the star gathering up mass that has accumulated in its surrounding disk. These flare-ups vary in intensity, with really big eruptions occurring every 50 years or so.

The researchers observed EX Lupi with Spitzer's infrared spectrograph in April 2008. Although the star was beginning to fade from the peak of a major outburst detected in January, it was still 30 times brighter than when it was quiet. When they compared this new view of the erupting star with Spitzer measurements made in 2005 before the eruption began, they found significant changes.

In 2005, the silicate on the surface of the star's disk appeared to be in the form of amorphous grains of dust. In 2008, the spectrum showed the presence of crystalline silicate on top of amorphous dust. The crystals appear to be forsterite, a material often found in comets and in protoplanetary disks. The crystals also appear hot, evidence that they were created in a high-temperature process, but not by shock heating. If that were the case, they would already be cool.

"At outburst, EX Lupi became about 100 times more luminous," said Juhasz. "Crystals formed in the surface layer of the disk but just at the distance from the star where the temperature was high enough to anneal the silicate--about 1,000 Kelvin (1,340 degrees Fahrenheit)--but still lower than 1,500 Kelvin (2,240 degrees Fahrenheit). Above that, the dust grains will evaporate." The radius of this crystal formation zone, the researchers note, is comparable to that of the terrestrial-planet region in the solar system.

"These observations show, for the first time, the actual production of crystalline silicates like those found in comets and meteorites in our own solar system," said Spitzer Project Scientist Michael Werner of NASA's Jet Propulsion Laboratory, Pasadena, Calif. "So what we see in comets today may have been produced by repeated bursts of energy when the sun was young."

JPL manages the Spitzer Space Telescope mission for NASA's Science Mission Directorate, Washington. Science operations are conducted at the Spitzer Science Center at the California Institute of Technology in Pasadena. Caltech manages JPL for NASA.

More information about Spitzer is at http://www.spitzer.caltech.edu/spitzer and http://www.nasa.gov/spitzer .

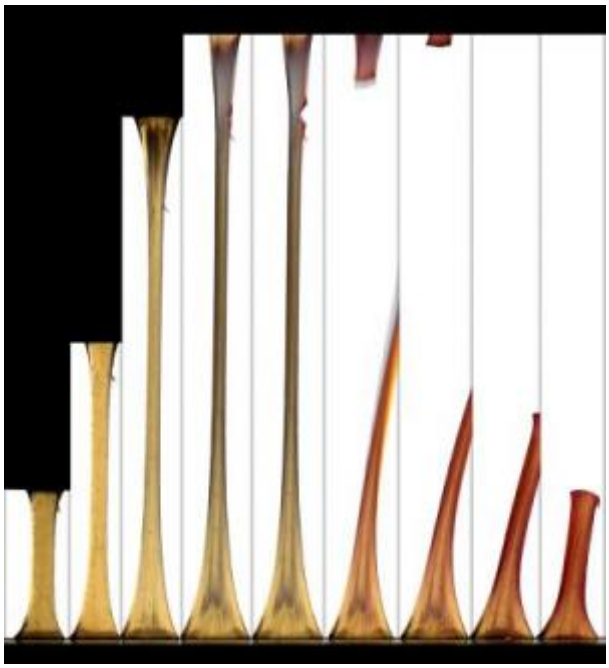
Journal reference:

1. P. Ábrahám, A. Juhász, C. P. Dullemond, Á. Kóspál, R. van Boekel, J. Bouwman, Th. Henning, A. Moór, L. Mosoni, A. Sicilia-Aguilar & N. Sipos. **Episodic formation of cometary material in the outburst of a young Sun-like star**. *Nature*, 2009; 459 (7244): 224 DOI: 10.1038/nature08004

Adapted from materials provided by NASA/Jet Propulsion Laboratory.

http://www.sciencedaily.com/releases/2009/05/090513234218.htm

See The Force: Mechanical Stress Leads To Self-sensing In Solid Polymers



This shows progressive images of a mechanophore linked elastomer during tensile loading. After the polymer reaches a critical strain, a force-induced red color results from selective covalent bond cleavage in the mechanophore just prior to failure. (Credit: Beckman Institute ITG, Darren Stevenson and Alex Jerez)

ScienceDaily (May 14, 2009) — Parachute cords, climbing ropes, and smart coatings for bridges that change color when overstressed are several possible uses for force-sensitive polymers being developed by researchers at the University of Illinois.

The polymers contain mechanically active molecules called mechanophores. When pushed or pulled with a certain force, specific chemical reactions are triggered in the mechanophores.

"This offers a new way to build function directly into synthetic materials," said Nancy Sottos, a Willett Professor of materials science and engineering at the U. of I. "And it opens the door to creating mechanophores that can perform different responsive functions, including self-sensing and self-reinforcing, when stressed."

In previous work, Sottos and collaborators showed they could use mechanical force to induce a reaction in mechanophore-linked polymers that were in solution. Now, as reported in the May 7 issue of the journal Nature, the researchers show they can perform a similar feat in a solid polymer.

Mechanically induced chemical activation (also known as mechanochemical transduction) enables an extraordinary range of physiological processes, including the senses of touch, hearing and balance, as well as growth and remodeling of tissue and bone.

Analogous to the responsive behavior of biological systems, the channeling of mechanical energy to selectively trigger a reaction that alters or enhances a material's properties is being harnessed by the U. of I. researchers.

In critical material systems, such as polymers used in aircraft components, self-sensing and self-reinforcing capabilities could be used to report damage and warn of potential component failure, slow the

spread of damage to extend a material's lifetime, or even repair damage in early stages to avoid catastrophic failure.

"By coupling mechanical energy directly to structural response, the desired functionality could be precisely linked to the triggering stimulus," said Sottos, who also is affiliated with the university's Beckman Institute.

In their work, the researchers used molecules called spiropyrans, a promising class of molecular probes that serve as color-generating mechanophores, capable of vivid color changes when they undergo mechanochemical change. Normally colorless, the spiropyran used in the experiments turns red or purple when exposed to certain levels of mechanical stress.

"Mechanical stress induces a ring-opening reaction of the spiropyran that changes the color of the material," said Douglas Davis, a graduate research assistant and the paper's lead author. "The reaction is reversible, so we can repeat the opening and closing of the mechanophore."

"Spiropyrans can serve as molecular probes to aid in understanding the effects of stress and accumulated damage in polymeric materials, thereby providing an opportunity for assessment, modification and improvement prior to failure," Davis said.

To demonstrate the mechanochemical response, the researchers prepared two different mechanophore-linked polymers and subjected them to different levels of mechanical stress.

In one polymer, an elastomer, the material was stretched until it broke in two. A vivid color change in the polymer occurred just before it snapped.

The second polymer was formed into rigid beads several hundred microns in diameter. When the beads were squeezed, they changed from colorless to purple.

The color change that took place within both polymers could serve as a good indicator of how much stress a mechanical part or structural component made of the material had undergone.

"We've moved very seamlessly from chemistry to materials, and from materials we are now moving into engineering applications," Sottos said. "With a deeper understanding of mechanophore design rules and efficient chemical response pathways, we envision new classes of dynamically responsive polymers that locally remodel, reorganize or even regenerate via mechanical regulation."

In addition to Sottos and Davis, the paper's co-authors include materials science and engineering professor Paul Braun, chemistry professors Todd Martinez and Jeffrey Moore, and aerospace engineering professor Scott White, as well as members of their research groups.

The work was funded by the U.S. Army Research Office MURI program.

Adapted from materials provided by University of Illinois at Urbana-Champaign, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/05/090506144312.htm

Liquid Lens Creates Tiny Flexible Laser On A Chip

ScienceDaily (May 14, 2009) — Like tiny Jedi knights, tunable fluidic micro lenses can focus and direct light at will to count cells, evaluate molecules or create on-chip optical tweezers, according to a team of Penn State engineers. They may also provide imaging in medical devices, eliminating the necessity and discomfort of moving the tip of a probe.

Conventional, fixed focal length lenses can focus light at only one distance. The entire lens must move to focus on an object or to change the direction of the light. Attempts at conventional tunable lenses have not been successful for lenses on the chip. Fluidic lenses, however, can change their focal length or direction in less than a second while remaining in the same place and can be fabricated on the chip during manufacture.

"We use water and a calcium chloride solution because they are readily available and safe and their optical properties have been well characterized," said Tony Jun Huang, James Henderson assistant professor of engineering science and mechanics. "There are lots of possibilities about what fluids we can use. Most solutions change their refractive indices if the concentration changes."

He notes that they could use a variety of solutions with water. There are also a number of commercially available "refractive index fluids" which could potentially provide better optical properties and make these Liquid-Gradient Refractive Index (L-GRIN) lenses work even better.

Huang, working with engineering science and mechanics graduate students Sz-Chin Steven Lin, Michael I. Lapsley, Jinjie Shi and Bala Krishna Juluri and bioengineering graduate student Xiaole Mao, who is the first author on the paper, reported their work in a recent issue of Lab on a Chip.

To create their lens, the researchers have constant, tiny streams of calcium chloride surrounded by two adjustable streams of water. By increasing or decreasing the flow rate of the water, they can shorten or lengthen the focusing distance of the lens. The focal length changes because the amount of diffusion of calcium chloride into the water changes and alters the refractivity of the fluid. The researchers can swing the focal point side to side by changing the flow rate of the water on only one side, skewing the point of focus left or right.

"With these two combined, we will have the capability of directing the light to any given point within the device," said Huang.

One application, according to Huang, would be as optical tweezers positioned directly on a chip the size of a quarter. This would eliminate the complex systems now necessary for optical tweezers. Optical tweezers made up of focused laser beams can capture tiny particles like cells, stabilize them, move them and even rotate them at will.

"Our L-GRIN lens is probably the only microlens that can focus and steer the light simultaneously and yet is still small enough to fit on such a biochip," said Huang.

Huang notes that there are applications for this fluidic lens in other places as well. Currently, for an endoscope operator to focus light on a specific internal location, the probe itself must be manipulated into place, sometimes causing discomfort. With these fluidic lenses, aiming

Adapted from materials provided by Penn State.

http://www.sciencedaily.com/releases/2009/05/090511164605.htm

Medicinal Plant Kava Safe And Effective In Reducing Anxiety, Study Suggests

Local man making traditional kava. (Credit: iStockphoto/Tammy Peluso)

ScienceDaily (May 14, 2009) — Researchers at the University of Queensland in Australia have found a traditional extract of Kava, a medicinal plant from the South Pacific, to be safe and effective in reducing anxiety.

To be published online this week in the Springer journal *Psychopharmacology*, the results of a world-first clinical trial which found that a water-soluble extract of Kava was effective in treating anxiety and improving mood. The Kava was prescribed in the form of tablets.

Lead researcher Jerome Sarris, a PhD candidate from UQ's School of Medicine, said the placebo-controlled study found Kava to be an effective and safe treatment option for people with chronic anxiety and varying levels of depression.

"We've been able to show that Kava offers a natural alternative for the treatment of anxiety, and unlike some pharmaceutical options, has less risk of dependency and less potential of side effects," Mr. Sarris said.

Each week participants were given a clinical assessment as well as a self-rating questionnaire to measure their anxiety and depression levels. The researchers found anxiety levels decreased dramatically for participants taking five tablets of Kava per day as opposed to the placebo group which took dummy pills.

"We also found that Kava had a positive impact on reducing depression levels, something which had not been tested before," Mr. Sarris said. In 2002 Kava was banned in Europe, UK and Canada due to concerns over liver toxicity.

While the three-week trial raised no major health concerns regarding the Kava extract used, the researchers said larger studies were required to confirm the drug's safety.

"When extracted in the appropriate way, Kava may pose less or no potential liver problems. I hope the results will encourage governments to reconsider the ban," Mr. Sarris said.

"Ethanol and acetone extracts, which sometimes use the incorrect parts of the Kava, were being sold in Europe. That is not the traditional way of prescribing Kava in the Pacific Islands. Our study used a water-soluble extract from the peeled rootstock of a medicinal cultivar of the plant, which is approved by the Therapeutic Goods Administration of Australia and is currently legal in Australia for medicinal use."

Journal reference:

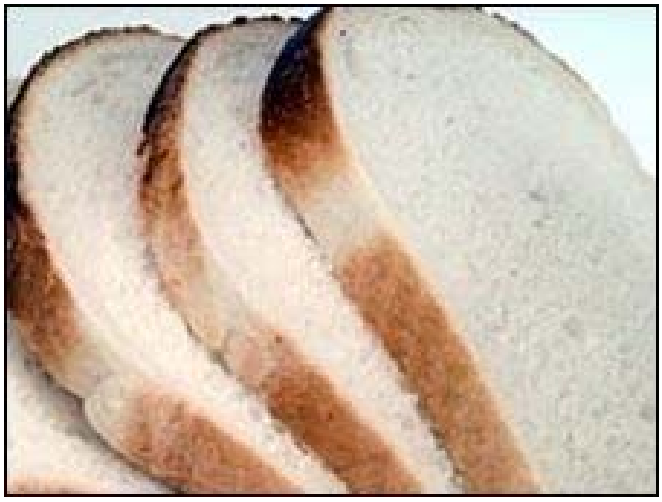
1. Sarris et al. **The Kava Anxiety Depression Spectrum Study (KADSS): a randomized, placebo-controlled crossover trial using an aqueous extract of Piper methysticum
**. *Psychopharmacology*, 2009; DOI: 10.1007/s00213-009-1549-9

Adapted from materials provided by Springer.

http://www.sciencedaily.com/releases/2009/05/090511122619.htm

Folic acid protects baby hearts

Mandatory fortification of bread with folic acid would slash the risk of babies being born with a heart problem, experience from Canada shows.



Rates of severe congenital heart defects among newborns in Quebec fell significantly after the move to fortify flour and pasta began in 1998.

The British Medical Journal online study lends support to calls for introducing fortification to Europe.

But others argue against this, saying it would inevitably harm some people.

The fear is that adding folic acid to products like bread could harm some elderly people if they are deficient in other B vitamins.

" **Personally, I do not think mandatory fortification is the way forward. It is like using a sledge hammer to crack a nut** "
Dr Sian Astley, a scientist for the Institute of Food Research

In extreme cases, this can cause irreversible damage to the nervous system.

There is also concern that it may also increase the risk of certain cancers, including bowel cancer, in some people.

In 2007 the UK's watchdog, the Food Standards Agency, agreed with expert recommendations to fortify bread or flour with folic acid.

Since then, at the request of the Chief Medical Officer, an expert working group on folate has been considering the results of recent trials looking at the effect of folic acid on the risk of some types of cancer.

The group is expected to report back to Sir Liam Donaldson this summer.

Risk reduction

Folic acid is a synthetic form of folate, a B vitamin found in a wide variety of foods including liver and green leafy vegetables.

Pregnant women and those trying to conceive are already advised to take folic acid supplements to reduce the risk that their baby will have a "neural tube" birth defect like spina bifida.

But uptake is not ideal, particularly because some pregnancies are unplanned and can go unnoticed for some weeks.

The latest work suggests folic acid also cuts the risk of baby heart defects.

In the seven years after fortification was introduced there was a 6% drop per year in the birth prevalence of severe heart defects.

This compares with a 9% drop in neural tube defects.

Writing in the BMJ, lead author Professor Louise Pilote of McGill University in Montreal, said: "Given that severe congenital heart defects require complex surgical interventions in infancy and are associated with high infant mortality rates, even a small reduction in the overall risk will significantly reduce the costs associated with the medical care of these patients and the psychological burden on patients and their families."

Weighing the risks

The British Heart Foundation said the risks and benefits of fortification must be carefully weighed.

A spokeswoman said: "This Canadian study shows that when folic acid was added to flour and pasta the number of babies born with certain severe heart conditions was reduced.

"While the decrease in babies born with heart conditions during this time is statistically significant, many children were still born with congenital heart disease. "This must be taken into account when considering the benefits of routinely introducing folic acid to flour and pasta in the UK.

"Especially because routine introduction could pose a risk to some elderly people as potentially dangerous vitamin B12 deficiency can be masked by high intake of folic acid." **Alternative suggested**

Dr Sian Astley, a scientist for the Institute of Food Research, said: "Personally, I do not think mandatory fortification is the way forward. It is like using a sledge hammer to crack a nut.

"It would reduce ill health in children but there are cautionary issues.

"An alternative would be to fortify only certain foods and clearly label them so consumers can make the choice. Co-fortification with other B vitamins would be another sensible option."

She said the IFR believes there is still insufficient evidence to make a decision about whether the benefits of fortification would outweigh the risks.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8045212.stm

Published: 2009/05/12 23:50:11 GMT

New e-readers will end black and white era

- 17 May 2009 by **Paul Marks** and **Michael Fitzpatrick**

MEDIA frenzy over the launch of Amazon's magazine-sized Kindle e-book reader last week overlooked the fact that, like its predecessors and competitors, it remains resolutely monochrome. Not for long, though. A full-colour version of electronic paper, which forms the display of these devices, is to be demonstrated later this month.

E Ink Corporation of Cambridge, Massachusetts, says it will be demonstrating a colour version of its e-paper at the Society for Information Display conference in San Antonio, Texas, on 31 May, and that products based on its colour e-paper will be on the market by the end of 2010.

The aim is to have a reflective display that uses very little power and is as easy on the eye as the printed word. Like E Ink's monochrome e-paper, used in Sony and Amazon readers, the colour version will be based on technology called an electrophoretic display.

In black-and-white e-paper, each pixel is made up of around 60 plastic microcapsules that contain a negatively charged black powder and a positively charged white powder. To make a pixel black, electrodes underneath the display apply a negative charge to push the black powder to the top. To reproduce shades of grey, some electrodes are positive and others negative, so some microcapsules are white while others in the same pixel are black. Once a page is set, this arrangement uses no power- critical for reading book-length content.

In the new colour display, each pixel will be split into four subpixels showing red, green, blue and white in their "on" states. That means squeezing four times as many transistors beneath each pixel to control the electrodes, which has been a challenge too far- until now. "The transistor resolution is now getting fine enough," says Sri Peruvemba of E Ink. But the proof will be in the quality of image they demonstrate in Texas.

Squeezing four times as many transistors beneath each pixel has been a challenge - until now
E-paper is not the only game in town, however. Fujitsu in Japan makes the LCD-based Flepia e-reader, which has a colour screen 20 centimetres on the diagonal. It uses a thin sandwich of red, green and blue layers made from a novel liquid crystal material that, like e-paper, only draws power when changing a page.

Early next year, Plastic Logic of Cambridge, UK, plans to launch A4 e-book readers with flexible transistors- which will make e-reader screens more robust and will also allow the gadgets to begin mimicking the bendiness of paper.

http://www.newscientist.com/article/mg20227086.100-new-ereaders-will-end-black-and-white-era.html?full=true&print=true

Infinite Poetry, From a Finite Number

By KEVIN COYNE

Union City

IT'S not much of a yard by the standards of most of America — just a postage stamp of grass behind the house at the corner of Fourth Street and New York Avenue, fenced by chain link and shaded by an unruly maple, here in this densest of cities in this densest of states. But like many things in New Jersey, it turns out to be larger than it looks at first glance.

The eminent poet W. S. Merwin lived at this corner until he was 9, a block away from the Presbyterian church his father pastored. Several years ago, long after he had won his first Pulitzer, his boyhood city honored him with a street sign here: "W. S. Merwin Way," it reads. Last month, Mr. Merwin won a second Pulitzer prize for poetry — the fourth New Jersey poet to win in the last 10 years, a streak that is unmatched of late by any other state, and one that raises the question of whether it is more than just a happy coincidence.

New Jersey loyalists — and I, living as I do in the same town where six generations of my family are buried, count myself among them — would argue that it is. Look at what else we've produced, we argue, and point to a roster of cultural heavyweights that extends from Sinatra to Springsteen. But why this particular and dominating skill in poetry? Why not fiction or drama or history?

Something else is going on here, I think, and there's a number that explains it: 566, the number of municipalities in New Jersey, more per square mile than any other state. It's the same number that explains so much else about our state — its economy, its politics, its landscape, its psychology, and why it has provided such a rich trove of stories for newspapers like this one. Poetry is compressed language, a density of meaning in a small space, and we are a compressed state, a density of communities in a small landscape.

"New Jersey's gift to its poets," wrote one of the other Pulitzer winners, Stephen Dunn, "is that it's a place of many places."

There are so many of them that the late Dave Van Ronk wrote a song, "Garden State Stomp," whose lyrics consisted entirely of 80 of the most euphonic place names strung together in a rhyming pattern; and enough remained that he might easily have gone a few stanzas more. "Allamuchy, Hacklebarney, Rockaway, Piscataway," he opened, and continued all the way to, "Matchaponix, Delawanna, Wawayanda, Timbuctoo."

It's a crazy system we have here, inefficient in the extreme and the cause of periodic handwringing, especially in years like this, when a budget crunch makes it seem an unaffordable luxury to have 566

governments serving a population roughly the same size as New York City's, which manages with just one. A commission in Trenton — the infelicitously named Local Unit Alignment, Reorganization and Consolidation Commission — has been studying the issue for the last year. It recently recommended 26 possible mergers of North Jersey communities; the South Jersey recommendations are expected later this month.

But the commission can only recommend; it can't undo an entrenched legacy of home rule in the state that dates back before the Revolution. It can't force any of those 566 municipalities to share schools or police or even garbage collection with any other, let alone ask them to merge. It can't erase the fiercely parochial bonds shared by those who remember when the mill closed, when the river rose, when the fire struck, when the high school football team won the championship.

Consolidation sounds like a reasonable idea, a rational solution to an expensive and anachronistic status quo, until it starts knocking at your own door. If your blood begins to rise at the prospect of your community joining in wedlock with one of its neighbors, then you've just marked yourself as a genuine New Jerseyan.

All those separate places — all 566 of them, with their costly mayors and police chiefs and school principals, but also their priceless heroes and villains, their legends and tragedies — may be bad for our wallets, but they're essential to our identity. They are the fenced-in gardens where our abundant stories grow; and the smaller they are, the more captive the audience, the faster the stories can root and bloom.

A couple of weeks ago, the New Jersey Hall of Fame inducted a dozen new members, two of them poets: Walt Whitman, who spent the last 20 years of his life in Camden; and William Carlos Williams, who practiced medicine and wrote some of the most influential poetry of the 20th century in Rutherford, just a few miles across the Meadowlands from the young W. S. Merwin. Both of them, like Mr. Merwin, lived in unlikely places.

If you hold in your mind an image of what a poet's home should look like — a rustic farm engirdled by a stone wall, a magnolia-shaded manse, a dim city garret — theirs, like his, will disappoint. Whitman's home, the only one he ever owned, was a small wood-frame row house near the waterfront. Williams's, just a few blocks from his boyhood home, doubled as a medical office, a rambling Victorian near the World War I monument designed by his brother, an architect.

What their homes say, what the one on the corner of Fourth and New York says, is that poetry is a neighbor, not a visitor; that it arises most prolifically not from isolated, rarified precincts, but from the dense, chaotic, ever-changing places that our state abounds in.

Mr. Merwin returned here in 2006 for the dedication of the street sign, and he found a different city from the one he left. Swelled in the 1960s by Cubans fleeing Castro, Union City is now predominantly Hispanic. His father's yellow-brick church on Palisade Avenue, which kept its back turned to the panoramic view of the Manhattan skyline, was demolished long ago. But across the street from his old home is a Pentecostal church. It, too, is built of yellow brick, and all around it — and all around every corner of our state — are more poems to be written, more stories to tell, for someone else, by someone else.

E-mail: jersey@nytimes.com

http://www.nytimes.com/2009/05/17/nyregion/new-jersey/17colnj.html?_r=1&partner=rss&emc=rss

Before the Trees Disappeared

By JEREMY HILDRETH

Easter Island, SOUTH PACIFIC -- That you can now fly here in five hours, several days a week from Santiago, Chile, belies the truth that Easter Island is the most isolated of inhabited places on Earth. The nearest neighbor, Pitcairn -- where the Bounty mutineers settled -- with a population of a mere 48 people, is 1,240 miles to the west. Significantly, it is this preternatural lonesomeness that suggests the answers to two of archaeology's greatest riddles: the giant and eerie stone carvings for which the island is renowned, and the ecological disaster that caused a 99% population decline and made Easter Island a poster child for the fate many believe awaits the whole of humanity if we're not careful.

But first, the heads.

Archaeologists have inventoried 887 carved figures made between about A.D. 1000 and 1600. These big busts, called *moai*, are an average of 13 feet tall and are known to islanders as the "living faces." They represent ancestors and elders. "For us, they are people," one descendent of the natives told me. Perhaps. But for me they are just ancient and alien statues. Their meaning isn't intrinsic at all -- it is abstract, intense and interrogative: I want to sit at their feet and ask questions. I feel these guys know something, and I want to know it too. Gigantic and primitive, the moai provoke not reverence or awe but pure wonder, registered as a definite physical sensation, a kind of cosmic "Huh?"

Such ethereal queries are accompanied by terrestrial ones, such as: How did the moai get from the single quarry where they all were carved to their erect positions -- mostly dotted around the coastal perimeter with their backs to the sea -- up to 12 miles away? Several theories have been demonstrated as feasible, including dragging the statues on wooden sleds. "There are lots of ways they could have been moved," says Sergio Rapu, the only born Easter Islander who is also a trained archaeologist. "'How was it actually done?' is the question."

Oral history claims that the statues walked, and Mr. Rapu believes he has found examples of the "shoes" they wore for the journey: stones, flat on the topside, used by the islanders to pivot a trussed-up statue back and forth and forward -- like moving a refrigerator -- while synchronizing their exertions with chanting. Some experiments show a convincing way the moai, if lashed upright into a wooden frame,

could have marched themselves along practically under their own power, as though hobbling on crutches. In truth, islanders may have used a combination of techniques. And why did they make so many? Well, why not? Easter Island, in the relative far east of the Pacific Ocean, 2,360 miles from South America, was one of the very last places to be settled by Polynesians. People arrived around the year 500, and after several generations the population was sufficient to get into the labor-intensive monument business. Polynesians were carvers anyway; here they had the perfect volcanic rock for it and little else to occupy their time. So statue building became the central activity of Easter's society. Unsurprisingly, the maximum population of 15,000 to 20,000, reached in the 15th or 16th century, corresponds to the peak of moai-making.

Unluckily, the native Rapa Nui were living in one of the most fragile ecosystems imaginable: a windy, cool climate, very dry by tropical standards. Deforestation set in almost from the outset, caused by a combination of factors: animals eating the seeds of trees; fires; El Niño-induced droughts; salt spray; and human consumption of wood.

Mr. Rapu, who was also governor of the island for six years, says that the deforestation was undoubtedly a mixture of human and natural forces. By the time Dutch Admiral Jacob Roggeveen spotted the island on Easter Sunday in 1722 (there's one secret revealed for you), he found no trees taller than 10 feet.

The major obvious fallout from Easter's deforestation was diminution of the food supply. The archaeological record shows that the islanders' diet changed from big porpoises -- which had to be caught far from shore using canoes they no longer had -- to small mollusks gathered from tidal basins; birds were hunted to extinction; and cannibalism became rife. Jared Diamond, who uses Easter as a case study in his book "Collapse," reports that "Your mother's flesh sticks in my teeth" became a common insult.

For the Easter Islanders, there was no escape. "They were trapped," says Mr. Rapu. In or around 1680, we know, civil war broke out. People began tearing down the statues, possibly in deliberate effrontery to leaders they believed had failed them. (A 33-foot tall statue named Paro, dating from about 1620, was one of the last erected and one of the last felled.) The year 1838 offers the last European mention of a standing statue, and in 1868 every moai on Easter Island was either toppled in the dirt or resting stillborn in the quarry.

Captain Cook, arriving in 1774, described the islanders as "small, lean, timid and miserable." European diseases arrived soon after, killing more people, and slave raids in 1862-63 carried off 1,500 Rapa Nui -- half the remaining population -- to the Peruvian guano mines. A handful managed to struggle home a few years later -- and brought the plague with them. By 1872 there were just 111 people on the island.

Today, the 3,800 residents in Rapa Nui are citizens of Chile, the islanders having accepted Chilean annexation in 1888. It's been for the most part a happy relationship. Spanish is the island's lingua franca (though Rapa Nui is being revived), and you can have a mean plate of *ceviche con coco* while you contemplate the fate of the island and its lessons.

Due to the massive population drop-off, vast swaths of cultural knowledge have been lost forever, contributing to the sense of insolubility that surrounds Easter's puzzling past. Says Mr. Rapu: "Our ethnography is one of the poorest in the Pacific. But we still know how to fish. We still know how to track the moon for guidance in planting. We still have some things to call ourselves Rapa Nui." Above all -- and for all of us -- they have the moai, about which no matter how much archaeologists surmise, we shall always be left wondering.

- **Mr. Hildreth (jeremyhildreth.com) is a traveler, a writer, and an image consultant for companies and countries.**

http://online.wsj.com/article/SB124242685832325213.html

Are humans cruel to be kind?

- 16 May 2009 by **John Whitfield**

Hearings on the lead-up to the US government's $700-billion Wall Street bailout are investigating the collapse of financial giant Lehman Brothers. Lehman Chief Executive Richard Fuld was one of those grilled (Image: KPA / Zuma / Rex)

2 more images

AROUND the time of the G20 summit in London on 2 April, the streets of cities across the world were filled with people protesting against the excesses of the banking bosses, among other things. Chances are you agreed with the sentiment. Chances are too that if you had been asked to put your hand in your pocket to fund a campaign to seize their bonuses, even if you wouldn't see any of the money, you'd have been sorely tempted.

If so, congratulations: you have just confounded classical economics, which says that no rational person should ever reduce their own income just to slash someone else's. And yet that's exactly what we do. Classical economics, it turns out, is a pretty terrible predictor of how we actually behave.

But why do we inflict pain for no gain? On the face of it, it is rather a perverse way of going about things. Does spitefulness stem from an affronted sense of fairness? Or something altogether darker: envy, lust for revenge - or perhaps even pure sadism?

It might be all those things. Economists, anthropologists and evolutionary biologists have been teasing out how, used judiciously, spiteful behaviour can be one of our best weapons in maintaining a fair and ordered society. But intentions that are noble in one situation can be malicious in another - making spite a weapon that can all too easily backfire.

Human spite is a complex affair. It is not pure selfishness in the Darwinian sense, like a stag that picks a fight with another. Though it might be gored in the process, the stag is actually acting in its own best interests. If it ends up with more mates, then the chances of passing on its genes are increased, an evolutionary prize worth fighting for.

Nor is spite as we practise it true spite in the biologist's sense. That would involve diminishing our own evolutionary fitness just so we can lower that of some unrelated individual. That behaviour exists, but it is hard to come by, says Stuart West, an evolutionary biologist at the University of Oxford. There is a particular type of parasitic wasp, for example, some of whose larvae do not develop into adults capable of reproduction, but instead kill unrelated larvae of the same species, freeing up resources for their siblings. And in several types of bacteria, spiteful cells produce chemicals that kill both themselves and other members of their kind, unless they carry a genetic marker of relatedness to the suicidal individual. That makes microbes the kings of true spite, says West.

Human spite is something altogether subtler. Psychological motivations and social contexts influence our course of action. That requires a very special set of circumstances and skills, says Marc Hauser, a biologist at Harvard University. First, it needs a stable social grouping in which unrelated individuals interact regularly, and in which costs incurred retain relevance. What's more, you must also be able to spot when you're getting a raw deal, identify the guilty party, and be willing to do something about it.

That requires what Hauser has dubbed "floodlight" intelligence - the ability to see the big picture and combine many cognitive inputs over time. That, he suggests, might make both spite and reciprocity - the doing and returning of favours - uniquely human qualities. The "laser-beam" intelligence of most animals might be superb at solving individual problems, but it is simply not good enough at generalising experience to develop such complex behaviours (see "Is spite uniquely human?").

Naughty but nice

If that's true, the floodlight is switched on at an early age. At a meeting of London's Royal Society in January, Hauser reported preliminary results from experiments in which children between 4 and 8 years old were offered varying numbers of sweets for themselves and another child unknown to them. They had to pull either a lever delivering the sweets, or another that tipped the sweets out of reach. Infants of all ages almost always rejected one sweet for themselves if the other child was set to receive more. The older children often also rejected sweets if they got more than the other child. Where that kind of concern about inequality disappears to is unclear, because we adults certainly don't have it. "Imagine you have four dollars on your side, and there's one on the other side," says Hauser. "It's highly unlikely that you'll dump your four dollars." But the negative, spiteful version persists: most of us would be quite prepared to sacrifice a dollar to stop someone else getting four. "Spite is the ugly sister of altruism," says Hauser.

What motivates this ignoble behaviour? A clue is provided by laboratory experiments known as public goods games. In a standard public goods game, each participant is given the same amount of money, some or all of which they can pay into a common pot. What's in the pot is then multiplied by the experimenters and divided equally between the players, so that even those who put in nothing get a share of its contents. The best outcome for all is if everyone puts their cash into the pot. But that does not naturally happen. In repeated rounds of the game, some individuals hold on to their own cash and hope to leech off other people.

Deterred by these freeloaders, the players who at first cooperate start to hold onto their cash. Cooperation breaks down entirely, and the whole group misses out on the bonus - society as a whole suffers (see diagram). But allow participants to pay for the privilege of punishing defectors, and it is a very different game. Cooperative players eagerly part with still more of their cash to punish cheats - who soon learn that cooperation is the cheaper option (*Nature*, vol 415, p 137).

Simply, it seems that niceness needs nastiness. Our sense of fairness and our willingness to inflict damage on one another combine to encourage contributions to the common good and deter people from cheating. Researchers call this altruistic punishment. "But at the end of the day, it's still spite," says economist Benedikt Herrmann of the University of Nottingham, UK. The benefits of this

constructive spite might not be immediate, but they are real - in the long run, we all benefit more if we can ensure others in society toe the line.

Our brains are certainly wired to respond positively to this constructive form of spite. Although we might lose out financially, scans show that a region called the striatum, which responds to rewarding experiences, lights up during altruistic punishment (*Science*, vol 305, p 1254). So, problem solved. Spite is in our own best interests and our brains reward us for it, so we should welcome it, right?

Not quite. The problem is that it's not only doing bad things to bad people that makes us feel good. Recent studies have shown how the striatum responds in the same way to schadenfreude, when we take a morally dubious pleasure in others' misfortunes (*Science*, vol 323, p 937). Adolescent boys with aggressive conduct disorder show similar brain activity when they watch a video of someone hurting another person (*Biological Psychology*, vol 80, p 203).

The problem with spite is that it's not just doing bad things to bad people that makes us feel good Sadism aside, it is easy to imagine why evolution might have wired us up like this, according to Hidehiko Takahashi of the National Institute of Radiological Sciences in Chiba, Japan, leader of the schadenfreude study. "Altruistic punishment might bring an indirect benefit to us from society, and schadenfreude a direct benefit from a rival." But it also suggests that the line between the cooperative and competitive prompts for spiteful behaviour is blurry and subjective. If the prospect of bankrupting a few fat cats gives us a twinge of pleasure, it is hard to say whether that is because we believe they have robbed society, or because we are envious of their wealth and success and happy to see them toppled.

Daniel Zizzo, an economist at the University of East Anglia in Norwich, UK, points out that we shouldn't necessarily feel too bad about being bad - as long as we don't take it too far. "Envy has a stigma attached to it," he says, "but it's a powerful motivation towards egalitarianism and entrepreneurship." But it can also be used to cut down anyone who seems too clever or successful, possibly stunting innovation to the detriment of society. Accusations of witchcraft, which are often levelled against the successful, are a classic case in point, he says. If we can't raise ourselves up, we might find dragging someone else down just as good.

And there is evidence that, in some parts of the world, the rewards of spite can lead to just that kind of counterproductive behaviour. Last year Karla Hoff, an economist at the World Bank who is currently working at Princeton University, and her colleagues reported the results of experiments conducted in villages in the Indian state of Uttar Pradesh (*American Economic Review*, vol 98, p 494). In these tests, two players started out with 50 rupees each. The first could choose to give his to the second, in which case the experimenters added a further 100 rupees, giving the second player 200 rupees in total. The second player could decide to keep the money for himself, or share it equally with the first player. A third player then entered the game, who could punish the second player - for each 2 rupees he was willing to spend, the second player was docked 10 rupees.

The results were startling. Even when the second player shared the money fairly, two-thirds of the time the newcomer decided to punish him anyway - a spiteful act with seemingly no altruistic payoff. "We asked one guy why," says Hoff. "He said he thought it was fun."

Hoff found that high-caste players were more likely to punish their fellow gamers spitefully than low-caste players, leading her to suggest that context is everything. It is not that people in Uttar Pradesh are nastier than elsewhere, but rather that the structure of their society makes them acutely conscious of status. The sensitivity of higher castes to their position makes them tend not to support any changes that threaten to level the social hierarchy, such as development projects. But higher castes can also put others down, safe in the knowledge that "untouchables" are unlikely to strike back. "If you're low caste it's dangerous to rise in status," says Hoff. "You'll get beaten up or worse."

The moral seems to be that, while spiteful behaviour can be a powerful force for keeping a society functioning smoothly, the structure of that society must be able to contain and channel those spiteful urges. "Social norms are a moral scaffold that keeps aggression and spite under control," says Herrmann. Societies that have strong laws tend to be those where individuals have a strong sense that they should treat strangers fairly - and are willing to punish cheats informally through gossip and ostracism.

So if you want to squeeze the bankers till their pips squeak, it might indeed be the case that spite is right. But it pays to examine your motives carefully. Woe betide a society in which altruistic punishment gives way to an envy-driven contest where everyone stands to lose. Hoff likes to illustrate the dangers with a Russian joke. A genie appears to a man and says: "You can have anything you want. The only catch is that I'll give your neighbour double." The man says: "Take out one of my eyes."

Is spite uniquely human?

Are we humans really alone in our spitefulness? It makes sense to take a peek at our nearest relatives to find out. "Chimpanzees are very competitive," says primatologist Keith Jensen of the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany. "They're good candidates for spiteful motivations."

To test that, Jensen set up an experiment with two chimps, the first of which could pull a rope to deprive both it and the other of a food reward (*Proceedings of the National Academy of Sciences*, vol 104, p 13046). If the second chimp stole its food, the first chimp was quick to pull the rope. But if Jensen took the first chimp's food and gave it to the second, they pulled far less often. On that evidence, chimps don't do envy. "Just having another chimp better off than they are doesn't affect them," says Jensen.

Frans de Waal, a primatologist at Emory University in Atlanta, Georgia, thinks the results are inconclusive - the chimps sometimes pulled the rope when no food was available, so might simply have not understood the experiment. Given what we know about chimpanzees' intellectual and social skills, he says, a sense of fairness - and so a capacity for spite - would not be a surprise.

De Waal's own experiments suggest that capuchin monkeys are sensitive to fairness. If another monkey gets a tasty grape, they will not cooperate with an experimenter who offers a piece of cucumber (*Nature*, vol 425, p 297). A similar aversion has been spotted in dogs (*New Scientist*, 13 December 2008, p 12), and even rabbits seem affected by inequality, leading de Waal to believe that an ability to detect and react to injustice is common to all social animals. "Getting taken advantage of by others is a major concern in any cooperative system," he says.

But do social animals lash out against inequality in the same way as humans do? Marc Hauser and his colleagues Katharine McAuliffe and Kyle Foreman of Harvard University are experimenting with cotton-top tamarins, another species of monkey, to find out. Preliminary results show that some monkeys would forfeit a piece of food if it stopped an unrelated monkey getting more. That looks a lot like spite - but the monkeys' true motivations remain unclear. Until we understand more, says Hauser, we remain the lone champions of spite.

http://www.newscientist.com/article/mg20227081.400-are-humans-cruel-to-be-kind.html?full=true&print=true

Human noses too cold for bird flu

Bird flu may not have become the threat to humans that some predicted because our noses are too cold for the virus to thrive, UK researchers say.

An Imperial College London recreation of the nose's environment found that at 32 degrees Celsius, avian flu viruses lose function and cannot spread.

It is likely that the viruses have adapted to suit the warmer 40 degree environments in the guts of birds.

A mutation would be needed before bird flu became a human problem, they said.

Published in the journal PLoS Pathogens, the study also found that human viruses are affected by the colder temperatures found in the nose but to nowhere near the same extent.

" **It is certainly part of the explanation of why avian viruses, such as H5N1, fail to transmit readily to humans** "
Professor Ian Jones, University of Reading

In effect, human viruses are still able to replicate and spread under those conditions, the researchers said.

Both viruses were able to grow well at 37 degrees - human core body temperature and equivalent to the environment in the lungs.

They also created a mutated human flu virus by adding a protein from the surface of an avian influenza virus.

This virus - an example of how a new strain could develop and start a pandemic - was also unsuccessful at 32 degrees.

Mutations

Study leader Professor Wendy Barclay said it suggested that if a new human influenza strain evolved by mixing with an avian influenza virus, it would still need to undergo further mutations before it could be successful in infecting humans.

"Our study gives vital clues about what kinds of changes would be needed in order for them to mutate and infect humans, potentially helping us to identify which viruses could lead to a pandemic."

She added further research could point to warning signs in viruses that are beginning to make the kinds of genetic changes for them to jump into humans.

"Animal viruses that spread well at low temperatures in these cultures could be more likely to cause the next pandemic than those which are restricted."

She said swine flu - which was spreading from person to person, seemingly through upper respiratory tract infection - was probably an example of a virus which had adapted to cope with the cooler temperatures in the nose.

Key protein role

Professor Ian Jones, an expert in virology at the University of Reading, said: "This work confirms the fact that temperature differences in the avian and human sites of influenza infection are key to virus establishment.

"It is certainly part of the explanation of why avian viruses, such as H5N1, fail to transmit readily to humans."

He added that the research also showed that the proteins on the outside of the virus were key to its function at different temperatures.

"This helps the monitoring of avian flu as it indicates which changes to look out for."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8050523.stm

Published: 2009/05/14 23:02:07 GMT

Heart disorder Alzheimer's link

A common heart disorder has been linked to a raised risk of Alzheimer's disease by US researchers.

Atrial fibrillation causes the heart to beat chaotically, increasing the risk of blood clots and, if the condition is left untreated, stroke.

It has previously been linked to some types of dementia - but not Alzheimer's, the most common form.

The study, by Intermountain Medical Center in Utah, was based on more than 37,000 patients.

" **If research helps us understand the relationship between the two conditions, we will be in a better position to develop desperately needed new treatments** "
Rebecca Wood Alzheimer's Research Trust

The study found atrial fibrillation patients under the age of 70 had a 187% greater risk of all types of dementia compared with the general population.

But their specific risk of Alzheimer's disease was also up - by 130%.

However, the overall risk of Alzheimer's for all patients remained low.

Lead researcher Dr Jared Bunch said: "Previous studies have shown that patients with atrial fibrillation are at higher risk for some types of dementia, including vascular dementia.

"But to our knowledge, this is the first large-population study to clearly show that having atrial fibrillation puts patients at greater risk for developing Alzheimer's disease."

Alzheimer's, which accounts for up to 80% of all dementia cases, is known to be linked to age and genetics.

It has long been suspected that poor heart health may also play a role.

Various theories

The researchers said more research was needed to explain why atrial fibrillation may raise the risk of Alzheimer's.

They put forward several theories for a possible link. They suspect atrial fibrillation damages the small blood vessels, potentially reducing blood flow to the brain.

Alternatively, the condition is linked to tiny micro-strokes, the damage from which may accumulate over time, making Alzheimer's more likely.

Thirdly, atrial fibrillation is associated with a general increase in inflammation throughout the body, again a possible risk factor for Alzheimer's.

Researcher Dr John Day said: "Now that we've established this link, our focus will be to see if early treatment of atrial fibrillation can prevent dementia or the development of Alzheimer's disease."

Rebecca Wood, chief executive of the Alzheimer's Research Trust, said: "If research helps us understand the relationship between the two conditions, we will be in a better position to develop desperately needed new treatments.

"We can all lower our dementia risk by maintaining a balanced diet and taking regular exercise, which is also good advice for protecting your heart."

Alasdair Little, cardiac nurse at the British Heart Foundation, said: "This is an interesting study which adds weight to previous data indicating a link between atrial fibrillation - a common disturbance of heart rhythm - and dementia.

"The risk factors for heart disease and dementia are very similar so it is not surprising that in some people they co-exist.

"Further research into both conditions is needed to understand whether there is a causal link between the two."

Details of the study were presented to the Heart Rhythm Society in Boston.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8051800.stm

Published: 2009/05/15 23:06:47 GMT

Elderly need more 'sun vitamin'

Spending more time in the sun could help older people cut their risk of heart disease and diabetes say experts.

Sun exposure helps the skin make vitamin D - a vitamin older people are generally deficient in due to their lifestyles and ageing processes.

A team at Warwick University has shown a deficiency increases the risk of metabolic syndrome, which is linked to diabetes and cardiovascular disease.

Their study of more than 3,000 people is published in Diabetes Care.

The researchers say older people would benefit from more sunshine, although it is still important to be sensible in the sun as UV damage is linked with skin cancer.

Among the 50 to 70-year-olds living in China that the scientists studied, 94% had a vitamin D (25-hydroxyvitamin D) deficiency or insufficiency and 42% also had metabolic syndrome.

" **When we are older we may need to spend more time outdoors to stimulate the same levels of vitamin D we had when we were younger** "
Lead researcher Dr Oscar Franco

Lead researcher Dr Oscar Franco says the same can be seen in British and American populations too.

"Vitamin D deficiency is becoming a condition that is causing a large burden of disease across the globe with particular deleterious impact among the elderly.

"We found that low vitamin D levels were associated with an increased risk of having metabolic syndrome, and was also significantly associated with increased insulin resistance."

Metabolic syndrome's cluster of obesity, high blood sugar, high blood pressure and high cholesterol can lead to heart disease, stroke and diabetes.

Sunshine vitamin

Vitamin D is mainly obtained from exposure to the sun, as well as from certain foods such as oily fish and eggs.

There are concerns that many people, including the elderly, pregnant women and those who wear all-concealing clothing do not get enough of the vitamin.

Dr Franco said there were many factors which could explain why older people had less vitamin D in their blood, including changes in lifestyle factors such as clothing and outdoor activity.

"As we get older our skin is less efficient at forming vitamin D and our diet may also become less varied, with a lower natural vitamin D content.

"When we are older we may need to spend more time outdoors to stimulate the same levels of vitamin D we had when we were younger."

Lorna Layward from Age Concern and Help The Aged said: "We have always advocated that older people get out into the sunshine for a bit each day if they can. A bit of sun is good for you.

"We hear a lot about sun exposure and the risk of cancer, but older people tend to be at the other end of the spectrum. They do not get enough sun and tend to cover up and wear more clothing."

Ed Yong of Cancer Research UK said: "The amount of sunlight it takes to make enough vitamin D is always less than the amounts that cause reddening or burning, so it should be possible to get the benefits of this vitamin without increasing the risk of skin cancer.

"Elderly people can also boost their vitamin D levels by eating foods like oily fish, or by using vitamin D supplements on the advice of their GP."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8043297.stm

Published: 2009/05/16 23:00:16 GMT

Women's menstruation genes found

Scientists say they have begun to crack the genetic code that helps determine when a girl becomes a woman.

A UK-led team located two genes on chromosomes six and nine that appear to strongly influence the age at which menstruation starts.

The Nature Genetics study also provides a clue for why girls who are shorter and fatter tend to get their periods months earlier than classmates.

The genes sit right next to DNA controlling height and weight.

PUBERTY
- The two to three-year transition from childhood to adult body size and sexual maturity
- Complex multi-staged process involving growth acceleration, weight gain and the appearance of secondary sexual characteristics
- Can happen earlier in overweight and obese chidlren
- Early puberty associated with increased risk for obesity, diabetes and cancer

A second paper, published in the same journal, also concludes that one of the two genes highlighted by the first study plays a key role in the timing of puberty in both girls and boys.

Reproductive lifespan is closely linked to the risk of developing conditions such as heart disease, breast cancer and osteoporosis.

It is thought that the female sex hormone oestrogen - produced at higher rates during a woman's reproductive life - raises the risk of these diseases. Therefore, the earlier a woman goes through puberty, the more risk she may be at.

So the researchers say their work not only improves our understanding of the genetics underpinning development, it may ultimately aid the fight against disease.

However, they also accept that the onset of puberty is influenced by factors such as nutrition and exercise, and the effect of a single gene is likely to be relatively small.

Developing earlier

In the western world children are reaching puberty at younger and younger ages - some girls at the age of seven.

" **This study provides the first evidence that common genetic variants influence the time at which women reach sexual maturation** "
Researcher Dr Anna Murray from the Peninsula Medical School

Many blame rising obesity rates because, generally, girls who achieve menstruation earlier in life tend to have greater body mass index (BMI) and a higher ratio of fat compared to those who begin menstruation later.

From its analysis, a team led by Exeter's Peninsula Medical School predict one in 20 females carry two copies of each of the gene variations which result in menstruation starting earlier - approximately four and half months earlier than those with no copies of the gene variants.

In collaboration with research institutions across Europe and the US, they studied 17,510 women from across the world, including women of European descent who reported reaching menstruation of between nine and 17 years of age.

When they split the women up according to the age they began menstruating, certain gene patterns appeared.

Scanning the whole genome enabled them to hone in on these differences and pinpoint the exact genes most likely accountable. Researcher Dr Anna Murray said: "This study provides the first evidence that common genetic variants influence the time at which women reach sexual maturation.

"Our findings also indicate a genetic basis for the associations between early menstruation and both height and BMI."

Biological mechanisms

Co-worker John Perry said: "Understanding the biological mechanisms behind reproductive lifespan may also help inform us about associated diseases that affect a lot of women as they get older, including diabetes, heart disease and breast cancer."

The second paper, led by the MRC Epidemiology Unit at Cambridge, analysed genetic information from thousands of people. It linked a specific variant one of the two genes highlighted by the Exeter team - LIN28B - with earlier breast development in girls, and earlier voice breaking and pubic hair development in boys.

Lead researcher Dr Ken Ong said: "LIN28B works by controlling whether or not other genes are active.

"There are a number of such 'master switch' genes known, but this is the first evidence linking such a gene to growth and physical maturation." Dr Aric Sigman, psychologist and fellow of the Royal Society of Medicine, said: "Early menstruation is a health issue because beyond being an inconvenient surprise for a girl and her parents, it's also associated with a higher risk of a variety of diseases and psychological problems.

"Girls maturing earlier are more likely to become depressed, delinquent, aggressive, socially withdrawn, suffer sleep problems drinking, smoking, drug abuse, lower self-esteem and suicide attempts.

"They're also more likely to exhibit poor academic performance in high school than on-time or later maturing peers. "It is important that we understand why early menstruation occurs and these findings bring us closer to explaining this in some girls."

Three other papers, also published in Nature Genetics, throw up other candidate genes which appear to be involved in the onset of puberty.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8046457.stm

Published: 2009/05/17 23:02:52 GMT

Keep working 'to avoid dementia'

Keeping the brain active by working later in life may be an effective way to ward off Alzheimer's disease, research suggests.

Researchers analysed data from 1,320 dementia patients, including 382 men.

They found that for the men, continuing to work late in life helped keep the brain sharp enough to delay dementia taking hold.

The study was carried out by the Institute of Psychiatry at King's College London.

It features in the International Journal of Geriatric Psychiatry.

" **More people than ever retire later in life to avert financial hardship, but there may be a silver lining - lower dementia risk** "
Rebecca Wood Alzheimer's Research Trust

Around 700,000 people in the UK currently have dementia and experts have estimated that by 2051, the number could stand at 1.7m.

It is estimated that the condition already costs the UK economy £17bn a year.

Brain connections

Dementia is caused by the mass loss of cells in the brain, and experts believe one way to guard against it is to build up as many connections between cells as possible by being mentally active throughout life. This is known as a "cognitive reserve".

There is evidence to suggest a good education is associated with a reduced dementia risk.

And the latest study suggests there can also be a positive effect of mental stimulation continued into our later years.

Those people who retired late developed Alzheimer's at a later stage than those who opted not to work on.

Each additional year of employment was associated with around a six week later age of onset.

Researcher Dr John Powell said: "The possibility that a person's cognitive reserve could still be modified later in life adds weight to the "use it or lose it" concept where keeping active later in life has important health benefits, including reducing dementia risk."

The researchers also admit that the nature of retirement is changing, and that for some people it may now be as intellectually stimulating as work.

Key threshold

Researcher Professor Simon Lovestone said: "The intellectual stimulation that older people gain from the workplace may prevent a decline in mental abilities, thus keeping people above the threshold for dementia for longer."

However, he added: "Much more research is needed if we are to understand how to effectively delay, or even prevent, dementia."

Rebecca Wood, chief executive of the Alzheimer's Research Trust, which funded the study, said: "More people than ever retire later in life to avert financial hardship, but there may be a silver lining - lower dementia risk."

However, Dr Susanne Sorensen, head of research at the Alzheimer's Society, said the small sample size of the study made it difficult to draw firm conclusions.

She said: "There could be a number of reasons why later retirement in men is linked with later onset of dementia.

"Men who retire early often do so because of health conditions, such as hypertension or diabetes, which increase your risk of dementia.

"It could also be that working helps keep your mind and body active, which we know reduces risk of dementia."

A spokesperson for the Department for Work and Pensions said it had carried out work showing that working beyond pension age had many positive effects.

"Not only can it mean more income, but also social networking and increased activity.

"We also find that many of today's older workers are choosing rejecting the cliff edge between work and retirement in favour of a gradual step down. And employers should help them to do this."

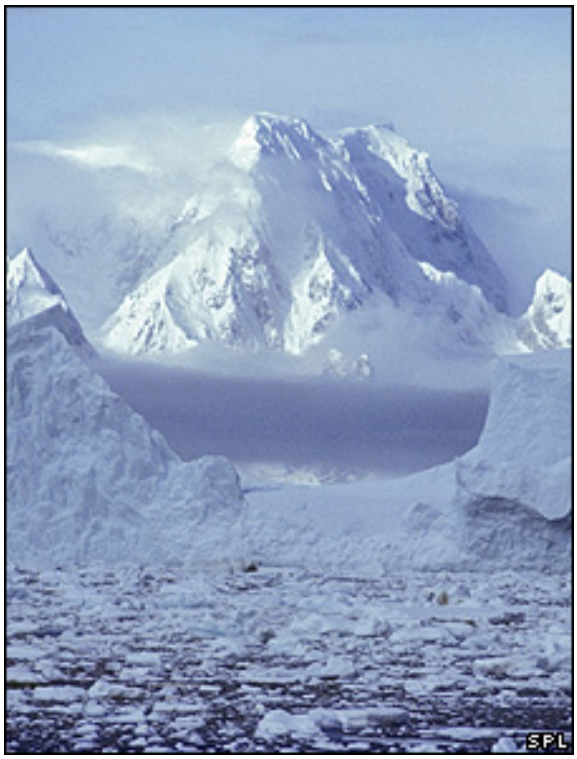
Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8048523.stm

Published: 2009/05/17 23:02:27 GMT

Ice sheet melt threat reassessed

By Mark Kinver
Science and environment reporter, BBC News

The collapse of a major polar ice sheet will not raise global sea levels as much as previous projections suggest, a team of scientists has calculated.



Writing in Science, the researchers said that the demise of the West Antarctic Ice Sheet (WAIS) would result in a sea level rise of 3.3m (10 ft).

Previous estimates had forecast a rise in the region of five to six metres.

However, they added, the rise would still pose a serious threat to major coastal cities, such as New York.

"Sea level rise is considered to be the one of the most serious consequence of climate change," lead author Jonathan Bamber told the Science podcast.

"A sea level rise of just 1.5m would displace 17 million people in Bangladesh alone," he added.

"So it is of the utmost importance to understand the potential threats to coastlines and people living in coastal areas."

Threat reassessed

Professor Bamber, from the University of Bristol's Glaciology Centre, said that the WAIS posed "potentially one of the most serious threats". The world has three ice sheets, Greenland, East Antarctica and West Antarctica, but it is the latter that is considered most vulnerable to climatic shifts.

"It has been hypothesised for more than 30 years now that the WAIS is inherently unstable," he explained.

"This instability means that the ice sheet could potentially rapidly collapse or rapidly put a lot of ice into the oceans."

When the idea first emerged in the late 1970s, it was estimated that global sea level would rise by five metres if the WAIS collapsed.

Current projections suggest that a complete collapse of WAIS would result in an increase of up to six metres.

But Professor Bamber said that no-one had revisited the calculation, despite new data sets becoming available, and scientists developing a better understanding of the dynamics in the vast ice sheets.

The original estimates were based on "very basic ice thickness data", he explained.

"Ice thickness data gives you information about the depth of the bedrock underneath the ice sheet.

"Over the past 30 years, we have acquired much more ice thickness data over the whole of Antarctica, particularly over West Antarctica. "We also have much better surface topography. Those two data sets are critical in determining two things."

The first was knowing the volume of ice that could contribute to sea level rise, and the second was a better understanding of the proportion of WAIS that was potentially susceptible to this instability.

Instead of assuming that the entire WAIS would collapse, causing sea level to rise by up to six metres, Professor Bamber and colleagues used models based on glaciological theory to simulate how the 2.2 million-cubic-km ice sheet would respond.

"Our reassessment of West Antarctica's contribution to sea level rise if the ice sheet was to collapse is about 3.3 metres," he said.

"That is about half of the value that has been quoted up until now."

The team's study also calculated what regions were likely to experience the biggest increases in sea level.

"Sea level rise is not uniform across the world's oceans, partly as a result of disruptions to the Earth's gravity field," explained Professor Bamber.

"It turns out that the maximum increase in sea level rise is centred at a latitude of about 40 degrees along the Atlantic and Pacific seaboards of North America."

This would include cities such as San Francisco and New York.

These areas could expect increases of one-and-a-quarter times the global average, the team estimated.

In other words, if the global average was one metre, then places like New York could expect to see a rise of 1.25m. Responding to Professor Bamber's paper in Science, British Antarctic Survey science leader Dr David Vaughan described the findings as "quite sound".

"But for me, the most crucial question is not solely about the total amount of ice in West Antarctica, because that might take several centuries to be lost to the ocean," he told BBC News.

"The crucial question is how much ice could be lost in 100-200 years; that's the sea level rise we have to understand and plan for.

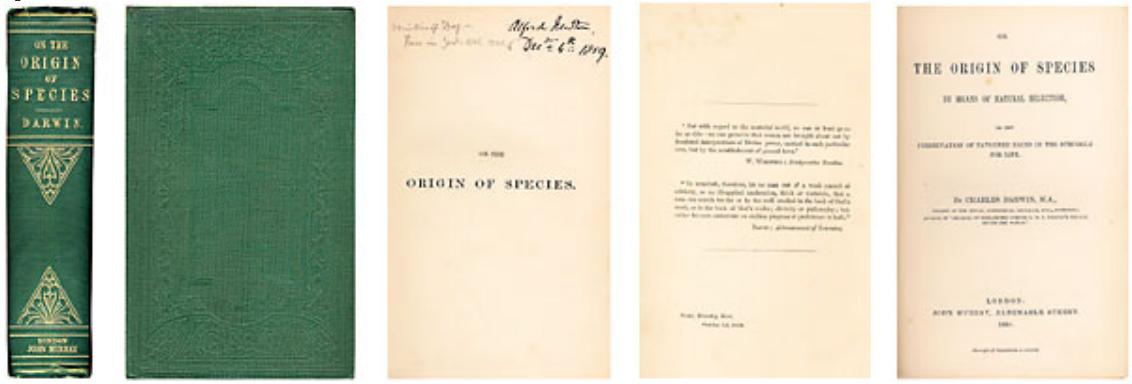
"Even with this new assessment the loss of a fraction of WAIS over those timescales would have serious consequences and costs that we've only really just begun to understand."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8050094.stm

Published: 2009/05/14 21:08:07 GMT

Digging for Darwin

By PETER DIZIKES



Dozens of people return overdue books to the Boston Public Library every day. Probably only one person, however, has ever walked in holding a book that had been missing for 80 years. Please salute Julie Geissler, the New Hampshire resident who stunned library staff members by showing up unannounced one day in 2001 to return a rare first-edition copy of Charles Darwin's "On the Origin of Species," one of the most famous books ever written.

What was Geissler doing with this copy of the treatise that so brilliantly laid out the principles of evolution? Well, in the early 1920s, someone removed the volume from the library. About five years later, Geissler says, a relative of hers, a scholar in Providence, R.I., bought it at a sale. Several years ago, Geissler's mother, sorting through old family belongings, gave the book to Geissler. "It was in a box in the attic," she recalled in a recent interview. "If my mother hadn't noticed, it would have been thrown in the trash." Geissler and her husband decided to return the book: "Now everyone can see it."

Through it all, this copy of the "Origin" has remained in good condition. "Whoever had it for most of the 80 years kept it nicely and clearly treasured it," said Susan Glover, who oversees the rare-books department at the Boston Public Library. And it is a treasure. A first edition of the "Origin" sold last year at Christie's for $194,500.

But as celebrations of the 150th anniversary of the book's publication continue, the episode raises a question. How many other first editions of "On the Origin of Species" are still tucked away in bookcases, boxes or attics? Could anyone else stumble across Darwin's masterpiece by accident?

There are reasons to suspect it will happen again. Unlike any other epochal work of science, "On the Origin of Species" was written for a mass audience. Instead of being acquired only by elite intellectuals and libraries, it was bought by popular-science readers within the Victorian bourgeoisie. Among rare books, this makes the "Origin" a further rarity: the people's scientific blockbuster, if you will.

This manner of distribution increases the odds that "Origin" first editions are resting in obscure places. "It seems highly likely that some copies are lying about unrecognized," said John van Wyhe, a bye-fellow of Christ's College, Cambridge, and director of the Darwin Online project, which places Darwin documents on the Web. That cannot be said of some other famous works. For example, scholars believe they have an essentially complete list of 276 surviving first editions of Copernicus's "On the Revolutions of Heavenly Spheres," with further surprise findings highly unlikely.

By contrast, no one knows how many of the 1,250 first-edition copies of the "Origin" still exist. Thus, in this anniversary year, researchers for Darwin Online are conducting the first census of the first edition, contacting private collectors, studying library catalogs and hoping owners will contact them through the Darwin Online Web site. "Clearly quite a few are in private hands," said Angus Carroll, director of the census. (For those wondering about their own copy, he suggests a handy way of identifying a first edition: on the 11th line of Page 20, the word "species" is incorrectly rendered as "speceies.")

Why is Carroll so certain that more first editions are still in private hands? Scholars know that Darwin's publisher, John Murray, printed 1,250 copies of the "Origin" for its Nov. 24, 1859, publication. Darwin quickly made some revisions, and Murray declared his next printing of 3,000, in January 1860, to be the second edition. At the time, the rapid appearance of a new edition may have diminished the

distinctiveness of the first edition, leaving it in the hands of regular readers. Carroll believes that the first formal census figure, to be announced in November, will be between 600 and 700 copies, but said that within a few years, "I fully expect to find 1,000." Even so, a couple of hundred would remain at large; Carroll estimates that only three to seven emerge for sale each year.

Certainly, some "Origin" first editions are easy to trace. Darwin was given a dozen and bought 80 more for notable colleagues and intellectuals, including the geologist Charles Lyell and the social philosopher Herbert Spencer. "There is a very good chance the ones sent to prominent individuals have survived," van Wyhe said.

Around 1,100 first-edition copies were sold publicly, according to Janet Browne, a Harvard historian of science and Darwin biographer. Of these, 500 were purchased by Mudie's Circulating Library, which mailed its subscribers books every month. Mudie's also ran a secondhand store in London, and Browne believes they "almost certainly" sold first editions there. But others from the circulating collection may have disappeared into home libraries. In any case, even the copies now owned by large institutions show us how first editions of the "Origin" bounced from homes to booksellers and back.

Consider the two copies I examined at the Boston Public Library (which owns three in all). How did the library acquire them in the first place? "We don't know," Susan Glover of the rare-books division said. There is no acquisition record for either book. Julie Geissler's copy has been rebound. The other copy, still in its original green and gold binding, has some older ownership labels inside it. One reads "R. G. Tatham," with an address around London's docklands area. Another label cites W. W. Lucy, a bookshop. Still another, in both English and Latin, says "Caroli ac Mariae Lacaitae Filiorumque Selham Sussex." Glover suggested I take these clues to pursue my own sleuthing about this copy — so I did. These few labels, it turns out, evoke a lot of history. "R. G. Tatham" was almost certainly one Robert Gordon Tatham, a "much respected" London doctor who lived from 1829 to 1895, according to his obituary in The British Medical Journal. He sounds like just the kind of interested professional — not an academic specialist — Darwin was hoping to reach.

The joint English-Latin inscription indicates the book once belonged to a couple, Charles and Mary Lacaita, and their children. Charles Lacaita, a member of Parliament in the 1880s and a botanist, lived in the town of Selham, in West Sussex. His father, Sir James Lacaita, was one of many prominent Italian exiles who moved to England in the 19th century, and a noted bibliophile. His son, Francis, was killed in World War I. Book dealers have found similar Lacaita family labels, most likely from the early 20th century, in other science volumes.

I would guess this book belonged to Tatham, was sold to W. W. Lucy after his death, then to the Lacaita clan. It is not clear how either copy crossed the Atlantic, although prominent American families of the time often collected art and valuables in Europe, then donated heavily to public institutions. The Boston Public Library, housed in an 1895 Charles McKim building decorated with John Singer Sargent murals, attracted this kind of patronage.

So in these first editions of "On the Origin of Species," we glimpse an intellectually curious member of the Victorian bourgeoisie, the unusual family story of an Italian exile in England, the agony of the Great War, the rise of American wealth and collecting, a Rhode Island scholar's quiet bibliophilia, and a New Hampshire woman's matter-of-fact generosity. Not bad for a couple of books. And while they wound up in a library, many others that remain at large probably offer similarly rich and varied histories.

"There might be more of these amazing, serendipitous moments to come," van Wyhe said. With all due respect to the high-powered institutions and collectors who are preserving and cataloging the first edition of "On the Origin of Species," it would reflect the popular spirit of Darwin's work if it remained a source of such humble surprises.

Peter Dizikes is a science journalist based in Boston.

http://www.nytimes.com/2009/05/17/books/review/Dizikes-t.html?8bu&emc=bub2

Capitalism's Fault Lines
By JONATHAN RAUCH

A FAILURE OF CAPITALISM

The Crisis of '08 and the Descent Into Depression

By Richard A. Posner

346 pp. Harvard University Press. $23.95

"This recession," President Obama said recently, "was not caused by a normal downturn in the business cycle. It was caused by a perfect storm of irresponsibility and poor decision-making that stretched from Wall Street to Washington to Main Street." Richard A. Posner is having none of it. A perfect storm, yes: but a storm of responsibility and reasonable decision-making. The Crash of '08 happened because businesspeople and consumers did what markets and society expect them to do. Don't blame capitalists or, for the most part, government. Blame capitalism.

It comes as something of a surprise that Posner, a doyen of the market-oriented law-and-economics movement, should deliver a roundhouse punch to the proposition that markets are self-correcting. It might also seem odd that a federal appellate judge (and University of Chicago law lecturer) would be among the first out of the gate with a comprehensive book on the financial crisis — if, that is, the judge were any other judge. But Posner is the late Daniel Patrick Moynihan's successor as the country's most omnivorous and independent-minded public intellectual. By now, his dozens of books just about fill their own wing in the Library of Congress.

In "Catastrophe: Risk and Response" (2004), he took up the problem of low-probability, high-impact events. The financial meltdown certainly qualifies. In this compact and bracingly lucid volume, he offers a simple, but not simplistic, primer: "a concise, constructive, jargon- and acronym-free, nontechnical, unsensational, light-on-anecdote, analytical examination of the major facets of the biggest U.S. economic disaster in my lifetime and that of most people living today."

If you read the newspapers, you will not see much in "A Failure of Capitalism" by way of unfamiliar particulars. Cheap money and an inrush of foreign capital fueled a lending boom, which poured credit into the housing market. As prices went up, up, up, even risky mortgages seemed safe and everyone piled in, including banks. Financiers relied on securitization and complicated financial instruments to dilute the attendant risk, but the result was to spread that risk through the financial system, making it impossible to locate. When the housing bubble popped, everyone was holding bad debt, but no one was sure how bad or even how much. With banks suddenly looking undercapitalized, lenders stopped lending and started selling assets to raise cash. The faster everyone ran for the exits, the faster asset prices fell, dragging banks' balance sheets down with them. Credit markets seized up, depressing the economy, causing more mortgage defaults and asset-price deflation, further weakening banks, further paralyzing credit, depressing the economy still more. . . . Repeat ad nauseam.

You know that story, and Posner tells it well, with a particular flair for showing how dozens of moving parts interacted. Being Richard Posner, however, he is not content to be an amiable guide through the thicket. His real interest is in finding and detonating grenades in the underbrush.

One is right there on the title page, which flaunts the D-word. The current crisis, Posner maintains, is a depression. True, it is not (we hope) a great depression. But the typical postwar recession is a partly self-correcting disinflationary contraction that soon subsides, often leaving the economy healthier. The present downturn is a self-sustaining deflationary contraction whose costly aftereffects will linger for years. The Great Depression led to World War II. Today's depression presumably won't be that bad, but it may cause a huge loss of output, an immense increase in the national debt, a swing to excessive regulation, a nasty bout of inflation, a decline in America's economic and geopolitical power, and increased political instability abroad.

A typical recession is a market correction, usually of inflation or other economic imbalances; a depression is a market failure. And it is a failure (here is grenade No. 2) that the market is powerless to prevent. "An interrelated system of financial intermediaries" — a banking system, broadly defined — "is inherently unstable," Posner writes. Think of it as "a kind of epileptic, subject to unpredictable, strange seizures."

Populists and libertarians will hate this book, though I wouldn't want to predict which group will hate it more. A perfect storm of irresponsibility? Hardly. The crisis came about precisely because intelligent businesses and consumers followed market signals. "The mistakes were systemic — the product of the nature of the banking business in an environment shaped by low interest rates and deregulation rather than the antics of crooks and fools."

Were a lot of people reckless and stupid? Of course! But that cannot explain why the whole system crashed, since a lot of people are always reckless and stupid. The problem, fundamentally, is that markets cannot, and rationally should not, anticipate their own collapse. "A depression is too remote an event to influence business behavior." Any single business can rationally guard against its own bankruptcy, but not the simultaneous bankruptcy of everybody else. "The profit-maximizing businessman rationally ignores small probabilities that his conduct in conjunction with that of his competitors may bring down the entire economy."

During the housing bubble, for example, sitting out the mortgage boom meant forgoing large profits. "Even if you know you're riding a bubble and are scared to be doing so," Posner writes, "it is difficult to climb off without paying a big price." So people made decisions that were individually rational but collectively irrational. To see the crisis through populist spectacles, as President Obama does when he attributes it to "irresponsibility," is to misunderstand the whole problem by blaming capitalists for a failure of capitalism.

And so — here is the part libertarians will hate — markets, entirely of their own accord, will sometimes capsize and be unable to right themselves completely for years at a stretch. (See: Japan, "lost decade" of.) Nor can monetary policy be counted on to counteract markets' tippy tendencies, as so many economists had come to believe.

Alas, economists and policy makers got cocksure. They thought they had consigned depressions to history. As a result, they missed warning signs and failed to prepare for the worst. "We are learning," Posner writes, "that we need a more active and intelligent government to keep our model of a capitalist economy from running off the rails."

By doing what, exactly? Posner thinks laissez-faire economics has nothing relevant to say. The rest of the economics profession is all over the map. The system of financial regulation will need an overhaul, but Posner argues that the time for that is not now, in the heat of crisis. Anyway, no one is sure what to do. He halfheartedly suggests a few reforms but concedes they are "pretty small beer." If pressed, I suspect, he might also acknowledge some 20-20 hindsight in his insistence that the government should have prepared for an event that hardly anyone thought possible.

By the last page, not a single lazy generalization has survived Posner's merciless scrutiny, not one populist cliché remains standing. "A Failure of Capitalism" clears away whole forests of cant but leaves readers at a loss as to where to go from here. In other words, it is only a starting point — but an indispensable one.

Jonathan Rauch is a senior writer with National Journal and a guest scholar at the Brookings Institution.

http://www.nytimes.com/2009/05/17/books/review/Rauch-t.html?8bu&emc=bua2

The Oceans' Junkyards
By PAUL GREENBERG

FLOTSAMETRICS AND THE FLOATING WORLD

How One Man's Obsession With Runaway Sneakers and Rubber Ducks Revolutionized Ocean Science

By Curtis Ebbesmeyer and Eric Scigliano

286 pp. Smithsonian Books/Collins/HarperCollins Publishers. $26.99

Flotsam and jetsam are two different things. Flotsam is an accident, debris that has fallen into the water haphazardly — a container full of sneakers swept off the deck of a freighter, for example. Jetsam, meanwhile is a thing of intent, cast into the sea deliberately, like a message in a bottle. This duality sums up the choppy but often surprising swirl Curtis Ebbesmeyer pulls together in "Flotsametrics and the Floating World: How One Man's Obsession With Runaway Sneakers and Rubber Ducks Revolutionized Ocean Science," written with the journalist Eric Scigliano.

Ebbesmeyer is a well-known oceanographer who has made a career out of tracking debris as it circulates around our planet's 11 great oceanic gyres. But by his own admission, trying to give narrative coherence to his four-odd decades of processing beachcomber discoveries, analyzing bath toy spills and exploring oceanic "garbage patches" (one of which has a surface area twice the size of Texas) is akin to "drinking from a fire hose." When approaching "Flotsametrics and the Floating World," the reader must therefore parse the jetsam from the flotsam.

When it comes to the jetsam part — i.e., the part of the book with true intent — Ebbesmeyer's goal is noble and fresh: to show how the flow of ocean debris around the world reveals the "music" of the world's oceans. Ebbesmeyer does this through a series of studies of floating matter that are mostly pretty weird. Hockey gloves, plastic turtles, Nike sneakers — these are Ebbesmeyer's lodestars, since they are often dumped en masse into the sea and distribute themselves around the world like so many data points on a vast liquid graph. Messages in bottles are also good, since it turns out they too are often put out to sea in great numbers. In the 1950s, the Guinness brewing company released some 200,000 messages in beer bottles. Even today, a few people write in each year to claim their reward.

Less successful are the flotsam-y parts of the book — the arbitrary releases about Ebbesmeyer's career struggles or the detailings of one too many garbage finds. Still, just as one starts to drift off, so to speak, something bobs by that catches the eye. We learn that some human bodies naturally float while others sink, but that any body will sink for good if 12 extra pounds is added to its person; and that right-footed and left-footed sneakers track radically yet predictably different paths when they hit the same patch of

sea. And eventually the flotsam-a-centric approach to human history that the authors propose becomes kind of fun.
Even the European discovery of America has a provenance in flotsam. Inspired by the drift patterns of debris in the Mediterranean, Columbus was able to plot a judicious course westward. Indeed, had he not used ocean currents to speed his journey, Ebbesmeyer argues, Columbus would most likely have had to turn back before sighting land.

Amid all these floaters, it is easy to miss the truly profound message that sneaks out at the very end of the book. After compiling and compressing a life of garbage, Ebbesmeyer found that the world's great oceanic gyres turn out to be singing a kind of earth-size harmony. The gyres are in fact arranged in octaves, with each one spinning twice as fast as its lesser neighbor — "a global instrument with a prodigious range." But as global warming changes the temperature gradients of the sea and unfreezes the current-blocking ice caps, all of this is about to be thrown into dissonance. Like any good scientist, Ebbesmeyer is loath to make a hard and fast prediction of what will happen as a result, but he is advanced enough in his career to venture a guess. "The gyres' music," he writes, "foretells a very different future from the gentle ride we have long enjoyed on their global carousel."

Paul Greenberg is the author of the novel "Leaving Katya" and of a forthcoming book about the future of fish.

http://www.nytimes.com/2009/05/17/books/review/Greenberg-t.html?8bu&emc=bua2

Madame President

By HELENE COOPER

THIS CHILD WILL BE GREAT

Memoir of a Remarkable Life by Africa's First Woman President

By Ellen Johnson Sirleaf Illustrated. 353 pp. Harper/HarperCollins Publishers. $26.99

In November 2005, Liberian women strapped their babies on their backs and flocked to voting tables all across their war-racked country to elect Ellen Johnson Sirleaf as Africa's first female president. It was a seminal moment in the political history of not just Liberia but the entire continent, where patriarchal rule has long dominated, leaving African women on the sidelines to fetch water, carry logs, tend farms, sell market wares and bear the children of their rapists, while their menfolk launched one pointless war after another.

Now comes "This Child Will Be Great," a memoir by Johnson Sirleaf, the heiress to this line of long-suffering yet rock-strong women. Her father was a lawyer, a member of the Gola tribe who — as part of a common practice in Liberia — had been reared by one of the elite families descended from the freed American slaves who settled the country in the early 19th century. Her mother was the mixed-race daughter of a German trader who abandoned his Liberian wife and child, and was never heard from again.

In the complex spaghetti of Liberian society, Johnson Sirleaf was considered by outsiders to be from the elite class. She attended one of the country's best private schools, moved freely within the upper echelons of its social strata, reported religiously to church on Sundays and traveled to America for college. But her native Liberian parentage meant that she also knew the other side of life, the side where a vast majority of Liberians lived for the 150 years before the 1980 military coup that violently splintered the country, ending the rule of the American-Liberian class, and eventually led to 13 years of civil war.

Johnson Sirleaf tells the story of an old man who, within days of her birth, came to visit to pay his respects. The man looked at the baby and turned to her mother "with a strange expression," telling her, "This child shall be great." Johnson Sirleaf refers to the anecdote elsewhere in the book, usually with irony; her family would wryly remind her of it when, for instance, she was trapped in a physically abusive marriage, or when she fell into the latrine, or when she was locked up in prison by one of the various madmen who ran Liberia, with no idea whether she would be executed, raped or released.

This is the incredible story of a woman who spent her life talking tough to the lunatics surrounding her. It is an accessible walk through contemporary Liberian history, told by someone who was somehow always in the center of the political storm; during the 1980 coup, Johnson Sirleaf, as the country's minister of finance, was spared, while 13 colleagues were executed on the beach. After another coup attempt — this one aimed at the military strongman Samuel Doe — Johnson Sirleaf was taken prisoner and threatened with execution by the paranoid Doe. When Charles Taylor invaded Liberia in 1989, Johnson Sirleaf met in the bush with this wide-eyed guerrilla, determining for herself, she says, that he was "not at all grounded in the very real consequences of the path upon which he had embarked."

"This Child Will Be Great" will most likely not appeal to everyone. Johnson Sirleaf, whom I have interviewed, refrains from the sort of emotional detail that might allow her life's story to resonate with readers uninterested in the "who's up, who's down" scales of Liberian political parties. She throws a lot of abbreviations out there, and even Liberians may have trouble with some of them.

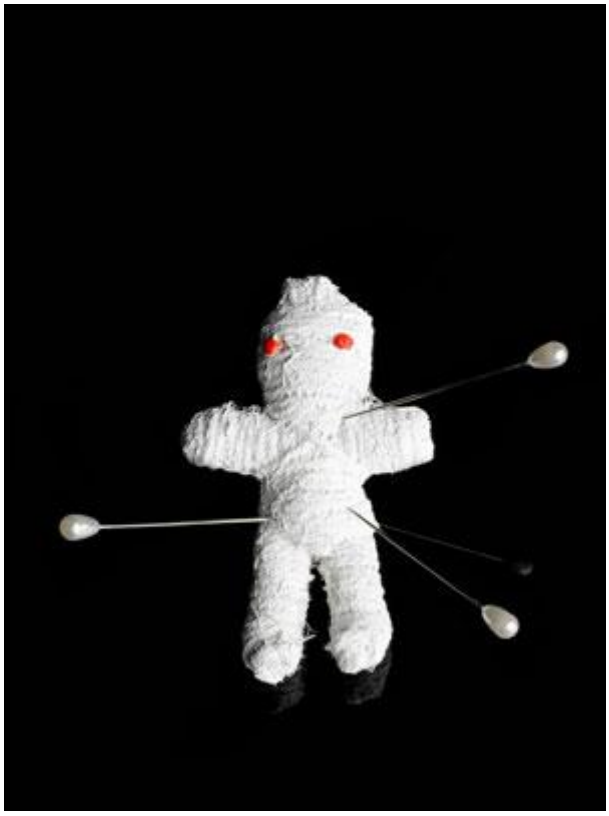
But Johnson Sirleaf admirably conveys the hopelessness of the everyday Liberian who still worships — futilely, it turns out — the United States, waiting for the day when America sweeps in to rescue a country founded by Americans. That day never comes, as "This Child Will Be Great" demonstrates again and again. But perhaps, in electing this no-nonsense, practical technocrat as the first woman to be their president, Liberians are finally ready to make a stab at trying to rescue themselves.

Helene Cooper, the White House correspondent for The Times, is the author of "The House at Sugar Beach: In Search of a Lost African Childhood."

http://www.nytimes.com/2009/05/17/books/review/Cooper-t.html?8bu&emc=bua2

The science of voodoo: When mind attacks body

- 13 May 2009 by **Helen Pilcher**



There are numerous documented instances from many parts of the globe of people dying after being cursed (Image: Image Source/Rex)

Late one night in a small Alabama cemetery, Vance Vanders had a run-in with the local witch doctor, who wafted a bottle of unpleasant-smelling liquid in front of his face, and told him he was about to die and that no one could save him.

Back home, Vanders took to his bed and began to deteriorate. Some weeks later, emaciated and near death, he was admitted to the local hospital, where doctors were unable to find a cause for his symptoms or slow his decline. Only then did his wife tell one of the doctors, Drayton Doherty, of the hex.

Doherty thought long and hard. The next morning, he called Vanders's family to his bedside. He told them that the previous night he had lured the witch doctor back to the cemetery, where he had choked him against a tree until he explained how the curse worked. The medicine man had, he said, rubbed lizard eggs into Vanders's stomach, which had hatched inside his body. One reptile remained, which was eating Vanders from the inside out.

Great ceremony

Doherty then summoned a nurse who had, by prior arrangement, filled a large syringe with a powerful emetic. With great ceremony, he inspected the instrument and injected its contents into Vanders' arm. A few minutes later, Vanders began to gag and vomit uncontrollably. In the midst of it all, unnoticed

by everyone in the room, Doherty produced his pièce de résistance - a green lizard he had stashed in his black bag. "Look what has come out of you Vance," he cried. "The voodoo curse is lifted."

Vanders did a double take, lurched backwards to the head of the bed, then drifted into a deep sleep. When he woke next day he was alert and ravenous. He quickly regained his strength and was discharged a week later.

The facts of this case from 80 years ago were corroborated by four medical professionals. Perhaps the most remarkable thing about it is that Vanders survived. There are numerous documented instances from many parts of the globe of people dying after being cursed.

With no medical records and no autopsy results, there's no way to be sure exactly how these people met their end. The common thread in these cases, however, is that a respected figure puts a curse on someone, perhaps by chanting or pointing a bone at them. Soon afterwards, the victim dies, apparently of natural causes.

Voodoo nouveau

You might think this sort of thing is increasingly rare, and limited to remote tribes. But according to Clifton Meador, a doctor at Vanderbilt School of Medicine in Nashville, Tennessee, who has documented cases like Vanders, the curse has taken on a new form.

Take Sam Shoeman, who was diagnosed with end-stage liver cancer in the 1970s and given just months to live. Shoeman duly died in the allotted time frame - yet the autopsy revealed that his doctors had got it wrong. The tumour was tiny and had not spread. "He didn't die from cancer, but from believing he was dying of cancer," says Meador. "If everyone treats you as if you are dying, you buy into it. Everything in your whole being becomes about dying."

He didn't die from cancer but from believing he was dying of cancer

Cases such as Shoeman's may be extreme examples of a far more widespread phenomenon. Many patients who suffer harmful side effects, for instance, may do so only because they have been told to expect them. What's more, people who believe they have a high risk of certain diseases are more likely to get them than people with the same risk factors who believe they have a low risk. It seems modern witch doctors wear white coats and carry stethoscopes.

The nocebo effect

The idea that believing you are ill can make you ill may seem far-fetched, yet rigorous trials have established beyond doubt that the converse is true - that the power of suggestion can improve health. This is the well-known placebo effect. Placebos cannot produce miracles, but they do produce measurable physical effects.

The placebo effect has an evil twin: the nocebo effect, in which dummy pills and negative expectations can produce harmful effects. The term "nocebo", which means "I will harm", was not coined until the 1960s, and the phenomenon has been far less studied than the placebo effect. It's not easy, after all, to get ethical approval for studies designed to make people feel worse.

What we do know suggests the impact of nocebo is far-reaching. "Voodoo death, if it exists, may represent an extreme form of the nocebo phenomenon," says anthropologist Robert Hahn of the US Centers for Disease Control and Prevention in Atlanta, Georgia, who has studied the nocebo effect.

Life threatening

In clinical trials, around a quarter of patients in control groups - those given supposedly inert therapies - experience negative side effects. The severity of these side effects sometimes matches those

associated with real drugs. A retrospective study of 15 trials involving thousands of patients prescribed either beta blockers or a control showed that both groups reported comparable levels of side effects, including fatigue, depressive symptoms and sexual dysfunction. A similar number had to withdraw from the studies because of them.

Occasionally, the effects can be life-threatening (see "The overdose"). "Beliefs and expectations are not only conscious, logical phenomena, they also have physical consequences," says Hahn.

Nocebo effects are also seen in normal medical practice. Around 60 per cent of patients undergoing chemotherapy start feeling sick before their treatment. "It can happen days before, or on the journey on the way in," says clinical psychologist Guy Montgomery from Mount Sinai School of Medicine in New York. Sometimes the mere thought of treatment or the doctor's voice is enough to make patients feel unwell. This "anticipatory nausea" may be partly due to conditioning - when patients subconsciously link some part of their experience with nausea - and partly due to expectation.

Catching

Alarmingly, the nocebo effect can even be catching. Cases where symptoms without an identifiable cause spread through groups of people have been around for centuries, a phenomenon known as mass psychogenic illness. One outbreak (see "It's catching") inspired a recent study by psychologists Irving Kirsch and Giuliana Mazzoni of the University of Hull in the UK.

They asked some of a group of students to inhale a sample of normal air, which all participants were told contained "a suspected environmental toxin" linked to headache, nausea, itchy skin and drowsiness. Half of the participants also watched a woman inhale the sample and apparently develop these symptoms. Students who inhaled were more likely to report these symptoms than those who did not. Symptoms were also more pronounced in women, particularly those who had seen another apparently become ill - a bias also seen in mass psychogenic illness.

The study shows that if you hear of or observe a possible side effect, you are more likely to develop it yourself. That puts doctors in a tricky situation. "On the one hand people have the right to be informed about what to expect, but this makes it more likely they will experience these effects," says Mazzoni.

Catch 22

This means doctors need to choose their words carefully so as to minimise negative expectations, says Montgomery. "It's all about how you say it."

Hypnosis might also help. "Hypnosis changes expectancies, which decreases anxiety and stress, which improves the outcome," Montgomery says. "I think hypnosis could be applied to a wide variety of symptoms where expectancy plays a role."

Is the scale of the nocebo problem serious enough to justify such countermeasures? We just don't know, because so many questions remain unanswered. In what circumstances do nocebo effects occur? And how long do the symptoms last?

It appears that, as with the placebo response, nocebo effects vary widely, and may depend heavily on context. Placebo effects in clinical settings are often much more potent than those induced in the laboratory, says Paul Enck, a psychologist at the University Hospital in Tübingen, Germany, which suggests the nocebo problem may have profound effects in the real world. For obvious reasons, though, lab experiments are designed to induce only mild and temporary nocebo symptoms.

Real consequences

It is also unclear who is susceptible. A person's optimism or pessimism may play a role, but there are no consistent personality predictors. Both sexes can succumb to mass psychogenic illness, though women report more symptoms than men. Enck has shown that in men, expectancy rather than conditioning is more likely to influence nocebo symptoms. For women, the opposite is true. "Women tend to operate more on past experiences, whereas men seem more reluctant to take history into a situation," he says.

What is becoming clear is that these apparently psychological phenomena have very real consequences in the brain. Using PET scans to peer into the brains of people given a placebo or nocebo, Jon-Kar Zubieta of the University of Michigan, Ann Arbor, showed last year that nocebo effects were linked with a decrease in dopamine and opioid activity. This would explain how nocebos can increase pain. Placebos, unsurprisingly, produced the opposite response.

Meanwhile, Fabrizio Benedetti of the University of Turin Medical School in Italy has found that nocebo-induced pain can be suppressed by a drug called proglumide, which blocks receptors for a hormone called cholecystokinin (CCK). Normally, expectations of pain induce anxiety, which activates CCK receptors, enhancing pain.

Ultimate cause

The ultimate cause of the nocebo effect, however, is not neurochemistry but belief. According to Hahn, surgeons are often wary of operating on people who think they will die - because such patients often do. And the mere belief that one is susceptible to a heart attack is itself a risk factor. One study found that women who believed they are particularly prone to heart attack are nearly four times as likely to die from coronary conditions than other women with the same risk factors.

Despite the growing evidence that the nocebo effect is all too real, it is hard in this rational age to accept that people's beliefs can kill them. After all, most of us would laugh if a strangely attired man leapt about waving a bone and told us we were going to die. But imagine how you would feel if you were told the same thing by a smartly dressed doctor with a wallful of medical degrees and a computerful of your scans and test results. The social and cultural background is crucial, says Enck.

Meador argues that Shoeman's misdiagnosis and subsequent death shares many of the crucial elements found in hex death. A powerful doctor pronounces a death sentence, which is accepted unquestioningly by the "victim" and his family, who then start to act upon that belief. Shoeman, his family and his doctors all believed he was dying from cancer. It became a self-fulfilling prophecy.

Nothing mystical

"Bad news promotes bad physiology. I think you can persuade people that they're going to die and have it happen," Meador says. "I don't think there's anything mystical about it. We're uncomfortable with the idea that words or symbolic actions can cause death because it challenges our biomolecular model of the world."

Perhaps when the biomedical basis of voodoo death is revealed in detail we will find it easier to accept that it is real - and that it can affect any one of us.

Editorial: *Breaking the voodoo spell*

The overdose

Depressed after splitting up with his girlfriend, Derek Adams took all his pills... then regretted it. Fearing he might die, he asked a neighbour to take him to hospital, where he collapsed. Shaky, pale and drowsy, his blood pressure dropped and his breaths came quickly.

Yet lab tests and toxicology screening came back clear. Over the next 4 hours Adams received 6 litres of saline, but improved little.

Then a doctor arrived from the clinical trial of an antidepressant in which Adams had been taking part. Adams had enrolled in the study about a month earlier. Initially he had felt his mood buoyed, but an argument with his ex-girlfriend saw him swallow the 29 remaining tablets.

The doctor revealed that Adams was in the control group. The pills he had "overdosed" on were harmless. Hearing this, Adams was surprised and tearfully relieved. Within 15 minutes he was fully alert, and his blood pressure and heart rate had returned to normal.

It's catching

In November 1998, a teacher at a Tennessee high school noticed a "gasoline-like" smell, and began complaining of headache, nausea, shortness of breath and dizziness. The school was evacuated and over the next week more than 100 staff and students were admitted to the local emergency room complaining of similar symptoms.

After extensive tests, no medical explanation for the reported illnesses could be found. A questionnaire a month later revealed that the people who reported symptoms were more likely to be female, and to have known or seen a classmate who was ill. It was the nocebo effect on a grand scale, says psychologist Irving Kirsch at the University of Hull in the UK. "There was, as far as we can tell, no environmental toxin, but people began to feel ill."

Kirsch thinks that seeing a classmate develop symptoms shaped expectancies of illness in other children, triggering mass psychogenic illness. Outbreaks occur all over the world. In Jordan in 1998, 800 children apparently suffered side effects after a vaccination and 122 were admitted to hospital, but no problem was found with the vaccine.

Helen Pilcher is a science writer based in the UK

http://www.newscientist.com/article/mg20227081.100-the-science-of-voodoo-when-mind-attacks-body.html?full=true&print=true

Oldest Known Sculpture Is Busty Clue to Brain Boom

- By Brandon Keim
- May 13, 2009 |

From a cave in southwestern Germany, archaeologists have unearthed the oldest known piece of figurative art. More than an ancient artistic impulse, it may signify a profound change in modern human brains.

Carved from ivory and depicting a woman with exaggerated sexual features, the pinkie-sized sculpture is 36,000 years old, or about 5,000 years older than the next-earliest piece of figurative art.

Though 77,000-year-old carvings have been found in South Africa, they consist of cross-hatched lines. Such abstractions are relatively simple compared to representational art, which requires high levels of cognition to both conceive and make.Perhaps not coincidentally, the rise of figurine-carving modern human cultures in Europe coincided with the decline of Neanderthals. Some anthropologists suspect that humans of the era experienced a leap in mental abilities, fueled by random genetic mutation or the neurological nourishment of language and culture.

"The advent of fully representational, 'figurative' art seems at present to be a European phenomenon, without any documented parallels in Africa or elsewhere earlier than about 30,000 years ago," writes University of Cambridge archaeologist Paul Mellars in a commentary accompanying the discovery, published Wednesday in *Nature*.

"How far this 'symbolic explosion' associated with the origins and dispersal of our species reflects a major, mutation-driven reorganization in the cognitive capacities of the human brain — perhaps associated with a similar leap forward in the complexity of language — remains a fascinating and contentious issue," he wrote.

Citations: "A female figurine from the basal Aurignacian of Hohle Fels Cave in southwestern Germany." By Nicholas J. Conard. Nature, Vol. 459 No. 7244, May 14, 2009.

"Origins of the female image." By Paul Mellars. Nature, Vol. 459 No. 7244, May 14, 2009.

http://www.wired.com/wiredscience/2009/05/oldestsculpture/

Simulators 'make surgeons better'

Using simulators to train surgeons makes them quicker and better, a study shows.

The Danish research comes after calls to introduce strict guidelines for NHS doctors.

Unlike many other countries the use of simulators is not a formal part of the training process.

But the Copenhagen University Hospital team said it should be after monitoring the performance of 24 junior doctors carrying out keyhole surgery.

The researchers put the obstetrics and gynaecology medics in two groups - one which had the traditional training of working alongside doctors and tutoring and another which supplemented this with seven hours simulator training.

" **This can potentially improve patient safety and improve operation room efficiency** "
Christian Rifbjerg Larsen, lead researcher

They found that those that used the computer simulators were twice as quick, taking just 12 minutes to complete the operation on a patient.

They also carried out better procedures, according to a points system used to judge the quality of the work.

Lead researcher Christian Rifbjerg Larsen said: "Simulator training should be incorporated into the curriculum for all surgical trainees before they embark on patient procedures.

"This can potentially improve patient safety and improve operation room efficiency."

The publication of the study in the British Medical Journal comes after Sir Liam Donaldson, England's chief medical officer, called for more simulation training in the NHS.

In his annual report in March, he said simulators "reduce errors and make surgery much safer".

Guidelines

Simulators are already used in the NHS for everything from practising surgery to administering drugs.

But unlike other countries, such as Israel, there are no strict guidelines about how much time doctors should spend on them.

The British Medical Association is also keen on increased use of simulators, although it has said real-life training with consultants should not be compromised.

Roger Kneebone, an expert in surgical education at Imperial College London, agreed.

He said: "Simulation offers obvious benefits. Sophisticated virtual reality simulators can provide anatomically realistic recreations of many operations."

But he added trainee surgeons also needed to develop communication and leadership skills as well as be ready for the unexpected - all of which required different training to simulators.

Health Minister Lord Darzi said high quality training is essential.

"In my own career as a surgeon I have seen the huge benefits which innovations in surgical simulation have made possible so I am pleased but not surprised by these findings which we welcome.

"We are working with NHS colleagues to develop a new strategy for simulation-based training in order to ensure the best training for doctors and the best quality of care for our patients."

Practical training

The Royal College of Surgeons (RCS) has recently opened a new clinical skills unit, where a range of simulation techniques are taught, from simple plastic models, on which trainees can practice stitching, to a simulated operating theatre suite.

College President, John Black said: "The skills centre will change the way surgical training is delivered in the UK.

"Traditionally, measuring performance in the operating theatre has concentrated on the surgeons alone.

"While technical ability and dexterity are critical to the success of operations so too are team-working, communication skills and leadership qualities.

"We have learned from other highly skilled industries, including the airline industry, that many errors are due to human factors and this is also true in surgery.

"We have, therefore, responded by placing greater emphasis on training the whole surgical team."

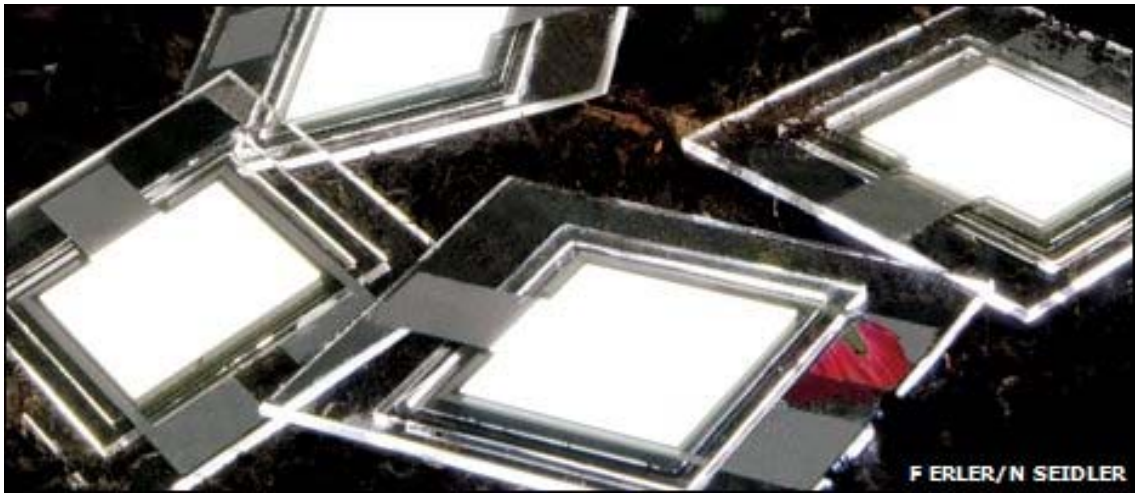
Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8050633.stm

Published: 2009/05/14 23:58:07 GMT

Flat-screen light bulbs switch on

By Jason Palmer
Science and technology reporter, BBC News

Researchers have demonstrated white, organic light-emitting diode (OLED) sources with the same efficiency as fluorescent light bulbs.



The result brings closer the prospect that OLEDs will be the flat-screen light sources of choice in the future.

The limited lifetime of the blue-emitting part of the devices means they survive for just hours, but new blue-emitting materials are on the horizon.

The results are published in the journal Nature. There has been significant work in OLEDs in recent years, so that small displays and even televisions based on the technology are beginning to come to market.

Though much of the technology would be the same for lighting, the key word for light bulbs is efficiency - and OLEDs had not, until now, passed the efficiency benchmark set by fluorescent bulbs.

Two different types of organic polymers can be used in the devices: phosphorescent and fluorescent.

While fluorescent materials - the kind used in OLED displays and televisions - are significantly longer-lived, they are only one-quarter as efficient.

Recent research has therefore focused on optimising the efficiency and lifetime of devices based on phosphorescent materials.

Profit and loss

" **I think if you went back five or 10 years and said this is where we're going to end up, there would've been all-round scepticism** "
John de Mello Imperial College London

Now, Karl Leo of the Institute for Applied Photophysics in Dresden and his colleagues have made the first devices to outperform fluorescent bulbs in the efficiency stakes.

To do that they had to reduce the sources of loss - stages in which electrical energy goes in but does not exit in the form of usable light.

They did this first by optimising the design in the emitter layer, where losses happen because charge carriers recombine rather than dumping their energy into the polymers that give rise to coloured light.

Another significant source of loss happens at the edge of the diode structure where the light is actually produced; if it is not extracted efficiently, photons can bounce around inside it or be re-absorbed.

The team solved that problem by designing a particularly efficient, nano-structured interface to suck out more light than previous efforts.

"The combined result is that we achieve an efficiency which is for the first time higher than a fluorescent tube," Professor Leo told BBC News.

Also, unlike previous white OLEDs, that efficiency does not decrease as the devices are turned up to produce higher-intensity light.

Very much like prior white OLEDs, however, the significant problem is that the devices degrade within an hour or two, because the polymers that produce the blue part of the light are unstable.

However, Professor Leo said that promising first results on stable, phosphorescent blue polymers are starting to emerge. "I'm personally convinced that it may take a few years, but chemists will solve this problem and find materials which are stable enough," he said.

Roll call

John de Mello, an optoelectronics expert at Imperial College London, described the work as "impressive".

"I think if you went back five or 10 years and said this is where we're going to end up, there would've been all-round scepticism," he said. "But they've shown that by taking existing materials and known methods, tweaking them a little bit, and addressing several issues in parallel you really can bring efficiencies up to parity with fluorescent tube lighting."

Professor Leo suggested that by further improving the design of the part of the OLEDs that whisks the light out, efficiencies up to twice that of fluorescent bulbs could be reached.

For the moment, the devices are comparatively expensive because of the manufacturing methods the group employs. But OLEDs, when the materials and designs are right, can be produced in so-called "roll-to-roll" manufacturing in which vast sheets are made, making them economical on a commercial scale.

"Commercially this is really an opportunity," said Professor Leo.

"I'm pretty convinced that in a few years OLEDs will be a standard in buildings."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8048480.stm

Published: 2009/05/15 10:47:17 GMT

Going Softly Into a Parallel Universe

By CAROL KINO

IN 1961, early in his career, the Pop artist Claes Oldenburg wrote a manifesto: “I am for an art that grows up not knowing it is art at all. I am for an artist who vanishes.”

One afternoon last month, as a crew began to install his current shows at the Whitney Museum of American Art, Mr. Oldenburg seemed to be making good on that promise. Still lean and vigorous at 80, he had been in the galleries all afternoon, consulting on placement and eagerly offering to research installation methods in his personal archives. But he also displayed a strikingly nonegocentric attitude toward some of his most renowned work.

Take the room full of soft sculptures from the 1960s, like “Giant Fagends” (1967), an eight-foot-wide Formica ashtray stuffed with canvas-covered cigarette butts; “Soft Toilet” (1966), whose sagging form suggests a body; and “Giant BLT (Bacon, Lettuce and Tomato Sandwich” (1963), constructed from wood and fabric slabs. Although its triangular mass must be restacked each time it is shown, allowing some room for variation, Mr. Oldenburg said he had no part in its current incarnation. “Someone else did it,” he shrugged. “I haven’t set it up since 1963.”

He seemed similarly laid back about the exhibition’s showstopper, “Ice Bag — Scale C” (1971), a mammoth mechanical silver-toned soft sculpture of an old-fashioned ice bag, which has been almost entirely rebuilt by conservators. Mr. Oldenburg said its innards had originally been fabricated by mechanics, and he had never really understood how they worked. “I’m not mechanically inclined,” he said. “I only know about the outside. If you look at what goes on in there, it’s pretty puzzling.”
The exhibition, which runs through Sept. 6, consists of two segments. One, drawn largely from the Whitney’s permanent collection, is devoted to Mr. Oldenburg’s work of the 1960s and early 1970s, the installations, Happenings, drawings and sculptures of everyday objects that made him a founding father of Pop. The other focuses on his 33-year collaboration with his wife, Coosje van Bruggen, who died in January from breast cancer. It includes drawings and sculptures of musical instruments from the 2000-7 series “The Music Room,” as well as a slide show of their absurdist civic monuments.

Together these halves make up a mini-retrospective, replete with firsts: the first time that “Ice Bag” will function consistently since its completion (or so the conservators hope), and the first time the public will

see rare footage of most of Mr. Oldenburg's legendary Happenings, the anarchic, semiscripted group performances involving sculptural props and sets that prefigured today's performance art.

More poignantly, it is also the first show in decades that Mr. Oldenburg has undertaken without Ms. van Bruggen. Despite his avid involvement with the exhibition, he clearly felt some trepidation about it. "What I'm afraid of is that I don't know what's going to overwhelm what," he confessed the day before the installation began, during a long interview at his home in SoHo. "I think there are certain things that may attract more attention than other things, and I don't know how Coosje would have responded to that. Usually the shows that we have had together have been shows which have covered our period."
The exhibition has been in the works since late 2008, but Mr. Oldenburg only learned of the Whitney's plans in January when he returned home after Ms. van Bruggen's death and found a letter from the museum requesting his approval for an advertisement. Right away, he recounted, he had fired off a letter to Adam D. Weinberg, the Whitney's director. "I said, 'This is a bad moment because I'm thinking mostly of Coosje and me, and not about myself. I don't think it would be a good time for a show about my work alone.' " Mr. Weinberg's response was sympathetic, Mr. Oldenburg recalled, and they eventually settled on the idea of a parallel show that would focus on "The Music Room."
A visit to Mr. Oldenburg's home, a former engine factory, reveals the intensity of their collaboration. The interior is spare, white and minimally furnished. But every room is full of neatly arranged sculptures and editions that are immediately recognizable from their work together, as well as Mr. Oldenburg's earlier oeuvre: a soft light switch, a baked potato, a profiterole. Ms. van Bruggen used to refer to the house as "our image bank."

After Mr. Oldenburg acquired the property in 1971, he cleaned it up enough to be livable, but it was Ms. van Bruggen who later applied the finishing touches. "When Coosje came here she was quite shocked by the state of it," he said fondly. "She has been working on it ever since." He often speaks of his wife in the present tense as though she had just stepped away. Her neat office, filled with furniture built by their friend Donald Judd — and apparently unchanged since her death — also gives that impression.
But Mr. Oldenburg also seems to have relished the trip back into his solo career afforded by the Whitney show. Along with several drawings and much of "The Music Room" work, he supplied ephemera from "The Store," a 1961 project for which he rented a Lower East Side storefront and used it to sell plaster renditions of ordinary household goods.

He also lent the museum five Happenings films and seems especially happy with their installation — projected in a dark room with several running simultaneously. The Happenings "very often took off in their own direction," he said. "And that's what you get here in this room: the images are exchanging and knocking together, and new connections are developing."

Mr. Oldenburg's work has always been about developing connections since he stopped painting figures in the late 1950s and began making what he calls "metamorphic" sculptures, ordinary objects that he transformed into something else by manipulating their materials, texture or size.

His work has also frequently involved others, starting with the Happenings, whose casts usually included his first wife, Pat Muschinski, as well as friends like the artist Lucas Samaras and the curator Henry Geldzahler.

His sculptures frequently became team endeavors too. Ms. Muschinski sewed many of the oversize soft pieces that Mr. Oldenburg began making in 1962, just before they moved to Los Angeles. As they grew larger and more fantastic, there were other fabricators: Walt Disney's WED Enterprises, the company that made the rides for Disneyland, was an initial partner for the first version of "Ice Bag" in 1969.
"It is a strange career that I have, which has parts to it," said Mr. Oldenburg. "Earlier parts and later parts."

The later parts largely concern Ms. van Bruggen. The couple met in 1970 when Mr. Oldenburg's first major retrospective traveled to the Stedelijk Museum in Amsterdam, where Ms. van Bruggen, 14 years his junior — and married — was a curator. (Mr. Oldenburg and Ms. Muschinski were near divorce.) By 1975, once Ms. van Bruggen had also divorced, their romance took off, and she soon became deeply

involved with Mr. Oldenburg's monuments, initially making suggestions for their color and placement, and eventually coming up with creative schemes. "Coosje's collaboration was the most profound because it went into ideas and concepts," he said.

After marrying in 1977, they decided to dedicate themselves entirely to building civic monuments that "would represent what art should be," Mr. Oldenburg said. "It should be in the community and visible for all and not hidden in a gallery." Today their work can be seen around the world, usually making a playful comment on its surroundings, like "Flashlight" (1981), an upended torch in Las Vegas, or "Buried Bicycle" (1990), a 150-foot-long bicycle that appears to be partially entombed in a Parisian park.
In 1992 they acquired a small Loire Valley chateau, whose gracious music room gave them the idea of making a domestically sized collection. That's how "The Music Room" — sculptures and drawings of soft, deconstructed string and wind instruments — came into being
.
Mr. Oldenburg also continued to make drawings, often from Ms. van Bruggen's ideas. Eventually he began signing her name to them along with his own. "I felt that any drawings I did after meeting and being with her were collaborative because I could never really separate myself from her sensibility and ideas," Mr. Oldenburg said. "So I decided that we just regard all the drawings as collaborative."
Today Mr. Oldenburg is beginning to make new drawings. But he still feels Ms. van Bruggen's presence in his thinking, and isn't sure how they should be signed. "I usually sign them with both names," he said. Then he reconsidered. "But it might seem a little bit strange to do it now."

Meanwhile he continues to be preoccupied with finishing their collaborative projects: a show of drawings opened last week at the Menil Collection in Houston, and he is now on his way to Oslo to install their final public sculpture, "Tumbling Tacks," four 18-foot-wide thumbtacks that appear to be hurtling down a hillside.

He is also mulling over the work they made during the last year of Ms. van Bruggen's life, when they lived and worked in a Los Angeles hotel suite while she received treatment at Cedars-Sinai Medical Center. In the house now he has sculptures of fruit pies, a lithograph of notes and musical staffs based on the soft sculpture "Falling Notes" (2003) and scores of flower sculptures, many of them with poppylike petals fashioned from magazines left by visiting friends. This work led to studies for another public monument — a gigantic upside-down bouquet.

The idea, Mr. Oldenburg explained, was to have the stems rise to create a central tower as the blossoms splayed out around it. The title was to be "Wild Flowers." "We had started to build models and do drawings, but we hadn't quite figured it out," he said. "But we may go beyond it." Then he reconsidered. "Or I may," he said softly.

http://www.nytimes.com/2009/05/17/arts/design/17kino.html?ref=design

Show of Force

By BENJAMIN GENOCCHIO

The Wadsworth Atheneum has a long, celebrated history of presenting advanced contemporary art, beginning in the early 20th century with pioneering shows of European modernists. But in recent times that edge has slipped, with a funding shortfall and staff turnover pushing the museum into a tailspin. These have been painful, difficult years.

Now the contemporary art program appears to be getting back on track with the revival of the Matrix series, which highlights work by emerging artists through solo exhibitions. The latest is "The Shooting...At Watou," an elaborate, multipart sculptural installation by the young Dutch artist Folkert de Jong. It is a terrific one-work show.

"The Shooting...At Watou" consists of a crouching, outsize figure with a mad grin on his face surrounded by soldiers. The figures look something like melted department store mannequins; everything is made of colorful chunks of viscous industrial insulation materials like polystyrene foam and polyurethane foam. The tableau was originally produced in 2006 as a site-specific installation in Watou, Belgium; it was an allegory for the protracted struggle between the Spanish empire and the subjugated Netherlands during the Eighty Years' War (1568-1648). The 10-foot-tall menacing figure is meant to represent Spain, while the life-size soldiers are the Dutch.

Woven into the allegory are other references, to the biblical story of David and Goliath and to Francisco de Goya's famous 1814 painting "The 3rd of May 1808 in Madrid: The Executions on Principe Pio Hill," showing a Spanish citizen being shot by Napoleon's troops. Like Goya, Mr. de Jong depicts an execution of sorts, for the soldiers are firing upon the unarmed, grinning giant who taunts his executioners with castanets.

But unlike Goya's painting, "The Shooting" does not make it clear who the victim is, for the Eighty Years' War was largely a struggle for Dutch independence from the Spanish empire. One interpretation of this work, offered by the museum wall label, is that Mr. de Jong's sculpture is intended as a reminder that "in war everyone is a victim."

Several of Mr. de Jong's past tableaux reference modern European art, frequently Pablo Picasso's paintings of the Harlequin, a fictional circus performer and adventurer. I see elements of the Harlequin character incorporated in "The Shooting," chiefly in the form of a soldier beating a drum. He could be

inciting his comrades to kill, or more probably playing the traditional drumroll prior to a military execution.

But "The Shooting" is interesting for reasons beyond possible social or historical commentary. There is the grotesquery of the figures, which look a bit like costumed visitors at a Halloween party. Then there is the use of the synthetic foams, making the figures light and airy despite their immense scale. Finally there is the palette — sky blue, bubblegum pink, burning reds and a lush green — which helps draw viewers in.

Born in 1972, Mr. de Jong is the most gifted artist to emerge from the Netherlands in the past decade. He has had more than 10 solo shows at museums and galleries all around the world, an astonishing achievement for such a young artist, and his art has been bought by major museums and private collectors. He is represented by James Cohan Gallery in New York, another prestigious career milestone for such a young artist.

But as much as I like and admire his work, I have reservations. Having viewed and reviewed Mr. de Jong's sculptures for a few years now, I have yet to see any genuine evolution in his ideas and thinking. In short, the artist is more or less doing the same thing over and over again, reimagining historical and art historical imagery using cheap, toxic, colorful contemporary materials. It is starting to get repetitive.

I also don't buy the frequent assertions made in catalog essays and press releases that the artist's use of petroleum-based foams hints at an environmental consciousness, although Mr. de Jong is obviously capitalizing on the materials' contradictory nature — so light, yet so indestructible; so widely used, yet so environmentally incorrect.

Over and above these concerns it is clear that Mr. de Jong has hit on an original, visually powerful and identifiable sculptural style, something that is not easy to do. He has also managed to give his work substance and meaning, focusing on the impact of history on contemporary life. Like his work or not, he is a force to be reckoned with.

"Folkert de Jong: The Shooting...At Watou," Wadsworth Atheneum Museum of Art, 600 Main Street, Hartford, through June 28. Information: (860) 278-2670 or wadsworthatheneum.org.

http://www.nytimes.com/2009/05/17/nyregion/connecticut/17artct.html?ref=design

Architect Without Limits

By NICOLAI OUROUSSOFF

Frank Lloyd Wright died half a century ago, but people are still fighting over him.

The extraordinary scope of his genius, which touched on every aspect of American life, makes him one of the most daunting figures of the 20th century. But to many he is still the vain, megalomaniacal architect, someone who trampled over his clients' wishes, drained their bank accounts and left them with leaky roofs.

So "Frank Lloyd Wright: From Within Outward," which opens on Friday at the Guggenheim Museum, will be a disappointment to some. The show offers no new insight into his life's work. Nor is there any real sense of what makes him so controversial. It's a chaste show, as if the Guggenheim, which is celebrating its 50th anniversary, was determined to make Wright fit for civilized company.

The advantage of this low-key approach is that it puts the emphasis back where it belongs: on the work. There are more than 200 drawings, many never exhibited publicly before. More than a dozen scale models, some commissioned for the show, give a strong sense of the lucidity of his designs and the intimate relationship between building and landscape that was such a central theme of his art.

Taken as a whole, the exhibition conveys not only the remarkable scope of his interests, which ranged from affordable housing to reimagining the American city, but also the astonishing cohesiveness of that vision

— an achievement that has been matched by only one or two other architects in the 20th century.

One way to experience the show is as a straightforward tour of Wright's masterpieces. Organized by Thomas Krens and David van der Leer, it is arranged in roughly chronological order, so that you can spiral up through the highlights of his career: the reinvention of the suburban home and the office block, the obsession with car culture, the increasingly outlandish urban projects.

There is a stunning plaster model of the vaultlike interior of Unity Temple, built in Oak Park between 1905 and 1908. Just a bit farther up the ramp, another model painstakingly recreates the Great Workroom of the Johnson Wax Headquarters in Racine, Wis., with its delicate grid of mushroom columns and milky glass ceiling.

Such tightly composed, inward-looking structures contrast with the free-flowing spaces that we tend to associate with Wright's fantasy of a democratic, agrarian society.

But as always with Wright, the complexity of his approach reveals itself only after you begin to fit the pieces together. For Wright, the singular masterpiece was never enough. His aim was to create a

framework for an entire new way of life, one that completely redefined the relationships between individual, family and community. And he pursued it with missionary zeal.
Wright went to extreme lengths to sell his dream of affordable housing for the masses, tirelessly promoting it in magazines.
The second-floor annex shows a small sampling of its various incarnations, including an elaborate model of the Jacobs House (1936-37), its walls and floors pulled apart and suspended from the ceiling on a system of wires and lead weights. One of Wright's earliest Usonian houses, the one-story Jacobs structure in Madison, Wis., was made of modest wood and brick and organized around a central hearth. Its L-shape layout framed a rectangular lawn, locking it into the landscape, so that the homeowner remained in close touch with the earth.
The ideas Wright explored in such projects were eventually woven into grander urban fantasies, first proposed in Broadacre City and later in The Living City project. In both, Usonian communities were dispersed over an endless matrix of highways and farmland, punctuated by the occasional residential tower.
The subtext of these plans, of course, was Wright's war with the city. To Wright, the congested neighborhoods of the traditional city were anathema to the spirit of unbridled individual freedom. His alternative, shaped by the car, represented a landscape of endless horizons. Sadly, it was also a model for suburban sprawl.
Wright continued to explore these themes until the end of his life, even as his formal language evolved. A model of the Gordon Strong Automobile Objective and Planetarium captures his growing obsession with the ziggurat and the spiral. A tourist destination that was planned for Sugarloaf Mountain, Md., but never built, the massive concrete structure coiled around a vast planetarium. The project combines his love of cars and his fascination with primitive forms, as if he were striving to weave together the whole continuum of human history.
In his 1957 Plan for Greater Baghdad, Wright went a step further, adapting his ideas to the heart of the ancient city. The plan is centered on a spectacular opera house enclosed beneath a spiraling dome and crowned by a statue of Alladin. Set on an island in the Tigris, the opera house was to be surrounded by tiers of parking and public gardens. A network of roadways extends like tendrils from this base, weaving along the edge of the river and tying the complex to the old city.
Just across the river, another ring of parking, almost a mile in diameter, encloses a new campus for Baghdad University.
Wright's fanciful design was never built, but it demonstrates the degree to which he remained distrustful of urban centers. Stubborn to the end, he saw the car as the city's salvation rather than its ruin. The cosmopolitan ideal is supplanted by a sprawling suburbia shaded by palms and date trees.
And what of the Guggenheim? Some will continue to see it as an example of Wright's brazen indifference to the city's history. With its aloof attitude toward the Manhattan street grid, the building still pushes buttons.
For his part, Wright saw the spiral as a symbol of life and rebirth. The reflecting pool at the bottom of his rotunda represented a seed, part of his vision of an organic architecture that sprouts directly from the earth.
Yet Wright also needed the city to make his vision work. The force of the spiral's upward thrust gains immeasurably from the grid that presses in on all sides. The ramps, too, can be read as an extension of the street life outside. Coiled tightly around the audience, they replicate the atmosphere of urban intensity that Wright supposedly so abhorred.
Or maybe not. In preparing for the show, the Guggenheim's curators decided to remove the frosting from a window at the lobby's southwest corner. The window frames a vista over a low retaining wall toward the corner of 88th Street and Fifth Avenue, where you can see people milling around the exterior of the building. It is the only real view out of the lobby, and it visually locks the building into the streetscape, making the city part of the composition.
I choose to see it as a gesture of love, of a sort, between Wright and the city he claimed to hate.

http://www.nytimes.com/2009/05/15/arts/design/15wrig.html?ref=design

'AVEDON FASHION'
Starting With Fashion, Ending With Art

By ROBERTA SMITH

Five years after Richard Avedon's death at 81 the International Center of Photography is setting the record straight. Avedon was indeed a great artist, and his fashion photographs are his greatest work.

This may not be quite the way Avedon wanted it. His own pursuit of greatness often involved playing down the half-century of fashion magazine work he did for Harper's Bazaar and Vogue as little more than a day job and emphasizing his portraiture, which he produced voluminously. At least that's how it seemed with his last big New York retrospective at the Whitney Museum in 1994; that 50-year survey included, shockingly, fewer than a dozen examples of the fashion work.
"Avedon Fashion: 1944-2000" is the corrective, the first museum exhibition devoted exclusively to his fashion work. Its nearly 180 images and ephemera confirm Avedon's place in the history and the art of his time.
Avedon's fashion photographs from the late 1940s to the early '60s are everything you want great art to be: exhilarating, startlingly new and rich enough with life and form to sustain repeated viewings. Their beauty is joy incarnate and contagious. The best of them are as perfect on their own terms as the best work of Jackson Pollock or Jasper Johns from that era, and as profoundly representative of it.
As with these painters Avedon's work represents an important turning point and a new kind of self-consciousness of his medium. He makes us aware of its process on different levels, while also questioning its values and deflating its pretensions. His images have a new tautness; you see them as energy-producing wholes in which every detail and bit of surface is articulated. Like Abstract Expressionist painting, they show us an art form learning from and then moving beyond European conventions.
Avedon came to fashion photography at a propitious moment. Just after Martin Munkacsi had introduced movement to the genre at Bazaar, Avedon began to study with Alexey Brodovitch, the magazine's influential artistic director, who groomed him, hired him and gave him plum assignments. The plummiest were semiannual trips to Paris to photograph the latest couture. And this was just as Christian Dior was re-establishing Paris as the center of the fashion universe with wasp-waisted, voluminous gowns and caped, curvaceous suits. Judging from some of the photographs here both Avedon and Dior were sculptors in previous lives.

Avedon took models dressed in the same gowns and suits that were going down the runways to photograph them in Bazaar's garretlike Paris studio, on the city's streets or bridges, in nightclubs, at cafes or even at the circus, a ploy that produced the famous 1955 image of Dovima — one of his favorite models — swaying arms outstretched in a Dior gown and flanked closely by two elephants, who also sway and furl their trunks.

In some instances the striking beauty of Avedon's images derives simply from a fresh and purposeful articulation of fashion photography's time-tested conventions: basically, a dress, a model, a studio.

In a 1950 picture of the tall, dark-haired, insuperably elegant Dovima wearing a satin evening gown by Fath, the model's body language and face send delightfully tangled messages. She steps toward the left; cocks her ear and slides her eyes to the right, folds one bare arm across her torso and raises the other, resting her elbow on the wall, a cigarette holder in her hand. She is doing her job, striking a pose, collaborating with the photographer. Her step reveals the narrowness of the gown; her angled arms reiterate the switch-back folds of its peplum. But she's also alone, perhaps at a party; her listening, backward gaze savors the meaning of a parting remark or subsequent talk. And don't miss the lacquered hand with the cigarette, which is suggestive of a relaxed claw. As with most of Avedon's Bazaar women she is a force to be reckoned with, a real woman if also a really glamorous one.

Would Avedon have cooperated with the making of this exhibition? It is hard to say, but luckily the Richard Avedon Foundation has. The show's organizers, Carol Squiers, the center's curator, and Vince Aletti, its adjunct curator, have had access to rare prints, engraver's prints and the archive. Such liberty was clearly a boon to the fresh and opinionated essays that the two have contributed to the sizable catalog. This access also accounts for the very interesting ephemera. Three contact prints, an open magazine and a framed print indicate how opinions differed about which images to use from a shoot. In the case of those of the model Renée in the Place de la Concorde, twirling to show off the gored skirt of her Dior suit, Brodovitch chose a close-up of the skirt and her feet. Avedon's favorite — the one that's famous from his books and exhibitions — hangs on the wall. In it Renée is seen full-length from the back as three young men walk past looking toward her and the photographer. It is an event in the world.

This image among others indicates how Avedon took inspiration from great Paris street photographers like Cartier-Bresson and Brassai but used the model to set up an almost jarring tension between the artificial and the everyday. This is especially the case with the famous "Elise Daniels with Street Performers," shot in Paris in 1948, with a decrepit Marais apartment building as backdrop. Wearing a broad "picture" hat and a Balenciaga suit, the model stands hands on hips by a table comandeered as a stage by a contortionist while a weight lifter and a horn player do their things. She is in many ways an alien among aliens, observed by clutch of normal Parisians. (In an alternate shot, included in the catalog, the table is bare, and two acrobats, one doing a handstand on the other's hand, round out the group.)

Avedon took Munkacsi's use of motion and literally ran with it. In one of his most giddily glamorous images, from 1956, we see Suzy Parker and her frequent model escort, Robin Tattersall, roller-skating (or posed as if roller-skating) across the Place de la Concorde, shot from the low angle that was one of his trademarks. As Mr. Aletti points out, movement becomes much more flamboyant after Avedon goes to Vogue; it's the mid-'60s, and the regal womanly swans of the 1950s have been replaced by more girlish flower-children like Twiggy and Penelope Tree at Vogue. They dance, leap or lope past, often completely obscured by flowing garments. Movement could also be disintegration: in a 1994 photograph, Stephanie Seymour is shown crumpling like a marionette whose strings have been cut.

Avedon also extended motion into narrative, in a way that seemed prescient of 1980s picture art. In addition to setting up single shots that seemed to tell extremely complicated stories about life and beauty, he also strung images together to create stop-action stories. These often poked fun at the very thing he helped create: couture and celebrity culture. He photographed fashion models surrounded by paparazzi in 1961, when the phrase was barely coined. In 1962 he cast Suzy Parker and Mike Nichols as famous lovers hotly pursued by the press (like Elizabeth Taylor and Richard Burton in Rome during the shooting of "Cleopatra"). We see the pair besieged in limos and hotel lobbies, coming out of nightclubs and — voila! — on the front row of a prestigious Paris fashion show. Mr. Nichols, slumped in a chair, smoking, looks tired and bored. The Un-Avedon.

"Avedon Fashion: 1944-2000" continues through Sept. 6 at the International Center of Photography, 1133 Avenue of the Americas, at 43rd Street; (212) 857-0000, www.icp.org.

http://www.nytimes.com/2009/05/15/arts/design/15aved.html?ref=design

A Grand and Intimate Modern Art Trove

By ROBERTA SMITH

CHICAGO — The Art Institute of Chicago is a great encyclopedic museum that is about to become greater. At least it is about to start to become greater. Renzo Piano's elegant new Modern Wing is a rarity: a work of genuinely good architecture that is also kind to art. But as usual with new buildings there remains curatorial work to be done.This wing adds 264,000 square feet of interior space to the institute's floor plan, making it the second-largest museum in the country after the Metropolitan Museum of Art. This includes 60,000 square feet of new galleries that are dedicated to European painting and sculpture; art since 1945; photography; and 20th- and 21st-century architecture and design. And there is a good-sized temporary exhibition space being inaugurated by an exceptional show of recent paintings, sculpture and photographs by Cy Twombly, who is in top form at 81.The expanded space could allow the museum to redefine its relationship to the recent past, the present and the future. It instantly places it well ahead of the Met in terms of contemporary art. And its spacious architecture and design galleries, which lead off with a cache of rare architectural drawings, outrank the Museum of Modern Art. But a newly completed museum wing of this scope is by definition the beginning of a longer, more subtle work in progress. It is now the curators' turn to explore its strengths and limitations.

The main strengths here are two suites of galleries on the second and third floors that are at once grand and intimate. The biggest problem, stated simply, is that the Modern Wing accommodates only the classic, European version of modernism. American art from 1900 to 1945 has its own, quite generous galleries in the Art Institute's 1988 expansion, the Rice Wing.
But nothing is perfect, least of all in a museum. While this separation may reinforce a version of modernism that seems outmoded, there are signs of change being fomented from within.
The building's kindness to art is especially palpable on the third floor, thanks to plentiful skylights. Straight ahead in the first gallery hangs a Matisse 1909-17 masterpiece, the serene yet implacable "Bathers by a River," suffused in natural light. Around the corner you'll find treasures like Juan Gris's 1912 Cubist "Portrait of Pablo Picasso," a figurative ziggurat built mostly from blocks of Pointillist blue, and Joan Miró's 1918 "Portrait of Juanita Obrador," a tightly wound woman in a black-and-white striped dress, an image that is as solid as Gris's Picasso is not.
Throughout there are deviations from modernism-as-usual: "Composition With Red Arrow," a small Popish abstraction from 1918 by the Romanian Dadaist Marcel Janco; a 1936-37 painting of (I think) brightly wrapped packages by Maria Elena Vieira da Silva that equivocates between magic realism and abstraction; and a wonderful little tropical fantasy by Leonora Carrington. This last work is part of the museum's extraordinary Bergman Collection of mostly Surrealist art, which forms a kind of cabinet of curiosities at the heart of the third-floor galleries.

The Bergman trove includes a phalanx of 30 boxes by Joseph Cornell, an American. That collection contains the only artists on this floor who developed outside Europe, primarily Arshile Gorky, Matta and Wifredo Lam. (The exception is the Parisian expatriate Man Ray, who is in the Bergman collection and elsewhere in these galleries.)

There are also recent acquisitions and promised gifts to admire: a sulfurous early farmscape by Mondrian; a shimmering Bonnard still life from 1926; a blocky, abstract sculpture in cast plaster by Georges Vantongerloo, also from 1926; and Magritte's enigmatic "White Race," from 1937, which dissects a female bather, evoking both Picasso's monstrous paintings of Olga and his pneumatic treatments of Marie-Thérèse Walter.

In the final gallery Picasso's mountainous "Nude Under a Pine Tree," from 1959, locks eyes — and a grandiose sense of scale — with a demonic 1945 portrait by Jean Dubuffet. Its wide slashing strokes amaze. Franz Kline must be just around the corner.

And of course he is, downstairs on the second floor. Unfortunately Kline's classic black-and-white "Painting" from 1952, along with other works from 1945 to 1960, are sequestered in a shallow, constricted 3,000-square-foot space. It is also separate from the big, glorious suites of galleries, and feels sidelined.

Here you will encounter Willem de Kooning's great jangling 1950 "Excavation," one of Abstract Expressionism's finest moments, along with "The Key," an obstreperous predrip painting from 1946 by Jackson Pollock that the museum acquired in 1987.

Its neighbor is in some ways even better because it is rarer: a truly great painting by Robert Motherwell, acquired only in 1997. "Wall Painting With Stripes," from 1944, is a field of broad verticals of cream and yellowish brown interrupted by black and gray intimations of a tree, and ovals suggesting suns and moons. It is a glowering, unstoppable canvas, something left behind by Tom Sawyer and Huckleberry Finn, taking cues from Miró, on a broad, back-alley fence from a Walker Evans photograph. After works by Mark Rothko, Joan Mitchell, Barnett Newman and William Baziotes, the passing of Abstract Expressionism is signaled by a small, beautiful Robert Rauschenberg and larger works (all loans) by Lucio Fontana, Yves Klein and Jasper Johns.

In other words, two of the greatest turning points in mid-century art are cramped into this space. It can feel like a reverential chapel or an isolated cul-de-sac, depending on your point of view.

The big suite of galleries on the second floor, which is dedicated to art since 1960, swings between moments of daring new thought and late- and postmodernism-as-usual. Pop Art is expanded with works by Alex Katz, David Hockney, Sylvia Plimack Mangold and Ed Paschke. There is a small gallery devoted to six works by Jim Nutt, an outstanding but underappreciated painter, native to Chicago, whose perverse portraits and strung-out figures reflect the influence of local Surrealist collections like the Bergman.

Other surprises include a small gallery dedicated to Mel Bochner's early painted wood wall pieces; a little-known low-lying sculpture by Bruce Nauman that can be walked on (like a Carl Andre) but is actually more interesting to read; and "It's a New Age," one of Sue Williams's searingly caustic, body-oriented early paintings. Less surprising but still impressive is a gallery overly full with paintings and drawings by Gerhard Richter; two galleries devoted to the enigmatic objects (and wallpaper) of Robert Gober; and Charles Ray's "Hinoki," a to-scale copy of a large, dead oak tree that Mr. Ray had hand carved, in cypress, in Japan. Mr. Ray's sculpture is a big-budget production that may become rare in the years ahead, but looking at it and gradually realizing that none of its delicate, desiccated textures are natural is a semihallucinatory experience.Too often the post-1960 presentation is dry and correct on several levels, including politics, art theory and marketability.

Except for some of the Richters, four late Philip Gustons and single works by Lari Pittman and Marlene Dumas, European and American painting from the 1980s has gone missing. Perhaps in keeping with the Minimal-Conceptual stranglehold that has so dominated views of the art of the late '60s and '70s, the '80s are now to be seen only in terms of the strictly photo-based appropriation of the Pictures Generation. I hope not.

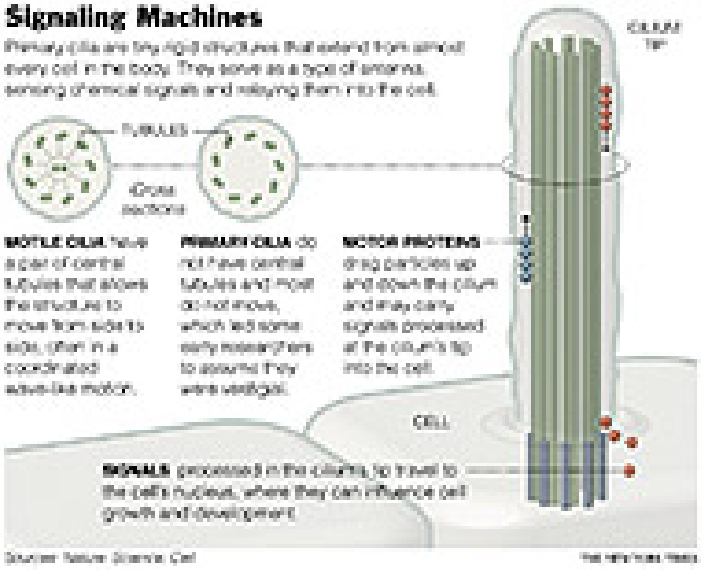
It is dismaying to see modernism's linear thinking — falsely narrow to begin with — persist. We depend on museums like the Art Institute, now capable of telling a much fuller, more mixed-up story, to do just that.

The Modern Wing opens Saturday at the Art Institute of Chicago, 111 South Michigan Avenue; artic.edu.

http://www.nytimes.com/2009/05/14/arts/design/14inst.html?ref=design

Antenna on Cell Surface Is Key to Development and Disease

By WALLACE RAVVEN



At first they cannot see at night. Then daytime vision fails, and by age 5 or 10, these children are blind. Some become extremely obese and develop diabetes and kidney disease.

The crushing condition is known as Bardet-Biedl syndrome, and it is caused by inherited defects in the child's primary cilia — solitary slivers that poke out of almost every cell in the body. These are not the wisps that wave Rockette-like in our airways. They are stiff, tiny, nearly transparent structures, sometimes as little as one-thousandth the size of the cell. Only one sticks out of each cell, and it acts as both an antenna and a machine to process signals essential for development and survival.

Largely ignored for a century as vestigial, primary cilia are now emerging as pivotal players in the subtle shifts of signaling that shape the fetus and assure normal adult cell growth. Powerful genetic and imaging tools have opened a window into these machines, fueling a flurry of research intended to clarify their role in health and disease.

"Primary cilia are turning out to be a kind of signaling machine that no one had appreciated," said Matthew Scott, a geneticist at Stanford Medical School. "It's as if there was a shed out back with all sorts of weird machinery, and hardly anyone had ever looked in. But the farm can't work without it."

In the last few years, scientists have discovered that the single cilium on each cell receives and reconfigures the signals that form neurons, sculpt the body plan and organize the brain. In adults, cilia are required to heal wounds and grow cells, and when they malfunction, they can help cause cancer. Damage to primary cilia is now also linked to kidney disease, obesity and even the failure of adult neuron development.

A quick succession of discoveries in the past 10 years has revealed an intricate architecture within each cilium that supports two-way trafficking of proteins up and down tubes that run the cilium's length. Molecular motors push particles along the tubes. These motor proteins are linked to the cilium's outer envelope, so they can move material up and down the membrane itself.

More startling than the finding of this elaborate system was the discovery a few years later that traffic on the cilia highway includes the signals that switch on genes to drive development of the embryo. These signals are themselves proteins, like the highly important Sonic hedgehog.

The cilia trafficking system, now known as intraflagellar transport, was discovered in the green algae Chlamydomonas, which has long, thin flagella, accessible to study. Flagella and cilia have the same structure, part of life's toolkit for more than a billion years.

In the mid-1990s, Keith Kozminski, a graduate student in the Yale laboratory of Joel Rosenbaum, placed small beads on the membrane of Chlamydomonas, and under a powerful microscope he saw that some of them moved along the surface of the membrane.

He and Dr. Rosenbaum knew that meant motors must have been at work inside the cilium. Motor proteins had been discovered elsewhere in cells. Among other tasks, they are responsible for pushing paired chromosomes apart during cell division.
"We were using the very best optics available," Dr. Rosenbaum said. "Keith told me he could see particles under the membrane, moving up from the bottom to the tip of the cilium and back down again. My first response was, 'Almost certainly that is an optical artifact.' "
But it was for real. Douglas Cole in Dr. Rosenbaum's lab and Gregory Pazour at the University of Massachusetts Medical School soon identified a number of flagellum genes needed for the architecture that made the transport system possible.
In 2000, with George Witman of the University of Massachusetts, they found the first link between primary cilia and disease. They showed that a gene connected to transport within the Chlamydomonas flagellum was a close relative of a mouse gene that causes a severe kidney disease when it is defective. A mutated flagellum or cilium gene, then, could cause a serious, recognized illness.
Polycystic kidney disease affects about 600,000 people in the United States. It is the most common life-threatening disease caused by a single gene mutation, and the reason for most of the need for dialysis. The disease develops when cysts grow in the kidney and block its filtering capacity. Cilia normally protrude into the kidney tubules and bend in the urine flow. If a mutation prevents cilia from bending, kidney cells needlessly divide, and cysts form.
The connection of cilia to kidney disease extended the prevailing view that cilia were antennas capable of sensing the environment. But a few years later, the discovery of a far more pervasive cilia role startled developmental biologists and geneticists. In 2003, Kathryn Anderson of the Sloan-Kettering Institute and a graduate student, Danwei Huangfu, went on a kind of genetic fishing expedition.
They were looking for genes that affect early development of mouse embryos, so they exposed the embryos to a chemical mutagen and found mutated genes that caused early neural defects. Some of the mutated genes were somehow connected to the pathways followed by Sonic hedgehog, an extremely important growth-promoting protein involved in embryonic development. And among these genes were two that affected the construction of cilia.
The conclusion was that cilia were involved in an important way in the Sonic hedgehog system, which reaches into so many aspects of cell biology. "Kathryn Anderson's discovery was astounding," said Dr. Frédéric de Sauvage, the vice president for molecular biology at the biotech company Genentech.
"Virtually all basal cell carcinomas — the most common form of skin cancer — have mutated genes involved in processing hedgehog signals. Mutations in components of the hedgehog pathway keep it turned on all the time."
Genentech is now running clinical trials of a compound that inhibits unrestrained signaling in the hedgehog pathway for potential treatment of basal cell carcinoma, colorectal cancer and ovarian cancer.
Arturo Alvarez-Buylla, a neuroscientist at the University of California, San Francisco, recently began studying how primary cilia affect the brain's neural stem and progenitor cells. He suspects damaged primary cilia may cause some types of brain tumors. In related research, working with Young-Goo Han, a postdoctoral fellow, he discovered that neural stem cells that lack primary cilia failed to give rise to adult neurons in the hippocampus, a region of the brain required for memory formation.
He sees strong evidence that cilia also help orient neuronal stem cells in tissues in the direction in which they will grow.
Since Dr. Anderson's discovery, reported in Nature, scientists have begun to decipher how the cilium's Rube Goldberg-like mechanism, on the fringes of the cell, controls genes that are cradled in the cell's nucleus.
Bradley Yoder of the University of Alabama, Birmingham, discovered that the protein units that ultimately deliver hedgehog's commands to the genes actually reside in the cilium's tip. Jeremy Reiter at the University of California, San Francisco, and Dr. Scott at Stanford have shown that hedgehog's arrival — at a different site on the cilium — turns on this gene-switching protein. The protein messengers move down the cilium tube to the nucleus, where they light up or turn off dozens of genes.
Scientists zeroing in on different diseases are encountering more cilia defects. For example, the hormone leptin circulates throughout the body, gauging fat deposition and docking onto neurons to convey that the body has adequate food. One of leptin's targets is a class of neurons in the hypothalamus. Dr. Yoder and Val Sheffield at the University of Iowa have found in mice that when the lone cilium on each such neuron is disrupted, the animals seem unable to sense leptin as they normally would. They overeat and become obese.

At a meeting in February in Italy focusing on the latest primary cilia research, Soren Christensen of the University of Copenhagen discussed cell culture studies showing that primary cilia are essential for wound healing. He studies a signaling molecule that, like Sonic hedgehog, diffuses to tissue to spur growth and division. In Italy, he reported that cells lacking cilia failed to migrate normally toward a wound, a process that usually is the first step in healing. He and Dr. Yoder have now confirmed this in live mice.

"If you look at mutated cells that cannot make the primary cilium, they are blindfolded," Dr. Christensen said. They cannot sense the signals from the wound. "They don't migrate. They just run in place."

Other research reported in Italy focused on primary cilia's effect on another signaling molecule, called Wnt, which orients cells in developing tissue and enables them to sense their three-dimensional location. Kimberly McDermott of the University of California, San Francisco, described research showing that primary cilia are essential for Wnt to control normal mouse mammary gland branching in puberty and pregnancy.

Although the cilium appears to be far removed from the heart of the cell, it is tightly tied to cell division. As the cell prepares to divide, the cilium disassembles, and rebuilds only after division.

"This little antenna is poking out of the cell surface and may well communicate when and in what orientation the cell should divide," said Wallace Marshall at the University of California, San Francisco. Dr. Marshall recently helped clarify a classic discovery 10 years ago of how the embryo "knows" left from right. This sense enables normal placement and structure of the heart. Unlike most primary cilia, the subset of cilia involved in this process move. The original discovery had revealed that thousands of individual cilia in the week-old mouse embryo rotate from their base, similar to the way a stiff arm rotates around the shoulder.

The net effect is a leftward flow of embryonic fluid that establishes left-right asymmetry. Dr. Marshall and his colleagues confirmed that each cilium projected out at a left-leaning angle to the cell surface, and they used fluid dynamics models to demonstrate that the angle and motion accounted for the flow observed in the embryos.

Some scientists are exploring the possibility that cilia may do more than regulate master signaling molecules. They may actually coordinate protein signals for proper fetal development.

Dr. Yoder said he was confident that cilia coordinated different signals. But what interests him most is homing in on the mutations affecting the cilia.

"We need that to identify those genes so we can develop drugs to counter defective signals," he said. "That could help us attack severe obesity, polycystic kidney disease, Bardet-Biedl syndrome and even cancer."

http://www.nytimes.com/2009/05/19/science/19cilia.html?ref=science

Inexpensive Plastic Used In CDs Could Improve Aircraft, Computer Electronics

CDs. The inexpensive plastic now used to manufacture CDs and DVDs may one day soon be put to use in improving the integrity of electronics in aircraft, computers and iPhones. (Credit: iStockphoto/José Luis Gutiérrez)

ScienceDaily (May 17, 2009) — If one University of Houston professor has his way, the inexpensive plastic now used to manufacture CDs and DVDs will one day soon be put to use in improving the integrity of electronics in aircraft, computers and iPhones.

Thanks to a pair of grants from the U.S. Air Force, Shay Curran, associate professor of physics at UH, and his research team have demonstrated ultra-high electrical conductive properties in plastics, called polycarbonates, by mixing them with just the right amount and type of carbon nanotubes.

Curran, who initially began this form of research a decade ago at Trinity College Dublin, started to look at high-conductive plastics in a slightly different manner. Curran's team has come up with a strategy to achieve higher conductivities using carbon nanotubes in plastic hosts than what has been currently achieved. By combining nanotubes with polycarbonates, Curran's group was able to reach a milestone of creating nanocomposites with ultra-high conductive properties.

"While its mechanical and optical properties are very good, polycarbonate is a non-conductive plastic. That means its ability to carry an electrical charge is as good as a tree, which is pretty awful," Curran said. "Imagine that this remarkable plastic can now not only have good optical and mechanical properties, but also good electrical characteristics. By being able to tailor the amount of nanotubes we can add to the composite, we also can change it from the conductivity of silicon to a few orders below that achieved by metals."

Making this very inexpensive plastic highly conductive could benefit electronics in everything from military aircraft to personal computers. Computer failure, for instance, results from the build up of thermal and electrical charges, so developing these polymer nanotube composites into an antistatic coating or to provide a shield against electromagnetic interference would increase the lifespan of computing devices, ranging from PCs to PDAs.

The next step of this research is to develop ink formulations to paint these polycarbonate nanocomposites onto various electrical components. Normally, metal plates are used to dissipate electrical charge, so it's not surprising that the availability of a paintable ink would be particularly appealing to the Air Force for its lightweight properties, resulting in lighter aircraft that guzzle less gas.

Another key component of this latest research is that pristine nanotubes disbursed in this polycarbonate were found to possess an even higher conductivity than acid-treated carbon nanotubes. Traditionally, the tubes are sonicated, or treated with acid, to clean them and remove soot to get a higher conductivity. This, however, damages the tubes and exposes them to defects. Instead, Curran and his group were able to centrifuge, or swirl, them. This takes a little longer, but increases the potential to have higher conductivities. He attributes this to the incredibly clean samples of carbon nanotubes obtained from fellow collaborator David Carroll in the physics department at Wake Forest University.

In addition to Curran and Carroll, the team behind these remarkable findings includes Donald Birx, professor of electrical engineering and vice president for research at UH, two of Curran's former post-doctoral students, Jamal Talla and Donghui Zhang, and a current Curran student, Sampath Dias.

Coincidentally, Curran's former thesis supervisor Werner Blau and his group in the department of physics at Trinity College Dublin have come out with similar findings recently in the journal ACS Nano. Both groups really have been pushing hard in the area of polymer nanotube composites during the course of the last decade. Curran said his group at UH achieved the highest conductivity levels so far, but also is encouraged by Blau's success and said repeating these types of outcomes will open doors for even higher values.

"While these are phenomenal results, finding these unusual highly conductive properties has not even begun to scratch the surface," Curran said. "There is hard science behind it, so developing it further will require significant investment. And we are very thankful to the Air Force for giving us this auspicious start."

Journal reference:

1. Curran et al. **Electrical transport measurements of highly conductive carbon nanotube/poly(bisphenol A carbonate) composite**. *Journal of Applied Physics*, 2009; 105 (7): 073711 DOI: 10.1063/1.3073938

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

http://www.sciencedaily.com/releases/2009/05/090515150946.htm

Method Of Repairing Cadiz's Walls Has Hardly Changed Since The 17th Century

Garita del castillo de Santa Catalina, en Cádiz. (Credit: Wikimedia Commons, public domain image)

ScienceDaily (May 17, 2009) — In the year 1596, a sacking at the hands of the Count of Essex almost destroyed the city of Cadiz. Since then, authorities have focused their efforts on establishing a barrier between the city and the sea, a reconstruction task which has accompanied the inhabitants of Cadiz throughout the last 400 years. The problems that Philip II encountered in halting marine erosion are similar to those that exist today, as well as the solutions.

This research project, carried out by researchers from the University of Cadiz and the Andalusian-Atlantic Coasts Department, traces a historic continuity in the tasks of maintaining and reforming Cadiz's walls. Juan José Muñoz, from the department of Applied Physics at the UOC, explains to SINC that the first mention of the city's walls, which Lord Byron baptized as the ¨Siren of the Ocean¨, was in the 13th century, along with the city's repopulation carried out by Alfonso X the Wise. In his Papal Bull of 1263, Pope Urban IV spoke to the King, referring to ¨the reparation that you are carrying out on the Hercules buildings and the restoration of the old walls in a place called Cadiz¨.

Through an exhaustive documentation labour, the authors of the project, ¨The walls of Cadiz and its struggle against the sea¨, published in the latest Revista de Obras Públicas, compared different sources from the 16th century which made reference to the construction or reinforcement processes of these defensive structures. In one of them, one of Philip II's collections officers, named Horozco, recounts the construction of ¨a new and high wall, all made of mason stone, with battlements and towers and parapets in each stretch, with a castle and a fortress of ashlar stone, situated on some very old and very strong foundations¨.

After the city resisted numerous attacks, among which figure those carried out by adversaries as feared as Redbeard or Admiral Drake, in 1596, the Count of Essex managed to overcome the scarce resistance offered by Cadiz, and disembarked through the isthmus which joined the city with the island of San

Fernando. According to Muñoz, ¨As a result of the city's destruction, Philip II decided to reconstruct it, after ruling out its abandon and reconversion into a prison¨. That process brought to light, through the writings of the period, the use of oyster stone in its construction, a shell-fish sandstone from the region extracted from the quarry waters of Puerto Real which has been used throughout the centuries.

Even though the progressive construction and reinforcement of the walls and bastions made attacks on the city less frequent, the sea and its sudden attacks have traditionally been the greatest and most constant enemy of this defensive line. Restoration labours have been carried out in an almost permanent fashion. According to Muñoz, ¨this is so much the case, that the authors on many occasions have a feeling of déjà vu when observing old photographs¨.

Of course, progress has given erosion and undermining solutions a greater capacity in site positioning and material resistance in respect of previous centuries, but these are almost the only differences.

The walls of San Rafael and San Miguel, known as the ¨gale walls¨, suffered much more from the elements than from any army. Its remodelling was constant between the 17th and 19th centuries, a time in which many of the grand ideas which are applied up to today were developed, such as a breakwater step at the foot of the wall, forming a dike with a 45º angle so that the waves would bounce off of it and hit the wall with much less force. This solution, proposed by the engineer Ignacio Sala in 1728, was improved on by Juan Cavallero (circa 1772), who proposed setting back the upper part to achieve a ¨wave-bouncing effect¨. According to the researcher, ¨the period's techniques knew the advantages of inclined planes based on granular material to dissipate energy in breaking swells¨.

Then in the 20th century, although a reinforced concrete footing attachment to the wall had been included, the restoration of the southern area of the wall was still being considered-as in previous centuries-with a defence based on blocks, whose size (which before had been calculated by a method of trial and error) began to be defined based on existing scientific-technical knowledge, according to the project.

The study indicates that ¨in 1981, engineers López, Peláez and Fages, from what was then the Headquarters of Ports and Coasts, warned that the blocks from 1949 in the Baluarte de San Roque area had rounded edges and that the swells used them as projectiles against the wall's surface¨. On this occasion, as in the 17th century, the breakwater was again used.

¨Let's take note that the breakwaters placed in previous centuries were cubic in form, very similar in size and weight to the first concrete blocks. As can be seen, the transition from one to the other is not coincidental¨, comments Juan José Muñoz. With the latest labours carried out in 1993, during which the section of the wall in front of the Cárcel Vieja was restored and where the greatest difference in respect of previous designs lay in the wall's inclination angle, a task that has occupied Cadiz during the last 400 years was completed.

Adapted from materials provided by Plataforma SINC.

http://www.sciencedaily.com/releases/2009/05/090511091534.htm

High Blood Pressure Could Be Caused By A Common Virus, Study Suggests

ScienceDaily (May 16, 2009) — A new study suggests for the first time that cytomegalovirus (CMV), a common viral infection affecting between 60 and 99 percent of adults worldwide, is a cause of high blood pressure, a leading risk factor for heart disease, stroke and kidney disease.

Led by researchers at Beth Israel Deaconess Medical Center (BIDMC) and published in the May 15, 2009 issue of *PLoS Pathogens*, the findings further demonstrate that, when coupled with other risk factors for heart disease, the virus can lead to the development of atherosclerosis, or hardening of the arteries.

"CMV infects humans all over the world," explains co-senior author Clyde Crumpacker, MD, an investigator in the Division of Infectious Diseases at BIDMC and Professor of Medicine at Harvard Medical School. "This new discovery may eventually provide doctors with a whole new approach to treating hypertension, with anti-viral therapies or vaccines becoming part of the prescription."

A member of the herpes virus family, CMV affects all age groups and is the source of congenital infection, mononucleosis, and severe infection in transplant patients. By the age of 40, most adults will have contracted the virus, though many will never exhibit symptoms. Once it has entered the body, CMV is usually there to stay, remaining latent until the immune system is compromised, when it then reemerges.

Previous epidemiological studies had determined that the CMV virus was linked to restenosis in cardiac transplant patients, a situation in which the heart's arteries "reblock." The virus had also been linked to the development of atherosclerosis, the hardening of the heart's arteries. But, in both cases, the mechanism behind these developments remained a mystery. This new study brought together a team of researchers from a variety of disciplines – infectious diseases, cardiology, allergy and pathology – to look more closely at the issue.

"By combining the insights of investigators from different medical disciplines, we were able to measure effects of a viral infection that may have been previously overlooked," explains Crumpacker.

In the first portion of the study, the scientists examined four groups of laboratory mice. Two groups of animals were fed a standard diet and two groups were fed a high cholesterol diet. After a period of four weeks, one standard diet mouse group and one high-cholesterol diet mouse group were infected with the CMV virus.

Six weeks later, the animals' blood pressures were measured by the cardiology team using a small catheter inserted in the mouse carotid artery. Among the mice fed a standard diet, the CMV-infected mice had increased blood pressure compared with the uninfected group. But even more dramatically, 30 percent of the CMV-infected mice that were fed a high-cholesterol diet not only exhibited increased blood pressure, but also showed signs of having developed atherosclerosis.

"This strongly suggests that the CMV infection and the high-cholesterol diet might be working together to cause atherosclerosis," says Crumpacker. In order to find out how and why this was occurring, the investigators went on to conduct a series of cell culture experiments.

Their first analysis demonstrated that CMV stimulated production of three , and MCP1 – in the infected mice,∝different inflammatory cytokines – IL6, TNF an indication that the virus was causing inflammation to vascular cells and other tissues.

A second analysis found that infection of a mouse kidney cell line with murine CMV led to an increase in expression of the renin enzyme, which has been known to activate the renin-angiotensin system and lead to high blood pressure. Clinical isolates of human CMV in cultured blood vessel cells also produced increased renin expression.

"Viruses have the ability to turn on human genes and, in this case, the CMV virus is enhancing expression of renin, an enzyme directly involved in causing high blood pressure," says Crumpacker. When the scientists inactivated the virus through the use of ultraviolet light, renin expression did not increase, suggesting that actively replicating virus was causing the increase in renin.

In their final experiments, the researchers demonstrated that the protein angiotensin 11 was also increased in response to infection with CMV. "Increased expression of both renin and angiotensin 11 are important factors in hypertension in humans," says Crumpacker. "What our study seems to indicate is that a persistent viral infection in the vessels' endothelial cells is leading to increased expression of inflammatory cytokines, renin and angiotensin 11, which are leading to increased blood pressure."

According to recent figures from the American Heart Association, one in three U.S. adults has high blood pressure, and because there are no known symptoms, nearly one-third of these individuals are unaware of their condition. Often dubbed "the silent killer," uncontrolled high blood pressure can lead to stroke, heart attack, heart failure or kidney failure, notes Crumpacker.

"We found that CMV infection alone led to an increase in high blood pressure, and when combined with a high-cholesterol diet, the infection actually induced atherosclerosis in a mouse aorta," says Crumpacker. "This suggests that further research needs to be directed at viral causes of vascular injury. Some cases of hypertension might be treated or prevented by antiviral therapy or a vaccine against CMV."

This study was funded by grants from the National Heart, Lung and Blood Institute of the National Institutes of Health.

Study co-authors include Jielin Zhang of BIDMC's Division of Infectious Diseases (co-senior author); Jilin Cheng formerly of BIDMC's Division of Infectious Diseases and now at Fudan University, Shanghai, China (first author); Qingen Ke of BIDMC's Division of Cardiology; Zhuang Jin and Haiban Wang of BIDMC's Division of Allergy; Olivier Kocher of BIDMC's Division of Pathology; and James Morgan of Caritas St. Elizabeth's Medical Center, Boston.

Adapted from materials provided by Beth Israel Deaconess Medical Center.

http://www.sciencedaily.com/releases/2009/05/090514221915.htm

Peruvian Stalagmites Hold Clues To Climate Change

ScienceDaily (May 16, 2009) — How will the Netherlands, dominated by water, be affected by future climate change? Dutch researcher Martin van Breukelen hopes to answer that question by analyzing stalagmites from the South American Amazon tributaries in Peru as a way to reconstruct climate changes in the past.

Information that can be used to test climate models is stored in various forms: in ice formations, plant remnants, oceans and caves. Limestone formations in caves, so-called speleothemes, provide insights into the land climate. The best-known speleothemes are stalagmites, standing formations and stalactites, hanging formations. Van Breukelen discovered stalagmites in South America that provide information about the climate over the past 13,000 years.

In order to study climate change, Van Breukelen analyzed the accumulation of oxygen isotopes in both the cave water and the stalagmite. A small quantity of fossil cave water is enclosed in the core of the stalagmite, so-called fluid inclusions. The entrapped water is just as old as the carbonate of the stalagmite in which it is trapped. The isotope ratio of this fossil water can be measured using an extraction technique. As this water has been entrapped for thousands of years it provides unique information about the climatic history.

Much climate research on the land and sea is based on the measurement of subtle changes in the ratio between stable oxygen isotopes in, for example, ice or stone formations. Isotopes of an element can have different numbers of neutrons but always contain the same number of protons. Light isotopes (^{16}O) respond differently to climate change than heavier isotopes (^{18}O). Climate changes result in an altered ratio of the ^{16}O and ^{18}O isotopes. The ratio of the different isotopic elements oxygen, carbon and hydrogen provides a lot of useful information about the climatic history. Van Breukelen uses this information to reconstruct the changes in temperature and precipitation.

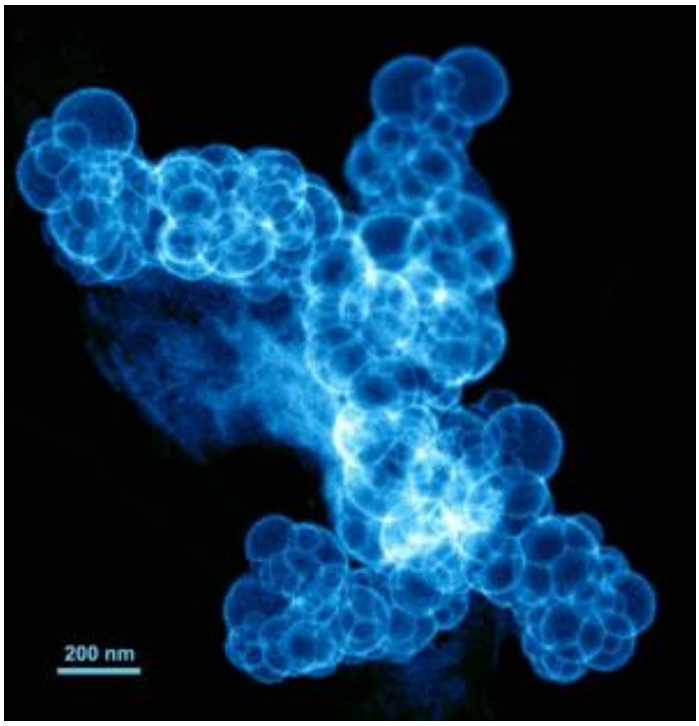
Climate research reveals that even without human influence the Earth's climate was changeable in the past. To what extent humans have influenced climate change since the industrial revolution remains unclear. It should be remembered that studies into climatic history can provide insights into the natural behaviour of the climate in the past. Additionally current climate models can only be improved if more historical data become available so that the accuracy of these models can be tested. The research method used by Van Breukelen that examines stalagmites is vitally important for climate research. This method allows the accurate reconstruction of independent temperature changes and precipitation patterns from thousands of years ago.

Van Breukelen's research was funded by a grant from the NWO division WOTRO Science for Global Development. WOTRO focuses on funding innovative scientific research into development issues, especially sustainable development and poverty alleviation.

Adapted from materials provided by NWO (Netherlands Organization for Scientific Research).

http://www.sciencedaily.com/releases/2009/05/090515084039.htm

New Fuel Cell Catalyst Uses Two Metals: Up To Five Times More Effective



A catalyst made of platinum (above in nanocage form), and paladium has been developed by WUSTL's Yunan Xia and his collaborators. Tests have shown that the "bimetallic" catalyst outperforms commerical catalysts, which could enable a cost effective fuel cell technology and ultimately provide cleaner fuels worldwide. (Credit: Sandia National Laboratory)

ScienceDaily (May 16, 2009) — Material scientists at Washington University in St. Louis have developed a technique for a bimetallic fuel cell catalyst that is efficient, robust and two to five times more effective than commercial catalysts. The novel technique eventually will enable a cost effective fuel cell technology, which has been waiting in the wings for decades, and should give a boost for cleaner use of fuels worldwide.

Younan Xia, Ph.D., the James M. McKelvey Professor of Biomedical Engineering at Washington University led a team of scientists at Washington University and the Brookhaven National Laboratory in developing a bimetallic catalyst comprised of a palladium core or "seed" that supports dendritic platinum branches, or arms, that are fixed on the nanostructure, consisting of a nine nanometer core and seven nanometer platinum arms. They synthesized the catalysts by sequentially reducing precursor compounds to palladium and platinum with L-ascorbic acid (that is, Vitamin C) in an aqueous solution. The catalysts have a high surface area, invaluable for a number of applications besides in fuel cells, and are robust and stable.

Xia and his team tested how the catalysts performed in the oxygen reduction reaction process in a fuel cell, which determines how large a current will be generated in an electrochemical system similar to the cathode of a fuel cell. They found that their bimetallic nanodendrites, at room temperature, were two-and-a-half times more effective per platinum mass for this process than the state-of-the-art commercial platinum catalyst and five times more active than the other popular commercial catalyst. At 60 C(the typical operation temperature of a fuel cell), the performance almost meets the targets set by the U.S. Department of Energy.

The Department of Energy has estimated for widespread commercial success the "loading" of platinum catalysts in a fuel cell should be reduced by four times in order to slash the costs. The Washington

University technique is expected to substantially reduce the loading of platinum, making a more robust catalyst that won't have to be replaced often, and making better use of a very limited and very expensive supply of platinum in the world.

The study was published in *Science* online on May 14.

"There are two ways to make a more effective catalyst," Xia says. "One is to control the size, making it smaller, which gives the catalyst a higher specific surface area on a mass basis. Another is to change the arrangement of atoms on the surface. We did both. You can have a square or hexagonal arrangement for the surface atoms. We chose the hexagonal lattice because people have found that it's twice as good as the square one for the oxygen reduction reaction.

"We're excited by the technique, specifically with the performance of the new catalyst."

Xia says seeded growth has emerged recently as a good technique for precisely controlling the shape and composition of metallic nanostructures prepared in solutions. And it's the only technique that allowed Xia and his collaborators to come up with their unconventional shape.

"When you have something this small, the atoms tend to aggregate and that can reduce the surface area,' Xia says. "A key reason our technique works is the ability to keep the platinum arms fixed. They don't move around. This adds to their stability. We also make sure of the arrangement of atoms on each arm, so we increase the activity."

Xia and his collaborators are exploring the possibility of adding other noble metals such as gold to the bimetallic catalysts, making them trimetallic. Gold has been shown to oxidize carbon monoxide, making for even more robust catalysts that can resist the poisoning by carbon monoxide – a reduction byproduct of some fuels.

"Gold should make the catalysts more stable, durable and robust, giving yet another level of control," Xia says.

Journal reference:

1. Byungkwon Lim, Majiong Jiang, Pedro H. C. Camargo, Eun Chul Cho, Jing Tao, Xianmao Lu, Yimei Zhu, and Younan Xia. **Pd-Pt Bimetallic Nanodendrites with High Activity for Oxygen Reduction**. *Science*, 2009; DOI: 10.1126/science.1170377

Adapted from materials provided by Washington University in St. Louis.

http://www.sciencedaily.com/releases/2009/05/090514153022.htm

Key coral reefs 'could disappear'

By Lucy Williamson
BBC News, Manado, Indonesia

The world's most important coral region is in danger of being wiped out by the end of this century unless fast action is taken, says a new report.

The international conservation group WWF warns that 40% of reefs in the Coral Triangle have already been lost.

The area is shared between Indonesia and five other South East Asian nations and is thought to contain 75% of the world's coral species.

It is likened to the Amazon rainforest in terms of its biodiversity.

Temperature change

The WWF report paints a bleak picture. If the world's richest coral reef is destroyed, the fish that people rely on for food could be gone.

By the end of the century, 100 million people across South East Asia could be on the march, looking for something to eat. Communities might be breaking down and economies destroyed.

" **The productivity of ocean... is plummeting right now** "
Professor Ove Hoegh-Guldberg WWF report author

It's billed as a worst-case scenario, but the report's chief author, Professor Ove Hoegh-Guldberg, says it is not as bad as the future we're currently headed towards.

"Up until now we haven't realized how quickly this system is changing," says Professor Hoegh-Guldberg.

"In the last 40 years in the Coral Triangle, we've lost 40% of coral reefs and mangroves - and that's probably an underestimate. We've fundamentally changed the way the planet works in terms of currents and this is only with a 0.7 degree change in terms of temperature.

"What's going to happen when we exceed two or four or six?"

Climate change consequences

Avoiding a worst-case scenario would need significant reductions in greenhouse gas emissions and better controls on fishing and coastal areas, says the report.

The Coral Triangle covers 1% of the earth's surface but contains a third of all the world's coral, and three-quarters of its coral reef species.

If it goes, an entire eco-system goes with it - and that, says Prof Hoegh-Gudberg, has serious consequences for its ability to tackle climate change.

"Pollution, the inappropriate use of coastal areas, these are destroying the productivity of ocean which is plummeting right now. That is the system that traps CO2 - 40% of CO2 goes into the ocean.

"Now if we interrupt that, the problems on planet earth become even greater," says Prof Hoegh-Gudberg.

Indonesia is hosting the World Ocean Conference this week because, it says, oceans have been neglected so far in global discussions on climate change.

It wants the issue to have a bigger profile at UN climate talks later this year.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8047138.stm

Published: 2009/05/13 02:11:18 GMT

Rare island species 'undervalued'

Rare species on islands are at risk of being lost forever because they have been generally overlooked by current conservation models, a study suggests.

Although islands had less diversity of species compared to mainland sites, a greater proportion were unique to the remote habitats, researchers concluded.

Yet the impact of human activities was relatively greater on islands because space was at a premium, they added.

The findings appear in the Proceedings of the National Academy of Sciences.

The team from Germany and the US wrote: "Islands are well-known centres of range-restricted species and thus high levels of endemism.

"However, they are also acknowledged for their lower species richness compared to mainland areas," they added.

"Hence, an index combining both endemism and species richness can provide insight into the question of relative conservation value of islands and mainlands."

But to date, the team observed, no study had focused on the differences between mainland areas and islands.

" **Islands are important and should be part of any global conservation strategy** "
Dr Holger Kreft, University of California, San Diego

While some islands, such as the Galapagos archipelago and Madagascar, were well known for their biodiversity richness, the team said the habitat's biological value had not been quantified.

"Normally, you want to focus on the most diverse places to protect a maximum number of species," said co-author Holger Kreft, a post-doctoral fellow from the University of California, San Diego.

"But you also want to focus on unique species that occur nowhere else."

To understand the level of endemic species found in particular areas, the team used a measure of biodiversity that weighted rare species more heavily than widespread ones.

When they calculated the level of weighted biodiversity, they then compared island ecosystems with continental habitats.

Using this measurement, the team found that islands' populations of flora and fauna were eight to nine times as rich.

The team observed: "Island floras and faunas are usually recognised to maintain a high degree of endemism because of their geographic isolation and the limited interchange with neighbouring mainland or island biota."

"Islands are important and should be part of any global conservation strategy," Dr Kreft added.

"Such a strategy wouldn't make any sense if you didn't include the islands."

The team also noted that islands were at the centre of "past and imminent species extinctions, stressing even more the need for information on both biodiversity and specific threats in this part of the world".

Lead author Gerold Kier, project leader at the University of Bonn, warned that threats to islands' biodiversity were likely to rise more sharply in the coming decades.

"That threat is expected to accelerate particularly rapidly on islands where access to remaining undeveloped lands is comparatively easy," he explained.

As a result, expanding farmlands, deforestation and other changes in how human populations use land were likely to be more stark than on the mainlands.

"We now have new and important data in our hands," said Dr Kreft, "but still have no simple solution for nature conservation."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8043907.stm

Published: 2009/05/12 10:43:00 GMT

In Man vs. Virus, The Win Goes to the Swift

By: Joan Melcher

A little more than a year ago, a team of scientists that included Wildlife Trust President Peter Daszak identified Mexico and other tropical locales as "hotspots" for emerging zoonotic diseases (diseases that can be transmitted between humans and animals, including the H1N1 virus).

In a paper published in *Nature*, the team made a predictive map of where diseases are most likely to emerge — Latin America, tropical Africa and Asia — and, for the first time, were able to correlate socioeconomic, environmental and ecological factors to disease risk.

Daszak has adjunct positions at three American and two British universities, and has served on committees of the International Union for the Conservation of Nature, the World Health Organization, National Academy of Sciences and Department of the Interior. His research focuses on the taxonomy, pathology and conservation impact of parasitic diseases. He is executive director of the Consortium for Conservation Medicine.

We caught up with Dr. Daszak by phone last week.

Miller-McCune.com: What sort of analyses are you doing now?

Peter Daszak: We've been analyzing trade and human travel data information in and out of Mexico before and after the outbreak. What we've found is that it looks like Mexico imports hundreds of thousands of pigs every year for the pig industry. Often these swine influenzas don't cause huge critical

signs in pigs, so it could go pretty much unnoticed. The other thing is that Mexico does import pigs from other countries in Latin America and countries in Europe - not many, but enough to bring over other strains. In terms of origins, it may be that this virus was hanging around a long time in pigs in North America as a region, switching genes with other viruses, and then the avian gene got inserted.

It seems it made the step into human disease in Mexico. The next question is how did it travel so widely so rapidly? The answer to that is through travel networks, which are incredible now. We've been tracking travel information, and we've found that a large number of passengers traveled to other Latin American countries from Mexico at that time. Some of those countries haven't reported many cases, if any. So I think we're going to see a bigger impact in Latin America as those cases get noticed.

They're probably not being noticed because they're not being reported. These are people who traveled to Brazil or Venezuela and went home, maybe to the countryside, and got ill and have not yet seen a doctor.

Mexico City is a hub for connections to Latin America. The volume of travel to Latin America from Mexico is huge. It's also a huge connector for people traveling from Houston, Miami and New York. The richer countries that can afford better health care are going to report the cases first. That's why we saw cases reported rapidly in New Zealand. New Zealand picks up cases very quickly because it's got better reporting and better health care. We should expect to see surprising numbers of cases from places like other parts of Asia, Australia and even Africa.

M-M: You noted in a recent article that your group will be releasing findings related to the H1N1 virus. When will they come out?

PD: We're doing a formal analysis and will publish a paper in a journal soon. What we've found is that once an influenza gets into a country like Mexico, it's going to very rapidly get into the U.S. We can't live in isolation now. We really have to look at what our neighbors do and make sure that the same standards of surveillance and control that we have we share with our neighbors or we pick up on their standards and control. It's countries coming together and working together as a unit — that's the way to beat these diseases.

M-M: It seemed that the word got out fast on this virus and steps were taken fairly quickly. Is that how you see it?

PD: The response did happen very quickly, but we should have seen this coming before it happened. We predicted it. We didn't say which virus and exactly when; you can't do that. What you can do, using the very sophisticated computers that we use, is you can say, 'Here's the hot spot.' It's the equivalent of an earthquake zone.

If you live in an earthquake zone, like San Francisco, and you're building a house, you build it to code and that code includes protection against earthquakes. In the same way, if you're in a disease hot zone, and you're building a pig farm or poultry trade or you're increasing travel, you need to build in protection, and the protection you build in is surveillance. The surveillance wasn't up to snuff when you compare it with what we do here in the U.S.

M-M: Do you think the virus originated in the large hog-farm operations in Mexico?

PD: When we look at the data on the hog trade to Mexico, it's increased pretty dramatically in last few years. I don't know why, but it feels like this is (due to) stocking of big pig-farm production facilities. There's nothing wrong with that. As a carnivore, it's great to have cheap, good-quality food.

But the problem is that part of the risk of doing these trades and these globalized food production networks are disease outbreaks. When we do globalized food production and trade, we've got to insure

ourselves just like you would insure yourself personally if you were doing a high-risk activity — you'd make sure you have life insurance.

Diseases are an actual product of these things that we do. For the first time ever we were able to prove that scientifically. Human activity drives the emergence of new diseases. Everybody says it, everybody thinks they know it, but we were actually able to show it definitively. The message there is that human activity is a risk for disease emergence so let's insure ourselves properly against that risk. You can still do the trade. There's nothing wrong with intensive production of pigs per se, but you've got to be careful when you do those things. You've got to get ready for those diseases.

M-M: Can you give an example of the sort of surveillance or testing that's needed?
PD: It's probably not fair to pick on the pigs too much because there is a question of if this really came out of the pig farms in Mexico. The point is there's swine involvement. Now, what you would do is in a hot zone — like Mexico, like South America, like Southeast Asia, any large animal production facility — there should have a higher level of surveillance. And that means testing more animals for more pathogens.

I'll give you an example of how poor our strategy is to protect ourselves against disease. We published a paper in Science this week on the wildlife trade. When animals come into the country in the U.S., we think we're protected. We test pigs, sheep, cows; we test them for four or five diseases only. We don't test for rare diseases or for pathogens we don't even know about. In the wildlife trade, 200 million animals come into the country every year. Most of those come in without any testing at all.

M-M: Really — that many animals?

PD: It's mainly fish, so that's not a big risk. Actually, there are zoonotic diseases that fish can carry. There are also mammals in there, birds in there. Birds are tested for three diseases: psittacosis, which is a rare disease that comes from parrots and can affect people, Newcastle disease, and only in the last few years, avian influenza. What about all those other diseases — for instance, West Nile disease? We know that West Nile emerged in the U.S. recently. It first started in New York. It clearly came in to New York through trade or travel. Humans can't carry it because we're unable to spread the infection. But birds can, mosquitoes can. Who's checking those animals that come in for things like West Nile? Nobody. Who's checking airplanes to see if they've got mosquitoes that are bringing it into the country? Nobody. There's big gap out there that's not being covered.

M-M: Can you give me some examples about how socioeconomic and environmental factors affect the emergence of disease?

PD: Sure. A good example is we've found that the origin of SARS (severe acute respiratory syndrome) is bats, a group of viruses carried by bats in Asia. People of Asia eat bats. What's happened is that the population of Asia has increased, especially in Southern China. The prosperity of people has increased and they can afford these special meals of wildlife. So the trade in wildlife increases and you get these animals coming together in markets where different species are mixed and people live in those markets. So it's a perfect place for pathogens to spill over from bats into people.

Another good example is deforestation. If you've got an intact forest full of wildlife, the wildlife carries viruses that don't really affect them. If you build a road through the forest to log it, you bring in camp workers who are doing the logging. They start to eat wildlife or they're exposed to wildlife, and you start to see the pathogens spilling over into people. So any disruption like that brings in the risk of disease spread.

M-M: It seems to come down to the world being smaller and there being more people.

PD: It does. It's a human-driven thing. Human population is in strong correlation with emerging diseases. But it's not just the denser the city, the more risks there are. It's really what people do. The more people you have in an area, the more resources you need; the bigger the food industry, the bigger the deforestation, the bigger the urban sprawl — all those things have a risk of disease spread. Now, the answer to it doesn't have to be we can't do anything about it because human population is expanding. We can expand in a smarter way, in a way that won't leave us wide open like this — and start to do surveillance that really gets to these big issues and target the areas where these diseases are emerging rather than doing this randomly.

So, if you're a government with $2 billion to spend on surveillance, don't spend it all here in the U.S. necessarily. Put some funds into those areas where these diseases originate and try to block them before they emerge. Look at wildlife in those regions - see what pathogens they carry. The idea here is that it's effectively cheaper because you stand a better chance of preventing a disease from going to people and therefore the outbreak is smaller and the cost in terms of human lives and economic costs is a lot less. It's economically a better move. The argument is pretty strong for governments to do this.

M-M: From reading your paper, a person might surmise that you would suggest stopping flights into the United States and Mexico because these countries seem to be the epicenter of the H1N1 virus. Is that correct?

PD: The real problem in this outbreak is that whatever we did when we found out was already too late. I think the real trick is to be massively increasing our surveillance, working with Mexico, working with other countries in hot-spot regions — Brazil, African countries, Asian countries — and saying, 'Let's share technology, let's share resources,' so that they benefit as well, and they see the value of allowing us in. That way, you get the disease much quicker, before it even leaves the country. Then you don't have any of these ethical dilemmas about whether you cancel flights or quarantine people, like China had to do. We need to be targeting our resources in a smarter way. We've been calling this 'smart surveillance.'

M-M: But it seems that by the time they identify a virus, it's too late no matter what.

PD: No. If you get it in the first case, you can control it. If you get it in the first cluster of cases you can control it. If you get it in the first city, you can control it. The problem happens once it's spread out in the travel network.

A good example is we've been working in Bangladesh for the past few years and there's a virus there called Nipah virus, which is very lethal; 70 percent of people who get infected die. It spills over from bats into people every year, and you get small clusters of cases — a dozen cases, a hundred cases. We're really concerned because it's got the ability to move from one person to another, so it has the potential to become a pandemic.

Bangladesh is the densest population on the planet. People are traveling there in increasing numbers every year, so we're there working with teams trying to find ways of stopping the virus spilling over in the first place — testing bats, working out what time of year is the highest-risk time, what activities bring people into contact with bats. To do that costs a few million dollars. If there was an outbreak that spread beyond Bangladesh, first of all, you've got a large number of lives lost. You've also got an outbreak that shuts down travel and industry and will cost tens of billions of dollars. I just think it makes sense on a public health and economic front.

M-M: Is that an example where you've been able to contain a virus?

PD: It's still research right now. There are strategies to stop people from getting infected. There are no drugs, no vaccines. It's a very dangerous pathogen. Right now we're in the early stages of it becoming a pandemic, so we'll hopefully prevent it. And that's where we need to be with all these diseases. We need

to be much smarter in the way we do our research. We need to get out there before they emerge and try to block them — even when they're still in wildlife.

M-M: Could you immunize wildlife?

PD: We're a conservation group, so we're always very nervous about doing things with wildlife. But in some cases we do that. If you look at raccoons, in the U.S. we vaccinate wildlife. We throw out edible bait that only gets into raccoons and stops them from being infected (with rabies). A simpler way is to stop people from getting in contact in wildlife, to educate people who eat wildlife, to talk to people who have pet trade in wildlife and find healthier ways to do captive breeding in a pathogen-free way. There are lots of things you can do. But the bottom line is you're dealing with human behavior, trade, economics, and you have to find a way that people will want to do. And that often involves a way that doesn't lose them money.

M-M: When you're dealing with a developing country, that's a major concern.

PD: It is. That's the other unfortunate thing about this disease. Now, Mexico is a wealthy country; it's doing very well economically. The pig industry is critical to that country's growth, and it's unfortunate when a country loses travel and trade because of this. It's very hard to say to a country, 'developing this agricultural network is going to put you at risk of disease,' so we need to work to find simple and cheap ways to stop that. And surveillance is pretty cost-effective. It just involves testing animals and testing more of them. It adds some extra dollars to the cost of a pig. It's cheaper than an outbreak, that's for sure.

One of the real problems of surveillance is it goes against human nature. Human nature is to respond to an outbreak, to respond to an earthquake, to send all our resources in to help people who are suffering. Political will and human nature say, 'Why would we put a lot of money and energy into prevention that ends up with no result — nothing happens.'

The question is, what can you show people? We're working on ways to do that. We have some economists working with us who are analyzing the wildlife trade and travel — the true cost of these diseases and who should pay for it.

M-M: There's also increasing reports of transference of disease from humans to animals, isn't there?
PD: There's evidence of polio in chimps in Gombe in National Park in Tanzania; there's been influenza from people in gorillas; there's human nematodes in gorillas. It's a consequence of ecotourism. So we do things we think are going to be good. We have ecotourism programs to bring in dollars to help save species and one of the outcomes of that is that diseases from us get into wildlife. And it's very easy to stop — better control of tourists, better sanitation, not letting sick people go near the gorillas, not touching them. There are policies in place to stop that.

And if you think of the big diseases that had the highest impact recently — HIV, Ebola, Lyme disease — they're from wildlife, so there clearly is an issue that wildlife carry these pathogens. Our message here is don't blame wildlife. It's what we do with wildlife. If we leave wildlife alone in protected areas, there should be no problem. Environmental degradation is one of the causes of emerging diseases.

M-M: That sort of transference probably happens more than we know.
PD: I expect it does. With all of these disease issues, there's a lot more going on than we hear about. For instance, we know this virus in Bangladesh ... first emerged in Malaysia in 1998. We work in Malaysia. We heard about unusual things happening in Bangladesh and sure enough, it's in Bangladesh. And then we did some analyses of outbreaks of unknown diseases in India and we tested animals in India and sure enough, the virus is there, too. These diseases are increasing in number year after year, decade after decade — new diseases spilling over into people. Even if you correct for more and more scientists trying to find them, we're still seeing an increase, dramatically.

M-M: Will developing countries likely take the brunt of these outbreaks because of lack of access to flu shots and other medicines?

PD: There was a good bit of research couple years ago that suggested Thailand could be the source of the next avian flu outbreak, and if you had 12 million doses of Tamiflu, you prevent the outbreak from getting out of the country. And sure enough, World Health bought 12 million doses of Tamiflu and donated them to Thailand. So people are trying to work to protect the globe from diseases in emerging countries that can't afford as good a health care. The other message is that the things we do here make us a hot spot, too. High population density, lots of changes to the environment, changes to food production — these are big risk factors for emerging diseases.

M-M: What predictions would you make today?
PD: Globally, we're going to see a lot more of these emerging diseases - more diseases coming from wildlife. They're going to emerge in the tropical regions of the world where all the wildlife are, especially in those countries where there's high wildlife diversity and big populations of people changing the environment. Mexico is one of those countries — a huge human population, lots of diversity, lots of changes to the environment and food production. So (they will emerge in) places where economic change is happening very rapidly — India, for instance, where people are getting wealthier quicker. They're changing their livestock production strategy, and we'll see new diseases emerge through that. I firmly believe we can predict these things, and I firmly believe we can prevent them, too.

http://www.miller-mccune.com/science_environment/man-vs-virus-win-goes-to-swift-1221

Green Planting: Eco-Friendly Burials Catching On

By: Frank Nelson

Is the "death care" industry — in the United States alone an $11 billion-a-year effort supporting more than 20,000 funeral homes and around 105,000 jobs — flirting with death itself?

It's an industry which every year buries millions of tons of valuable resources — wood and metal coffins, and concrete grave liners — along with embalmed bodies containing countless gallons of toxic formaldehyde.
Traditional burials have long been that way, but in today's eco-conscious world, it's a system that leaves the funeral industry seeming to be increasingly out of step, complain those who favor greener, more natural ways of burying people.

That may explain in part the growing popularity of cremation, which the National Funeral Directors Association says is the preferred option of more than one-third of clients in the United States, and one widely quoted study says that number is growing. In England, that figure currently is more than two-thirds.

But cremation, with its discharge of the greenhouse gas carbon dioxide and other airborne pollutants, including a few nasty ones like mercury vapor from teeth fillings, is not especially kind to the environment either.

Instead, more people are turning to natural burials, typically much simpler than traditional ceremonies. Bodies are preserved with refrigeration or dry ice rather than embalming; cotton shrouds and biodegradable coffins replace metal or ornate wooden caskets; and the body is placed in a shallow grave instead of deep inside a concrete vault.

And burials take place not in a traditional cemetery, but in a natural area destined to be protected and preserved for posterity as a woodland or nature reserve.

In the summer 2004 edition of Generations, the journal of the *American Society of Aging*, psychologist, playwright and academic Robert Kastenbaum put an almost rhapsodic spin on green burial in an introductory essay titled, "Why Funerals?" Quoting in turn Abi Holmes, a modern woman who makes willow coffins, he wrote: "(Green) funerals are to be removed from the technological-commercial matrix and put in the service of 'producing wildlife habitats and forests from green burial sites, where native trees, wild flowers and protected animals are encouraged ... meadow brown butterfly colonies, grasshoppers, insects, bats, voles and owls to multiply ... where the mechanical mower does not prey on a regular basis and a self-supporting ecosystem can evolve.'"

Rupert Callender, who owns the Green Funeral Company, in southwest England's Devon, believes natural burials will grow to become the dominant type of burial in the U.K. "within the next 20 to 30 years."

That's a startling claim given Callender's own admission that green burials were considered "a bit faddy" as recently as a decade ago and today still account for perhaps just 2 percent of all U.K. burials.

However, Callender, one of only a handful of green funeral directors in England, says around 250 natural burial sites, averaging three or four acres each, are now operating and "new ones are opening up on a monthly basis.""The U.K. put green burial on the map," said Joe Sehee, who is widely credited with doing the same thing in the U.S. when he founded the Green Burial Council in 2002.

The trend has not escaped the attention of the death care industry, which believes going green could be critical to its own survival. "Green funerals are an emerging alternative to the funeral services we're used to providing," notes the association Web site. And while there are differing points of view over things like the best way to ensure burial sites are permanently preserved and whether to allow the burial of any embalmed bodies, observers see the trend line pointing up.

Sehee, whose Santa Fe-based council is working to produce a set of standards and operating procedures for natural burial sites, believes the movement is gaining momentum "more quickly than any of us anticipated."

By 1998, the first such U.S. site had already opened at Ramsey Creek, S.C. Today, he said, there are about 20 of these areas with another 30 or so in the pipeline and expected to come "online within a year." While the rate of green burials has not been measured, proponents feel the curve will resemble that of cremation, which after a slow start in 1876 has grown dramatically since the "cremation boom" started in 1963.
Mary Woodsen is president of the board of trustees of Greensprings Natural Cemetery Preserve, which opened in 2006 and remains the only natural burial ground in New York state. She links the rise of natural burials to baby boomers, the post-war generation that she says embraced "natural childbirth, home schooling and natural foods."

"We now have cradle-to-grave options for natural living, and we're taking care of the grave end of it," she says. "People want their choices in death to reflect their choices in life."

According to the NFDA, funerals average around $7,000 with perhaps another $3,000 for a plot and cemetery-related costs. Cremation typically costs significantly less, while natural burials tend to be even cheaper: Greensprings charges $750 for a lot, plus $600 for opening and closing the grave. As the economic downturn tightens its grip, Sehee says people feel bad about blowing $4,000 on a box that they are going to use for two days and then bury. However, he senses stronger social and philosophical forces at work than just economics.

"I believe what we're seeing is a paradigm shift in death care. We have been impeding the natural cycle with sealed caskets, burial vaults and bodies full of chemicals. Green burial also invites people to participate in a way conventional burial does not."

Lisa Auble agrees. She's a funeral director in Lansing, close to Greensprings, where she has helped with

about 20 natural burials. "It's how the early burials were," she says. "Very simple, very natural, very moving."

These sea changes in burial practices come at a time when U.S. death rates are steadily climbing — provisional figures from the National Center for Health Statistics shows 2,449,000 deaths for the year ending July 2008. This compares with a provisional figure of 2,415,000 for 2007 and a final tally of 2,426,264 for 2006.
And as natural burial begins to elbow its way into the mainstream, those in the death care business are starting to adopt green practices and work with families wanting an eco-friendly final journey for their loved ones.
"I think they're coming to see this as an extension of their core business and not so much as a threat," Sehee says. "This is not a way to circumvent the death care industry. We want to green up the whole industry. What we don't want is for it to become a marketing gimmick."
Results from two recent surveys — one in 2007 by AARP and one last year by funeral industry publishers Kates-Boylston Publications — suggest only limited awareness of green or natural burials but a willingness to find out more and consider the option.
The Green Burial Council is about raising awareness and giving people choices while addressing the practical issues surrounding natural burial sites. "A lot of dots have to be connected," says Sehee. "Our standards are evolving, and they should be. We don't claim to have all the answers."
Embalming with formaldehyde temporarily preserves and sanitizes a body. However, NFDA spokesman Michael Krill, who owns three funeral homes in Ohio, says it's a family choice, not a legal necessity, and only in rare circumstances is it officially required.
Formaldehyde is potentially dangerous for those handling it and for its effects once in the soil. Dr. Michael J. Thun, vice president emeritus of epidemiology and surveillance research at the American Cancer Society, says these risks have been researched since the 1970s. In a 2006, after reviewing numerous health-related studies, the International Agency for Research on Cancer concluded that formaldehyde is carcinogenic.
However, environmental objections to embalming may be muted by the use of new products such as nontoxic "ecobalming" chemicals being made by The Champion Company, of Springfield, Ohio, using a mix of natural plant extracts.
Other steps are also being taken to green up the death care industry. Mark Allen, executive director of the Casket & Funeral Supply Association of America, says several companies now offer biodegradable caskets. Materials being used here or in the U.K. include cardboard, willow, sea grass, banana leaf and bamboo.
Similarly, the Cremation Association of North America is investigating better filtration systems to reduce emissions while improving fuel and energy consumption, says association board member and environmental adviser, Paul Rahill.
In addition, he says, a flameless bio-cremation process is under commercial development. Alkaline hydrolysis combines caustic soda, water, heat and pressure to dissolve a body, leaving behind a syrupy waste liquid and a similar residue as cremation.
Yet another high-tech solution, from a company in Sweden called Promessa Organic, could eventually replace all current burial and cremation methods by deep-freezing the body and submerging it in liquid nitrogen. Vibration then turns the brittle remains into a fine powder that is dehydrated and any metal residue removed. The remains can then be kept or disposed of like ashes.

As Kastenbaum wrote, "Beneath our whiz-bang, cybernetic, palm-pilot daily whirl we still have much in common with those who confronted death long before history found an enduring voice. Our orientation must somehow take into account both the distinctive characteristics of life in the early twenty-first century and our continuing bonds with all who have experienced the loss of loved ones. ... We can recognize that the funeral process offers an opportunity to reach deep into our understanding and values."

http://www.miller-mccune.com/culture_society/eco-friendly-burials-catching-on-1159

Tumour make-up 'fuels depression'

Scientists have shown there may be biochemical reasons - quite apart from the mental trauma of diagnosis - why cancer patients can become depressed.

A University of Chicago team found tumours produce chemicals which can produce negative mood swings.

They say the findings shed new light on why depression is such a risk for many cancer patients.

The study, carried out on rats, features in Proceedings of the National Academy of Sciences.

" **About one in 10 people with cancer gets clinical depression and the root causes are likely to be complex** "
Dr Alison Ross Cancer Research UK

It has long been known that cancer is associated with depression.

Experts thought this was likely to be either a result of the trauma of diagnosis, or possibly a side effect of chemotherapy treatment.

The Chicago study suggests a third possibility.

The researchers found that substances associated with depression are produced in increased quantities by tumours, and then are transmitted to the brain where they impact on the hippocampus - the area which regulates emotion.

In addition, chemical pathways which normally put a brake on the impact of these depression-causing substances appear to be disrupted when a tumour develops.

The researchers carried out tests on about 100 rats, some of which had cancer, to determine their emotional state.

Lack of motivation

They found animals with tumours were less motivated to try to escape when submitted to a swimming test - a condition similar to depression in humans.

Rats with tumours were also less eager to drink sugar water, a substance that usually attracts the appetites of healthy rats.

Further tests revealed that the rats with tumours had increased levels of cytokines in their blood and in the hippocampus when compared with healthy rats.

Cytokines are produced by the immune system, and an increase in cytokines has been linked to depression.

They also produced lower levels of the stress hormone corticosterone, which helps to regulate the impact of cytokines.

Lead researcher Dr Brian Prendergast said: "Rats are commonly used to test drugs that are being studied for potential human benefits, such as treating depression.

"In this case, examining behavioural responses to tumours in non-human animals is particularly useful because the rats have no awareness of the disease, and thus their behavioural changes were likely the result of purely biological factors."

Cancer Research UK senior science information officer Dr Alison Ross said: "As this study looking at cancer and depression was carried out in rats, we don't know whether the results will hold true in cancer patients.

"About one in 10 people with cancer gets clinical depression and the root causes are likely to be complex, but this study provides an intriguing suggestion that the cancer itself may have a part to play."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8055104.stm

Published: 2009/05/18 23:07:30 GMT

Wolfram 'search engine' goes live

A web tool hailed as a significant rival to search giant Google has gone live to the public.

Wolfram Alpha is called a computation knowledge engine rather than a search engine and wants to change the way people use online data.

It aims to give people direct answers to queries rather than send them to other sites where they may find what they are seeking. The system is the brainchild of British-born physicist Stephen Wolfram.

Wolfram Alpha was unveiled in late April and since then has been publicly demonstrated and some people have had a chance to run queries through it.

Typically the results it returns are annotated pages of data rather than a simple list of other sites that might help resolve a user's query. For example, if asked about the weather in Manchester it would present a graph of average temperatures, rainfall and other salient data.

The computational horsepower behind the main site works out answers to question as they are put by grabbing data from databases and consulting feeds of relevant information.

" **Will it be a Google, changing the way we see the web and the world - or will it be be a Cuil, a much-hyped search engine that sinks without trace after the initial interest?** "
BBC Technology correspondent Rory Cellan-Jones

Wolfram Alpha can be asked known facts, such as the height of mountains, or be asked to generate new information such as up to date figures for a nation's GDP.

It can also handle complicated mathematical queries, plot statistics and produce charts of natural events.

The data it consults is chosen and managed by staff at Wolfram Research who ensure it can be displayed by the system. Behind the scenes Wolfram Alpha has about 10,000 CPUs spread across five data centres that it draws on when generating answers.

During a demonstration at Harvard University's Berkman Center for Internet and Society, Dr Wolfram said: "Our goal is to make expert knowledge accessible to anyone, anywhere, anytime."

Dr Wolfram played down talk that the system would be a Google killer and instead presents it as a way for people to get more out of the information on the web.

The final tuning and testing of the system was webcast live during the weekend before the official launch.

Prior to the start of the webcast and final testing, Theo Grey, co-founder of Wolfram Research, said: "If we do melt down when we go live it will not be for lack of effort, or any sort of naive idea of how many queries we might get. It will be because of overwhelming response."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/technology/8052798.stm

Published: 2009/05/18 09:46:10 GMT

Electricity to power 'smart grid'

Global electricity networks could become smart grids that can help us monitor and control our energy usage, if plans from net firm Cisco take off.

The giant US firm, whose technology helps underpin the net, is building a two-way link into electricity grids.

Smart grids would allow devices to communicate with utility firms to give an accurate view of energy use that could cut CO2 emissions by 211m tonnes.

Cisco believes the market could be worth up to $20bn a year.

The basic premise is to link different parts of the electrical grid - from a single home to the largest of power stations - using a customised network based on internet protocol (IP).

Cisco says the proposal would be a "once in a generation capital investment".

With the rising cost of electrical power and concerns about how that power is generated - especially when it comes to fossil fuels - a number of other firms are also making a bid to modernise the electrical networks.

IBM launched a range of embedded software applications, although these communicate through the regular internet, rather than via the mains; General Electric and a number of new start-up firms are also making bids to capture a slice of the market.

Cisco says its system is different, because it would send the IP data down the power lines themselves, rather than using the internet.

Shocking news

Security is also a factor. In April the Wall Street Journal reported that hackers had penetrated the "US electrical grid and left behind software programs that could be used to disrupt the system".

Speaking to the BBC, Neil Harris - Cisco Europe's head of green IT - said it would be harder for hackers to penetrate the new network.

"It won't make it invulnerable, but as the network is separate from the net it adds a new layer of resilience," he said.

"We expect to see a rise in micro-generation, not just in Europe, but round the world, and the smart grid would be able to handle the bi-directional flow of data and electricity."

However, the existing grid is not exactly empty. Stewart Larque, a spokesman for the UK's National Grid, said it already monitored the main power network. The problem, he said, arose when it came to dealing with individual streets.

"We have a lot of detailed information on what's happening on our network at any given time," he told the BBC.

"We can see everything down to the substations, after that it's down to the distribution companies.

"And there is only so far they can see. Sometimes they won't know that there has been a small power cut until the users phone them to say there is a problem."

Mr Harris says the new system could address that issue.

"One of the aims is more agility in distribution. The packets would carry information on the health of the network - just as they currently do on the internet - and you could use this data to spot operational issues or even a malicious attack," he said.

Cisco says that the network would not just benefit the utility companies.

"Ultimately, this can help users see where their power is being used and from that you can see where it is being wasted and thus save on your electricity bills."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/technology/8056083.stm

Published: 2009/05/18 16:45:33 GMT

Nine games computers are ruining for humanity

- 12:30 18 May 2009 by **Michael Marshall**

Checkers, also known as draughts, is effectively dead as a game, as a computer program can now play it perfectly (Image: DS Effects)

If we ever manage to build a working quantum computer, the first killer app might be online poker. Thanks to the counter-intuitive rules of quantum mechanics, players will be able to use mind-boggling strategies like betting and folding simultaneously (see *Quantum poker: Are the chips down or not?*).

Poker wouldn't be the first game to have been revolutionised by computers. Artificial intelligence researchers have taught computers to play a wide range of strategic games well enough to compete with skilful human players – and in a few cases, they've beaten them convincingly...

Checkers

We first reported on a computer that could play checkers, also known as draughts, way back in 1957, and researchers have continued to improve their computerised adversaries ever since. They may have been more successful than the checkers fans would have liked.

By the 1990s, the world's best checkers-playing computer program was Chinook, developed by computer scientist Jonathan Schaeffer. Initially, Chinook wasn't good enough to take the laurels from human world champion Marion Tinsley, but thanks to continuing improvements it went on to win the world championship in 1994 and was "retired" in 1996 in order to give the humans a chance.

But then Schaeffer delivered a killer blow. In 2007, he proved that the game always ends in a draw if neither player makes a mistake, and released an updated version of Chinook that cannot be beaten. This is one case where the complaint that computers have taken the fun out of the game really might be justified.

Chess

For decades, chess was viewed as a bastion of humans' intellectual supremacy over computers. While you might think that computers would excel at such a highly structured game, it wasn't until 1997 that IBM's computer Deep Blue finally beat world champion Garry Kasparov.

Humans have regained and lost the advantage a number of times in subsequent years. Kasparov managed a draw against Deep Blue's successor, Deep Junior, in 2003, and another world champion, Vladimir Kramnik, held the computer Deep Fritz to a draw in 2002. But, in the last such competition, Kramnik was bested by the computer in 2006, leaving humans firmly in second place.

Go

Computers might be unbeatable at chess and checkers, but they are still a few moves behind humans at another board game reliant on strategy – go. This is partly because at any time go players have far more possible moves than in chess, increasing the computational load on the computer. As a result, winning at go has become a new target for AI researchers.

While a program did manage to beat a professional go player in February 2009, the human was playing with a large handicap, and one expert predicted it would be another 28 years before go programs can play on an even footing with the best human players.

Poker

The big challenge for computerised poker players is deception. Poker relies heavily on bluffing, where players pretend to have a good hand when they really have little or nothing.

That might seem like something computers would struggle with, but in fact a program called Sparbot has harnessed game theory well enough to come out ahead of amateur players. And in July 2008, a program called Polaris beat a team of world-class players in a game of Texas hold 'em, the most popular variant of the game.

Bridge

Computers are still pretty hopeless at bridge. The same factors that make bridge tricky for humans to learn – in particular, the need to decide a whole game strategy before making the first move – have left even the most powerful computers struggling.

But even here, the computers are gaining on us. For instance, in 2005 a program called Jack took on top players in a series of seven games. It lost four and won three.

Tic-Tac-Toe

Otherwise known as noughts and crosses. This is such a simple and logical game that it is perhaps unsurprising that computers can play it perfectly. In fact, these qualities make it an ideal way to test out new types of computer – for example, one that can perform calculations using strands of DNA.

Rock-paper-scissors

The rules of rock-paper-scissors, also known as rochambeau, are almost laughably simple, and it's tempting to think there's no skill involved. But that would be very wrong. In fact, RPS is a mathematically complex game of strategy that reveals both the fickleness and the limitations of the human mind.

Even more surprisingly, humans turn out to be hopeless at RPS compared to computers – because we simply aren't random enough in our choices. Computers, unlike people, don't try to second-guess their opponents or delude themselves that they have spotted patterns where none exist. That's why RPS has also been used to test computers that learn by imitating humans.

Jeopardy!

Contestants on the American quiz show *Jeopardy!* have to answer general knowledge questions – with a twist. They are presented with answers, and must identify a question with that answer. For example, a correct response to "5280" would be "how many feet are there in a mile?"

So *Jeopardy!*, unlike chess or go, requires broad general knowledge and the ability to unpick the intricacies of natural human language.

Nor can the game be readily simplified, so the approach that's worked with other games – building a basic program that can then be made more sophisticated – won't work here. Nonetheless, IBM is rising to the challenge, and is working on a program called Watson that it hopes will prove able to win the game.

Take your pick

Current game-playing programs are only good at one game: Deep Blue may have beaten Garry Kasparov at chess, but it would be utterly flummoxed by snakes and ladders. However the next generation of bots will be general game players (GGPs), which can learn the rules of any game and then figure out how to play it.

That really might mean it's game over for humans.

http://www.newscientist.com/article/dn17145-nine-games-computers-are-ruining-for-humanity.html?full=true&print=true

Arts appear to play role in brain development

Classes can change brain and the way people think

By Liz Bowie | liz.bowie@baltsun.com

May 18, 2009

For years, school systems across the nation dropped the arts to concentrate on getting struggling students to pass tests in reading and math. Yet now, a growing body of brain research suggests that teaching the arts may be good for students across all disciplines.

Scientists are now looking at, for instance, whether students at an arts high school who study music or drawing have brains that allow them to focus more intensely or do better in the classroom.

Washington County schools Superintendent Betty Morgan would have liked to have had some of that basic research in her hands when she began building a coalition for an arts high school in Hagerstown. The business community and school principals worked together, and the school will open this summer, but even at its groundbreaking a man objecting to the money spent on the school held up a sign of protest reading "Big Note$ Wrong Music."

Scientists and educators aware of the gap between basic research and the school systems are beginning to share findings, such as at this month's seminar on the brain and the arts held at Baltimore's American Visionary Art Museum.

The event was sponsored by the new Neuro-Education Initiative at the Johns Hopkins University, a center designed to bridge that gap.

Brain research in the past several years is just beginning to uncover some startling ideas about how students learn. First came the proof, some years ago, that our brains do not lose brain cells as we get older, but are always capable of growing.

Now neuroscientists are investigating how training students in the arts may change the structure of their brains and the way they think. They are asking: Does putting a violin in the hands of an elementary school student help him to do math better? Will learning to dance or paint improve a child's spacial ability or ability to learn to read?

Research in those areas, Harvard professor Jerome Kagan said, is "as deserving of a clinical trial as a drug for cancer that has not yet been shown to be effective."

There aren't many conclusions yet that can be translated into the classroom, but there is an emerging interdisciplinary field between education and neuroscience. Like Hopkins, Harvard also has created a center to study learning and the brain.

Much of the research into the arts has centered on music and the brain. One researcher studying students who go to an arts high school found a correlation between those who were trained in music and their ability to do geometry. Yet another four-year study, being conducted by Ellen Winner of Boston College and Gottfried Schlaug of Harvard, is looking at the effects playing the piano or the violin has on students who are in elementary school.

Winner said she was quite skeptical of claims that schools that had introduced the arts had seen an increase in test scores and a generally better school climate. She had previously looked at those claims and found they couldn't be backed up by research.

However, she is in the midst of a four-year study of elementary students that has shown some effects: One group is learning an instrument and another is not. "It is the first study to demonstrate brain plasticity in young children related to music playing," Schlaug said.

The study Winner is working on has shown that children who receive a small amount of training - as little as half an hour of lessons a week and 10 minutes of practice a day - do have structural changes in their brains that can be measured. And those students, Winner said, were better at tests that required them to use their fingers with dexterity.

About 15 months after the study began, students who played the instrument were not better at math or reading, although the researchers are questioning whether they have assessments that are sensitive enough to measure the changes. They will continue the study for several more years.

Charles Limb, a Johns Hopkins doctor and a jazz musician, studied jazz musicians by using imaging technology to take pictures of their brains as they improvised. He found that they allowed their creativity to flow by shutting down areas that regulated inhibition and self-control. So are the most creative people able to shut down those areas of the brain?

Most of the new research is focusing on the networks of the brain that are involved in specific tasks, said Michael Posner, a researcher at the University of Oregon. Posner has studied the effects of music on attention. What he found, he said, was that in those students who showed motivation and creativity, training in the arts helped develop their attention and their intelligence. The next great focus in this area, he said, is on proving the connection that most scientists believe exists between the study of music and math ability.

The imaging is now so advanced that scientists can already see the difference in the brain networks of those who study a string instrument and those who study the piano intensely.

The brain research, while moving quickly by some measures, is still painfully slow for educators who would like answers today. Morgan, the Washington County schools chief, said some research did help her support the drive to build the Barbara Ingram School for the Arts in Hagerstown.

Mariale Hardiman, the former principal of Roland Park Elementary/Middle School, was once one of those principals who focused a lot of attention on reading and math scores. But she saw what integrating the arts into classrooms could do for students, she said, and she then began her own research into the subject.

She is now the co-director of the Hopkins Neuro-Education Initiative. She said there are a myriad of questions that could be answered in the research that is just starting, but there are two she would like to see approached: Do children who learn academic content through the arts tend to hold onto that knowledge longer? And are schools squeezing creativity out of children by controlling so much of their school day?

Even without research though, Kagan of Harvard said there is ample evidence of the value of an arts education because so many children who aren't good at academics can gain self-confidence through the arts.

"The argument for an arts education is based not on sentimentality but on pragmatism," he said. "If an arts program only helped the 7 million children in the bottom quartile, the dropout rate would drop."

http://www.baltimoresun.com/news/education/bal-md.arts18may18,0,1345340.story

Artificial Skin Manufactured In Fully Automated Process

Skin from a factory -- this has long been the dream of pharmacologists, chemists and doctors. (Credit: Image courtesy of Fraunhofer-Gesellschaft)

ScienceDaily (May 19, 2009) — Skin from a factory – this has long been the dream of pharmacologists, chemists and doctors. Research has an urgent need for large quantities of 'skin models', which can be used to determine if products such as creams and soaps, cleaning agents, medicines and adhesive bandages are compatible with skin, or if they instead will lead to irritation or allergic reactions for the consumer. Such test results are seen as more meaningful than those from animal experiments, and can even make such experiments largely superfluous.

But artificial skin is rare. "The production is complex and involves a great deal of manual work. At this time, even the market's established international companies cannot produce more than 2,000 tiny skinpieces a month. With annual requirements of more than 6.5 million units in the EU area alone, however, the industrial demand far exceeds all currently available production capacities," reports Jörg Saxler. Together with Prof. Heike Mertsching, he is coordinating the "Automated Tissue Engineering on Demand" project within the Fraunhofer-Gesellschaft.

Tissue engineering is still in its infancy. "Until now, the offer was limited predominantly to single-layer skin models that consist of a single cell type," explains Mertsching, who heads the Cell Systems Department at the Fraunhofer Institute for Interfacial Engineering and Biotechnology IGB. "Thanks to developments at our institute, the project team has access to a patent-protected skin model that consists of two layers with different cell types. This gives us an almost perfect copy of human skin, and one that provides more information than any system currently available on the market."

An interdisciplinary team of Fraunhofer researchers is currently developing the first fully automatic production system for two-layer skin models. "Our engineers and biologists are the only ones who have succeeded in fully automating the entire process chain for manufacturing two-layer skin models," explains Saxler, who is from the Fraunhofer Institute for Production Technology IPT where he is responsible for technology management and heads the "Life Science Engineering" business unit. In a

multi-stage process, first small pieces of skin are sterilized. Then they are cut into small pieces, modified with specific enzymes, and isolated into two cell fractions, which are then propagated separately on cell culture surfaces. The next step in the process combines the two cell types into a two-layer model, with collagen added to the cells that are to form the flexible lower layer, or dermis. This gives the tissue natural elasticity. In a humid incubator kept at body temperature, it takes the cell fractions less than three weeks to grow together and form a finished skin model with a diameter of roughly one centimeter. The technique has already proven its use in practice, but until now it has been too expensive and complicated for mass production. Mertsching explains, "The production is associated with a great deal of manual work, and this reduces the method's efficiency."

The project team, in which engineers, scientists and technicians from four Fraunhofer institutes are cooperating, is currently working at full speed to automate the work steps. The researchers at the IGB and the Fraunhofer Institute for Cell Therapy and Immunology IZI are handling the development of the biological fundamentals and validation of the machine and its sub-modules. Experts from the Fraunhofer Institute for Manufacturing and Automation IPA and the Fraunhofer Institute for Production Technology IPT are taking care of prototype development, automation and integration of the machine into a complete functional system. "At the beginning, our greatest challenge was to overcome existing barriers, because each discipline had its own very different approach," Saxler remembers. "Meanwhile, the four institutes are working together very smoothly – everyone knows that progress is impossible without input from the others." After working together for one year, the project team has already initiated eight patent procedures.

At a collective Fraunhofer-Gesellschaft booth at the 2009 BIO in Atlanta, the researchers are presenting a computer model of the overall system, along with the three fundamental sub-modules. The first module prepares the tissue samples and isolates the two cell types; the second proliferates them. The finished skin models are built up and cultivated in the third, and then packed by a robot.

The researchers still have a lot of meticulous work ahead before the machine will be finished. The difference between success and failure often depends on details, such as the quality of the skin pieces, processing times of enzymes, and liquid viscosities. Furthermore, the cell cultures must be monitored throughout the entire manufacturing process in order to provide optimal process control and to allow timely detection of any contamination with fungi or bacteria. The skin factory is expected to be finished in two years. "Our goal is a monthly production of 5,000 skin models with perfect quality, and a unit price under 34 euros. These are levels that are attractive for industry," Saxler continues.

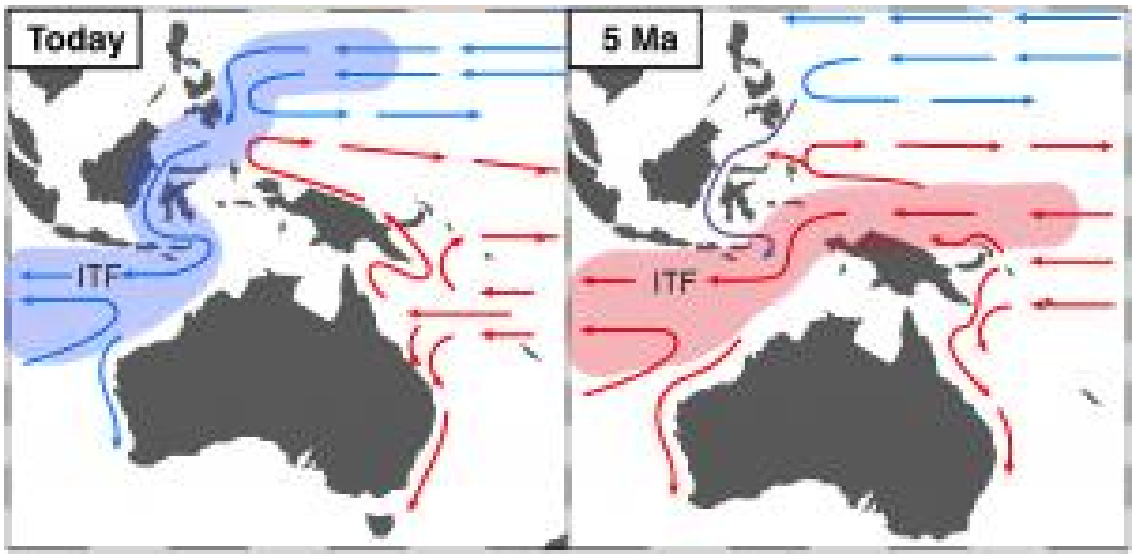
But chemical, cosmetic, pharmaceutical, and medical technology companies who have to test the reaction of skin to their products are not the only ones interested in Automated Tissue Engineering. In transplantation medicine, surgeons require healthy tissue in order to replace destroyed skin sections when burn injuries cover large portions of the body. The two-layer models that the new machine is intended to produce are not yet suitable for this purpose, however. "They don't have a blood supply, and are consequently rejected by the body after some time," Saxler explains.

But IGB researchers are already working on a full-skin model that will even include blood vessels. Once the research has been completed, fully automatic production of the transplants should also be possible. "We have designed the production system in such a way that it satisfies the high standards for good manufacturing practices (GMP) for the manufacture of products used in medicine," Mertsching explains. "And so they are also suitable for producing artificial skin for transplants."

Adapted from materials provided by Fraunhofer-Gesellschaft.

http://www.sciencedaily.com/releases/2009/05/090518102959.htm

From Greenhouse To Ice House: Important Role Of The Indonesian Gateway Suggested



Schematic pattern of sea (sub)surface currents for today and 5 Ma in the Indonesian Throughflow (ITF) area. The 5 Ma scenario is based on general circulation models. Note that the source of water masses entering the Indian Ocean changed considerably. (Credit: Copyright IFM-GEOMAR)

ScienceDaily (May 19, 2009) — One of the mysteries of the Earth's history is the fundamental climate change in the Mid Pliocene, about 3.5-2.5 million years ago. By that time warm climate conditions ended and the ice caps in the northern hemisphere developed. Investigations by marines scientists from Germany and India suggest that changes in the Indonesian throughflow might have been the determining process for this fundamental climate change.

The forcing mechanisms initiating the Mid-Pliocene climate change from a „Greenhouse" to an „Icehouse World" with extended continental ice sheets at high northern latitudes is still controversely debated – although quite sophisticated geochemical methods are at hand to reconstruct Earth´s history. There are notions that the closure of the Panamanian Gateway was pre-conditioning high northern latitude glaciation. Now, a group of marine scientists from Germany and India under the leadership of the Leibniz Institute of Marine Sciences (IFM-GEOMAR), Kiel, found compelling evidence that between 3.5-2.5 million years the watermass throughflow of the Indonesian Gateway changed at the subsurface level from warm and saline South Pacific watermasses towards cool and fresh ones originating from the North Pacific – with dramatic climatic effects.

Their findings are supported by model results suggesting that the continuous plate tectonic narrowing of the Indonesian Seaway might have had an ever-lasting impact on global climate change. The importance of the Indonesian Gateway is apparent as it is at a key location of the global thermohaline circulation, linking two major ocean basins and transferring huge amounts of heat from the Pacific into the Indian Ocean.

Indeed, the Mid-Pliocene change in the Indonesian throughflow induced not only a dramatic cooling of ca. 4°C in the tropical Indian Ocean subsurface level (ca. 300-400m), but also contributed to a significant ocean surface cooling in various upwelling regions worldwide, said Cyrus Karas, first author of the study.

The dramatic subsurface cooling signal was most likely transported westward into the Indian Ocean and further towards the South Atlantic via the Agulhas Current. Upwelling processes off South West Africa and off Somalia, might have brought the cold signal to the surface. Colder sea surface temperatures in the West Indian Ocean might have led to less evaporation, dryer conditions in East Africa and in consequence, to a change in hominid evolution.

Even the equatorial East Pacific, where today cold upwelling appears, might have been affected through the constriction of the Indonesian Gateway. With the change in Indonesian subsurface throughflow, the authors suspect that an increasing portion of cold Subantarctic Mode Water was transported via „ocean tunnels“ northward and contributed to the Equatorial Undercurrent. This subsurface current might have transported the cold water signal all the way from the West to the East Pacific not only amplifying the cold upwelling there, but also terminating the permanent El Niño-like state of the Pliocene world.

Journal reference:

1. Karas et al. **Mid-Pliocene climate change amplified by a switch in Indonesian subsurface throughflow**. *Nature Geoscience*, May 18, 2009; DOI: 10.1038/ngeo520

Adapted from materials provided by Leibniz Institute of Marine Sciences (IFM-GEOMAR).
http://www.sciencedaily.com/releases/2009/05/090518102954.htm

Infection Control 'Urgently Needed' To Curb Spread Of XDR-TB Among Health Care Workers

ScienceDaily (May 19, 2009) — Healthcare workers in South Africa are at a significantly increased risk of developing drug-resistant tuberculosis, or XDR-TB, in a trend which threatens to further exacerbate the already beleaguered healthcare systems in sub-Saharan countries, according to results of a new study. Researchers say the results underscore the urgent need for stringent TB screening policies among healthcare workers in these areas.

Keertan Dheda, M.D., Ph.D., Associate Professor of Medicine at the University of Cape Town in South Africa, and collaborators, Julie Jarand, M.D. from University of Calgary and Max O'Donnell, M.D. from the Boston University, will present their findings at the 105th American Thoracic Society International Conference in San Diego on May 17.

XDR-TB is a potentially untreatable strain of tuberculosis that is resistant to all major primary and secondary anti-tuberculosis drugs. This retrospective study is the first to focus on healthcare workers who have contracted XDR-TB in a non-outbreak setting, said Dr. Dheda.

"The purpose of this study was to describe a series of healthcare workers in South Africa with extensively drug-resistant tuberculosis and to determine whether XDR-TB was prevalent among them," Dr. Dheda noted.

The study was based on a chart review of 270 patients in South Africa with passively detected XDR-TB, including 11 healthcare workers. Of those 11, eight were working in district hospitals, 10 had been treated for TB at least once previously and eight were negative for HIV. At the time these workers were diagnosed with XDR-TB, there were no standard infection control measures in place at the facilities where they were employed. In separate presentations Dr. O'Donnell and Dr. Dheda will present their findings from Kwa-Zulu Natal and four treatment centers in South Africa, respectively.

Dr. Dheda noted that although tuberculosis is a well-recognized occupational risk for healthcare workers in both low- and high-income countries, the prevalence and natural history of XDR-TB in these workers is unknown.

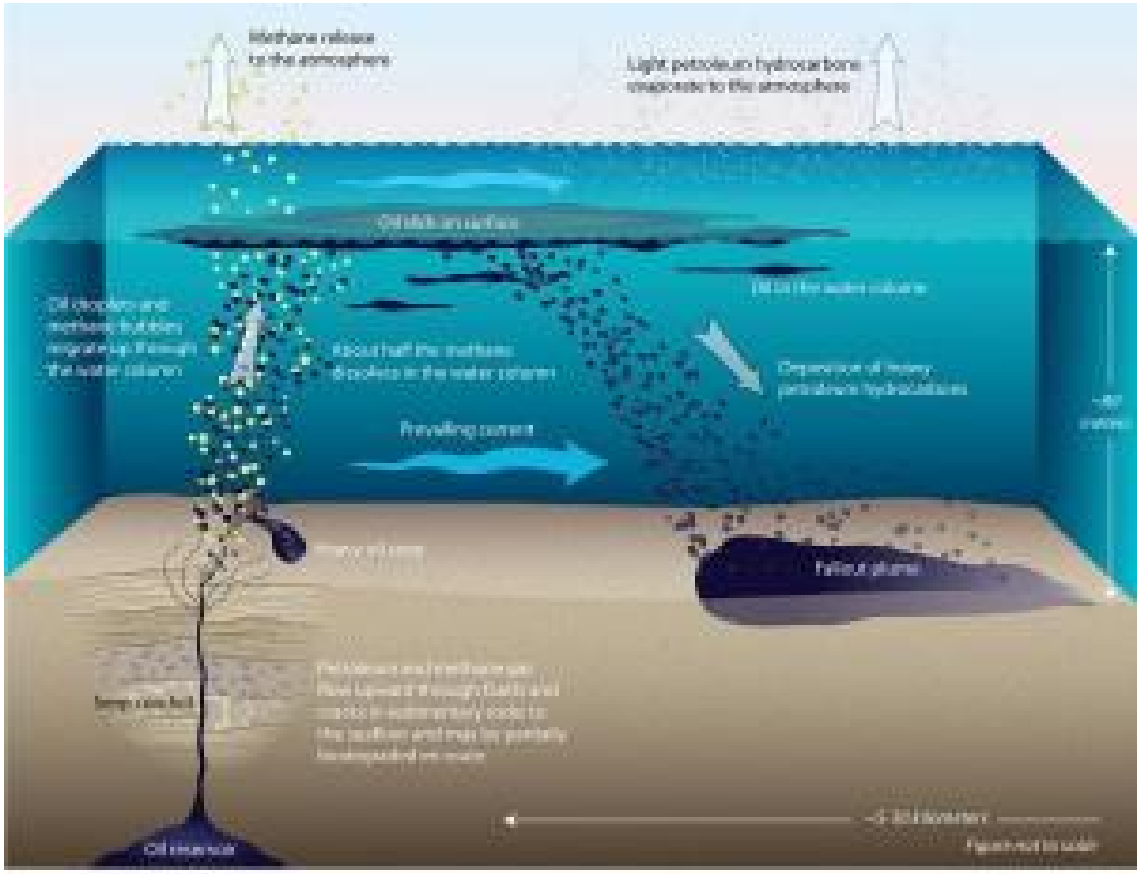
"The emergence and progression of XDR-TB is threatening to destabilize global tuberculosis control," he said. "The negative impact of XDR-TB is further exacerbated by a global shortage of healthcare workers, a shortage which has reached crisis levels in most of sub-Saharan Africa."

"XDR-TB is an important risk for healthcare workers globally, particularly for those who work or travel to high-burden areas, regardless of HIV status," Dr. Dheda added. "Implementation of infection control measures and rapid diagnostic testing for all healthcare workers suspected of TB needs to be undertaken urgently to minimize the risk of drug-resistant TB."

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

http://www.sciencedaily.com/releases/2009/05/090517164913.htm

Natural Petroleum Seeps Release Equivalent Of Up To 80 Exxon Valdez Oil Spills



A graphic depicts what happens to the oil, from seep to the fallout plume. (Credit: John E. Cook, Woods Hole Oceanographic Institution)

ScienceDaily (May 18, 2009) — Twenty years ago, the oil tanker Exxon Valdez was exiting Alaska's Prince William Sound when it struck a reef in the middle of the night. What happened next is considered one of the nation's worst environmental disasters: 10.8 million gallons of crude oil spilled into the pristine Alaskan waters, eventually covering 11,000 square miles of ocean.

Now, imagine 8 to 80 times the amount of oil spilled in the Exxon Valdez accident.

According to new research by scientists from UC Santa Barbara and the Woods Hole Oceanographic Institution (WHOI), that's how much oil has made its way into sediments offshore from petroleum seeps near Coal Oil Point in the Santa Barbara Channel. Their research, reported in an article being published in the May 15 issue of *Environmental Science & Technology*, documents how the oil is released by the seeps, carried to the surface along a meandering plume, and then deposited on the ocean floor in sediments that stretch for miles northwest of Coal Oil Point.

In addition, the research reveals that the oil is so degraded by the time it gets buried in the sea bed that it's a mere shell of the petroleum that initially bubbles up from the seeps. "These were spectacular findings," said Christopher Reddy, a marine chemist at WHOI and one of the co-authors of the new paper.

Other co-authors include UCSB's David Valentine, associate professor of earth science; and Libe Washburn, professor of geography; and Emily Peacock and Robert K. Nelson, both of WHOI.

The lead author is Christopher Farwell, who at the time of the research was an undergraduate studying chemistry at UCSB. Inspired by this project, Farwell has changed his career path and is now a graduate student at UCSB studying marine science and earth science.

In an earlier paper published in 2008, Valentine and Reddy documented how microbes devour many of the compounds in the oil emanating from the seeps. The new study examines the final step in the life cycle of the oil.

"One of the natural questions is: What happens to all of this oil?" Valentine said. "So much oil seeps up and floats on the sea surface. It's something we've long wondered. We know some of it will come ashore as tar balls, but it doesn't stick around. And then there are the massive slicks. You can see them, sometimes extending 20 miles from the seeps. But what is really the ultimate fate?"

Based on their previous research, Valentine and Reddy surmised that the oil was sinking "because this oil is heavy to begin with," Valentine said. "It's a good bet that it ends up in the sediments because it's not ending up on land. It's not dissolving in ocean water, so it's almost certain that it is ending up in the sediments."

An all-night sampling marathon on the research ship R/V Atlantis, funded by the National Science Foundation, provided the means to test that hypothesis. With Farwell and Reddy leading the way, the team used what Reddy called an "old school" sampling device to take 16 sediment samples from the ocean floor, following a carefully calculated path mapped out by Farwell. The researchers were hoping that their route, described by Farwell as a "rectangle along the coast from Santa Barbara to Point Conception," would match the trail of the plume. Farwell's calculations were perfect, Valentine said. The 16-point route yielded an unmistakable pattern of oil-saturated sediment all along the ship's path.

The scientists then painstakingly analyzed the samples using Reddy's comprehensive two-dimensional gas chromatograph (GCxGC). "What we saw is that we can link the seep oils to the oils in the sediment," Valentine said. "We can do that through the composition of select molecules that are specific to the oils from the seeps. So, being able to link them, and being able to quantify how much is there, we can see the pattern of the oil. It's coming from the seeps."

Washburn, who has been using radio waves to map ocean currents off Santa Barbara for a number of years, provided additional evidence. "Libe took a seven-year average of surface current flow in the region, and plotted that out," Valentine said. "It matched perfectly with our plume."

This research proved to be an extension of the 2008 study by Valentine and Reddy: that the oil has indeed degraded, largely eaten away by microbes, before it settles back to the ocean floor and becomes buried.

"For all of these samples, the bacteria seem to hit a common wall, where they don't eat anymore," Valentine said. "In the previous study, we were looking at subsurface biodegradation where there is no oxygen. Now, you still have thousands of compounds in that oil, but now we're seeing all of the evaporation and dissolution that happens to the slick, and then the biodegradation happens in the slick with oxygen present, and then when it falls to the sea floor, it continues to be biodegraded. All the oil seems to be biodegraded to the same point and then it just stops."

"It's dramatic how much the oil loses in this life cycle," Reddy said. "It's almost like someone who has lost 400 pounds."

It's the amount of residual oil that made it to the ocean floor that surprised all of the researchers. "Based on what we found in the sample cores at our sites, we calculated the amount of hydrocarbon in the whole area," Valentine said. "We have to make assumptions about how deep the sediment is, so we assume a range of between 50 centimeters and 5 meters. We come out with 8 to 80 Exxon Valdezes worth of oil, just in this area."

"When we got reviews for the paper, one reviewer said it should actually be more, because of how much has been degraded out," Farwell said. "The amount that actually seeped out is more like 11 to 110 Exxon Valdezes, just in this area."

Washburn thinks that this research will resonate among scientists who have studied oil. "I think it's giving us a lot of insight into the fate of oil and hydrocarbons in the ocean," the UCSB oceanographer said. "There may also be some applications for oil spills."

Journal reference:

1. Christopher Farwell, Christopher M. Reddy, Emily Peacock, Robert K. Nelson, Libe Washburn, David L. Valentine. **Weathering and the Fallout Plume of Heavy Oil from Strong Petroleum Seeps Near Coal Oil Point, CA**. *Environmental Science & Technology*, 2009; 43 (10): 3542 DOI: 10.1021/es802586g

Adapted from materials provided by University of California - Santa Barbara.
http://www.sciencedaily.com/releases/2009/05/090513130944.htm

Will designer brains divide humanity?

13 May 2009 by **Andy Coghlan**

Would tweaking human brains widen the gulf between the world's haves and have-nots? (Image: Norbert Millauer/AFP/Getty)

WE ARE on the brink of technological breakthroughs that could augment our mental powers beyond recognition. It will soon be possible to boost human brainpower with electronic "plug-ins" or even by genetic enhancement. What will this mean for the future of humanity?

This was the theme of a recent Neuroscience in Context meeting in Berlin, Germany, where anthropologists, technologists, neurologists, archaeologists and philosophers met to consider the implications of this next stage of human brain development. Would it widen the gulf between the world's haves and have-nots - and perhaps even lead to a distinct and dominant species with unmatchable powers of intellect?

One view is that this is merely the next phase in a process that has been taking place throughout human history. Humans have always played an active role in improving their own brainpower, says Lambros Malafouris of the McDonald Institute for Archaeological Research in Cambridge, UK, who was one of the organisers of the Berlin meeting. It began with inherited gene mutations that gave us uniquely "plastic" brains, capable of changing physically to meet hitherto unassailable intellectual and practical challenges.

More recent changes have been moulded through our interactions with the physical environment, and by the socially created "memes" passed down through culture. Milestones in human brain improvements over the past 2 million years have included the invention of gestures and language to describe our thoughts to others, as well as the written word and our ability to commit everything to permanent records.

These all act as extensions of our own brains, forming what Malafouris describes as a "metaplastic" system - a feedback loop between our brain's own neurology and the cultural and material demands on it. "Part of the reason *Homo* became *sapiens* lies in its unique ability to alter, modify and change what for other species remained fixed and stable," he says.

The evidence for this plasticity continues to grow. Andreas Roepstorff of Aarhus University in Denmark presented brain scans at the Berlin meeting showing that in people who meditate, the areas of the brain that control breathing are larger than the corresponding areas in people who do not (*NeuroReport*, DOI: 10.1097/wnr.0b013e328320012a).

Today, our minds are even more fluid and open to enhancement due to what Merlin Donald of Queens University in Kingston, Ontario, Canada, calls "superplasticity", the ability of each mind to plug into the minds and experiences of countless others through culture or technology. "I'm not saying it's a 'group mind', as each mind is sealed," he says. "But cognition can be distributed, embedded in a huge cultural system, and technology has produced a huge multiplier effect." In other words, humans already have minds evolving beyond anything seen before in history.

Humans already have minds evolving beyond anything seen before in history
The next stage of brainpower enhancement could be technological - through genetic engineering or brain prostheses. Because the gene variants pivotal to intellectual brilliance have yet to be discovered, boosting brainpower by altering genes may still be some way off, or even impossible. Prostheses are much closer, especially as the technology for wiring brains into computers is already being tested (see "Dawn of the cyborgs"). Indeed, futurist and inventor Ray Kurzweil believes the time when humans merge with machines will arrive as early as 2045 (*New Scientist*, 9 May, p 26).

It won't be long before "clip-on" computer aids become available for everybody, says Andy Clark, a pro-enhancement philosopher at the University of Edinburgh in the UK. These could be anything from memory aids to the ability to "search" for information stored in your brain. "We'll get a flowering of brain augmentations, some seeping through from the disabled community," he says. "I see them becoming fashion items, a bit like choosing clothing." Clark says that even today, devices such as head-up displays on spectacles or simply being adept at using computer programs like Photoshop come close to being physical extensions of people's minds.

Malafouris also believes such augmentation is the next logical stage in human development. "If we accept that tool use was part of the reason we came to develop language, then why should we perceive neuro-engineering as a threat rather than as the new stone industry of the 21st century?"

Not everyone thinks this is a good idea, however. Dieter Birnbacher, a philosopher at the University of Düsseldorf in Germany, says there are risks in technological self-improvement that could jeopardise human dignity. One potential problem arises from altering what we consider to be "normal": the dangers are similar to the social pressure to conform to idealised forms of beauty, physique or sporting ability that we see today.

People without enhancement could come to see themselves as failures, have lower self-esteem or even be discriminated against by those whose brains have been enhanced, Birnbacher says. He stops short of saying that enhancement could "split" the human race, pointing out that society already tolerates huge inequity in access to existing enhancement tools such as books and education.

The perception that some people are giving themselves an unfair advantage over everyone else by "enhancing" their brains would be socially divisive, says John Dupré at the University of Exeter, UK. "Anyone can read to their kids or play them music, but put a piece of software in their heads, and that's seen as unfair," he says. As Dupré sees it, the possibility of two completely different human species eventually developing is "a legitimate worry".

Can these potential pitfalls be avoided? The guiding principle, perhaps, could be to make sure the technology is cheap enough to be open to all, much as books, computers and cellphones are today, at least in richer countries. "If this stuff can be produced cheaply and resonates with what people want to do anyway, it could take off," says Chris Gosden, an archaeologist at the University of Oxford.

There are, however, simple alternatives to technological enhancement that would achieve many of the same goals, says Dupré: education and child-rearing. Moreover, he thinks such changes can be heritable via epigenetics - the reprogramming of gene expression in offspring by exposure to cultural, maternal and environmental influences. Dupré points to a study in rats showing that good maternal care was passed on largely because it permanently altered gene activity in the brains of the pups.

The upshot is that drastic changes are not the only way for our brain to evolve. "There will be a lot of evolution, but it won't be classic neo-Darwinist changes in the genome," says Dupré. "It will be changes in the environment, in technology and in the availability of good education." We should not tweak our genes, he adds. "I don't think souping up people's genomes is the way to go."

Whether we choose implants or not, our minds are destined to carry on evolving. "Given the right environment, most humans have an amazing potential to develop exciting mental capabilities," says Dupré.

Whether we choose implants or not, our minds are destined to carry on evolving
Gosden agrees. "We're part of one long experiment and have no idea of the outcome, and being a Luddite is as much a leap into the unknown as adopting new technology," he says. "There's such a huge input from the material world that we're only partly in control of what happens."

Dawn of the cyborgs

Brain implants are already on their way. Four severely disabled people have already been fitted with hardware enabling them to interface with computers. Pioneered by neuroscientist John Donoghue at Brown University in Providence, Rhode Island, the BrainGate technology allows paralysed people to move a cursor on a computer screen, open emails, and operate lights or the TV.

Some researchers have gone even further. Andrew Schwartz and colleagues at the University of Pittsburgh in Pennsylvania have inserted computer chips into macaque brains that enable them to guide a prosthetic arm to feed themselves.

Schwartz and other researchers are also contemplating implants that allow people to "speak" through computer systems, possibly by using wireless communication.

The US military is getting involved, with the Defense Advanced Research Projects Agency developing a prosthetic arm controlled by the brain through its "revolutionising prosthetics" programme, backed by $50 million over six years.

http://www.newscientist.com/article/mg20227083.700-will-designer-brains-divide-humanity.html?full=true

In Defense of Distraction

Twitter, Adderall, lifehacking, mindful jogging, power browsing, Obama's BlackBerry, and the benefits of overstimulation.

By Sam Anderson

- Published May 17, 2009

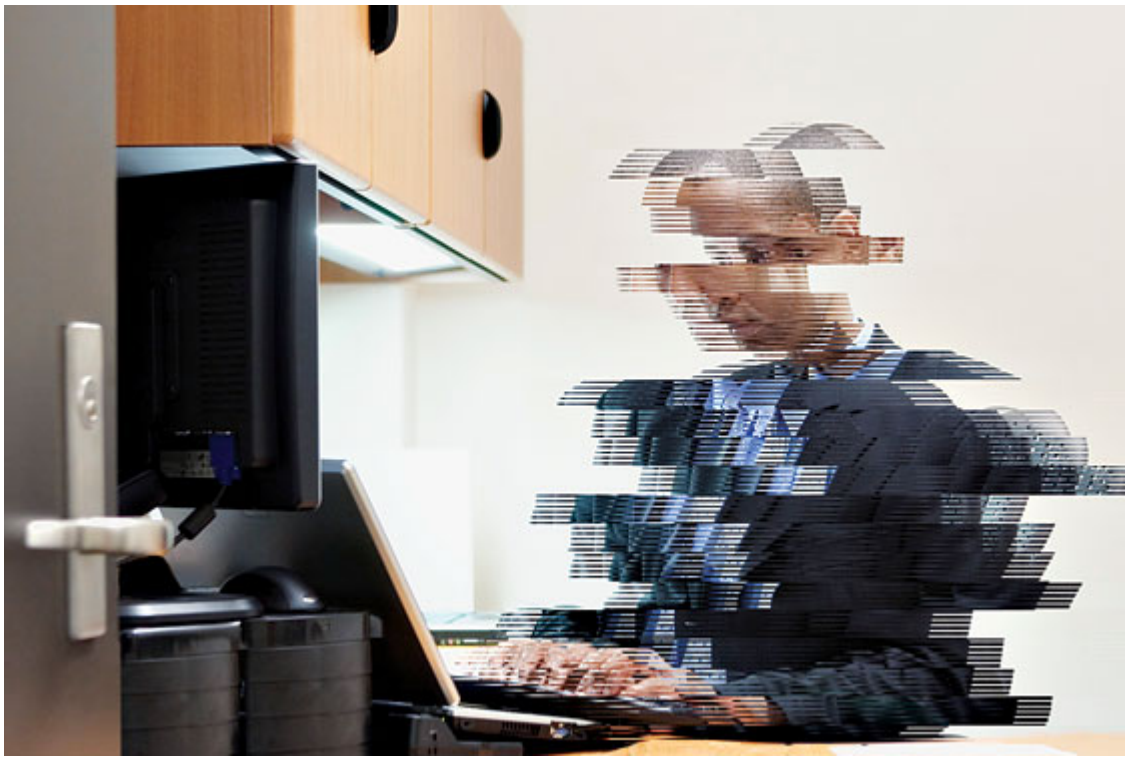


Illustration by Glen Cummings/MTWTF
Corbis)

I. The Poverty of Attention

I'm going to pause here, right at the beginning of my riveting article about attention, and ask you to please get all of your precious 21st-century distractions out of your system now. Check the score of the Mets game; text your sister that pun you just thought of about her roommate's new pet lizard ("iguana hold yr hand LOL get it like Beatles"); refresh your work e-mail, your home e-mail, your school e-mail; upload pictures of yourself reading this paragraph to your "me reading magazine articles" Flickr photostream; and alert the fellow citizens of whatever Twittertopia you happen to frequent that you will be suspending your digital presence for the next twenty minutes or so (I know that seems drastic: Tell them you're having an appendectomy or something and are about to lose consciousness). Good. Now: Count your breaths. Close your eyes. Do whatever it takes to get all of your neurons lined up in one direction. Above all, resist the urge to fixate on the picture, right over there, of that weird scrambled guy typing. Do not speculate on his ethnicity (German-Venezuelan?) or his backstory (Witness Protection Program?) or the size of his monitor. Go ahead and cover him with your hand if you need to. There. Doesn't that feel better? Now it's just you and me, tucked like fourteenth-century Zen masters into this sweet little nook of pure mental focus. (Seriously, stop looking at him. I'm over here.)

Over the last several years, the problem of attention has migrated right into the center of our cultural attention. We hunt it in neurology labs, lament its decline on op-ed pages, fetishize it in grassroots quality-of-life movements, diagnose its absence in more and more of our children every year, cultivate it in yoga class twice a week, harness it as the engine of self-help empires, and pump it up to superhuman levels with drugs originally intended to treat Alzheimer's and narcolepsy. Everyone still pays some form of attention all the time, of course—it's basically impossible for humans not to—but the currency in which we pay it, and the goods we get in exchange, have changed dramatically.

Back in 1971, when the web was still twenty years off and the smallest computers were the size of delivery vans, before the founders of Google had even managed to get themselves born, the polymath economist Herbert A. Simon wrote maybe the most concise possible description of our modern struggle: "What information consumes is rather obvious: It consumes the attention of its recipients. Hence a wealth of information creates a poverty of attention, and a need to allocate that attention efficiently among the overabundance of information sources that might consume it." As beneficiaries of the greatest information boom in the history of the world, we are suffering, by Simon's logic, a correspondingly serious poverty of attention.

If the pundits clogging my RSS reader can be trusted (the ones I check up on occasionally when I don't have any new e-mail), our attention crisis is already chewing its hyperactive way through the very foundations of Western civilization. Google is making us stupid, multitasking is draining our souls, and the "dumbest generation" is leading us into a "dark age" of bookless "power browsing." Adopting the Internet as the hub of our work, play, and commerce has been the intellectual equivalent of adopting corn syrup as the center of our national diet, and we've all become mentally obese. Formerly well-rounded adults are forced to MacGyver worldviews out of telegraphic blog posts, bits of YouTube videos, and the first nine words of *Times* editorials. Schoolkids spread their attention across 30 different programs at once and interact with each other mainly as sweatless avatars. (One recent study found that American teenagers spend an average of 6.5 hours a day focused on the electronic world, which strikes me as a little low; in South Korea, the most wired nation on earth, young adults have actually died from exhaustion after multiday online-gaming marathons.) We are, in short, terminally distracted. And *distracted,* the alarmists will remind you, was once a synonym for *insane.* (Shakespeare: "poverty hath distracted her.")

This doomsaying strikes me as silly for two reasons. First, conservative social critics have been blowing the apocalyptic bugle at every large-scale tech-driven social change since Socrates' famous complaint about the memory-destroying properties of that newfangled technology called "writing." (A complaint we remember, not incidentally, because it was written down.) And, more practically, the virtual horse has already left the digital barn. It's too late to just retreat to a quieter time. Our jobs depend on connectivity. Our pleasure-cycles—no trivial matter—are increasingly tied to it. Information rains down faster and thicker every day, and there are plenty of non-moronic reasons for it to do so. The question, now, is how successfully we can adapt.

Next: The complex process of attention.

Although attention is often described as an organ system, it's not the sort of thing you can pull out and study like a spleen. It's a complex process that shows up all over the brain, mingling inextricably with other quasi-mystical processes like emotion, memory, identity, will, motivation, and mood. Psychologists have always had to track attention secondhand. Before the sixties, they measured it through easy-to-monitor senses like vision and hearing (if you listen to one voice in your right ear and another in your left, how much information can you absorb from either side?), then eventually graduated to PET scans and EEGs and electrodes and monkey brains. Only in the last ten years—thanks to neuroscientists and their functional MRIs—have we been able to watch the attending human brain in action, with its coordinated storms of neural firing, rapid blood surges, and oxygen flows. This has yielded all kinds of fascinating insights—for instance, that when forced to multitask, the overloaded brain shifts its processing from the hippocampus (responsible for memory) to the striatum (responsible for rote tasks), making it hard to learn a task or even recall what you've been doing once you're done.

When I reach David Meyer, one of the world's reigning experts on multitasking, he is feeling alert against all reasonable odds. He has just returned from India, where he was discussing the nature of attention at a conference with the Dalai Lama (Meyer gave a keynote speech arguing that Buddhist monks multitask during meditation), and his trip home was hellish: a canceled flight, an overnight taxi on roads so rough it took thirteen hours to go 200 miles. This is his first full day back in his office at the University of Michigan, where he directs the Brain, Cognition, and Action Laboratory—a basement space in which finger-tapping, card-memorizing, tone-identifying subjects help Meyer pinpoint exactly how much information the human brain can handle at once. He's been up since 3 a.m. and has by now goosed his attention several times with liquid stimulants: a couple of cups of coffee, some tea. "It does wonders," he says.

My interaction with Meyer takes place entirely via the technology of distraction. We scheduled and rescheduled our appointment, several times, by e-mail. His voice is now projecting, tinnily, out of my cell phone's speaker and into the microphone of my digital recorder, from which I will download it, as soon as we're done, onto my laptop, which I currently have open on my desk in front of me, with several windows spread across the screen, each bearing nested tabs, on one of which I've been reading, before Meyer even had a chance to tell me about it, a blog all about his conference with the Dalai Lama, complete with RSS feed and audio commentary and embedded YouTube videos and pictures of His Holiness. As Meyer and I talk, the universe tests us with a small battery of distractions. A maximum-volume fleet of emergency vehicles passes just outside my window; my phone chirps to tell us that my mother is calling on the other line, then beeps again to let us know she's left a message. There is, occasionally, a slight delay in the connection. Meyer ignores it all, speaking deliberately and at length, managing to coordinate tricky subject-verb agreements over the course of multi-clause sentences. I begin, a little sheepishly, with a question that strikes me as sensationalistic, nonscientific, and probably unanswerable by someone who's been professionally trained in the discipline of cautious objectivity: Are we living through a crisis of attention?

Before I even have a chance to apologize, Meyer responds with the air of an Old Testament prophet. "Yes," he says. "And I think it's going to get a lot worse than people expect." He sees our distraction as a full-blown epidemic—a cognitive plague that has the potential to wipe out an entire generation of focused and productive thought. He compares it, in fact, to smoking. "People aren't aware what's happening to their mental processes," he says, "in the same way that people years ago couldn't look into their lungs and see the residual deposits."

I ask him if, as the world's foremost expert on multitasking and distraction, he has found his own life negatively affected by the new world order of multitasking and distraction.

"Yep," he says immediately, then adds, with admirable (although slightly hurtful) bluntness: "I get calls all the time from people like you. Because of the way the Internet works, once you become visible, you're approached from left and right by people wanting to have interactions in ways that are extremely time-consuming. I could spend my whole day, my whole night, just answering e-mails. I just can't deal with it all. None of this happened even ten years ago. It was a lot calmer. There was a lot of opportunity for getting steady work done."

Next: Is multitasking a myth?

Over the last twenty years, Meyer and a host of other researchers have proved again and again that multitasking, at least as our culture has come to know and love and institutionalize it, is a myth. When you think you're doing two things at once, you're almost always just switching rapidly between them, leaking a little mental efficiency with every switch. Meyer says that this is because, to put it simply, the brain processes different kinds of information on a variety of separate "channels"—a language channel, a visual channel, an auditory channel, and so on—each of which can process only one stream of information at a time. If you overburden a channel, the brain becomes inefficient and mistake-prone. The classic example is driving while talking on a cell phone, two tasks that conflict across a range of obvious channels: Steering and dialing are both manual tasks, looking out the windshield and reading a phone

screen are both visual, etc. Even talking on a hands-free phone can be dangerous, Meyer says. If the person on the other end of the phone is describing a visual scene—say, the layout of a room full of furniture—that conversation can actually occupy your visual channel enough to impair your ability to see what's around you on the road.

The only time multitasking does work efficiently, Meyer says, is when multiple simple tasks operate on entirely separate channels—for example, folding laundry (a visual-manual task) while listening to a stock report (a verbal task). But real-world scenarios that fit those specifications are very rare.

This is troubling news, obviously, for a culture of BlackBerrys and news crawls and Firefox tabs—tools that, critics argue, force us all into a kind of elective ADHD. The tech theorist Linda Stone famously coined the phrase "continuous partial attention" to describe our newly frazzled state of mind. American office workers don't stick with any single task for more than a few minutes at a time; if left uninterrupted, they will most likely interrupt themselves. Since every interruption costs around 25 minutes of productivity, we spend nearly a third of our day recovering from them. We keep an average of eight windows open on our computer screens at one time and skip between them every twenty seconds. When we read online, we hardly even read at all—our eyes run down the page in an *F* pattern, scanning for keywords. When you add up all the leaks from these constant little switches, soon you're hemorrhaging a dangerous amount of mental power. People who frequently check their e-mail have tested as less intelligent than people who are actually high on marijuana. Meyer guesses that the damage will take decades to understand, let alone fix. If Einstein were alive today, he says, he'd probably be forced to multitask so relentlessly in the Swiss patent office that he'd never get a chance to work out the theory of relativity.

II. The War on the Poverty of Attention

For Winifred Gallagher, the author of ***Rapt,*** a new book about the power of attention, it all comes down to the problem of jackhammers. A few minutes before I called, she tells me, a construction crew started jackhammering outside her apartment window. The noise immediately captured what's called her bottom-up attention—the broad involuntary awareness that roams the world constantly looking for danger and rewards: shiny objects, sudden movements, pungent smells. Instead of letting this distract her, however, she made a conscious choice to go into the next room and summon her top-down attention—the narrow, voluntary focus that allows us to isolate and enhance some little slice of the world while ruthlessly suppressing everything else.

This attentional self-control, which psychologists call executive function, is at the very center of our struggle with attention. It's what allows us to invest our focus wisely or poorly. Some of us, of course, have an easier time with it than others.

Gallagher admits that she's been blessed with a naturally strong executive function. "It sounds funny," she tells me, "but I've always thought of paying attention as a kind of sexy, visceral activity. Even as a kid, I enjoyed focusing. I could feel it in almost a mentally muscular way. I took a lot of pleasure in concentrating on things. I'm the sort of irritating person who can sit down to work at nine o'clock and look up at two o'clock and say, 'Oh, I thought it was around 10:30.' "

Gallagher became obsessed with the problem of attention five years ago, when she was diagnosed with advanced and aggressive breast cancer. She was devastated, naturally, but then realized, on her way out of the hospital, that even the cancer could be seen largely as a problem of focus—a terrifying, deadly, internal jackhammer. It made her realize, she says, that attention was "not just a latent ability, it was something you could marshal and use as a tool." By the time she reached her subway station, Gallagher had come up with a strategy: She would make all the big pressing cancer-related decisions as quickly as possible, then, in order to maximize whatever time she had left, consciously shift her attention to more positive, productive things.

Next: The most promising (and ancient) solution to our attention problem.

One of the projects Gallagher worked on during her recovery (she is now cancer free) was *Rapt,* which is both a survey of recent attention research and a testimonial to the power of top-down focus. The ability to positively wield your attention comes off, in the book, as something of a panacea; Gallagher describes it as "the sine qua non of the quality of life and the key to improving virtually every aspect of your experience." It is, in other words, the Holy Grail of self-help: the key to relationships and parenting and mood disorders and weight problems. (You can apparently lose seven pounds in a year through the sheer force of paying attention to your food.)

"You can't be happy all the time," Gallagher tells me, "but you can pretty much focus all the time. That's about as good as it gets."

The most promising solution to our attention problem, in Gallagher's mind, is also the most ancient: meditation. Neuroscientists have become obsessed, in recent years, with Buddhists, whose attentional discipline can apparently confer all kinds of benefits even on non-Buddhists. (Some psychologists predict that, in the same way we go out for a jog now, in the future we'll all do daily 20-to-30-minute "secular attentional workouts.") Meditation can make your attention less "sticky," able to notice images flashing by in such quick succession that regular brains would miss them. It has also been shown to elevate your mood, which can then recursively stoke your attention: Research shows that positive emotions cause your visual field to expand. The brains of Buddhist monks asked to meditate on "unconditional loving-kindness and compassion" show instant and remarkable changes: Their left prefrontal cortices (responsible for positive emotions) go into overdrive, they produce gamma waves 30 times more powerful than novice meditators, and their wave activity is coordinated in a way often seen in patients under anesthesia.

Gallagher stresses that because attention is a limited resource—one psychologist has calculated that we can attend to only 110 bits of information per second, or 173 billion bits in an average lifetime—our moment-by-moment choice of attentional targets determines, in a very real sense, the shape of our lives. *Rapt*'s epigraph comes from the psychologist and philosopher William James: "My experience is what I agree to attend to." For Gallagher, everything comes down to that one big choice: investing your attention wisely or not. The jackhammers are everywhere—iPhones, e-mail, cancer—and Western culture's attentional crisis is mainly a widespread failure to ignore them.

"Once you understand how attention works and how you can make the most productive use of it," she says, "if you continue to just jump in the air every time your phone rings or pounce on those buttons every time you get an instant message, that's not the machine's fault. That's your fault."

Making the responsible attention choice, however, is not always easy. Here is a partial list, because a complete one would fill the entire magazine, of the things I've been distracted by in the course of writing this article: my texting wife, a very loud seagull, my mother calling from Mexico to leave voice mails in terrible Spanish, a man shouting "Your weed-whacker fell off! Your weed-whacker fell off!" at a truck full of lawn equipment, my *Lost*-watching wife, another man singing some kind of Spanish ballad on the sidewalk under my window, streaming video of the NBA playoffs, dissertation-length blog breakdowns of the NBA playoffs, my toenail spontaneously detaching, my ice-cream-eating wife, the subtly shifting landscapes of my three different e-mail in-boxes, my Facebooking wife, infinite YouTube videos (a puffin attacking someone wearing a rubber boot, Paul McCartney talking about the death of John Lennon, a chimpanzee playing Pac-Man), and even more infinite, if that is possible, Wikipedia entries: puffins, *MacGyver,* Taylorism, the phrase "bleeding edge," the Boston Molasses Disaster. (If I were going to excuse you from reading this article for any single distraction, which I am not, it would be to read about the Boston Molasses Disaster.)

When the jackhammers fire up outside my window, in other words, I rarely ignore them—I throw the window open, watch for a while, bring the crew sandwiches on their lunch break, talk with them about the ins and outs of jackhammering, and then spend an hour or two trying to break up a little of the sidewalk

myself. Some of my distractions were unavoidable. Some were necessary work-related evils that got out of hand. Others were pretty clearly inexcusable. (I consider it a victory for the integrity of pre-web human consciousness that I was able to successfully resist clicking on the first "related video" after the chimp, the evocatively titled "Guy shits himself in a judo exhibition.") In today's attentional landscape, it's hard to draw neat borders.

Next: Can we dope our brains into focus?

I'm not ready to blame my restless attention entirely on a faulty willpower. Some of it is pure impersonal behaviorism. The Internet is basically a Skinner box engineered to tap right into our deepest mechanisms of addiction. As B. F. Skinner's army of lever-pressing rats and pigeons taught us, the most irresistible reward schedule is not, counterintuitively, the one in which we're rewarded constantly but something called "variable ratio schedule," in which the rewards arrive at random. And that randomness is practically the Internet's defining feature: It dispenses its never-ending little shots of positivity—a life-changing e-mail here, a funny YouTube video there—in gloriously unpredictable cycles. It seems unrealistic to expect people to spend all day clicking reward bars—searching the web, scanning the relevant blogs, checking e-mail to see if a co-worker has updated a project—and then just leave those distractions behind, as soon as they're not strictly required, to engage in "healthy" things like books and ab crunches and undistracted deep conversations with neighbors. It would be like requiring employees to take a few hits of opium throughout the day, then being surprised when it becomes a problem. Last year, an editorial in the *American Journal of Psychiatry* raised the prospect of adding "Internet addiction" to the *DSM*, which would make it a disorder to be taken as seriously as schizophrenia.

A quintessentially Western solution to the attention problem—one that neatly circumvents the issue of willpower—is to simply dope our brains into focus. We've done so, over the centuries, with substances ranging from tea to tobacco to NoDoz to Benzedrine, and these days the tradition seems to be approaching some kind of zenith with the rise of neuroenhancers: drugs designed to treat ADHD (Ritalin, Adderall), Alzheimer's (Aricept), and narcolepsy (Provigil) that can produce, in healthy people, superhuman states of attention. A grad-school friend tells me that Adderall allowed him to squeeze his mind "like a muscle." Joshua Foer, writing in Slate after a weeklong experiment with Adderall, said the drug made him feel like he'd "been bitten by a radioactive spider"—he beat his unbeatable brother at Ping-Pong, solved anagrams, devoured dense books. "The part of my brain that makes me curious about whether I have new e-mails in my in-box apparently shut down," he wrote.

Although neuroenhancers are currently illegal to use without a prescription, they're popular among college students (on some campuses, up to 25 percent of students admitted to taking them) and—if endless anecdotes can be believed—among a wide spectrum of other professional focusers: journalists on deadline, doctors performing high-stakes surgeries, competitors in poker tournaments, researchers suffering through the grind of grant-writing. There has been controversy in the chess world recently about drug testing at tournaments.

In December, a group of scientists published a paper in *Nature* that argued for the legalization and mainstream acceptance of neuroenhancers, suggesting that the drugs are really no different from more traditional "cognitive enhancers" such as laptops, exercise, nutrition, private tutoring, reading, and sleep. It's not quite that simple, of course. Adderall users frequently complain that the drug stifles their creativity—that it's best for doing ultrarational, structured tasks. (As Foer put it, "I had a nagging suspicion that I was thinking with blinders on.") One risk the scientists do acknowledge is the fascinating, horrifying prospect of "raising cognitive abilities beyond their species-typical upper bound." Ultimately, one might argue, neuroenhancers spring from the same source as the problem they're designed to correct: our lust for achievement in defiance of natural constraints. It's easy to imagine an endless attentional arms race in which new technologies colonize ever-bigger zones of our attention, new drugs expand the limits of that attention, and so on.

One of the most exciting—and confounding—solutions to the problem of attention lies right at the intersection of our willpower and our willpower-sapping technologies: the grassroots Internet movement

known as "lifehacking." It began in 2003 when the British tech writer Danny O'Brien, frustrated by his own lack of focus, polled 70 of his most productive friends to see how they managed to get so much done; he found that they'd invented all kinds of clever little tricks—some high-tech, some very low-tech—to help shepherd their attention from moment to moment: ingenious script codes for to-do lists, software hacks for managing e-mail, rituals to avoid sinister time-wasting traps such as "yak shaving," the tendency to lose yourself in endless trivial tasks tangentially related to the one you really need to do. (O'Brien wrote a program that prompts him every ten minutes, when he's online, to ask if he's procrastinating.) Since then, lifehacking has snowballed into a massive self-help program, written and revised constantly by the online global hive mind, that seeks to help you allocate your attention efficiently. Tips range from time-management habits (the 90-second shower) to note-taking techniques (mind mapping) to software shortcuts (how to turn your Gmail into a to-do list) to delightfully retro tech solutions (turning an index card into a portable dry-erase board by covering it with packing tape).

Next: One of the weaknesses of lifehacking.

When I call Merlin Mann, one of lifehacking's early adopters and breakout stars, he is running late, rushing back to his office, and yet he seems somehow to have attention to spare. He is by far the fastest-talking human I've ever interviewed, and it crosses my mind that this too might be a question of productivity—that maybe he's adopted a time-saving verbal lifehack from auctioneers. He talks in the snappy aphorisms of a professional speaker ("Priorities are like arms: If you have more than two of them, they're probably make-believe") and is always breaking ideas down into their atomic parts and reassessing the way they fit together: "What does it come down to?" "Here's the thing." "So why am I telling you this, and what does it have to do with lifehacks?"

Mann says he got into lifehacking at a moment of crisis, when he was "feeling really overwhelmed by the number of inputs in my life and managing it very badly." He founded one of the original lifehacking websites, 43folders.com (the name is a reference to David Allen's Getting Things Done, the legendarily complex productivity program in which Allen describes, among other things, how to build a kind of "three-dimensional calendar" out of 43 folders) and went on to invent such illustrious hacks as "in-box zero" (an e-mail-management technique) and the "hipster PDA" (a stack of three-by-five cards filled with jotted phone numbers and to-do lists, clipped together and tucked into your back pocket). Mann now makes a living speaking to companies as a kind of productivity guru. He Twitters, podcasts, and runs more than half a dozen websites.

Despite his robust web presence, Mann is skeptical about technology's impact on our lives. "Is it clear to you that the last fifteen years represent an enormous improvement in how everything operates?" he asks. "Picasso was somehow able to finish the *Desmoiselles of Avignon* even though he didn't have an application that let him tag his to-dos. If John Lennon had a BlackBerry, do you think he would have done everything he did with the Beatles in less than ten years?"One of the weaknesses of lifehacking as a weapon in the war against distraction, Mann admits, is that it tends to become extremely distracting. You can spend solid days reading reviews of filing techniques and organizational software. "On the web, there's a certain kind of encouragement to never ask yourself how much information you really need," he says. "But when I get to the point where I'm seeking advice twelve hours a day on how to take a nap, or what kind of notebook to buy, I'm so far off the idea of lifehacks that it's indistinguishable from where we started. There are a lot of people out there that find this a very sticky idea, and there's very little advice right now to tell them that the only thing to do is action, and everything else is horseshit. My wife reminds me sometimes: 'You have all the information you need to do *something* right now.' "

For Mann, many of our attention problems are symptoms of larger existential issues: motivation, happiness, neurochemistry. "I'm not a physician or a psychiatrist, but I'll tell you, I think a lot of it is some form of untreated ADHD or depression," he says. "Your mind is not getting the dopamine or the hugs that it needs to keep you focused on what you're doing. And any time your work gets a little bit too hard or a little bit too boring, you allow it to catch on to something that's more interesting to you." (Mann himself started getting treated for ADD a year ago; he says it's helped his focus quite a lot.)

Mann's advice can shade, occasionally, into Buddhist territory. "There's no shell script, there's no fancy pen, there's no notebook or nap or Firefox extension or hack that's gonna help you figure out why the fuck you're here," he tells me. "That's on you. This makes me sound like one of those people who swindled the Beatles, but if you are having attention problems, the best way to deal with it is by admitting it and then saying, 'From now on, I'm gonna be in the moment and more cognizant.' I said not long ago, I think on Twitter—God, I quote myself a lot, what an asshole—that really all self-help is Buddhism with a service mark.

"Where you allow your attention to go ultimately says more about you as a human being than anything that you put in your mission statement," he continues. "It's an indisputable receipt for your existence. And if you allow that to be squandered by other people who are as bored as you are, it's gonna say a lot about who you are as a person."

Next: Is the time we waste actually being wasted?

III. Embracing the Poverty of Attention

Sometimes I wonder if the time I'm wasting is actually being wasted. Isn't blowing a couple of hours on the Internet, in the end, just another way of following your attention? My life would be immeasurably poorer if I hadn't stumbled a few weeks ago across the Boston Molasses Disaster. (Okay, seriously, forget it: I hereby release you to go look up the Boston Molasses Disaster. A giant wave of molasses destroyed an entire Boston neighborhood 90 years ago, swallowing horses and throwing an elevated train off its track. It took months to scrub all the molasses out of the cobblestones! The harbor was brown until summer! The world is a stranger place than we will ever know.)The prophets of total attentional meltdown sometimes invoke, as an example of the great culture we're going to lose as we succumb to e-thinking, the canonical French juggernaut Marcel Proust. And indeed, at seven volumes, several thousand pages, and 1.5 million words, *À la Recherche du Temps Perdu* is in many ways the anti-Twitter. (It would take, by the way, exactly 68,636 tweets to reproduce.) It's important to remember, however, that the most famous moment in all of Proust, the moment that launches the entire monumental project, is a moment of pure distraction: when the narrator, Marcel, eats a spoonful of tea-soaked madeleine and finds himself instantly transported back to the world of his childhood. Proust makes it clear that conscious focus could never have yielded such profound magic: Marcel has to abandon the constraints of what he calls "voluntary memory"—the kind of narrow, purpose-driven attention that Adderall, say, might have allowed him to harness—in order to get to the deeper truths available only by distraction. That famous cookie is a kind of hyperlink: a little blip that launches an associative cascade of a million other subjects. This sort of free-associative wandering is essential to the creative process; one moment of judicious unmindfulness can inspire thousands of hours of mindfulness.

My favorite focusing exercise comes from William James: Draw a dot on a piece of paper, then pay attention to it for as long as you can. (Sitting in my office one afternoon, with my monkey mind swinging busily across the lush rain forest of online distractions, I tried this with the closest dot in the vicinity: the bright-red mouse-nipple at the center of my laptop's keyboard. I managed to stare at it for 30 minutes, with mixed results.) James argued that the human mind can't actually focus on the dot, or any unchanging object, for more than a few seconds at a time: It's too hungry for variety, surprise, the adventure of the unknown. It has to refresh its attention by continually finding new aspects of the dot to focus on: subtleties of its shape, its relationship to the edges of the paper, metaphorical associations (a fly, an eye, a hole). The exercise becomes a question less of pure unwavering focus than of your ability to organize distractions around a central point. The dot, in other words, becomes only the hub of your total dot-related distraction.

This is what the web-threatened punditry often fails to recognize: Focus is a paradox—it has distraction built into it. The two are symbiotic; they're the systole and diastole of consciousness. Attention comes from the Latin "to stretch out" or "reach toward," distraction from "to pull apart." We need both. In their extreme forms, focus and attention may even circle back around and bleed into one other. Meyer says there's a subset of Buddhists who believe that the most advanced monks become essentially "world-class

multitaskers"—that all those years of meditation might actually speed up their mental processes enough to handle the kind of information overload the rest of us find crippling.The truly wise mind will harness, rather than abandon, the power of distraction. Unwavering focus—the inability to be distracted—can actually be just as problematic as ADHD. Trouble with "attentional shift" is a feature common to a handful of mental illnesses, including schizophrenia and OCD. It's been hypothesized that ADHD might even be an advantage in certain change-rich environments. Researchers have discovered, for instance, that a brain receptor associated with ADHD is unusually common among certain nomads in Kenya, and that members who have the receptor are the best nourished in the group. It's possible that we're all evolving toward a new techno-cognitive nomadism, a rapidly shifting environment in which restlessness will be an advantage again. The deep focusers might even be hampered by having too much attention: Attention Surfeit Hypoactivity Disorder.

I keep returning to the parable of Einstein and Lennon—the great historical geniuses hypothetically ruined by modern distraction. What made both men's achievements so groundbreaking, though, was that they did something modern technology is getting increasingly better at allowing us to do: They very powerfully linked and synthesized things that had previously been unlinked—Newtonian gravity and particle physics, rock and blues and folk and doo-wop and bubblegum pop and psychedelia. If Einstein and Lennon were growing up today, their natural genius might be so pumped up on the possibilities of the new technology they'd be doing even more dazzling things. Surely Lennon would find a way to manipulate his BlackBerry to his own ends, just like he did with all the new technology of the sixties—he'd harvest spam and text messages and web snippets and build them into a new kind of absurd poetry. The Beatles would make the best viral videos of all time, simultaneously addictive and artful, disposable and forever. All of those canonical songs, let's remember, were created entirely within a newfangled mass genre that was widely considered to be an assault on civilization and the sanctity of deep human thought. Standards change. They change because of great creations in formerly suspect media.

Next: What will happen to the kids who've grown up with the Internet?

Which brings me, finally, to the next generation of attenders, the so-called "net-gen" or "digital natives," kids who've grown up with the Internet and other time-slicing technologies. There's been lots of hand-wringing about all the skills they might lack, mainly the ability to concentrate on a complex task from beginning to end, but surely they can already do things their elders can't—like conduct 34 conversations simultaneously across six different media, or pay attention to switching between attentional targets in a way that's been considered impossible. More than any other organ, the brain is designed to change based on experience, a feature called neuroplasticity. London taxi drivers, for instance, have enlarged hippocampi (the brain region for memory and spatial processing)—a neural reward for paying attention to the tangle of the city's streets. As we become more skilled at the 21st-century task Meyer calls "flitting," the wiring of the brain will inevitably change to deal more efficiently with more information. The neuroscientist Gary Small speculates that the human brain might be changing faster today than it has since the prehistoric discovery of tools. Research suggests we're already picking up new skills: better peripheral vision, the ability to sift information rapidly. We recently elected the first-ever BlackBerry president, able to flit between sixteen national crises while focusing at a world-class level. Kids growing up now might have an associative genius we don't—a sense of the way ten projects all dovetail into something totally new. They might be able to engage in seeming contradictions: mindful web-surfing, mindful Twittering. Maybe, in flights of irresponsible responsibility, they'll even manage to attain the paradoxical, Zenlike state of focused distraction.

Find this article at:
http://www.nymag.com/news/features/56793

Blood pressure pill action urged

Everyone aged 55 and over should be taking drugs to lower their blood pressure, a London-based expert says.

Epidemiology expert Professor Malcolm Law said blood pressure drugs cut the risk of heart attack and stroke even for those with normal blood pressure.

His conclusion, published in the British Medical Journal and backed by other experts, is based on a review of 147 studies, involving 464,000 people.

However, the Stroke Association warned the drugs could have side-effects.

" **Beyond a certain age, we're saying everyone would benefit from taking drugs that lower blood pressure.** "
Professor Malcolm Law Wolfson Institute

The research found most types of blood pressure drugs cut the risk of heart attacks and heart failure by around a quarter and the risk of stroke by about a third.

The studies looked at the effect on two blood pressure measurements; systolic - the pressure when the heart beats while pumping blood - and diastolic - the pressure when the heart is at rest between beats.

The lowered risk estimates were based on lowering systolic blood pressure by 10mm Hg or diastolic blood pressure by 5mm Hg.

Widespread benefit

Professor Law, an expert in epidemiology at the Wolfson Institute at Barts and The London School of Medicine, said: "Beyond a certain age, we're saying everyone would benefit from taking drugs that lower blood pressure.

"Beyond a certain age, we all have high blood pressure and we would all benefit from lowering it.

"What we call 'normal' blood pressure is actually high, and what we call high blood pressure is actually higher."

Professor Law said the universal use of blood pressure drugs should be seen as analogous to vaccinating the entire population in the event of a flu pandemic.

There was no case for trying to assess who was a top priority, he said, when everybody was potentially at risk.

In fact, Professor Law said giving everybody blood pressure drugs would minimise the risk that people would be alarmed when told they needed to take the medication.

Among those aged 65 living in England and Wales, the risk of having a heart attack in the next 10 years is about 10% for men and 5% for women, he added.

In an accompanying editorial, Richard McManus, from the University of Birmingham, and Jonathan Mant, from the University of Cambridge, backed Professor Law's call.

They said the findings supported the idea of giving everyone over a certain age a "polypill" - a drug that would include a statin to lower cholesterol as well as treatment for blood pressure.

Professor Law is one of the pioneers of the polypill, which he says would be an effective way to cut the number of heart attacks and strokes in the UK.

Caution

Joanne Murphy, of the Stroke Association, said: "High blood pressure is the single biggest risk factor for stroke and it is important that people take medication to combat this.

"Whilst blood pressure medication is one of the safest and most studied medications, they do have side-effects and should only be prescribed to people who are at significant risk of stroke."

Mike Rich, of the Blood Pressure Association, said: "Prevention is better than cure, but there are other proven ways to prevent high blood pressure such as healthy eating and regular exercise, which have other health benefits too.

"There is a danger that these important lifestyle factors could be overlooked in favour of 'popping a pill'."

Professor Alan Maryon-Davis, president of the Faculty of Public Health, said: "Mass medication turns us all into patients and I don't think it's the best approach.

"A far healthier way is for us to reduce our risk and increase our wellbeing by consuming less salt and alcohol and taking more regular exercise."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8057850.stm

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HIV's spread around Europe mapped

Scientists who have mapped HIV's spread across Europe say holidaymakers infected abroad are largely to blame.

By analysing samples from 17 European countries, the international team tracked the movement of the virus around the continent.

Their map shows Greece, Portugal, Serbia and Spain are big HIV exporters, with many tourists to and migrants from these countries leaving with the virus.

The UK is an exporter and importer, Retrovirology journal says.

The same is true of Israel, Norway, the Netherlands, Sweden and Switzerland, while countries like Austria, Belgium, Denmark, Germany and Luxembourg are largely importers of HIV, the researchers say.

In Poland, HIV is contained but is spread among its inhabitants because of injecting drug-users, the research group found.

To construct their map, the researchers looked at the most common type of HIV circulating in Europe, known as HIV-1 subtype B.

They tracked its migration by creating a family tree for the virus, looking at detailed genetic characteristics that reveal how the virus has been evolving over time.

DIRECTION OF HIV SPREAD
- Exporters: Greece, Portugal, Serbia and Spain
- Both exporters and importers: Israel, Norway, the Netherlands, Sweden, Switzerland and the UK
- Importers: Austria, Belgium, Denmark, Germany and Luxembourg

Lead author Dimitrios Paraskevis, of the University of Athens, said: "Popular tourist destinations like Greece, Portugal and Spain probably spread HIV with tourists infected during their holidays."

In the case of Serbia as an exporter, it is most likely down to its inhabitants travelling to other countries and carrying the virus with them, he said.

"To a large extent HIV spread within Poland is due to injecting drug-users, who make up around half of the HIV-infected population.

"Viruses move around with travellers - thus health programmes within countries should not only target the national populations, prevention efforts must also be aimed at migrants, travellers and tourists - who are both major sources and targets of HIV."

Rowan Harvey, of the Terrence Higgins Trust, said: "HIV isn't constrained by borders, it's a global epidemic and there are bound to be patterns of transmission between countries.

"Tourists travelling abroad should definitely pack condoms, but people should also be aware that HIV is at its highest level in the UK as well.

"To protect yourself from HIV and other sexually transmitted infections, safer sex is essential both at home and abroad."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8056299.stm

Published: 2009/05/19 23:10:07 GMT

Web children 'living in prisons'

Many children are living in a "prison-like environment" surrounded by technology, the chairman of the Independent Schools Association warns.

John Gibson says such experience does not prepare children for adult life and schools should challenge this.

Playing conkers and mending bikes helped children in later life, he told the ISA's annual conference.

Recent research suggests five to 16-year-olds are spending up to six hours a day online or watching television.

Mr Gibson, who is head of Stoke College in Suffolk, said "playing out" as a child and taking part in activities such as putting an oily chain back on a bike, or playing conkers, exposed children to emotions such as disappointment which would prepare them for adulthood.

In his speech to the conference, he said: "When your life is lived through images constructed by a technical genius from Silicon Valley played on a high definition screen I just feel it will be more difficult to experience those important rehearsals for adult life".

'Comfortable'

He went on: "When William Wordsworth wrote 150 years ago that 'shades of the prison-house begin to close upon the growing boy' I believed he was talking mainly about school.

"But today's prison-house is just as likely to be the home, a seductive, comfortable prison for boys and girls whose nimble fingers are adept at working their mobiles and computer games, but have never used them to play conkers."

He told ISA members - heads of independent schools in England and Wales - that they should offer children a diversity and excellence of experience to challenge the culture of technology in which they live outside school.

In doing so, they should always pay attention to assessing risk, while preparing children for the world they would grow up in, he added.

In a survey by Childwise research agency last autumn, 1,800 children were asked how much time they spent either watching television, on the internet or playing on games consoles.

The survey suggested the children were spending 2.7 hours a day on average watching television, 1.5 hours on the internet and 1.3 hours on games consoles.

A casualty of this amount of screen time had been reading, it suggested. The children questioned were spending just over half an hour a day reading.

In particular, older boys were resistant to reading, with 42% of 11 to 16-year-olds saying they never read books for pleasure.

However playing sport still appeared to be a major part of young people's lives, representing nearly five hours per week.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/uk_news/education/8049610.stm

Published: 2009/05/14 10:59:34 GMT

Some People Really 'Never Forget A Face:' Understanding Extraordinary Face Recognition Ability

Some people say they never forget a face, a claim now bolstered by psychologists at Harvard University who've discovered a group they call "super-recognizers": those who can easily recognize someone they met in passing, even many years later. (Credit: iStockphoto/Jacob Wackerhausen)

ScienceDaily (May 20, 2009) — Some people say they never forget a face, a claim now bolstered by psychologists at Harvard University who've discovered a group they call "super-recognizers": those who can easily recognize someone they met in passing, even many years later.

The new study suggests that skill in facial recognition might vary widely among humans. Previous research has identified as much as 2 percent of the population as having "face-blindness," or prosopagnosia, a condition characterized by great difficulty in recognizing faces. For the first time, this new research shows that others excel in face recognition, indicating that the trait could be on a spectrum, with prosopagnosics on the low end and super-recognizers at the high end.

The research is published in *Psychonomic Bulletin & Review*, and was led by Richard Russell, a postdoctoral researcher in the Department of Psychology at Harvard, with co-authors Ken Nakayama, Edgar Pierce Professor of Psychology at Harvard, and Brad Duchaine of the University College London.

The research involved administering standardized face recognition tests. The super-recognizers scored far above average on these tests—higher than any of the normal control subjects.

"There has been a default assumption that there is either normal face recognition, or there is disordered face recognition," says Russell. "This suggests that's not the case, that there is actually a very wide range of ability. It suggests a different model—a different way of thinking about face recognition ability, and possibly even other aspects of perception, in terms of a spectrum of abilities, rather than there being normal and disordered ability."

Super-recognizers report that they recognize other people far more often than they are recognized. For this reason, says Russell, they often compensate by pretending not to recognize someone they met in passing, so as to avoid appearing to attribute undue importance to a fleeting encounter.

"Super-recognizers have these extreme stories of recognizing people," says Russell. "They recognize a person who was shopping in the same store with them two months ago, for example, even if they didn't speak to the person. It doesn't have to be a significant interaction; they really stand out in terms of their ability to remember the people who were actually less significant."

One woman in the study said she had identified another woman on the street who served as her as a waitress five years earlier in a different city. Critically, she was able to confirm that the other woman had in fact been a waitress in the different city. Often, super-recognizers are able to recognize another person despite significant changes in appearance, such as aging or a different hair color.

If face recognition abilities do vary, testing for this may be important for assessing eyewitness testimony, or for interviewing for some jobs, such as security or those checking identification.

Russell theorizes that super-recognizers and those with face-blindness may only be distinguishable today because our communities differ from how they existed thousands of years ago.

"Until recently, most humans lived in much smaller communities, with many fewer people interacting on a regular basis within a group," says Russell. "It may be a fairly new phenomenon that there's even a need to recognize large numbers of people."

The research was funded by the U.S. National Eye Institute and the U.K. Economic and Social Research Council.

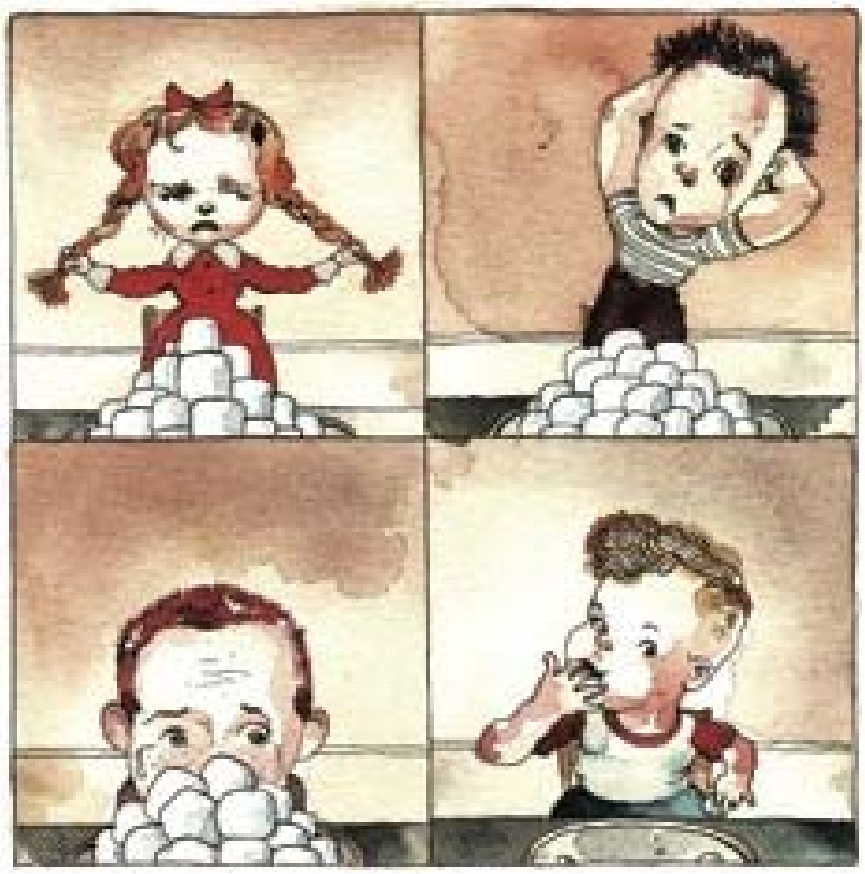
Adapted from materials provided by Harvard University, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/05/090519172204.htm

DON'T!

The secret of self-control.

by Jonah Lehrer May 18, 2009



Children who are able to pass the marshmallow test enjoy greater success as adults.

In the late nineteen-sixties, Carolyn Weisz, a four-year-old with long brown hair, was invited into a "game room" at the Bing Nursery School, on the campus of Stanford University. The room was little more than a large closet, containing a desk and a chair. Carolyn was asked to sit down in the chair and pick a treat from a tray of marshmallows, cookies, and pretzel sticks. Carolyn chose the marshmallow. Although she's now forty-four, Carolyn still has a weakness for those air-puffed balls of corn syrup and gelatine. "I know I shouldn't like them," she says. "But they're just so delicious!" A researcher then made Carolyn an offer: she could either eat one marshmallow right away or, if she was willing to wait while he stepped out for a few minutes, she could have two marshmallows when he returned. He said that if she rang a bell on the desk while he was away he would come running back, and she could eat one marshmallow but would forfeit the second. Then he left the room.

Although Carolyn has no direct memory of the experiment, and the scientists would not release any information about the subjects, she strongly suspects that she was able to delay gratification. "I've always been really good at waiting," Carolyn told me. "If you give me a challenge or a task, then I'm going to find a way to do it, even if it means not eating my favorite food." Her mother, Karen Sortino, is still more certain: "Even as a young kid, Carolyn was very patient. I'm sure she would have waited." But her brother Craig, who also took part in the experiment, displayed less fortitude. Craig, a year older than Carolyn, still remembers the torment of trying to wait. "At a certain point, it must have occurred to me that I was all by myself," he recalls. "And so I just started taking all the candy." According to Craig, he was also tested with little plastic toys—he could have a second one if he held out—and he broke into the

desk, where he figured there would be additional toys. “I took everything I could,” he says. “I cleaned them out. After that, I noticed the teachers encouraged me to not go into the experiment room anymore.”

Footage of these experiments, which were conducted over several years, is poignant, as the kids struggle to delay gratification for just a little bit longer. Some cover their eyes with their hands or turn around so that they can’t see the tray. Others start kicking the desk, or tug on their pigtails, or stroke the marshmallow as if it were a tiny stuffed animal. One child, a boy with neatly parted hair, looks carefully around the room to make sure that nobody can see him. Then he picks up an Oreo, delicately twists it apart, and licks off the white cream filling before returning the cookie to the tray, a satisfied look on his face.

Most of the children were like Craig. They struggled to resist the treat and held out for an average of less than three minutes. “A few kids ate the marshmallow right away,” Walter Mischel, the Stanford professor of psychology in charge of the experiment, remembers. “They didn’t even bother ringing the bell. Other kids would stare directly at the marshmallow and then ring the bell thirty seconds later.” About thirty per cent of the children, however, were like Carolyn. They successfully delayed gratification until the researcher returned, some fifteen minutes later. These kids wrestled with temptation but found a way to resist.

The initial goal of the experiment was to identify the mental processes that allowed some people to delay gratification while others simply surrendered. After publishing a few papers on the Bing studies in the early seventies, Mischel moved on to other areas of personality research. “There are only so many things you can do with kids trying not to eat marshmallows.”

But occasionally Mischel would ask his three daughters, all of whom attended the Bing, about their friends from nursery school. “It was really just idle dinnertime conversation,” he says. “I’d ask them, ‘How’s Jane? How’s Eric? How are they doing in school?’ ” Mischel began to notice a link between the children’s academic performance as teen-agers and their ability to wait for the second marshmallow. He asked his daughters to assess their friends academically on a scale of zero to five. Comparing these ratings with the original data set, he saw a correlation. “That’s when I realized I had to do this seriously,” he says. Starting in 1981, Mischel sent out a questionnaire to all the reachable parents, teachers, and academic advisers of the six hundred and fifty-three subjects who had participated in the marshmallow task, who were by then in high school. He asked about every trait he could think of, from their capacity to plan and think ahead to their ability to “cope well with problems” and get along with their peers. He also requested their S.A.T. scores.

Once Mischel began analyzing the results, he noticed that low delayers, the children who rang the bell quickly, seemed more likely to have behavioral problems, both in school and at home. They got lower S.A.T. scores. They struggled in stressful situations, often had trouble paying attention, and found it difficult to maintain friendships. The child who could wait fifteen minutes had an S.A.T. score that was, on average, two hundred and ten points higher than that of the kid who could wait only thirty seconds.

Carolyn Weisz is a textbook example of a high delayer. She attended Stanford as an undergraduate, and got her Ph.D. in social psychology at Princeton. She’s now an associate psychology professor at the University of Puget Sound. Craig, meanwhile, moved to Los Angeles and has spent his career doing “all kinds of things” in the entertainment industry, mostly in production. He’s currently helping to write and produce a film. “Sure, I wish I had been a more patient person,” Craig says. “Looking back, there are definitely moments when it would have helped me make better career choices and stuff.”

Mischel and his colleagues continued to track the subjects into their late thirties—Ozlem Ayduk, an assistant professor of psychology at the University of California at Berkeley, found that low-delaying adults have a significantly higher body-mass index and are more likely to have had problems with drugs—but it was frustrating to have to rely on self-reports. “There’s often a gap between what people are willing to tell you and how they behave in the real world,” he explains. And so, last year, Mischel, who is now a professor at Columbia, and a team of collaborators began asking the original Bing subjects to travel to Stanford for a few days of experiments in an fMRI machine. Carolyn says she will be participating in the scanning experiments later this summer; Craig completed a survey several years ago, but has yet to be invited to Palo Alto. The scientists are hoping to identify the particular brain regions that allow some people to delay gratification and control their temper. They’re also conducting a variety of genetic tests, as they search for the hereditary characteristics that influence the ability to wait for a second marshmallow.

If Mischel and his team succeed, they will have outlined the neural circuitry of self-control. For decades, psychologists have focussed on raw intelligence as the most important variable when it comes to

predicting success in life. Mischel argues that intelligence is largely at the mercy of self-control: even the smartest kids still need to do their homework. “What we’re really measuring with the marshmallows isn’t will power or self-control,” Mischel says. “It’s much more important than that. This task forces kids to find a way to make the situation work for them. They want the second marshmallow, but how can they get it? We can’t control the world, but we can control how we think about it.”

Walter Mischel is a slight, elegant man with a shaved head and a face of deep creases. He talks with a Brooklyn bluster and he tends to act out his sentences, so that when he describes the marshmallow task he takes on the body language of an impatient four-year-old. “If you want to know why some kids can wait and others can’t, then you’ve got to think like they think,” Mischel says.

Mischel was born in Vienna, in 1930. His father was a modestly successful businessman with a fondness for café society and Esperanto, while his mother spent many of her days lying on the couch with an ice pack on her forehead, trying to soothe her frail nerves. The family considered itself fully assimilated, but after the Nazi annexation of Austria, in 1938, Mischel remembers being taunted in school by the Hitler Youth and watching as his father, hobbled by childhood polio, was forced to limp through the streets in his pajamas. A few weeks after the takeover, while the family was burning evidence of their Jewish ancestry in the fireplace, Walter found a long-forgotten certificate of U.S. citizenship issued to his maternal grandfather decades earlier, thus saving his family.

The family settled in Brooklyn, where Mischel’s parents opened up a five-and-dime. Mischel attended New York University, studying poetry under Delmore Schwartz and Allen Tate, and taking studio-art classes with Philip Guston. He also became fascinated by psychoanalysis and new measures of personality, such as the Rorschach test. “At the time, it seemed like a mental X-ray machine,” he says. “You could solve a person by showing them a picture.” Although he was pressured to join his uncle’s umbrella business, he ended up pursuing a Ph.D. in clinical psychology at Ohio State.

But Mischel noticed that academic theories had limited application, and he was struck by the futility of most personality science. He still flinches at the naïveté of graduate students who based their diagnoses on a battery of meaningless tests. In 1955, Mischel was offered an opportunity to study the “spirit possession” ceremonies of the Orisha faith in Trinidad, and he leapt at the chance. Although his research was supposed to involve the use of Rorschach tests to explore the connections between the unconscious and the behavior of people when possessed, Mischel soon grew interested in a different project. He lived in a part of the island that was evenly split between people of East Indian and of African descent; he noticed that each group defined the other in broad stereotypes. “The East Indians would describe the Africans as impulsive hedonists, who were always living for the moment and never thought about the future,” he says. “The Africans, meanwhile, would say that the East Indians didn’t know how to live and would stuff money in their mattress and never enjoy themselves.”

Mischel took young children from both ethnic groups and offered them a simple choice: they could have a miniature chocolate bar right away or, if they waited a few days, they could get a much bigger chocolate bar. Mischel’s results failed to justify the stereotypes—other variables, such as whether or not the children lived with their father, turned out to be much more important—but they did get him interested in the question of delayed gratification. Why did some children wait and not others? What made waiting possible? Unlike the broad traits supposedly assessed by personality tests, self-control struck Mischel as potentially measurable.

In 1958, Mischel became an assistant professor in the Department of Social Relations at Harvard. One of his first tasks was to develop a survey course on “personality assessment,” but Mischel quickly concluded that, while prevailing theories held personality traits to be broadly consistent, the available data didn’t back up this assumption. Personality, at least as it was then conceived, couldn’t be reliably assessed at all. A few years later, he was hired as a consultant on a personality assessment initiated by the Peace Corps. Early Peace Corps volunteers had sparked several embarrassing international incidents—one mailed a postcard on which she expressed disgust at the sanitary habits of her host country—so the Kennedy Administration wanted a screening process to eliminate people unsuited for foreign assignments. Volunteers were tested for standard personality traits, and Mischel compared the results with ratings of how well the volunteers performed in the field. He found no correlation; the time-consuming tests predicted nothing. At this point, Mischel realized that the problem wasn’t the tests—it was their premise. Psychologists had spent decades searching for traits that exist independently of circumstance, but what if personality can’t be separated from context? “It went against the way we’d been thinking about personality since the four humors and the ancient Greeks,” he says.

While Mischel was beginning to dismantle the methods of his field, the Harvard psychology department was in tumult. In 1960, the personality psychologist Timothy Leary helped start the Harvard Psilocybin Project, which consisted mostly of self-experimentation. Mischel remembers graduate students' desks giving way to mattresses, and large packages from Ciba chemicals, in Switzerland, arriving in the mail. Mischel had nothing against hippies, but he wanted modern psychology to be rigorous and empirical. And so, in 1962, Walter Mischel moved to Palo Alto and went to work at Stanford.

There is something deeply contradictory about Walter Mischel—a psychologist who spent decades critiquing the validity of personality tests—inventing the marshmallow task, a simple test with impressive predictive power. Mischel, however, insists there is no contradiction. "I've always believed there are consistencies in a person that can be looked at," he says. "We just have to look in the right way." One of Mischel's classic studies documented the aggressive behavior of children in a variety of situations at a summer camp in New Hampshire. Most psychologists assumed that aggression was a stable trait, but Mischel found that children's responses depended on the details of the interaction. The same child might consistently lash out when teased by a peer, but readily submit to adult punishment. Another might react badly to a warning from a counsellor, but play well with his bunkmates. Aggression was best assessed in terms of what Mischel called "if-then patterns." If a certain child was teased by a peer, then he would be aggressive.

One of Mischel's favorite metaphors for this model of personality, known as interactionism, concerns a car making a screeching noise. How does a mechanic solve the problem? He begins by trying to identify the specific conditions that trigger the noise. Is there a screech when the car is accelerating, or when it's shifting gears, or turning at slow speeds? Unless the mechanic can give the screech a context, he'll never find the broken part. Mischel wanted psychologists to think like mechanics, and look at people's responses under particular conditions. The challenge was devising a test that accurately simulated something relevant to the behavior being predicted. The search for a meaningful test of personality led Mischel to revisit, in 1968, the protocol he'd used on young children in Trinidad nearly a decade earlier. The experiment seemed especially relevant now that he had three young daughters of his own. "Young kids are pure id," Mischel says. "They start off unable to wait for anything—whatever they want they need. But then, as I watched my own kids, I marvelled at how they gradually learned how to delay and how that made so many other things possible."

A few years earlier, in 1966, the Stanford psychology department had established the Bing Nursery School. The classrooms were designed as working laboratories, with large one-way mirrors that allowed researchers to observe the children. In February, Jennifer Winters, the assistant director of the school, showed me around the building. While the Bing is still an active center of research—the children quickly learn to ignore the students scribbling in notebooks—Winters isn't sure that Mischel's marshmallow task could be replicated today. "We recently tried to do a version of it, and the kids were very excited about having food in the game room," she says. "There are so many allergies and peculiar diets today that we don't do many things with food."

Mischel perfected his protocol by testing his daughters at the kitchen table. "When you're investigating will power in a four-year-old, little things make a big difference," he says. "How big should the marshmallows be? What kind of cookies work best?" After several months of patient tinkering, Mischel came up with an experimental design that closely simulated the difficulty of delayed gratification. In the spring of 1968, he conducted the first trials of his experiment at the Bing. "I knew we'd designed it well when a few kids wanted to quit as soon as we explained the conditions to them," he says. "They knew this was going to be very difficult."

At the time, psychologists assumed that children's ability to wait depended on how badly they wanted the marshmallow. But it soon became obvious that every child craved the extra treat. What, then, determined self-control? Mischel's conclusion, based on hundreds of hours of observation, was that the crucial skill was the "strategic allocation of attention." Instead of getting obsessed with the marshmallow—the "hot stimulus"—the patient children distracted themselves by covering their eyes, pretending to play hide-and-seek underneath the desk, or singing songs from "Sesame Street." Their desire wasn't defeated—it was merely forgotten. "If you're thinking about the marshmallow and how delicious it is, then you're going to eat it," Mischel says. "The key is to avoid thinking about it in the first place."

In adults, this skill is often referred to as metacognition, or thinking about thinking, and it's what allows people to outsmart their shortcomings. (When Odysseus had himself tied to the ship's mast, he was using some of the skills of metacognition: knowing he wouldn't be able to resist the Sirens' song, he

made it impossible to give in.) Mischel's large data set from various studies allowed him to see that children with a more accurate understanding of the workings of self-control were better able to delay gratification. "What's interesting about four-year-olds is that they're just figuring out the rules of thinking," Mischel says. "The kids who couldn't delay would often have the rules backwards. They would think that the best way to resist the marshmallow is to stare right at it, to keep a close eye on the goal. But that's a terrible idea. If you do that, you're going to ring the bell before I leave the room."

According to Mischel, this view of will power also helps explain why the marshmallow task is such a powerfully predictive test. "If you can deal with hot emotions, then you can study for the S.A.T. instead of watching television," Mischel says. "And you can save more money for retirement. It's not just about marshmallows."

Subsequent work by Mischel and his colleagues found that these differences were observable in subjects as young as nineteen months. Looking at how toddlers responded when briefly separated from their mothers, they found that some immediately burst into tears, or clung to the door, but others were able to overcome their anxiety by distracting themselves, often by playing with toys. When the scientists set the same children the marshmallow task at the age of five, they found that the kids who had cried also struggled to resist the tempting treat.

The early appearance of the ability to delay suggests that it has a genetic origin, an example of personality at its most predetermined. Mischel resists such an easy conclusion. "In general, trying to separate nature and nurture makes about as much sense as trying to separate personality and situation," he says. "The two influences are completely interrelated." For instance, when Mischel gave delay-of-gratification tasks to children from low-income families in the Bronx, he noticed that their ability to delay was below average, at least compared with that of children in Palo Alto. "When you grow up poor, you might not practice delay as much," he says. "And if you don't practice then you'll never figure out how to distract yourself. You won't develop the best delay strategies, and those strategies won't become second nature." In other words, people learn how to use their mind just as they learn how to use a computer: through trial and error.

But Mischel has found a shortcut. When he and his colleagues taught children a simple set of mental tricks—such as pretending that the candy is only a picture, surrounded by an imaginary frame—he dramatically improved their self-control. The kids who hadn't been able to wait sixty seconds could now wait fifteen minutes. "All I've done is given them some tips from their mental user manual," Mischel says. "Once you realize that will power is just a matter of learning how to control your attention and thoughts, you can really begin to increase it."

Marc Berman, a lanky graduate student with an easy grin, speaks about his research with the infectious enthusiasm of a freshman taking his first philosophy class. Berman works in the lab of John Jonides, a psychologist and neuroscientist at the University of Michigan, who is in charge of the brain-scanning experiments on the original Bing subjects. He knows that testing forty-year-olds for self-control isn't a straightforward proposition. "We can't give these people marshmallows," Berman says. "They know they're part of a long-term study that looks at delay of gratification, so if you give them an obvious delay task they'll do their best to resist. You'll get a bunch of people who refuse to touch their marshmallow."

This meant that Jonides and his team had to find a way to measure will power indirectly. Operating on the premise that the ability to delay eating the marshmallow had depended on a child's ability to banish thoughts of it, they decided on a series of tasks that measure the ability of subjects to control the contents of working memory—the relatively limited amount of information we're able to consciously consider at any given moment. According to Jonides, this is how self-control "cashes out" in the real world: as an ability to direct the spotlight of attention so that our decisions aren't determined by the wrong thoughts.

Last summer, the scientists chose fifty-five subjects, equally split between high delayers and low delayers, and sent each one a laptop computer loaded with working-memory experiments. Two of the experiments were of particular interest. The first is a straightforward exercise known as the "suppression task." Subjects are given four random words, two printed in blue and two in red. After reading the words, they're told to forget the blue words and remember the red words. Then the scientists provide a stream of "probe words" and ask the subjects whether the probes are the words they were asked to remember. Though the task doesn't seem to involve delayed gratification, it tests the same basic mechanism. Interestingly, the scientists found that high delayers were significantly better at the suppression task: they were less likely to think that a word they'd been asked to forget was something they should remember.

In the second, known as the Go/No Go task, subjects are flashed a set of faces with various expressions. At first, they are told to press the space bar whenever they see a smile. This takes little effort, since smiling faces automatically trigger what's known as "approach behavior." After a few minutes, however, subjects are told to press the space bar when they see frowning faces. They are now being forced to act against an impulse. Results show that high delayers are more successful at not pressing the button in response to a smiling face.

When I first started talking to the scientists about these tasks last summer, they were clearly worried that they wouldn't find any behavioral differences between high and low delayers. It wasn't until early January that they had enough data to begin their analysis (not surprisingly, it took much longer to get the laptops back from the low delayers), but it soon became obvious that there were provocative differences between the two groups. A graph of the data shows that as the delay time of the four-year-olds decreases, the number of mistakes made by the adults sharply rises.

The big remaining question for the scientists is whether these behavioral differences are detectable in an fMRI machine. Although the scanning has just begun—Jonides and his team are still working out the kinks—the scientists sound confident. "These tasks have been studied so many times that we pretty much know where to look and what we're going to find," Jonides says. He rattles off a short list of relevant brain regions, which his lab has already identified as being responsible for working-memory exercises. For the most part, the regions are in the frontal cortex—the overhang of brain behind the eyes—and include the dorsolateral prefrontal cortex, the anterior prefrontal cortex, the anterior cingulate, and the right and left inferior frontal gyri. While these cortical folds have long been associated with self-control, they're also essential for working memory and directed attention. According to the scientists, that's not an accident. "These are powerful instincts telling us to reach for the marshmallow or press the space bar," Jonides says. "The only way to defeat them is to avoid them, and that means paying attention to something else. We call that will power, but it's got nothing to do with the will."

The behavioral and genetic aspects of the project are overseen by Yuichi Shoda, a professor of psychology at the University of Washington, who was one of Mischel's graduate students. He's been following these "marshmallow subjects" for more than thirty years: he knows everything about them from their academic records and their social graces to their ability to deal with frustration and stress. The prognosis for the genetic research remains uncertain. Although many studies have searched for the underpinnings of personality since the completion of the Human Genome Project, in 2003, many of the relevant genes remain in question. "We're incredibly complicated creatures," Shoda says. "Even the simplest aspects of personality are driven by dozens and dozens of different genes." The scientists have decided to focus on genes in the dopamine pathways, since those neurotransmitters are believed to regulate both motivation and attention. However, even if minor coding differences influence delay ability—and that's a likely possibility—Shoda doesn't expect to discover these differences: the sample size is simply too small.

In recent years, researchers have begun making house visits to many of the original subjects, including Carolyn Weisz, as they try to better understand the familial contexts that shape self-control. "They turned my kitchen into a lab," Carolyn told me. "They set up a little tent where they tested my oldest daughter on the delay task with some cookies. I remember thinking, I really hope she can wait." While Mischel closely follows the steady accumulation of data from the laptops and the brain scans, he's most excited by what comes next. "I'm not interested in looking at the brain just so we can use a fancy machine," he says. "The real question is what can we do with this fMRI data that we couldn't do before?" Mischel is applying for an N.I.H. grant to investigate various mental illnesses, like obsessive-compulsive disorder and attention-deficit disorder, in terms of the ability to control and direct attention. Mischel and his team hope to identify crucial neural circuits that cut across a wide variety of ailments. If there is such a circuit, then the same cognitive tricks that increase delay time in a four-year-old might help adults deal with their symptoms. Mischel is particularly excited by the example of the substantial subset of people who failed the marshmallow task as four-year-olds but ended up becoming high-delaying adults. "This is the group I'm most interested in," he says. "They have substantially improved their lives."

Mischel is also preparing a large-scale study involving hundreds of schoolchildren in Philadelphia, Seattle, and New York City to see if self-control skills can be taught. Although he previously showed that children did much better on the marshmallow task after being taught a few simple "mental transformations," such as pretending the marshmallow was a cloud, it remains unclear if these new skills persist over the long term. In other words, do the tricks work only during the experiment or do the children learn to apply them at home, when deciding between homework and television?

Angela Lee Duckworth, an assistant professor of psychology at the University of Pennsylvania, is leading the program. She first grew interested in the subject after working as a high-school math teacher. "For the most part, it was an incredibly frustrating experience," she says. "I gradually became convinced that trying to teach a teen-ager algebra when they don't have self-control is a pretty futile exercise." And so, at the age of thirty-two, Duckworth decided to become a psychologist. One of her main research projects looked at the relationship between self-control and grade-point average. She found that the ability to delay gratification—eighth graders were given a choice between a dollar right away or two dollars the following week—was a far better predictor of academic performance than I.Q. She said that her study shows that "intelligence is really important, but it's still not as important as self-control."

Last year, Duckworth and Mischel were approached by David Levin, the co-founder of KIPP, an organization of sixty-six public charter schools across the country. KIPP schools are known for their long workday—students are in class from 7:25 A.M. to 5 P.M.—and for dramatic improvement of inner-city students' test scores. (More than eighty per cent of eighth graders at the KIPP academy in the South Bronx scored at or above grade level in reading and math, which was nearly twice the New York City average.) "The core feature of the KIPP approach is that character matters for success," Levin says. "Educators like to talk about character skills when kids are in kindergarten—we send young kids home with a report card about 'working well with others' or 'not talking out of turn.' But then, just when these skills start to matter, we stop trying to improve them. We just throw up our hands and complain."

Self-control is one of the fundamental "character strengths" emphasized by KIPP—the KIPP academy in Philadelphia, for instance, gives its students a shirt emblazoned with the slogan "Don't Eat the Marshmallow." Levin, however, remained unsure about how well the program was working—"We know how to teach math skills, but it's harder to measure character strengths," he says—so he contacted Duckworth and Mischel, promising them unfettered access to KIPP students. Levin also helped bring together additional schools willing to take part in the experiment, including Riverdale Country School, a private school in the Bronx; the Evergreen School for gifted children, in Shoreline, Washington; and the Mastery Charter Schools, in Philadelphia.

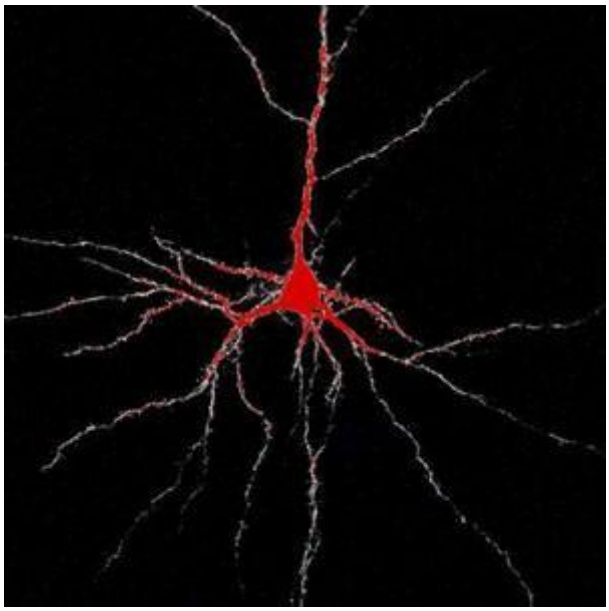
For the past few months, the researchers have been conducting pilot studies in the classroom as they try to figure out the most effective way to introduce complex psychological concepts to young children. Because the study will focus on students between the ages of four and eight, the classroom lessons will rely heavily on peer modelling, such as showing kindergartners a video of a child successfully distracting herself during the marshmallow task. The scientists have some encouraging preliminary results—after just a few sessions, students show significant improvements in the ability to deal with hot emotional states—but they are cautious about predicting the outcome of the long-term study. "When you do these large-scale educational studies, there are ninety-nine uninteresting reasons the study could fail," Duckworth says. "Maybe a teacher doesn't show the video, or maybe there's a field trip on the day of the testing. This is what keeps me up at night."

Mischel's main worry is that, even if his lesson plan proves to be effective, it might still be overwhelmed by variables the scientists can't control, such as the home environment. He knows that it's not enough just to teach kids mental tricks—the real challenge is turning those tricks into habits, and that requires years of diligent practice. "This is where your parents are important," Mischel says. "Have they established rituals that force you to delay on a daily basis? Do they encourage you to wait? And do they make waiting worthwhile?" According to Mischel, even the most mundane routines of childhood—such as not snacking before dinner, or saving up your allowance, or holding out until Christmas morning—are really sly exercises in cognitive training: we're teaching ourselves how to think so that we can outsmart our desires. But Mischel isn't satisfied with such an informal approach. "We should give marshmallows to every kindergartner," he says. "We should say, 'You see this marshmallow? You don't have to eat it. You can wait. Here's how.' " ♦

ILLUSTRATION: BARRY BLITT

http://www.newyorker.com/reporting/2009/05/18/090518fa_fact_lehrer?currentPage=all

Impaired Brain Plasticity Linked To Angelman Syndrome Learning Deficits



Pyramidal cell with staining. A type of neuron found in the cerebral cortex, the hippocampus and amygdala. These are the primary excitation units of the prefrontal cortex and spinal tract in mammals. Recent studies on pyramidal neurons have focused on topics ranging from neuroplasticity to cognition. (Credit: Image provided by Ben Philpot lab)

ScienceDaily (May 20, 2009) — How might disruption of a single gene in the brain cause the severe cognitive deficits associated with Angelman syndrome, a neurogenetic disorder? Researchers at the University of North Carolina at Chapel Hill School of Medicine and Duke University now believe they have the answer: impaired brain plasticity.

"When we have experiences, connections between brain cells are modified so that we can learn," said Benjamin Philpot, Ph.D., professor of cell and molecular physiology at UNC and senior author of the study published online May 10 in Nature Neuroscience. "By strengthening and weakening appropriate connections between brain cells, a process termed 'synaptic plasticity', we are able to constantly learn and adapt to an ever-changing environment."

Angelman syndrome occurs in one in 15,000 live births. The most common genetic defect of the syndrome is the lack of expression of the gene UBE3A on chromosome 15. The syndrome often is misdiagnosed as cerebral palsy or autism. Characteristics of the syndrome include intellectual and developmental delay, severe mental retardation lack of speech (minimal or no use of words), seizures, sleep disturbance, hand flapping and motor and balance disorders.

Philpot and his co-authors studied a mouse model of Angelman syndrome. In these mice, the gene UBE3A is functionally deficient. The study found that brain cells in the mice lacked the ability to appropriately strengthen or weaken their connections in the neocortex, a region of the brain that is important for cognitive abilities.

"If brain cells were unable to modify their connections with new experiences, then we would have difficulty learning," said Michael Ehlers, M.D., Ph.D., professor of neurobiology at Duke and co-senior author of the study. "We have found that a specific form of brain plasticity is severely impaired in a mouse model of Angelman syndrome and this prevents brain circuits from encoding information provided by sensory experiences. In addition, an exciting possibility is that the defect we have found may be a more general feature of other disorders of brain development including autism."

The inability of brain cells to encode information from experiences in the Angelman syndrome model suggests that this is the basis for the learning difficulties in these patients.

"It is difficult to study how experiences lead to changes in the brain in models of mental retardation," said Koji Yashiro, PhD, a former graduate student in Philpot's lab and lead author of the study, now a scientist with Urogenix, Inc. in Research Triangle Park, North Carolina. "Instead of studying a complex learning model, we studied how connections between brain cells change in visual areas of mice exposed to light or kept in darkness. This approach revealed that brain cells in normal mice can modify their connections in response to changes in visual experiences, while the brain cells in Angelman syndrome model mice could not."

An unexpected finding was that the plasticity of the cellular connections could be restored in visual areas of the brain after brief periods of visual deprivation. Philpot said the observation that the brain defect could be reversed "is very encouraging, as it suggests that viable behavioral or pharmacological therapies are likely to exist."

"By showing that brain plasticity can be restored in Angelman syndrome model mice, our findings suggest that brain cells in Angelman syndrome patients maintain a latent ability to express plasticity. We are now collaborating to find a way to tap into this latent plasticity, as this could offer a treatment, or even a cure, for Angelman syndrome," said Philpot.

Philpot added, "This same experimental approach could also reveal how brain cells encode information from experiences in other related disorders, such as autism, and may provide a model to find cures for a variety of neurodevelopmental disorders."

Other authors are, from Philpot's UNC lab: Thorfinn Riday, graduate student; Adam Roberts, Ph.D., postdoctoral fellow; Danilo Bernardo, medical student; and Rohit Prakash, former M.D./Ph.D. rotation student. Kathryn Condon, a graduate student in Ehler's lab and the department of neurobiology at Duke University; and Richard Weinberg, Ph.D., professor of cell and developmental biology at UNC, also participated in the research.

Support for the work came from grants from the National Institutes of Health, the Howard Hughes Medical Institute, the Angelman Syndrome Foundation and the Simons Foundation.

Adapted from materials provided by University of North Carolina School of Medicine.

http://www.sciencedaily.com/releases/2009/05/090510142547.htm

Children Raise Their Parents

Adolescents and young adults do not just passively take on the values of their parents; they also socialize their parents. (Credit: iStockphoto/Lisa F. Young)

ScienceDaily (May 20, 2009) — Whatever Prime Minister Balkenende may say, values are learnt at home; but not only from parents. Dutch researcher Annette Roest studied the role of the family in passing on personal values. Parents influence their children. But children also influence their parents. And parents influence each other.

For her research Roest made use of written interviews with fathers, mothers and children of intact two-parent families that were conducted over a period of ten years. The first interview took place in 1990, when 660 families took part, and the last was conducted in 2000, with 295 families remaining.

The researcher argues for a clear distinction between value transmission and value similarity. Many researchers make no distinction between the two, but on the basis of her research, Roest concludes that such a distinction should be made. Although a personal value can be passed on from father to son, this does not mean that father and son will share exactly the same values later on. A measurement at a single point in time can measure similarities but not transmission or change, whereas a measurement taken at several points in time can.

Not one-way traffic

The fact that personal values are passed on from parent to child is not so surprising. What is striking, however, is that certain values are passed on to a child mainly by the father and others mainly by the mother. For example, fathers are important for passing on values relating to ideas about work. On the other hand, mothers are important in passing on self-determination; being able to do what you want of your own free will. But mothers also influence fathers with respect to values concerning the enjoyment of life and having fun. Furthermore, adolescents and young adults do not just passively take on the values of their parents; they also socialise their parents.

Roest established that adolescents influence their fathers with respect to values relating to the enjoyment of life. They also influence their parents' work ethos. Surprisingly, it is mainly boys that exert this influence. Roest found no evidence of girls influencing their parents. Value socialisation should be regarded as a complex and dynamic process, says Annette Roest. Family members influence each other and, moreover, the value socialisation in the family does not occur in a vacuum. The 'zeitgeist' plays a major role. This complexity means that it is possible to intervene in norms and values through different channels, not only through parents.

Adapted from materials provided by Netherlands Organization for Scientific Research, via AlphaGalileo.

http://www.sciencedaily.com/releases/2009/05/090514084059.htm

Thomas Becket paintings unveiled in Spain

By Danny Wood
BBC News, Madrid

For the first time in 30 years, wooden protective boards and a glass panel have been taken away to fully reveal a rare medieval artwork.

The paintings in the ruined church of St Nicolas in the Spanish town of Soria tell the story of the murder of the English Archbishop Thomas Becket.

The story of Becket is told in most British classrooms as part of medieval history lessons. He is remembered as the Archbishop of Canterbury who stood up to a king and for his trouble was murdered by the king's knights while he was praying.

The murder was to turn Becket into a saint. It was also one of the first big showdowns between the Roman Catholic Church and a European monarchy.

King Henry II never forgave himself for his role in the murder of his political foe and his guilty conscience found its way to Spain. His daughter, Eleanor of England, married the Spanish King, Alfonso VIII.

As a way of asking God to forgive her father, Eleanor commissioned paintings of the murder of Becket to adorn the walls of a church in the northern Spanish town of Soria.

Today the church of Saint Nicolas is a complete wreck near Soria's main square, but three decades ago, builders were stabilising the ruin when they re-discovered these medieval paintings in excellent condition.

Disappearing fast

Since then a glass panel together with a wooden board have been the only protection for these beautiful works of art that are otherwise exposed to the open air.

Luis Romera has been campaigning with a group of locals for several years to get the paintings properly restored. "The paintings are important because there is nothing like them in all Spain," he says.

"It is intriguing enough to find a painting in a medieval church depicting a murder, and even more so when it is in Spain, and this is more to do with the history of England!"

Luis says this shared history needs to be saved but that it has to be done quickly before the paintings completely disappear.

When the Soria town council agreed to reveal the Thomas Becket paintings to the BBC and a small gathering of local media, it was clear what Luis meant. Compared to photos taken when they were rediscovered in the late 1970s, half of the work has vanished.

During the last 30 years, no-one has taken responsibility for this rare medieval treasure. Part of the problem is that even in Soria, many of the locals don't seem to know about the paintings.

Talking to people in the street, the typical response to inquiries about the Thomas Becket paintings was: "What paintings?"

The ruined church was still in the hands of the Roman Catholic Church until about five years ago when it became the responsibility of the town council.

In a bid to boost tourism, the town council has been campaigning to secure state funding to restore the historic centre of Soria. Tied up in that slow process of bidding for the big bucks, the paintings looked doomed to disappear.

But the Mayor, Carlos Martinez, has announced a restoration project that might start in time to save the Becket paintings.

"No-one can be proud of the state these paintings are in," says Mr Martinez. "I think it's now up to the town council to take responsibility as the owner of this ruined church," he says.

"We're contributing about half a million euros to restore the ruined church - including the crypt area and the paintings."

The results of the efforts, he believes, will be visible during this year.

Luis Romera and his supporters hope it is not too late. In the meantime, the paintings have been covered up again with their glass panel and wooden protective board as they await a possible final restoration.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/europe/8029320.stm

Published: 2009/05/15 10:24:10 GMT

Perfectionism Linked to Early Death

By: Tom Jacobs

That's the conclusion of a Canadian study of senior citizens just published in the *Journal of Health Psychology*. Researchers conducted psychological tests on 450 elderly residents of southern Alberta, and then kept tabs on them for 6½ years. During that period, just over 30 percent of the subjects, who ranged in age from 65 to 87, died.

Perfectionists — that is, those who expressed "a strong motivation to be perfect" and revealed a tendency toward "all or nothing thinking" — were approximately 51 percent more likely to have died during the life of the study than those with more reasonable self-expectations. Those who were rated high on neuroticism — for instance, those who reported often feeling tense — did even worse: Their risk of death nearly doubled compared with those with a more relaxed disposition.

In contrast, "risk of death was significantly lower for high scorers in conscientiousness, extraversion and optimism," reports lead author Prem S. Fry, a research psychologist at British Columbia's Trinity Western University. She notes that previous research has found that "perfectionism exerts a great deal of stress on health," while optimism "is viewed as a stress-alleviating factor.""In short, our findings confirmed that conscientiousness and extraversion are health-related dimensions that are enabling in their effects, and perfectionism and neuroticism are disabling," she concludes. "It is noteworthy that these associations endure well into late life."The findings have interesting implications for seniors' health care providers and caregivers. They suggest physicians and family members are well-advised to be vigilant in noticing perfectionist tendencies, and understanding of the physical and psychological toll they can take.

The desire to pursue a favorite task or hobby at the same high level one achieved in previous years is very understandable, and in many ways commendable. But at the same time, it's important to be cognizant of the stress such an effort can produce and the negative health effects that can result.

http://www.miller-mccune.com/news/perfectionism-linked-to-early-death-1229.print

Guest Column: Math and the City

By Steven Strogatz

As one of Olivia Judson's biggest fans, I feel honored and a bit giddy to be filling in for her. But maybe I should confess up front that, unlike Olivia and the previous guest writers, I'm not a biologist, evolutionary or otherwise. In fact, I'm (gasp!) a mathematician.

One of the pleasures of looking at the world through mathematical eyes is that you can see certain patterns that would otherwise be hidden. This week's column is about one such pattern. It's a beautiful law of collective organization that links urban studies to zoology. It reveals Manhattan and a mouse to be variations on a single structural theme. The mathematics of cities was launched in 1949 when George Zipf, a linguist working at Harvard, reported a striking regularity in the size distribution of cities. He noticed that if you tabulate the biggest cities in a given country and rank them according to their populations, the largest city is always about twice as big as the second largest, and three times as big as the third largest, and so on. In other words, the population of a city is, to a good approximation, inversely proportional to its rank. Why this should be true, no one knows. Even more amazingly, Zipf's law has apparently held for at least 100 years. Given the different social conditions from country to country, the different patterns of migration a century ago and many other variables that you'd think would make a difference, the generality of Zipf's law is astonishing.

Keep in mind that this pattern emerged on its own. No city planner imposed it, and no citizens conspired to make it happen. Something is enforcing this invisible law, but we're still in the dark about what that something might be. Many inventive theorists working in disciplines ranging from economics to physics have taken a whack at explaining Zipf's law, but no one has completely solved it. Paul Krugman, who has tackled the problem himself, wryly noted that "the usual complaint about economic theory is that our models are oversimplified — that they offer excessively neat views of complex, messy reality. [In the case of Zipf's law] the reverse is true: we have complex, messy models, yet reality is startlingly neat and simple."

After being stuck for a long time, the mathematics of cities has suddenly begun to take off again. Around 2006, scientists started discovering new mathematical laws about cities that are nearly as stunning as Zipf's. But instead of focusing on the sizes of cities themselves, the new questions have to do with how city size affects other things we care about, like the amount of infrastructure needed to keep a city going. For instance, if one city is 10 times as populous as another one, does it need 10 times as many gas stations? No. Bigger cities have more gas stations than smaller ones (of course), but not nearly in direct proportion to their size. The number of gas stations grows only in proportion to the 0.77 power of population. The crucial thing is that 0.77 is less than 1. This implies that the bigger a city is, the fewer gas stations it has per person. Put simply, bigger cities enjoy economies of scale. In this sense, bigger is greener.

The same pattern holds for other measures of infrastructure. Whether you measure miles of roadway or length of electrical cables, you find that all of these also decrease, per person, as city size increases. And all show an exponent between 0.7 and 0.9.Now comes the spooky part. The same law is true for living things. That is, if you mentally replace cities by organisms and city size by body weight, the mathematical pattern remains the same.

For example, suppose you measure how many calories a mouse burns per day, compared to an elephant. Both are mammals, so at the cellular level you might expect they shouldn't be too different. And indeed, when the cells of 10 different mammalian species were grown outside their host organisms, in a laboratory tissue culture, they all displayed the same metabolic rate. It was as if they didn't know where they'd come from; they had no genetic memory of how big their donor was.

But now consider the elephant or the mouse as an intact animal, a functioning agglomeration of billions of cells. Then, on a pound for pound basis, the cells of an elephant consume far less energy than those of a mouse. The relevant law of metabolism, called Kleiber's law, states that the metabolic needs of a mammal grow in proportion to its body weight raised to the 0.74 power. This 0.74 power is uncannily close to the 0.77 observed for the law governing gas stations in cities. Coincidence? Maybe, but probably not. There are theoretical grounds to expect a power close to 3/4. Geoffrey West of the Santa Fe Institute and his colleagues Jim Brown and Brian Enquist have argued that a 3/4-power law is exactly what you'd expect if natural selection has evolved a transport system for conveying energy and nutrients as efficiently and rapidly as possible to all points of a three-dimensional body, using a fractal network built from a series of branching tubes — precisely the architecture seen in the circulatory system and the airways of the lung, and not too different from the roads and cables and pipes that keep a city alive.

These numerical coincidences seem to be telling us something profound. It appears that Aristotle's metaphor of a city as a living thing is more than merely poetic. There may be deep laws of collective organization at work here, the same laws for aggregates of people and cells. The numerology above would seem totally fortuitous if we hadn't viewed cities and organisms through the lens of mathematics. By abstracting away nearly all the details involved in powering a mouse or a city, math exposes their underlying unity. In that way (and with apologies to Picasso), math is the lie that makes us realize the truth.

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NOTES:

For Zipf's law see:

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New light on Down's cancer link

Scientists may have solved the mystery of why people with Down's syndrome seem to have a lower risk of some cancers.

The extra copy of chromosome 21 which causes Down's appears to contain a gene that protects from solid cancerous tumours, tests on mice suggest.

The gene seems to interfere with signals a tumour relies on to grow. The finding raises hope of new ways to prevent and treat cancer.

The study by the Children's Hospital of Boston appears in the journal Nature.

" **This finding raises several important questions about the roles of other chromosome 21 genes that might help regulate tumour growth** "
Dr Kairbaan Hodivala-Dilke Queen Mary, University of London

Humans usually have two copies of the 23 chromosomes that together contain all our genetic information, one from each parent.

Down's syndrome is a genetic disorder which results from the presence of an extra, third copy of chromosome 21.

It has been known for some time that individuals with Down's syndrome get certain types of cancer less often than those without the condition.

However, the reason why has been unclear.

The latest study showed that having an extra copy of one of the genes located on chromosome 21 - a gene called Dscr1 - is sufficient to slow cancer growth in mice.

The gene seems to work in combination with another gene also found on chromosome 21 to interfere with the signals a tumour relies upon to stimulate growth of its own blood vessels.

Without those vessels feeding the tumour with its own supply of blood it cannot thrive.

Inspiration

Writing in the journal, the researchers, led by Dr Sandra Ryeom, said: "It is, perhaps, inspiring that the Down's syndrome population provides us with new insight into mechanisms that regulate cancer growth and, by so doing, identifies potential targets for tumour prevention and therapy."

Dr Kairbaan Hodivala-Dilke, a Cancer Research UK scientist at Queen Mary, University of London, said: "This finding raises several important questions about the roles of other chromosome 21 genes that might help regulate tumour growth.

"The next stage is to think about how we might be able to exploit this research to improve cancer treatments in the future."

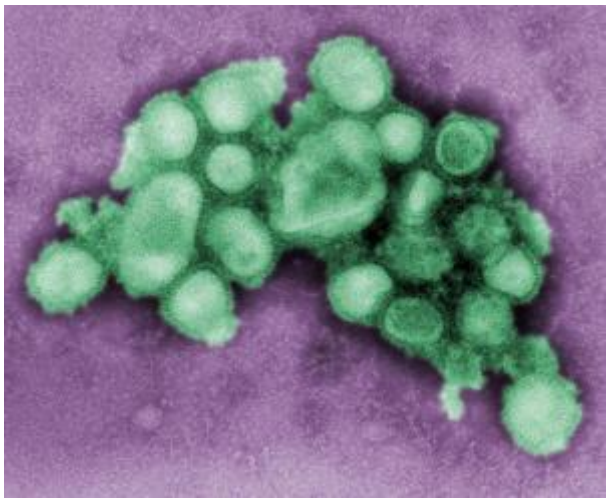
Stuart Mills, of the Down's Syndrome Association, said: "We have known for some time that people with Down's syndrome have lower incidences of cancer, apart from leukaemia, than the rest of the population.

"This is one of the first studies to examine the reasons why, and we welcome its findings. We will be following further research with great interest."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8055342.stm

Published: 2009/05/20 23:04:07 GMT

Swine Flu: Influenza A (H1N1) Susceptibility Linked To Common Levels Of Arsenic Exposure



This colorized negative stained transmission electron micrograph (TEM) depicts some of the ultrastructural morphology of the A/CA/4/09 swine flu virus. (Credit: CDC/C. S. Goldsmith and A. Balish)

ScienceDaily (May 21, 2009) — The ability to mount an immune response to influenza A (H1N1) infection is significantly compromised by a low level of arsenic exposure that commonly occurs through drinking contaminated well water, scientists at the Marine Biological Laboratory (MBL) and Dartmouth Medical School have found.

Joshua Hamilton, the MBL's Chief Academic and Scientific Officer and a senior scientist in the MBL's Bay Paul Center; graduate student Courtney Kozul of Dartmouth Medical School, where the work was conducted; and their colleagues report their findings in the journal *Environmental Health Perspectives.*

"When a normal person or mouse is infected with the flu, they immediately develop an immune response," says Hamilton, in which immune cells rush to the lungs and produce chemicals that help fight the infection. However, in mice that had ingested 100 ppb (parts per billion) arsenic in their drinking water for five weeks, the immune response to H1N1 infection was initially feeble, and when a response finally did kick in days later, it was "too robust and too late," Hamilton says. "There was a massive infiltration of immune cells to the lungs and a massive inflammatory response, which led to bleeding and damage in the lung." Morbidity over the course of the infection was significantly higher for the arsenic-exposed animals than the normal animals.

Respiratory infections with influenza A virus are a worldwide health concern and are responsible for 36,000 deaths annually. The recent outbreak of the influenza A H1N1 substrain ("swine flu") which is the same virus that Hamilton and his colleagues used in their arsenic study to date has killed 72 people in Mexico and 6 in the United States.

"One thing that did strike us, when we heard about the recent H1N1 outbreak, is Mexico has large areas of very high arsenic in their well water, including the areas where the flu first cropped up. We don't know that the Mexicans who got the flu were drinking high levels of arsenic, but it's an intriguing notion that this may have contributed," Hamilton says.

The U.S. Environmental Protection Agency considers 10 ppb arsenic in drinking water "safe," yet concentrations of 100 ppb and higher are commonly found in well water in regions where arsenic is geologically abundant, including upper New England (Massachusetts, New Hampshire, Maine), Florida, and large parts of the Upper Midwest, the Southwest, and the Rocky Mountains, Hamilton says.

Arsenic does not accumulate in the body over a lifetime, as do other toxic metals such as lead, cadmium, and mercury. "Arsenic goes right through us like table salt," Hamilton says. "We believe for arsenic to have health consequences, it requires exposure day after day, year after year, such as through drinking water."

Arsenic exposure not only disrupts the innate immune system, as the present study shows, it also disrupts the endocrine (hormonal) system in an unusually broad way, which Hamilton's laboratory discovered and first reported in 1998.

"Most chemicals that disrupt hormone pathways target just one, such as the estrogen pathway," he says. "But arsenic disrupts the pathways of all five steroid hormone receptors (estrogen, testosterone, progesterone, glucocorticoids, and mineralocorticoids), as well as several other hormone pathways. You can imagine that just this one effect could play a role in cancer, diabetes, heart disease, reproductive and developmental disorders–all the diseases that have a strong hormonal component."

At this point, Hamilton thinks arsenic disrupts the innate immune system and the endocrine system through different mechanisms. "Arsenic may ultimately be doing a similar thing inside the cell to make these effects happen, but the targets are likely different," he says. The proteins that mediate hormone response are different than the proteins that mediate the immune response. "We don't yet know how arsenic disrupts either system at the molecular level. But once we know how it affects one system, we will have a pretty good idea of how it affects the other systems as well."

Presently, Hamilton's lab is focused on understanding the unusual "biphasic" effect that arsenic has on the endocrine system. At very low doses, arsenic stimulates or enhances hormone responses, while at slightly higher doses (still within the range found in drinking water), it suppresses these same hormone responses.

"Why we see that dramatic shift (from hormone enhancement to suppression) over such a narrow dose range is quite fascinating and totally unknown," Hamilton says. "Our principal focus is to figure out this switch. We think that will help us understand why arsenic does what it does in the body."

This research was funded by the Dartmouth Toxic Metals Research Program Project by a grant from NIH-NIEHS and its Superfund Basic Research Program (grant P42 ES007373).

Journal reference:

1. Kozul et al. **Low Dose Arsenic Compromises the Immune Response to Influenza A Infection in vivo**. *Environmental Health Perspectives*, Online May 20, 2009; DOI: 10.1289/ehp.0900911

Adapted from materials provided by Marine Biological Laboratory.

http://www.sciencedaily.com/releases/2009/05/090520151436.htm