Infoteca's E-Journal

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Sistema de Infotecas Centrales, Universidad Autónoma de Coahuila

CONNTENTS

Academic Ranking of World Universities - 2009

World Rank	Institution	Region	Regional Rank	Country	National Rank	Total Score
1	Harvard University	Americas	1		1	100
2	Stanford University	Americas	2		2	73.1
3	University of California, Berkeley	Americas	3		3	71.0
4	University of Cambridge	Europe	1		1	70.2
5	Massachusetts Institute of Technology (MIT)	Americas	4		4	69.5
6	California Institute of Technology	Americas	5		5	64.8
7	Columbia University	Americas	6		6	61.7
8	Princeton University	Americas	7		7	60.2
9	University of Chicago	Americas	8		8	57.0
10	University of Oxford	Europe	2		2	56.3
11	Yale University	Americas	9		9	55.2
12	Cornell University	Americas	10		10	53.1
13	University of California, Los Angeles	Americas	11		11	52.3
14	University of California, San Diego	Americas	12		12	50.7
15	University of Pennsylvania	Americas	13		13	49.3
16	University of Washington	Americas	14		14	48.0
17	University of Wisconsin - Madison	Americas	15		15	46.7
18	University of California, San Francisco	Americas	16		16	45.9
19	The Johns Hopkins University	Americas	17		17	45.2
20	The University of Tokyo	Asia/Pacific	1		1	45.1
21	University College London	Europe	3		3	44.6
22	University of Michigan - Ann Arbor	Americas	18		18	43.8
23	Swiss Federal Institute of Technology Zurich	Europe	4		1	43.6
24	Kyoto University	Asia/Pacific	2		2	42.7
25	University of Illinois at Urbana-Champaign	Americas	19		19	42.4
26	The Imperial College of Science, Technology and Medicine	Europe	5		4	41.9
27	University of Toronto	Americas	20		1	40.5
28	University of Minnesota, Twin Cities	Americas	21		20	40.4
29	Washington University in St. Louis	Americas	22		21	39.5
30	Northwestern University	Americas	23		22	38.7
31	Duke University	Americas	24		23	37.1
32	New York University	Americas	25		24	36.9
32	Rockefeller University	Americas	25		24	36.9

34	University of Colorado at Boulder	Americas	27		26	36.4
35	University of California, Santa Barbara	Americas	28		27	35.0
36	University of British Columbia	Americas	29		2	34.4
37	University of Maryland, College Park	Americas	30		28	34.1
38	The University of Texas at Austin	Americas	31		29	34.0
39	University of North Carolina at Chapel Hill	Americas	32		30	33.4
40	Pierre and Marie Curie University - Paris 6	Europe	6		1	33.3
41	The University of Manchester	Europe	7		5	33.0
41	Vanderbilt University	Americas	33		31	33.0
43	University of Copenhagen	Europe	8		1	32.7
43	University of Paris Sud Paris 11)	Europe	8		2	32.7
45	Pennsylvania State University - University Park	Americas	34		32	32.5
46	University of California, Irvine	Americas	35		33	32.4
46	University of Southern California	Americas	35		33	32.4
48	The University of Texas Southwestern Medical Center at Dallas	Americas	37		35	32.2
49	University of California, Davis	Americas	38		36	31.8
50	Karolinska Institute	Europe	10		1	31.7
50	University of Pittsburgh	Americas	39		37	31.7
52	Utrecht University	Europe	11		1	31.5
53	The University of Edinburgh	Europe	12		6	31.0
54	University of Zurich	Europe	13		2	30.9
55	Rutgers, The State University of New Jersey - New Brunswick	Americas	40		38	30.4
55	University of Munich	Europe	14		1	30.4
57	Technical University Munich	Europe	15		2	30.2
58	University of Florida	Americas	41		39	29.8
59	Carnegie Mellon University	Americas	42		40	29.6
59	The Australian National University	Asia/Pacific	3		1	29.6
61	University of Bristol	Europe	16		7	29.5
62	The Ohio State University - Columbus	Americas	43		41	29.1
63	University of Heidelberg	Europe	17		3	28.7
64	The Hebrew University of Jerusalem	Asia/Pacific	4		1	28.6
65	King's College London	Europe	18		8	28.5
65	McGill University	Americas	44		3	28.5
65	Purdue University - West Lafayette	Americas	44		42	28.5
65	University of Oslo	Europe	18		1	28.5
69	Brown University	Americas	46		43	28.4
70	Ecole Normale Superieure - Paris	Europe	20		3	28.1
71	Osaka University	Asia/Pacific	5		3	27.8

72	Leiden University	Europe	21		2	27.7
72	University of Helsinki	Europe	21		1	27.7
74	Boston University	Americas	47		44	27.3
75	University of Melbourne	Asia/Pacific	6		2	27.2
76	Uppsala University	Europe	23		2	27.1
77	Moscow State University	Europe	24		1	26.9
77	University of Arizona	Americas	48		45	26.9
77	University of Rochester	Americas	48		45	26.9
80	University of Utah	Americas	50		47	26.6
81	The University of Sheffield	Europe	25		9	26.3
82	Nagoya University	Asia/Pacific	7		4	26.0
83	University of Nottingham	Europe	26		10	25.9
84	Tohoku University	Asia/Pacific	8		5	25.8
85	University of Basel	Europe	27		3	25.6
86	Michigan State University	Americas	51		48	25.5
87	Case Western Reserve University	Americas	52		49	25.3
88	Stockholm University	Europe	28		3	25.2
88	Texas A&M University - College Station	Americas	53		50	25.2
90	University of Goettingen	Europe	29		4	24.9
91	McMaster University	Americas	54		4	24.6
91	University of Virginia	Americas	54		51	24.6
93	Indiana University Bloomington	Americas	56		52	24.4
94	Arizona State University - Tempe	Americas	57		53	24.3
94	University of Birmingham	Europe	30		11	24.3
94	University of Sydney	Asia/Pacific	9		3	24.3
97	University of Aarhus	Europe	31		2	24.2
98	University of Bonn	Europe	32		5	24.1
99	Rice University	Americas	58		54	23.9
100	Emory University	Americas	59		55	23.8

http://www.arwu.org/ARWU2009.jsp

Timeline: The secret history of swine flu

- 15:26 29 October 2009 by **Debora MacKenzie** and **Michael Marshall**

16 August 1957: a nurse at Montefiore Hospital gets the first Asian flu vaccine shot in New York (Image: Associated Press)

Six months ago, swine flu emerged as a massive threat to global health. It seemed to come out of nowhere, but our timeline explains how the origins of the H1N1 pandemic go back more than a century

1889

Prior to 1889, the main flu virus circulating in humans has been from the H1 family. But this year, a new strain of H2 flu emerges in Russia and spreads around the world, killing about 1 million people. Afterwards, H2 replaces H1 in humans. Such replacements seem to be a regular feature of flu pandemics.

People born before 1889, who have been exposed to H1 flu, have some immunity to it. This affords them some protection in the deadly H1N1 epidemic of 1918. Those born after 1889 do not have any immunity to H1.

1918

The "Spanish flu" epidemic of 1918 kills at least 50 million people worldwide. It is caused by an H1N1 virus which evolves directly from a bird flu into a human flu.

After a mild wave of infections in the summer, the epidemic goes global: one-third of the population eventually get sick. Although most cases are mild, many sufferers develop a rapidly fatal infection deep in their lungs. People born before 1889 are less susceptible, thanks to their previous exposure to H1N1.

Most deaths are caused by bacterial lung infections that move in after the virus. Modern antibiotics might mean that a re-run of the 1918 pandemic would be less dangerous.

After 1919, the descendants of the H1N1 virus continue to circulate and cause seasonal flu outbreaks in humans – and pigs.

1931

Swine flu is first isolated from a pig in Iowa.

1933

The first human flu virus is isolated at Mill Hill in London. When given to ferrets, it produces a disease whose symptoms are all but identical to the Iowan pig virus. But ferrets that have had the human virus are not fully immune to the pig virus, showing that the two viruses have already started to evolve apart.

1957

An H2N2 virus causes the "Asian" flu pandemic, completely displacing the H1N1 viruses that have been circulating in humans since 1918. The pandemic is fairly mild, killing 1 to 1.5 million people worldwide.

The virus is produced by a reassortment, in which human-adapted H1N1 swaps genes with an H2N2 bird flu. The new H and N surface proteins mean most people do not have antibodies to the virus, allowing it to go pandemic. However, its human-adapted genes mean it is not as lethal to humans as the 1918 virus, which came, with few changes, from birds.

People tend to mount the best immune response to the first kind of flu virus they experience. Because of this, people born before 1957, whose first experience of flu would have been the H1N1 viruses then in circulation, have some immunity to the 2009 H1N1 strain causing the current pandemic. People born after the 1957 pandemic do not have this immunity.

1968

An H3N2 virus causes the "Hong Kong" flu pandemic, which is even milder than the Asian flu, killing an estimated 0.75 million to 1 million people worldwide.

The virus only differs from H2N2 in one of its surface proteins, the H; since many people still have antibodies to the unchanged N2 protein, its effects are less severe. But because H3N2 completely replaces H2N2 in people, no one born since 1968 has any immunity to H2.

1972

Researchers Graham Laver and Robert Webster discover that waterfowl are the natural hosts of influenza viruses. The birds harbour strains unknown in humans that could reassort with human strains and give rise to new human pandemics.

1976

An H1N1 virus jumps from pigs to humans and kills a US army recruit. However the virus does not spread beyond the army base and fizzles out without triggering a pandemic.

Nevertheless, fears of a replay of the 1918 pandemic lead to 48 million people being hastily vaccinated against the swine flu virus. The vaccine is associated with an unusual number of cases of Guillain-Barré syndrome: 532 people get it, and 25 die.

1977

An H1N1 virus appears in north-east China and starts circulating in humans. It causes seasonal flu in every subsequent year. No one knows where it came from, though it looks like an H1N1 that circulated in the Soviet Union in 1950 and some suspect it escaped in a laboratory accident.

The virus causes a mild flu pandemic, which mainly affects people born after H1N1 flu disappeared in 1957. However, the real surprise is that it does not displace the previous, and more virulent, seasonal flu, H3N2. Instead, it continues circulating alongside it.

The antibodies people produce after being infected by this new seasonal H1N1 do not protect against 2009 H1N1. However, infections also trigger another reaction called cell-mediated immunity, in which certain white blood cells target and destroy infected cells. Tests of the 2009 H1N1 pandemic vaccine show that, unlike antibodies, cell-mediated immunity to seasonal H1N1 may help protect against the pandemic virus. This does not prevent disease altogether, but can reduce its severity

1998

The predecessor of the 2009 H1N1 swine flu virus emerges in the US. It is a hybrid of human, bird and swine flu viruses, and by 1999 it is the dominant flu strain in US pigs.

US pig farms try to control it with vaccines, but these attempts are largely ineffective because the virus evolves too rapidly, changing the surface proteins targeted by the vaccine while keeping its internal genes unchanged. The 2009 pandemic virus is a variant on this 1998 flu, and behaves the same way.

2004-2006

H5N1 flu, first identified as a threat to humans in Hong Kong in 1997, spreads from Asia around the world, apparently carried by wild birds. While this "bird flu" proves deadly to humans, killing more than half of its victims, it is kept in check by its inability to spread readily from human to human. H5N1 is also found in pigs in Indonesia, raising fears that it might reassort with other human flu viruses that pigs can harbour.

The threat posed by bird flu leads to the first real efforts to be made at pandemic planning: governments start to stockpile antiviral drugs, and the world's drug companies start doing serious research on pandemic vaccines. These plans are made with the highly lethal H5N1 in mind, meaning that they are not always appropriate for the 2009 pandemic.

Read more: *Bird Flu*

2007-2008

Pandemic fears boost spending on flu research. European scientists start organising to track flu in wild birds, Vietnamese scientists find that antibodies from bird flu victims can cure other cases of the virus (a technique used in Hong Kong in 2009), the risk of dying of flu is found to be partly genetic, and it turns out that your mother was right to warn you about catching the flu when it's cold out.

However, Indonesia, where most H5N1 outbreaks are happening, refuses to share samples of the virus, arguing that it will not benefit in return from any vaccines developed as a result. This means scientists cannot monitor the virus's evolution.

But worries about H5N1 subside as it fails to become contagious in people – although virologists continue to warn that it is not the only threatening flu virus out there. Viruses from the H9, H7 and H2 families all give cause for concern.

March 2009

The first cases of a new type of swine flu are reported in California and Texas in late March. Subsequent genetic analysis suggests that it may have started circulating in humans in January.

April 2009

On 27 April, with 900 cases of suspected swine flu reported in Mexico, the World Health Organization (WHO) upgrades the pandemic warning level from 3 to 4 on a six-point scale. Intensive efforts to understand the virus and develop a vaccine begin immediately.

The US government advises against travel to Mexico, although research suggests that travel bans will not stop the virus spreading.

May 2009

Although swine flu seems to be spreading slowly, it is still progressing quickly enough to justify preparing for a pandemic. However, the WHO delays declaring a pandemic, partly because there is not enough evidence that the virus is spreading in the general population outside the Americas, where it originated.

New Scientist reveals that Europe is not testing people with flu symptoms unless they have recently travelled to an affected area in the Americas, or have had close contact with someone who did. As a result, Europe cannot detect spread in the general population. These restrictions may be making the pandemic "invisible" to the monitoring authorities.

As concerns mount, it transpires that many countries are poorly prepared for this scenario and that supplies of H1N1 vaccine cannot be prepared in time to catch the second wave.

June 2009

The UK and other countries change their rules and start testing people who have flu but no North American contacts. Cases of swine flu are soon detected.

On 11 June the WHO officially declares swine flu to be a pandemic. This is the signal for the vaccine industry to start making pandemic vaccine (paid for by governments), rather than conventional flu vaccine (paid for by ordinary health services).

July 2009

Treatment plans are shaken by the discovery of swine flu that is resistant to the antiviral drug Tamiflu and the realisation that the H1N1 vaccine is growing only half as fast as the ordinary flu vaccine.

The US decides to use its standard formulation for flu vaccine, so no new regulatory tests will be needed. This will allow it to authorise pandemic vaccine before September, when a renewed wave of the

pandemic is expected. But this formulation uses a lot of virus, and so reduces the number of doses that can be made.

Researchers discover that the swine flu virus binds far deeper in the lungs than ordinary flu, possibly explaining why it is sometimes fatal. However, the majority of cases are still mild, and it appears that many of the people with severe cases have an underlying health problem – although some of these "problems" are no more remarkable than being overweight, pregnant or unborn.

In the southern hemisphere, where it is winter, swine flu apparently replaces the usual seasonal flu. This suggests that the pandemic virus will displace the two previous seasonal flu strains, as previous pandemics have done. However, after the experience of 1977, when this did not happen, scientists do not rule out the return of H3N2 after the autumn wave of swine flu.

August 2009

A *New Scientist* poll reveals widespread concern about swine flu among public health officials and epidemiologists, many of whom have obtained supplies of antiviral drugs for their own families.

September 2009

Four major vaccine manufacturers report that their swine flu vaccines work with only one shot. This is good news, given that vaccine is in short supply despite researchers' success in finding faster-growing strains. The vaccine's effectiveness suggests there must be pre-existing cell-mediated immunity, possibly because of similarities between the surface proteins on swine flu and the seasonal H1N1 flu that emerged in 1977.

As autumn arrives in the northern hemisphere, experts are on tenterhooks: a particular worry is that swine flu will hybridise with bird flu to create a readily contagious human flu armed with a lethal H5 surface protein. At time of writing, the virus had not become more severe, causing mild disease in most sufferers but making a small number – probably less than 1 per cent – extremely ill.

October 2009

Vaccination programmes begin in the US and Europe, but many healthcare workers are reluctant to have the vaccine, even though it is virtually identical to the seasonal vaccines used in previous years, which have a good safety record.

Production delays also continue to plague the deployment of vaccine. By 22 October, the US has only 27 million doses available, compared with the expected 45 million. Researchers show that this much vaccine will reduce the number of cases in the second wave by less than 6 per cent – but that is still enough to save 2000 lives.

Six months after swine flu first shot to world attention, US President Barack Obama declares the virus a national emergency.

http://www.newscientist.com/article/dn18063-timeline-the-secret-history-of-swine-flu.html

North Carolina Sea Levels Rising Three Times Faster Than In Previous 500 Years, Study Finds

Beach at Cape Hatteras, North Carolina. (Credit: iStockphoto)

ScienceDaily (Oct. 29, 2009) — An international team of environmental scientists led by the University of Pennsylvania has shown that sea-level rise, at least in North Carolina, is accelerating. Researchers found 20th-century sea-level rise to be three times higher than the rate of sea-level rise during the last 500 years. In addition, this jump appears to occur between 1879 and 1915, a time of industrial change that may provide a direct link to human-induced climate change.

The results appear in the current issue of the journal *Geology*.

The rate of relative sea-level rise, or RSLR, during the 20th century was 3 to 3.3 millimeters per year, higher than the usual rate of one per year. Furthermore, the acceleration appears consistent with other studies from the Atlantic coast, though the magnitude of the acceleration in North Carolina is larger than at sites farther north along the U.S. and Canadian Atlantic coast and may be indicative of a latitudinal trend related to the melting of the Greenland ice sheet.

Understanding the timing and magnitude of this possible acceleration in the rate of RSLR is critical for testing models of global climate change and for providing a context for 21st-century predictions.

"Tide gauge records are largely inadequate for accurately recognizing the onset of any acceleration of relative sea-level rise occurring before the 18th century, mainly because too few records exist as a comparison," Andrew Kemp, the paper's lead author, said. "Accurate estimates of sea-level rise in the pre-satellite era are needed to provide an appropriate context for 21st-century projections and to validate geophysical and climate models."

The research team studied two North Carolina salt marshes that form continuous accumulations of organic sediment, a natural archive that provides scientists with an accurate way to reconstruct relative sea levels using radiometric isotopes and stratigraphic age markers. The research provided a record of

relative sea-level change since the year 1500 at the Sand Point and Tump Point salt marshes in the Albemarle-Pamlico estuarine system of North Carolina. The two marshes provided an ideal setting for producing high-resolution records because thick sequences of high marsh sediment are present and the estuarine system is microtidal, which reduces the vertical uncertainty of aleosea-level estimates. The study provides for the first time replicated sea-level reconstructions from two nearby sites.

In addition, comparison with 20th-century tide-gauge records validates the use of this approach and suggests that salt-marsh records with decadal and decimeter resolution can supplement tide-gauge records by extending record length and compensating for the strong spatial bias in the global distribution of longer instrumental records.

The study was funded by the National Oceanic and Atmospheric Administration Coastal Ocean Program, North Carolina Coastal Geology Cooperative Program, U.S. Geological Survey and National Science Foundation.

The study was conducted by Kemp and Benjamin P. Horton of the Sea-Level Research Laboratory at Penn, Stephen J. Culver and D. Reide Corbett of the Department of Geological Sciences at East Carolina University, Orson van de Plassche of Vrije Universiteit, W. Roland Gehrels of the University of Plymouth, Bruce C. Douglas of Florida International University and Andrew C. Parnell of University College Dublin.

Adapted from materials provided by University of Pennsylvania.

http://www.sciencedaily.com/releases/2009/10/091028192617.htm

Rot-resistant Wheat Could Save Farmers Millions

White heads caused by Fusarium crown rot of wheat. (Credit: Image courtesy of CSIRO Australia)

ScienceDaily (Oct. 29, 2009) — CSIRO researchers have identified wheat and barley lines resistant to Crown Rot -- a disease that costs Australian wheat and barley farmers $79 million in lost yield every year.

Crown Rot, which is a chronic problem throughout the Australian wheat belt, is caused by the fungus Fusarium.

Dr Chunji Liu and his CSIRO Plant Industry team in Brisbane are using sophisticated screening methods to scan over 2400 wheat lines and 1000 barley lines from around the world to find the ones resistant the fungal disease.

"The wheat and barley lines showing resistance to Crown Rot are now being used in pre-breeding programs to incorporate the resistance into adapted varieties for delivery to the wheat breeding companies," Dr Liu says.

Crown Rot infects many grasses and weeds found in wheat growing regions and minimum till cropping encourages Fusarium which survives in cereal stubbles.

Minimum till cropping minimises soil disturbance and retains plant stubble from previous crops in order to promote soil health and limit erosion.

Developing Crown Rot resistant wheat and barley varieties is an essential strategy in fighting the disease.

"As well as developing Crown Rot resistant varieties, we are also studying how Fusarium invades the plant, how plants resist Fusarium infection and what genes may be involved in defending the plant against Fusarium or reducing its effect on yield," Dr Liu says.

Another of the most serious wheat diseases in Australia, Head Blight, is also caused by Fusarium.

This work is being carried out with funding from CSIRO and the Grains Research and Development Corporation and in collaboration with numerous national and international groups.

Adapted from materials provided by CSIRO Australia.

http://www.sciencedaily.com/releases/2009/10/091028112609.htm

Dendritic Cells Spark Smoldering Inflammation In Smokers' Lungs

Inflammation still ravages the lungs of some smokers years after they quit the habit. (Credit: iStockphoto)

ScienceDaily (Oct. 28, 2009) — Inflammation still ravages the lungs of some smokers years after they quit the habit. What sparks that smoldering destruction remained a mystery until a consortium of researchers led by Baylor College of Medicine found that certain dendritic cells in the lung -- the cells that "present" a foreign antigen or protein to the immune system -- provoke production of destructive T-cells that attack a key protein called elastin, leading to death of lung tissue and emphysema.

A report of their work appears in the current issue of *Science Transformational Medicine*. The National Heart, Lung and Blood Institute estimates that 2 million Americans have emphysema, most of them over the age of 50 years. People with emphysema find it harder and harder to breathe as the lung's air sacs or alveoli are destroyed, causing holes in the lung and blocking airways. They have difficulty exchanging oxygen as their lungs become less elastic. Cigarette smoking is the greatest risk factor for the disease that contributes to as many as 100,000 deaths each year.

In previous work, Dr. Farrah Kheradmand, associate professor of medicine -- pulmonary and immunology at BCM, and colleagues had shown that T-helper cells and some enzymes in the lung destroyed tissue in the lungs of emphysema patients. She credits BCM graduate student Ming Shan with pushing the project forward with the work in the current report.

She and her colleagues found that a subset of antigen-presenting cells in the lung are programmed to turn peripheral blood cells into the cells that are activated and are associated with autoimmune inflammation. They also found that elastin peptides can activate T cells -a sign that elastin is acting as an auto-antigen.

"This has implications for something that is important and biologically relevant," said Kheradmand. "Smokers are also at risk for diseases of the blood vessels such as the carotid artery and aorta. These blood vessels are also enriched in elastin. We believe that particular cells circulating in the body could react to elastin molecule at these remote sites."

This may help explain some of the cardiovascular and other complications associated with smoking tobacco. For example, skin is rich in elastin. The skin of smokers loses elasticity.

"We believe that this systemic inflammation that may initially affect the lung could also affect other parts of the body," she said.

She and fellow senior author Dr. David Corry, professor of medicine -- pulmonary and immunology, and her colleagues used lung tissue taken from emphysema patients who were undergoing surgery anyway to determine which cells are present and their functions in the lung.

"These live cells are the center of what we studied," she said.

She and her colleagues found that some patients did not have the elastin-specific cells in their lungs, even though they had smoked.

"The Holy Grail is to find smokers who are destined to develop auto-reactive cells before the disease is fully manifested," she said. She said they hope to come with a test for T-cells that attack elastin that could be used in the doctor's office. However, she said, such a test would only identify patients at higher risk for emphysema and other elastin-associated diseases. It would not identify people at higher risk of lung cancer, for example.

"It is not a good excuse to smoke or continue smoking," she said.

Others who took part in the study include Han-Fang Cheng Li-zhen Song and Luz Roberts of BCM, Linda Green and Joan Hacken-Bitar of the Michael E. DeBakey Veterans Affairs Medical Center in Houston, Joseph Huh and Faisal Bakaeen of MEDVAMC and BCM, Harvey O. Coxson and Claudine Storness-Bliss of Vancouver General Hospital in British Columbia, Canada; Mahesh Ramchandani of The Methodist Hospital in Houston, and Seung-Hyo Lee of the Graduate School of Medical Science and Engineering, Korea Advanced Institute of Science and Technology, Daejeon, South Korea.

Funding for this work came from the U.S. National Institutes of Health and the American Heart Association.

Adapted from materials provided by Baylor College of Medicine.

http://www.sciencedaily.com/releases/2009/10/091028142229.htm

Cancer: New Explanation Of 'Asian Paradox'

ScienceDaily (Oct. 28, 2009) — Although *Helicobacter pylori* (*H. pylori*) has been classified as a class I (or definite) carcinogen by World Health Organization (WHO), the controversy as to why only a minority of infected patients develop gastric cancer still remains. Moreover, in Asian countries such as Indonesia, Japan, China, and Thailand, where the *H. pylori* infection rates are similar, there is a significant difference regarding the outcome of gastric cancer. That fact has been termed the "Asian paradox".

A research article to be published on October 21, 2009 in the World Journal of Gastroenterology addresses this question. A research, led by Murdani Abdullah, MD from Division of Gastroenterology, Department of Internal Medicine, University of Indonesia, was based on the old concept of a cascade of mucosal changes that develops from acute/chronic gastritis to gastric cancer as proposed by P. Correa. The difference in the pattern of *H. pylori*-associated gastritis may explain the difference in the incidence of gastric cancer between Indonesia and Japan. Previous studies have never evaluated the cascade of gastric mucosal changes prior to gastric cancer. In this research, the transformation of gastric mucosa that is induced by *H. pylori* infection prior to gastric cancer was investigated. The transformation was then compared between Indonesian and Japanese patients, the two countries that represent the "Asian paradox".

From 1998 to 1999, 42 Japanese patients at Yamanashi Medical University Hospital, Koufu and 125 Indonesian patients at Metropolitan Medical Centre Hospital, Jakarta were consecutively enrolled. From this research, it was seen that there was a significant difference in the grade and activity of gastric mucosal changes between Indonesian and Japanese *H. pylori*-positive patients. This finding suggests that there may be a different host response between Indonesian and Japanese people regarding *H. pylori* infection. The authors believe that lifestyle and genetic factors are considered to play a major role, in the meantime, their research may act as the initial step in explaining the "Asian paradox".

Journal reference:

1. Abdullah M, Ohtsuka H, Rani AA, Sato T, Syam AF, Fujino MA. **Helicobacter pylori infection and gastropathy: A comparison between Indonesian and Japanese patients**. *World Journal of Gastroenterology*, 2009; 15 (39): 4928 DOI: 10.3748/wjg.15.4928

http://www.sciencedaily.com/releases/2009/10/091028112615.htm

Why Fish Oils Help With Conditions Like Rheumatoid Arthritis How They Could Help Even More

Wild salmon steaks. Salmon is rich in omega-3 fatty acids. Researchers have now discovered precisely why taking fish oils can help with conditions like rheumatoid arthritis. (Credit: iStockphoto/Liza McCorkle)

ScienceDaily (Oct. 28, 2009) — New research from Queen Mary, University of London and Harvard Medical School has revealed precisely why taking fish oils can help with conditions like rheumatoid arthritis.

In a paper published in *Nature* October 28, researchers describe how the body converts an ingredient found in fish oils into another chemical called Resolvin D2 and how this chemical reduces the inflammation that leads to a variety of diseases.

The research also suggests that Resolvin D2 could be the basis for a new treatment for diseases including sepsis, stroke and arthritis. Unlike other anti-inflammatory drugs, this chemical does not seem to suppress the immune system.

The researchers, who were funded by the Arthritis Research Campaign, the Wellcome Trust and the National Institutes of Health, looked at a particular ingredient of fish oils called DHA. They were able to show how the body converts DHA* into Resolvin D2 and discover its exact chemical structure.

Mauro Perretti, Professor of Immunopharmacology at Queen Mary, University of London, led the UK team. He said: "We have known for some time that fish oils can help with conditions like arthritis which are linked to inflammation. What we've shown here is how the body processes a particular ingredient of fish oils into Resolvin D2. We've also looked in detail at this chemical, determining at least some of the ways it relieves inflammation. It seems to be a very powerful chemical and a small amount can have a large effect."

"This research is important because it explains at least one way in which fish oils can help in different types of arthritis. We can also work on this chemical and see if it can be used not only to treat or even

prevent arthritis, but also as a possible treatment for a variety of other diseases associated with inflammation."

Arthritis, and many other diseases, are caused by inflammation. This means that the body's natural defences against infections are mistakenly directed at healthy tissue.

Previous research has shown that a crucial step in this process occurs when white blood cells, called leukocytes, stick to the inner lining of the blood vessels, called the endothelium.

Researchers studied these blood cells and how they interact with the endothelium in the lab. When they added Resolvin D2 they found that the endothelial cells produced small amounts of nitric oxide, which acts as a chemical signal discouraging the white blood cells from sticking to the endothelial cells and preventing inflammation.

*DHA (docosahexaenoic acid) is an omega-3 fatty acid. Fish oils are a rich source of DHA.

Journal reference:

1. Spite et al. **Resolvin D2 is a potent regulator of leukocytes and controls microbial sepsis**. *Nature*, 2009; 461 (7268): 1287 DOI: 10.1038/nature08541

Adapted from materials provided by Queen Mary, University of London, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/10/091028142227.htm

Underwater Exploration: Autosub6000 Dives To Depth Of 3.5 Miles

The Autosub6000 is being readied for launch. Note the collision avoidance sonar and fenders mounted on the nose of the AUV.

ScienceDaily (Oct. 28, 2009) — The United Kingdom's deepest diving Autonomous Underwater Vehicle (AUV), Autosub6000, has been put through its paces during an extremely successful engineering trials cruise on the RRS Discovery, 27 September to 17 October 2009.

Autosub6000 was working in regions of the Iberian Abyssal Plain in the North Atlantic deeper than 5600 metres and also around the steep and rugged terrain of the Casablanca Seamount, between Madeira and Morocco. The vehicle was designed and constructed by engineers at the Underwater Systems Laboratory in the National Oceanography Centre, Southampton.

Highlights:

- Operating at 5600 metres depth. Very few (if any) AUVs have ever operated autonomously at this depth.
- Survey at 3 metre altitude -- paving the way for deep ocean photographic surveys.
- Terrain following at 10 metre altitude over very rough relief.
- Testing improved fault detection software so that the AUV can recover from hardware faults.
- Testing of recently fitted magnetometer, turbidity and precision salinity sensors

One of the main goals of the Autosub6000 engineering trials was the demonstration of the accessibility of deep ocean regions approaching the 6000 metre design depth limit. On 3 October 2009, the AUV

descended and reached it's pre-programmed target depth of 5525 metres in 1.5 hours. At this point, a navigation update procedure was undertaken to update and correct for the Autosub6000's drift which was incurred as it descended through the moving water column. After 2.5 hours from deployment, the Autosub6000 was on station at a depth of 5600 metres, positioned to accuracies of a few metres, and ready to start collecting scientific data.

Autosub6000 has been enhanced with a forward-looking vertically scanning obstacle-detection sonar and improved terrain-following control software, giving the AUV the ability to operate safely, closer to the seabed. This was demonstrated at low altitudes in the steep and rugged slopes of the Casablanca Seamount with a 10 metre altitude run starting at 3000 metres depth and rising up to 700 metres depth over a course of 7.5 kilometres. The ability of Autosub6000 to perform low-altitude colour photographic surveys was demonstrated on the more level summit regions of the Casablanca Seamount with low-speed surveys at altitudes of as low as 3 metres.

Steve McPhail, Autosub6000 project leader, said, "Apart from the correct functioning of the vehicle during the trials at extreme depths, what particularly pleased me was that we have now developed the control and obstacle avoidance systems such that we have the confidence to send the AUV into a hostile and rugged terrain. This will lead to more challenging and interesting scientific campaigns in the future."

Autosub6000 is now being prepared for a cruise on board the RRS James Cook to the Caribbean Sea near the Cayman Islands in April 2010, where it will be used in conjunction with the remotely operated vehicle Isis to search for deep hydrothermal vents.

Adapted from materials provided by National Oceanography Centre, Southampton (UK).

http://www.sciencedaily.com/releases/2009/10/091028112622.htm

Attention-deficit/hyperactivity Problems Associated With Low Folate Levels In Pregnant Women

ScienceDaily (Oct. 28, 2009) — It has long been suggested that healthy folate (the natural form of folic acid) levels in expectant mothers goes hand in hand with healthy nervous system development in their children. A study published in an upcoming issue of *The Journal of Child Psychology and Psychiatry* finds that low maternal folate levels is linked to the development of attention-deficit/hyperactivity problems in children at age seven to nine years.

Researcher Dr. Wolff Schlotz points out, "Our findings further support the hypothesis that maternal nutrition contributes to an individuals' development, with potential consequences for their behavior later in life." The long term effects of poor maternal nutrition may even branch out to the child's ability to interact with peers or form social bonds.

The researchers also found that children born from mothers with a low folate status had a notably smaller head circumference at birth, which may indicate a smaller rate of prenatal brain growth in children adversely affected by low folate levels. This is a cause for concern among low-income populations where the nutritional health of the mother is a low priority, and women are less likely to take folate supplements in advance of pregnancy.

Journal reference:

1. Schlotz et al. **Lower maternal folate status in early pregnancy is associated with childhood hyperactivity and peer problems in offspring**. *Journal of Child Psychology and Psychiatry*, 2009; DOI: 10.1111/j.1469-7610.2009.02182.x

Adapted from materials provided by Wiley-Blackwell.

http://www.sciencedaily.com/releases/2009/10/091028134631.htm

Tsunami Evacuation Buildings: Another Way To Save Lives In The Pacific Northwest

This shows a conceptual design for the Cannon Beach City Hall, a Tsunami Evacuation Building (Ecola Architects, 2008). (Credit: Photo courtesy of Yumei Wang, Oregon Department of Geology and Mineral Industries.)

ScienceDaily (Oct. 28, 2009) — Some time soon, a powerful earthquake will trigger a massive tsunami that will flood the Pacific Northwest, destroying homes and threatening the lives of tens of thousands of people, says Yumei Wang, a geotechnical engineer at the Oregon Department of Geology and Mineral Industries in Portland.

The region's geology makes an earthquake-triggered tsunami inevitable and imminent in geologic time, Wang says, yet coastal towns and cities in the northwest are woefully unprepared for such a large-scale natural disaster. In response, she is working with public officials and stakeholders to develop a series of tsunami evacuation buildings up and down the northwest coast. They would be the first buildings of their kind in the United States. And construction, she urges, can't start soon enough.

"Unless we do this, we will have lots of people dying in a tsunami," Wang says. "That's not how we want our people to die."

Wang will present recommendations in a session titled, Risks and Realities: Current Advances in Understanding Societal Risk and Resilience to Natural Hazards, at the Annual Meeting of the Geological Society of America in Portland, Oregon in October.

A line of volcanoes from northern California to British Columbia marks the eastern edge of a fault system (called the Cascadia subduction zone), where one plate is wedged under another. Those plates shift like geological clockwork every few hundred years, producing earthquakes that shake the region. The last major quake along the Cascadia subduction zone occurred on January 26, 1700. It produced a tsunami that damaged coastal towns as far away as Japan.

The region's next big earthquake could happen any day now, Wang says, or it might not happen for several hundred years. When the day comes, a tsunami -- with inundation heights of 50 feet or more -- could hit the northwest coast within 10 to 20 minutes.

The standard emergency response in cases like these is to move people inland and uphill, but there are plenty of communities where people simply won't be able to evacuate in time, Wang says. The resort town of Seaside, Ore., for example, is low-lying with inadequate roads and bridges. Kids and the elderly are particularly vulnerable.

In Cannon Beach, Ore., Wang has started meeting with officials to hold serious discussions on constructing the first tsunami evacuation building in the U.S. The building, a proposed rebuilding of the town's existing city hall, would have to be made of reinforced concrete with a deep foundation and strong columns, a post-tensioning structural system to keep it upright, an 18-foot tall first floor, and wave-dissipation structures in front and back, among many other design details.

Tsunami evacuation buildings won't be cheap. Wang estimates that the one in Cannon Beach would have an added cost of between $1 million and $2 million. But the building would provide a safe space that people could reach quickly and be ready for emergency response and long term recovery. Getting just one such building off the ground, Wang said, is a critical first step towards creating a network of buildings that will help save many thousands of lives.

Adapted from materials provided by Geological Society of America, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/10/091019134709.htm

The Objects of the Exercise
Text by NEGAR AZIMI; Photographs by OLAF BLECKER

IN ISTANBUL, one hot, sun-soaked day this past summer, the novelist Orhan Pamuk leaned back in his chair, a writerly throne in an overfull study, and looked out the window. He trained his eyes on the unblemished vista before him, where the Bosphorus, the Sea of Marmara and the Golden Horn run into one another and emerge as a perfect muddle of turquoise. Today, he announced, he was depressed. "I am a writer. I have books to write. What am I doing building a museum?" His voice rose in a crescendo to escape being drowned out by folkloric music coming from a passing cruise ship. A stuffed bird, perched to his left, peered down at the bookish debris below, giving the impression that the writer was addressing the handsome, ill-fated gull.

Scattered around the room was the raw material of the museum-to-be: salt shakers, porcelain figurines, irregularly shaped doorknobs, lottery tickets, a quince grinder. The words "never forget the objects as you write" were written in Turkish in capital letters across a little yellow Post-it. He looked stressed. He had lectures to deliver at Harvard in the fall. He hadn't gotten far into his next novel. He had dreamed of taking a vacation with his new love, the novelist Kiran Desai. The music from the Love Boat got still louder. He winced.

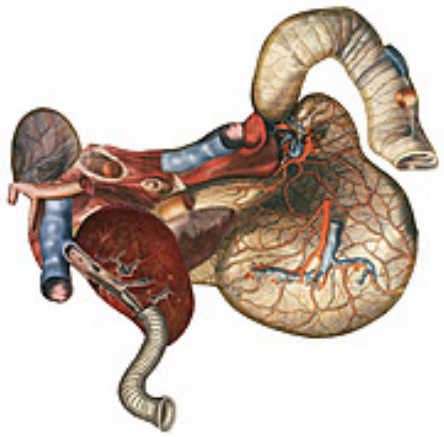
The story of how a Nobel Prize-winning novelist would come to open a museum begins some 10 years ago in this city. Pamuk, who had not yet attained the renown that would come with his Borgesian novel "My Name Is Red," was preoccupied by a love story taking shape in his head, the tale of a man — Kemal — who would come to suffer terrible heartbreak. Like Pamuk — who makes a handful of cameo appearances in his new novel, "The Museum of Innocence" — Kemal, the book's dolorous hero, is the scion of a bourgeois Istanbul family. He falls for a poorer distant relation, a young, former beauty-pageant contestant named Fusun. From there, Pamuk guides us through a multi-decade tale of loss that is equally a quasi-anthropological portrait of obsession, class and, because the author is Orhan Pamuk, ideas about East and West. By the end of the novel, Kemal, who has been collecting objects linked to Fusun, will, with monastic dedication, erect a monument to her in the form of a Museum of Innocence.

And like Kemal, Pamuk will also open a museum of objects, filled with 83 displays for each of the 83 chapters of the novel. "As I wrote this novel over the past 10 years," Pamuk told me, "I encountered everyday objects that would make their way into the story. At other times, the story would demand an object to keep it moving, so I would bring one in. When I am stuck, I cast about looking for ideas from objects around me. My perceptions, or you can say my tentacles, are wide open to everything in shop windows, in friends' homes, in flea markets and antique shops and so on. This is how the Museum of

Innocence came about." The photos shown here are of some of those objects, with explanatory captions taken from interviews with the author.
When the museum opens next year, in a narrow 19th-century building, admission will be free with a ticket printed in the book. Each chapter, whether "An Anatomical Chart of Love Pains" or "My Father's Death," will inspire displays of ephemera. Among the objects: 4,213 cigarette butts, 237 hair barrettes, 419 national lottery tickets and 1 quince grinder.
As Pamuk guided me through the museum-to-be one afternoon, we climbed to the top floor and looked down at the rubble of construction. In the semidark, the mood was a bit like the architecture, pregnant with possibility. But would anyone ever come to his museum?
"My mother used to say no one would read my novels," Pamuk told me. "My novel honors the museums that no one goes to, the ones in which you can hear your own footsteps." Over the years, he visited hundreds of these queer, lesser-known monuments to collecting — from the Chinese Traditional Medicine Museum in Hangzhou, China, to the Ava Gardner Museum in Smithfield, N.C.
His character Kemal visits museums, too — 5,723 of them, we learn from the novel. The similarities between Kemal and Orhan inspire a question that never fails to exasperate the author. He threw his voice, a complicated musical instrument, into the rhetorical query: "Mr. Pamuk, are you Kemal? Enough. No, I am not Kemal, but I cannot convince you that I am not Kemal. That is being a novelist."
I scribbled the word "flustered" in my notebook. Suddenly he eased up. "I don't want to give you the wrong idea," he said. "I am happy. Tolstoy had his school. Another writer had his magazine, a third one had his movie dreams, and yet another one has his politics. This museum is my school, my magazine, my film, my politics. It is part of me."
Negar Azimi is a senior editor at Bidoun, a cultural journal.

http://www.nytimes.com/2009/11/01/magazine/01Pamuk-t.html?_r=1&th&emc=th

Perplexing Pain
By LISA SANDERS, M.D.



"They took out my ovaries," the 46-year-old woman told the doctor. "And my appendix, and most of my colon. I had several exploratory surgeries where the doctors were just trying to find out what was wrong." Dr. Thomas Chelimsky listened attentively. "I've had, like, 13 surgeries," the woman reported, her voice edged with sadness. "It's really been a nightmare." For the past 23 years, this slender, middle-aged woman was tormented by these intermittent attacks of abdominal pain and fever that lasted sometimes for weeks. None of her doctors had been able to figure out what was causing the strange episodes of devastating illness that prompted all these surgeries and dozens of hospitalizations.

But that was not why her doctor sent her to Chelimsky. She'd been losing feeling in her hands and feet for the past couple of years. It started off as a tingling sensation that came and went. Now her hands and feet were always numb. She could barely hold a pen, and she often stumbled because she couldn't really feel the ground under her feet.

Chelimsky was a neurologist at University Hospitals Case Medical Center in Cleveland. The patient was there to have her hands and feet examined by EMG — electromyography — a test that looks for damaged nerves by sending tiny shocks through the muscle to the delicate strands that connect it to the spinal cord and brain. A change in the speed at which the electricity moves up the nerve indicates whether there is damage and, if so, where. As Chelimsky gently inserted the slender needle into the patient's muscle, he continued to ask questions about these unexplained attacks.

The first came when she was 23, she told him. She had this pain in the left side of her stomach. It felt like a knife stuck deep into her gut. Her temperature soared to 102 degrees. Her blood pressure rose to a level that frightened her doctors. She was delirious. She vomited uncontrollably. Her legs were so weak she couldn't walk.

The doctors in the hospital suspected it was her appendix, but when they took it out, the organ looked normal. After the surgery, the pain intensified. She stayed in the hospital for more than a week, and the pain slowly subsided but her doctors never figured out where the pain came from.

She had had other mysterious medical problems as well. At times her heart would beat so rapidly she would become lightheaded. Her cardiologist suspected that her heart had difficulty pacing itself, but repeated interventions failed to fix her heart's natural pacemaker. She had chronic constipation and what seemed to be frequent urinary-tract infections that were so severe she wasn't able to urinate at all. Other times, her joints and bones would hurt so awfully that she could barely get out of bed. There was never any redness or swelling of the joint, just this dull ache.

She had been given countless diagnoses — one doctor thought it was lupus; another told her it was multiple sclerosis. Repeated testing for these diseases was negative. Still another thought it was ovarian cysts — but the pain persisted even after first one ovary, then the other was removed. Some of the doctors she saw told her it was all in her head and suggested stress-reduction techniques.

Four years earlier, she found an internist whom she trusted, and together they tried to figure out the cause of each of the many problems she had. But she felt as if they were no closer to finding answers than they

were when they started. Her internist was a kind man, she told Chelimsky, but it just seemed as if every time he'd come up with some theory about what was going on and treat that, another symptom would pop up. It was like the arcade game her children played, whack-a-mole — you get rid of one problem, but then it would pop back up, along with another and another.

As Chelimsky ran his tests on her hands and feet, it was clear that there was significant nerve damage. The most common cause of this kind of damage was diabetes, but this patient didn't have that. A pinched nerve in the neck could also cause this kind of injury; so could a deficiency in vitamin B-12. But what caught Chelimsky's attention was the possibility that the disease had affected not just the nerves he was testing — those that carry information back and forth between the brain and the voluntary muscles of the body — but also the type of nerves he couldn't test by EMG, autonomic nerves, which innervate the organs like the heart, the stomach, the urinary tract. Many of her other symptoms — the rapid heart rate, being unable to urinate, abdominal pain with no visible cause, even her constipation, which had been so severe that six months before much of her colon was removed — could be caused by damage to the autonomic nervous system. All that added up to just one likely diagnosis.

"Has anyone ever mentioned the word porphyria to you?" he asked. She'd never heard of it. He wasn't certain that's what she had; he hadn't examined her or reviewed her medical records, but the involvement of both types of nerves suggested this rare disease, and he thought she should discuss the possibility with her doctors.

When the patient got home that afternoon, she told her husband that Chelimsky said that she might have something called porphyria. Together the patient and her husband, a pediatrician, went to his library of medical books and began reading up on this rare disease. They read that porphyria was the name of a group of diseases caused by a genetic defect in the way that one part of the red blood cell is made. The oxygen-carrying portion of blood, known as heme, is a complicated molecule made in the liver and the bone marrow. Porphyria is caused when one of the pieces of the anatomical machinery that makes heme is missing. This is the disease that may have given birth to the American Revolution. It's thought that King George III was suffering from porphyria as he fiddled while the colonies were ablaze with the drive for independence.

As the patient read about the most common symptoms of the disease — episodes of abdominal pain, nausea, vomiting or constipation, weakness, confusion, rapid heart rate, the inability to urinate — it was as if she were reading her own medical history: her entire life seemed to be there on the page of these old medical textbooks. All the strange and terrible symptoms she suffered through, had surgery for, been considered crazy for, were there on the pages she read. Tears flowed down her face. Her husband cried, too. They had, she felt certain, finally found the answer.

It took more than three months for the patient to get a definitive diagnosis. If figuring out this disease was difficult, testing for it was equally so. But eventually, porphyria was confirmed.

Porphyria is a disease of the nervous system. Thus, everything in the body is affected. The patient's hardworking doctors had been chopping down the trees one by one, treating each ailment in isolation. Dr. Chelimsky, a neurologist, was finally able to step back and see the entire forest.

The children of a person with porphyria have a 50 percent chance of inheriting the disease. Recently the patient's brother was given a diagnosis of porphyria. And she now realizes that her father, who died six years ago, probably had it as well. It's painful for her to think of his suffering for all those years without the diagnosis that could have saved his life.

There is no cure for porphyria, but it can be treated. Episodes of pain can be shortened by providing the body with the heme it needs. The patient learned that she could prevent many of the attacks by avoiding the disease triggers — certain drugs and hormones, stress, illness, skipping meals. She told me recently that she has worked hard to make these lifestyle changes. And, she added proudly, she hasn't had an attack in more than a year.

Lisa Sanders is the author of "Every Patient Tells a Story: Medical Mysteries and the Art of Diagnosis."

http://www.nytimes.com/2009/11/01/magazine/01FOB-diagnosis-t.html?ref=magazine

'INTERSECTIONS'
Grand Visions for a Faded Bronx Boulevard
By NICOLAI OUROUSSOFF

Decaying freeways, high-speed trains, levees, bicycle lanes — ever since Hurricane Katrina, infrastructure has been the hot topic among architects and architectural curators across the country. The chatter only grew louder after the Obama administration unveiled its economic stimulus package, igniting hopes of a major national transformation. "Intersections: The Grand Concourse Beyond 100," which opened at the Bronx Museum of the Arts on Sunday, is the latest show to pick up on this trend.

A result of a nine-month competition sponsored by the museum and the Design Trust for Public Space, the show focuses on seven visions for the future of the Grand Concourse in the Bronx that range from urban farms to high-tech sound barriers for a nearby freeway. Much of the work is by students, and it reflects the kind of earnest idealism that has always been a staple of graduate studios.
However naïve these proposals may seem at first glance, though, they are all conceived at a manageable, human scale. And the more time you spend among them, the more you become aware of both the faded beauty of the Grand Concourse and the remarkable potential for revitalizing this century-old boulevard modeled on the Champs-Élysées. Eventually you begin to feel that the problem is not so much the innocence of planners and architects, but our own indifference and lack of political will.
A highlight of the show is a series of big, glossy photographs by Jeff Chien-Hsing Liao. These are the first things you see, and a revelation: a startling illustration of the insensitive planning that contributed to the boulevard's decay.
One side of an image taken from the rooftop of a housing project radiates with the vibrant green treetops of the Mosholu Parkway. A thick band of train tracks carves diagonally through the other side of the image, disrupting the calm. The Concourse looks lost and isolated between the two.
Smaller photos on another wall show the street front between 138th and 206th Streets. First you notice the uniformity of scale: rows of nearly identical six-story apartment houses interrupted by an occasional 10- or 12-story building. On closer inspection, however, that scale begins to break down, and a more subtle rhythm begins to emerge. Strips of small shops — a dry cleaner, barbershop, grocery markets, a Popeyes fried chicken — create little moments of energy in a barren cityscape isolated from the life of the city around them.
Most of the proposals attempt to remedy that isolation through a mix of environmental initiative and technological innovation. The winning design, PUMP, by two Columbia University architecture and urban design graduate students, is a C-shaped structure that functions as an air-purifier, sound absorber and rainwater filter and can be clipped onto the side of the nearby Major Deegan Expressway. The roof of the structure's sleek form would shelter traffic from rain while absorbing exhaust fumes. A small channel on its exterior would allow people to walk on a path overlooking the waterfront along the length of the expressway.
The plan's real strength, however, is that it treats the Concourse as part of a larger urban matrix of distinct communities and local economies rather than as a uniform linear experience. A series of public

promenades would extend westward off the Concourse, passing under the expressway toward the waterfront and connecting to public piers. The area's dying industrial fabric would be revived through gentrification and a concentration of new environmentally friendly industries.

Angus McCullough, a senior at Wesleyan University, takes a more subversive approach. His proposal, "Live Wired," would create video and audio installations in strategic points along the Concourse. A 24-hour image of the sky would be projected onto platform ceilings in nearby subway stations so that people underground could see the weather outside — a potentially mesmerizing way to pass the time if you've just missed a train. Meanwhile another video of people milling around on the platforms below would be projected onto the Concourse's sidewalks. Aside from its voyeuristic appeal, the system would allow pedestrians to keep an eye out for an approaching subway train.

Other aspects of this design are a bit simplistic. Mr. McCullough, for example, imagines projecting unfolding Yankees games onto the Concourse's sidewalks, and mounting microphones and loudspeakers outside bodegas to broadcast fragments of conversations as people walk by. Still, the concept touches on a critical urban subject: the intensifying battle between transparency and privacy in the public realm.

Oddly, it was the most earnest approaches that touched me most in the end, even when they were not particularly inventive or original. A proposal by the New York office of the international design firm EDAW that would create a strip of communal farmland down the middle of the Concourse verges on cliché. But it improves when you keep in mind the grittiness of some of the urban gardens in New York or Berlin and imagine them stretched out along several miles. A new light-rail line would run the length of the boulevard; traffic would be reduced to two lanes in each direction, down from the current six.

A raucous proposal by the French team Nadau Lavergne Architects would pile more activities on top of existing structures to add density to the neighborhood and create unexpected urban frictions. Schools and cultural institutions would be stacked over apartment complexes, freeing up the street level for commercial use. A graffiti-covered streetcar would run up and down the Concourse, linking it to Manhattan. The Concourse would be packed with trees, transforming it into a linear urban forest.

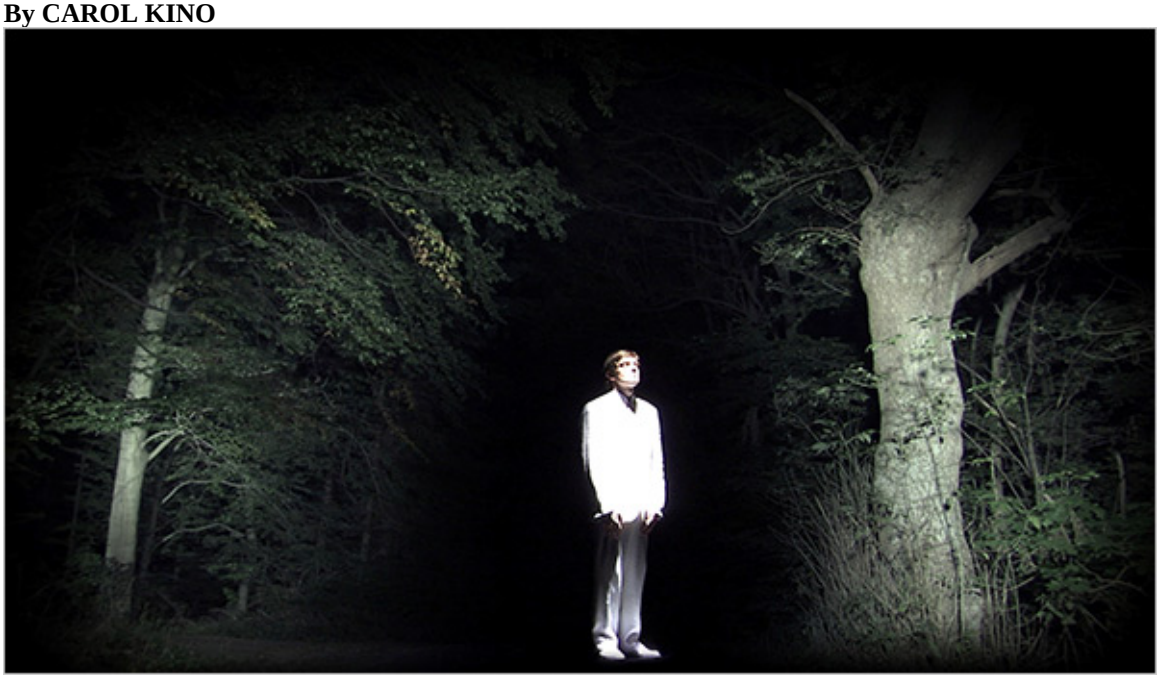
Part of what is moving about these proposals is that their approaches have become so familiar. Not long ago the notion of building farmland in the middle of a busy urban roadway would have seemed like madness; today it seems too obvious. So does the idea that segregating urban functions can drain the life from a city.

When you step back out onto the Grand Concourse after visiting the Bronx Museum show, you see the neighborhood with fresh eyes and a clearer understanding of its history and how it could be revived. If you linger there long enough, you are apt to be overtaken by sadness at lost opportunities and public inertia. And at how many of our cities' grandest achievements exist in a sort of perpetual limbo — half-dead, half-alive.

"Intersections: The Grand Concourse Beyond 100" runs through Jan. 3 at the Bronx Museum of the Arts, 1040 Grand Concourse, at 165th Street, Morrisania; (718) 681-6000, bronxmuseum.org.

http://www.nytimes.com/2009/11/02/arts/design/02concourse.html?ref=design

Art That Leaps Off the Canvas
By CAROL KINO



ONE morning last month, the performance art impresario RoseLee Goldberg sat in her Chelsea office discussing a new project with the artist Wangechi Mutu. It wasn't long until the opening of this year's Performa, the sprawling performance art biennial that Ms. Goldberg founded in New York in 2005. And throughout her loftlike headquarters, a staff of about 25 curators, producers and assistants buzzed about, attending to the details involved in producing a three-week, 170-artist event that takes place in more than 75 galleries, museums, theaters, office buildings and nightclubs throughout the city.

But Ms. Goldberg, a stylish figure who often dresses head to toe in black, didn't seem fazed by the hubbub outside her door. Instead she sat at a table, notepad and pen at the ready, peppering Ms. Mutu with questions. "How do you enter the stage?" she asked, regarding Ms. Mutu intently. "What do people see when they come in?"

"We'll already be there," Ms. Mutu said, sounding a bit tentative. "We're going to look at them."
Ms. Mutu, who was born in Kenya, has been a hot art world commodity in recent years, celebrated for surrealistic collages in which disembodied eyes, lips and body parts cut from magazines are layered with glitter, animal fur and paint to create distorted beings that suggest both animals and women. Ms. Goldberg asked Ms. Mutu to create a performance for Performa because she had always seen something else in the collages, she said: "Somehow these bodies look ready to be in motion, and they also seem to embody some very powerful political stories about Africa."

Called "Stone Ihiga," Ms. Mutu's performance, her first live work, finds its start in a question that has preoccupied her for years: How does it feel to be a woman sentenced to death by stoning? Created with the composer Imani Uzuri, it involves ritualistic movement and live and recorded sound, and unfolds in a curtained space filled with Ms. Mutu's spindly legged throne sculptures. "How is the curtain going to look?" Ms. Goldberg asked. "What do the thrones represent to you? What is the mood that you're trying to get when people walk into the space?" After teasing out the physical details, she pushed Ms. Mutu to voice the relationship between the performance and her studio work.

"Some people get turned on by my work, and it sells, but what drives me is the process of making it," Ms. Mutu said. "When I'm making a collage, there are a lot of things about it that are violent. This is a bit like opening up my studio and my mind and showing what it takes to get there."

Ms. Goldberg began smiling broadly. “It’s like you’re getting to the central core of your work,” she said. They had also arrived at the core of Performa.

Ask Ms. Goldberg why she decided to start a nonprofit performance art festival when the art world seems obsessed by work that can be bought and sold, and she talks about desire. “It really comes from this desire for somebody to totally amaze me with a performance that I want to write about,” she said. “Sometimes when I see work, I think, ‘Oh, wouldn’t that be amazing if that person could do something live?’ ” She also emphasizes the importance of performance art to modern art history. A curator and scholar who helped introduce the subject into art school curricula — her 1979 book “Performance Art: From Futurism to the Present” is used as a textbook around the world — Ms. Goldberg said that “performance has shaped the history of 20th-century art profoundly, from Dada and Futurism, going all through the century to Rauschenberg, Oldenburg and Cindy Sherman.” She founded the festival because “this story needed to be told.”

Starting Sunday, when Performa opens, New Yorkers will get a sense of what Ms. Goldberg has in mind. The first day concludes with a procession organized by Arto Lindsay, which puts 50 people dancing in Times Square to music playing from their cellphones. Meanwhile, the Performa Hub — a sort of hospitality center at the Thom Mayne building in Cooper Square — will play a film that records a year in the life of the Israeli artist Guy Ben-Ner.

Other projects in the works include an experimental music festival organized by Mike Kelley; a variety show by Dominique Gonzalez-Foerster, involving a live musical tour of Lower Manhattan; and a piece by Christian Tomaszewski featuring a fashion show inspired by Soviet bloc sci-fi films enacted within an enormous sculpture of a reclining woman in a space suit — a nod to Niki de Saint Phalle’s monumental 1966 installation “She: A Cathedral.”

This year’s festival also has a strong art-history component: many projects celebrate Futurism, an Italian movement founded in 1909 that aimed to cast off the past and revolutionize culture by embracing speed, the machine and urban life. As well as promoting several Futurist-inspired exhibitions and performances throughout the city, Performa has financed the restoration of several Futurist films and a re-creation of the 16 intonarumori — a group of noise “intoners” designed in 1913 by the Italian Futurist Luigi Russolo, none of which survived World War II — that will be played in a concert of newly composed music at Town Hall.

To many, this blend of old and new seems especially resonant. “Performance has always been a strand of art making, but it’s been ignored by museums and the larger world until recently,” said Chrissie Iles, a curator at the Whitney Museum. “Performa has brought it into the center, where it belongs. You can see what’s going on with a young artist, and you can see something from 1920 or 1965, and therefore you also have a new take on art history.”

Ms. Goldberg has cannily managed to extend her festival’s reach by convincing other New York institutions to mount work in conjunction with Performa. Throughout the year she works with other groups and exhibition spaces around Manhattan to present work that relates to her overall program. That’s why this year Performa is able to offer more than 130 projects — a third more than the 2007 festival.
It is a “genius concept,” said the artist Marina Abramovic, whose performance, organized by the Guggenheim Museum, for which she recreated acclaimed ’60s and ’70s performance works by Vito Acconci, Joseph Beuys and herself, among others, was a highlight of Performa 2005.
Equally shrewd is Ms. Goldberg’s fund-raising strategy. The festival is carried out on a shoestring budget — $1.5 million during a production year and about $400,000 for the others. Each project is financed case by case, with some produced in collaboration with a European institution or cultural agency, and others covered by the hosting institutions. “We are not using a model,” said Esa Nickle, Performa’s general manager. “We’re coming up with a new recipe, which combines a lot of different approaches to arts funding.”

Much of the rest comes from private donors, like the art dealer Jeanne Greenberg, the collector Peter Norton and the Ohio philanthropist Toby Devan Lewis, who has backed Performa from the beginning.

Ms. Goldberg also lures donors by allowing them to produce individual events. Ms. Lewis, who is underwriting Ms. Mutu's piece this year, as well as three other commissions, said she was captivated by Ms. Goldberg's drive. "RoseLee is just such an unusual woman," she said. "I've never seen anything like her energy or the visionary possibilities that she sees."

A native of Durban, South Africa, Ms. Goldberg arrived in New York in 1975, a time when conceptual and body artists like Vito Acconci and Joan Jonas created some of their greatest performance work, and Fluxus artists still mounted "actions" in the unpopulated streets of SoHo. "There was all this exchange of ideas," she said. "We were all downtown, and we were talking about art all night and day and night. And we weren't talking about how much something costs — in fact, it was a badge of honor to have no money."

By 1978 she had become curator of the Kitchen, the downtown performance space, where she presented early performances by the Kipper Kids and Laurie Anderson. The next year she married the furniture designer Dakota Jackson, with whom she has two children. (When asked her age, Ms. Goldberg said, "I'm old enough to have gone to my first Bienniale and Documenta in 1972 and to have a 28-year-old daughter.")

Throughout the 1980s and '90s, Ms. Goldberg continued to champion performance art while teaching (primarily at New York University), writing criticism and books, and organizing events around New York most notably in collaboration with the Museum of Modern Art. But by the early 2000s, as the art market began to boom, she had become frustrated by seeing performance relegated to a sideshow at biennials and art fairs. And with rising costs forcing young artists and creative experimentation out of New York, she decided that something had to be done.

"I really wanted New York to have that feeling again," she said. "The sense that creative people own the city, and that everything is possible."

http://www.nytimes.com/2009/11/01/arts/design/01kino.html?ref=design

A Distant Bauhaus Star

By ALICE RAWSTHORN

LONDON — Josef and Anni Albers, Herbert Bayer, Marcel Breuer, Walter Gropius, Wassily Kandinsky, Paul Klee, Ludwig Mies van der Rohe, Laszlo Moholy-Nagy, Oskar Schlemmer. The names of the students and teachers at the Bauhaus art and design school read like a roll call of some of the 20th century's greatest artists, architects and designers.

Their work is to be celebrated in "Bauhaus 1919-1933: Workshops for Modernity," an exhibition opening Sunday at the Museum of Modern Art in New York. It will be a dazzling tribute to the achievements of the Bauhaus stars, as was the first version of the show at Martin-Gropius-Bau in Berlin this summer. Yet there were other, equally inspiring Bauhäusler who will not appear in the MoMA show. One is Margarete Heymann, who studied ceramics there from 1920 to 1921, and was as gifted and gutsy as her famous contemporaries. She also created an impressive body of work, yet is rarely mentioned in the many books, essays and exhibitions on the Bauhaus. Why?

"It's a tragic story," said Anja Baumhoff, a lecturer in art and design history at Loughborough University in England. "She was an exceptional woman, who refused to live by the rules. Her work was original, functional, very, very beautiful and remarkably advanced for its time." The reasons for her obscurity tell us as much about why some people are cast as winners — and others as losers — in design history, as about the Bauhaus and Ms. Heymann herself.

First, a bit about her. Born to a Jewish family in Cologne in 1899, she went to art school there and in Dusseldorf before joining the Bauhaus. The school has been romanticized as a meritocratic place that treated both sexes equally, but that wasn't strictly true, especially in its early years. "The Bauhaus wasn't an equal playing field," said Leah Dickerman, co-curator of the MoMA retrospective. "Gropius (the founding director) guided the majority of women students into the weaving workshop, which he saw as a fittingly female activity."

Most of them complied, some reluctantly — Ms. Albers for instance — but Ms. Heymann refused, and insisted on studying ceramics. Discovering that there was only one female ceramics student, she made a formal appeal to Gropius, who was forced to back down. Once on the course, she clashed with her teacher, Gerhard Marcks, and left the Bauhaus the following year.

In 1923, she married a young industrialist, Gustav Löbenstein, and they established the Hael-Werkstätten pottery to produce her designs. Composed of simple shapes, mostly circles and triangles, her ceramics looked strikingly modern. Coloring them with vivid glazes, typically yellows or blues, she often added

patterns in the Constructivist style of Kandinsky's paintings. Within a few years, the factory employed 120 people and was exporting her designs to fashionable stores in the United States and Britain.
In 1928, Mr. Löbenstein was killed in a car crash, leaving her a widow with two sons. She ran the factory on her own, but the business struggled in the 1930s economic depression and Nazi oppression. In 1935, she was forced to sell it for a pittance and one of her clients, the London department store owner Ambrose Heal, helped her and the boys to leave Germany for Britain.
Once there, Ms. Heymann settled in Stoke-on-Trent, the industrial city known as "The Potteries," fired by the Constructivist belief that designers should work in close proximity to industry. "The German potteries had modernized by then, but Stoke was still a dirty, smoggy, noisy 19th-century town of bottle ovens and factory chimneys," said Miranda Goodby, ceramics curator at the Potteries Museum in Stoke. "The local manufacturers were producing dainty tea sets with festoons of flowers, and her stuff was very, very different."
She began by working for an established pottery, Mintons, and insisted on joining the board (then very rare for a designer, let alone a woman), only to fall out with her (male) colleagues. She then founded Grete Pottery, which sold her new designs and variations on her German pieces to old clients, including Heal's, but had to close down when World War II began. By then, she had remarried, to the educator Harold Marks. Tiring of Stoke's conservatism, she moved with him to London after the war and reinvented herself as a (not particularly good) painter.
Ms. Heymann has not been forgotten entirely. Her 1920s and '30s pieces survive in museum collections and are auctioned occasionally, although her status is so flimsy that she is known by different names. Grete Marks to the Potteries Museum, Margarete Heymann-Marks to the Dallas Museum of Art, Margarete Heymann-Löbenstein to the Nelson-Atkins Museum in Kansas City, Missouri, Margarete Heymann-Marks Löbenstein to Sotheby's, and so on.
The fundamental problem was that no one championed her. The few prominent female designers at the Bauhaus had powerful male protectors. Ms. Albers's husband, Josef, was one of Gropius's protégés, while a more successful female ceramicist, Marguerite Friedlaender-Wildenhain, not only married a male classmate but was a favorite of Mr. Marcks's. But Ms. Heymann fell out with both him and Gropius.
She also suffered from her decision to stay in Britain, where she was isolated from the Bauhaus powerbrokers, who joined Gropius in the United States. He dictated the "official" version of the school's history from a Harvard teaching post, and decided which Bauhäuslers to cast as stars, and which to ignore.
Stranded in The Potteries, Ms. Heymann was shunned by the local ceramics industry and cut off from potential allies in the London art and design scene. Nor has she been helped by design historians, who have tended to regard ceramics as being less important than architecture, graphics or furniture design. Even ceramic historians have shown greater interest in studio potters, like Ms. Friedlaender-Wildenhain, than industrial ceramicists.
It is tempting to think that all a successful designer needs is talent and determination. But they're not enough when gender, geography, genre and timing conspire against you, as they did for Margarete Heymann.

http://www.nytimes.com/2009/11/02/arts/02iht-design02.html?ref=design

BUICK LACROSSE
How New Buicks Took Shape in China

By CLIFFORD GHETTI

THE idea of creating a new Buick in a design studio in China, as General Motors has done with the 2010 LaCrosse, is not as loopy as it might sound. Buicks have a certain cachet in China, dating back some eight decades to when the emperor bought one.

But today's commercial imperative is more compelling than nostalgia: sales of Buicks in China first outpaced sales in the United States in 2006, and the margin is considerable today. For the first nine months of 2009, for instance, Buick sold 312,798 vehicles in China; in the United States, it sold 72,389.
In 1997 General Motors established two joint ventures with the Shanghai Automotive Industry Corporation in China. One was for manufacturing. The other venture, for design and engineering, is the Pan Asia Technical Automotive Center. The center has done the engineering to adapt various G.M. global models for the Chinese market.
It was logical, then, to expect that the Chinese designers and engineers would eventually take the lead in developing a new vehicle for both markets. That became a reality in July 2006 when Ed Welburn, G.M.'s vice president for global design, gave the Shanghai center an assignment to develop a design study for introduction at the 2007 Shanghai auto show.
The design study would be a modern-day version of the Riviera, which in its 1963 version was a trend-setting personal luxury coupe with crisply chiseled surfaces inspired by vintage Rolls-Royces. After the Shanghai debut, the 2007 Riviera concept was not forgotten; its design language, drawn from Buick history and Chinese culture, became the basis for another concept, the Invicta of 2008, as well as the production 2010 LaCrosse.
Under the guidance of Min Cao, lead exterior designer for the Riviera concept, the Pan Asia team looked to the Buick Y-Job concept of 1938, designed by Harley Earl, and to classic Buicks of the '50s and '60s. Three signature elements were distilled from those decades: the waterfall grille, the portholes and a "sweep-spear" design line along the side.
The low, wide grille of the Y-Job, a stark contrast to the tall, narrow radiator grilles of that era — probably influenced by the pioneering Lincoln Zephyr — set the stage for the 1942 Buick's thick convex vertical bars just above the front bumper, a theme continued through 1954. When the vertical bar theme was revived in the 1990s, the previous semi-elliptical form became a full ellipse and moved up the car's face. A 2004 concept, the Vélite, moved it farther up and wrapped it over the leading edge of the hood, creating a true waterfall form. It was this design that was applied to the Riviera concept.
Portholes appeared in 1949 and were part of Buick styling through 1957, appearing occasionally after that. Usually they were on the side of the fender and were called ventiports; in theory, at least, they vented warm air from under the hood. The Riviera concept moved them to the upper surface of the hood — an extension of the front light clusters.
The sweep-spear styling accent was both a body contour that provided emphasis above the front and rear wheels and a diving chrome accent line that followed those forms. It faded from favor after 1958 on the mainstream models but was resurrected with the 1963 Riviera.

Drawing from Chinese cultural history as well, exterior designers looked to the yuan bao, a gold ingot with convex and concave surfaces, which inspired them to develop similar forms on the car, especially where the roof joined the rear deck and spoiler lip.
Early design sketches by Nenghua Liu, lead interior designer of the Riviera concept, showed a wraparound treatment that had no discernible start or finish. It was an attempt to provide a sense of sanctuary, a place where occupants would feel relaxed and tranquil. A theme of earth and water was adopted for the colors and textures, and avoided hard, aggressive forms. A jadelike material on backlighted interior surfaces was included to signify the importance of that stone in Chinese culture.
"The Riviera concept made us realize how small the world was," Mr. Welburn, the design vice president, said. "It's not east; it's not west. It's Buick."
Making clear what the future held for the Riviera's design, Mr. Welburn continued, "The Riviera communicates the global design vocabulary of the Buick brand and sets the stage for General Motors' design, engineering and manufacturing centers to work together on the next generation of Buick midsize luxury cars."
That foretold the path from the Riviera concept to the 2010 LaCrosse. Joining the Pan Asia team in that project were designers at the Warren, Mich., technical center and chassis and body engineers in Rüsselsheim, Germany.
Using virtual reality technology that permitted 3-D visualization of proposed designs, the widely scattered designers took styling themes developed for the coupe body of the Riviera concept and applied them to a four-door sedan based on the new midsize car architecture developed for Opel's flagship, the Insignia. The Riviera's pair of gullwing doors gave way to four conventional doors.
The sedan was revealed at the Beijing auto show in 2008 as the Invicta concept. Other than a different front fascia, it was pretty much the 2010 LaCrosse that made its debut at the 2009 Detroit show.
The exterior of the LaCrosse clearly carries design themes drawn from the Riviera. It has a design line that runs along the top of the body side and around the car and is said to have been inspired by Chinese ribbon dancing. It also carries forward the sweep-spear tradition for Buick. Most of the Riviera's exterior forms have been squared up slightly for a more efficient use of space.

http://www.nytimes.com/2009/11/01/automobiles/01DESIGN.html?ref=design

'ART OF THE SAMURAI'
Wise Warriors, Artfully Attired

By ROBERTA SMITH

For the Japanese samurai, dying well was the best revenge. This elite warrior class began to play a central role in Japan's history and culture around the eighth century and in time evolved into the country's ruling caste. Highly cultivated in arts like poetry, monochrome ink painting and the tea ceremony, this class adhered to a strict code of honor built around loyalty, self-discipline, obligation and the shame of failure. Its most unbending principle was that a samurai's death should bring honor to his family and descendants and to the emperor or clan he served.

Fighting heroically to the end while looking good was what it was all about, even if the end turned out to be seppuku — ritual suicide — one way to avoid humiliation or assuage shame. Regardless, arms and armor of suitable grandeur and efficiency were required, and it was by meeting these requirements that generations of artisans helped shape the defining opposition of centuries of Japanese aesthetics: utter, even hermetic simplicity versus off-the-charts ostentation.

This opposition lies at the heart of "Art of the Samurai: Japanese Arms and Armor, 1156-1868," a sumptuous, revelatory and long-awaited exhibition at the Metropolitan Museum of Art that gives the term split personality a whole new meaning. The show's armor and helmets are among the world's most lavish works of multimedia art, and — in the opposite corner, as it were — its plain and simple sword blades, presented au naturel, offer subtleties of silhouette and tone that could challenge the most ardent admirer of Minimalism.

"Art of the Samurai" represents a decade of work by Morihiro Ogawa, special consultant for Japanese arms and armor at the Met; he was assisted by Donald J. La Rocca, curator of the museum's arms and armor department. All but about 10 of its 214 objects, including lacquer sword rests or luxurious surcoats worn over armor, are from Japanese museums, and nearly half are officially designated National Treasures or Important Cultural Properties by the Japanese. Many are exhibited only rarely in Japan, much less allowed to leave the country.

Due to their fragility, not all objects will be on view at once: about 60 will be rotated out of the show during the first week of December, to be replaced by similar objects of equal caliber. And some displays will be gone long before then. For example the battle-scarred 12th-century cavalry armor that greets viewers in the show's first gallery will be on view for only two weeks. Visit early and often.

This exhibition is a once-in-a-lifetime event for children, war buffs and connoisseurs of all ages, even garden-variety art lovers and anyone still mystified about the source of Darth Vader's black-on-black helmet and mask. But mainly it is a chance to grasp in irreducible visual terms the complex extremes of Japan's traditional aesthetic values and, to some extent, its moral ones too.

The centers of most of the show's galleries are given over to the stunningly ornate suits of armor topped by even more extravagant helmets and by face masks whose open-mouthed expressions seem locked in an eternal battle cry. Most Japanese armor is made of small scales of iron finished in gleaming lacquer and laced together with bands of brightly colored leather or woven silk. These ensembles qualify as multimedia art not only because they involve an array of ultra-refined crafts but because they embody the spirit of several Japanese art forms. Their jutting planes of tiles are architecture in miniature, and the curled flaps of certain helmets even introduce pagodalike curves. The grimacing masks are pure kabuki: combat as performance. And aspects of painting and sculpture abound. The scales' lacing alone — which provides color, texture, pattern and flexibility — dazzles.

A samurai's armor was, after his swords, his most prized possession, handed down through generations and depicted in paintings. One of the show's most exceptional ensembles is an all-black suit that belonged to the 16th-century commander Honda Tadakatsu and is especially notable for the large, three-pronged deer-horn helmet. (The horns, a wonderful combination of artifice and naturalism, are shiny lacquer with tiny bumps.) It is flanked on one side by a 17th-century hanging scroll that shows Tadakatsu in full regalia, with the same giant rosary of wood beads covered in gold leaf slung across his chest. On the other side of the actual armor is a second version, complete with the horns, in black and orange, which the family had made for a child seven generations later.

One of the show's high points is a large vitrine devoted to seven helmets, including one whose crest is a large gold praying mantis and another, covered with silver leaf and shaped like Mount Fuji. Judging from the pictures in the catalog, the helmets in the second rotation may be even more spectacular.

The unprecedented gathering of nearly 60 naked sword blades, which ring the walls of these galleries, almost forms a show in its own right, and combined with their labels the blades constitute a crash course in their connoisseurship. Dating primarily from the 11th to the 17th centuries, the blades would have been incorporated into a number of samurais swords, including the tachi (slung sword), katana (sword), uchigatana (mid-length sword) and tanto (dagger, which unusually figured in seppuku). Usually only samurai were officially permitted to wear two swords at once — for example, a katana and a tanto — both slipped through the warrior's broad sash.

The blades have always been appreciated as art objects as much as weapons. Several swords here were honored by being named. Swordsmiths began to sign their blades — on the tang, or the end of the blade left rough and covered by the hilt — as early as the 11th century, and contrasting aesthetics of swordsmithing, handed down in families through generations, resulted in different schools, just as in Japanese painting.

Swords are appreciated for their elegant proportions, curved lines and the subtle surface textures, which have names like "tight wood grain," "burl grain" and "pear skin." (Magnifying glasses are recommended for the truly serious.) But the most interesting distinguishing characteristic is the hamon, or tempering line or pattern, an austere but purely decorative contrast in the tone of the metal extending along the blade. The hamon is created by applying clay slip of different densities to both sides of the blade just before it is quenched — dipped in water — at the end of the forging process. (One result is that blades have a front and a back.)

With this process the swordsmith creates a narrow but distinctive dark-light silhouette of two or even three contrasting tones of silvers or grays that are usually visible from different angles. (Good knees help.) Basically, the blades are pictorial slivers, minimalist blends of painting and calligraphy in miniature that, as is usually the case with Japanese visual culture, are linked to nature. Their suggestiveness and variety astound, evoking irregular waves, mounds, mist, cloves, clouds and horizon lines. It is quite a revelation to go through this show concentrating on the blades.

When you turn from the arms back to the armor, the gaudy noise can be shocking, as can the realization that you have been viewing as beautiful pictorial objects weapons designed to maim and kill with utmost precision.

But the blades can't be used until they are encased in their own kind of gaudy armor — beautifully worked bronze sword guards, lacquer sheaths and elaborate hilts — that protect them and render them functional, but that are themselves pushed outrageously beyond function, providing some of the show's richest, most compressed moments of extravagance. The hilts are covered in sharkskin and beautifully bound with crisscrossing silk cord beneath which you can glimpse bits of gold: finely worked figures, creatures and plant forms called menuki. Thus embedded, they were barely visible, but they improved the samurai's grip on his weapon. Several are displayed ex-hilt, as it were, since they have long been collected in their own right, even by some of the samurai themselves.

"Art of the Samurai: Japanese Arms and Armor, 1156-1868" runs through Jan. 10 at the Metropolitan Museum of Art, (212) 535-7710, metmuseum.org.

http://www.nytimes.com/2009/10/23/arts/design/23samurai.html

A Southern Mirrored Window
By MOTOKO RICH

"The Help," a novel about the relationships between African-American maids and their white employers in 1960s Mississippi, has the classic elements of a crowd pleaser: it features several feisty women enmeshed in a page-turning plot, clear villains and a bit of a history lesson.

The book, a debut novel by Kathryn Stockett, also comes with a back story that is a publishing dream come true: at first rejected by nearly 50 agents, the manuscript was scooped up by an imprint of Penguin and pushed aggressively to booksellers, who fell in love with it. Since it came out in February, "The Help" has been embraced by book clubs and bloggers who can't stop recommending it to their friends. All of which helps explain why "The Help" — which some enthusiasts have compared to Harper Lee's "To Kill a Mockingbird" — has maintained a tenacious hold close to the top of several best-seller lists, despite one of the strongest seasons for big-name authors in recent memory. Amid blockbusters from the likes of Dan Brown, Michael Connelly, Patricia Cornwell and Nicholas Sparks, Ms. Stockett has stayed within the Top 5 on The New York Times Hardcover Fiction Best-Seller list since August.
"It is running and it's going to continue to run," said Vivienne L. Jennings, co-owner of Rainy Day Books, an independent bookstore in Fairview, Kan.
According to Nielsen BookScan, which tracks about 70 percent of retail sales, "The Help" has sold 445,000 copies in hardcover. At Barnes & Noble, the country's largest retail bookstore chain, Sessalee Hensley, the chain's fiction buyer, said the number of copies sold per week had grown steadily since August. "I think it's completely word of mouth," she said.
The publisher, Amy Einhorn Books, an imprint of Penguin Group USA, has delayed the publication of a paperback edition next year from February to June. "It's really hit a nerve," said Ms. Einhorn, whose imprint started off with "The Help" as its inaugural title. "People are passionate about this book."
The novel features three narrators. Two are black housekeepers, Aibileen and Minny, who work for white families in Jackson; the third is Skeeter, a young white woman who aspires to be a writer and break free of the Junior League expectations of her childhood friends (one of whom employs Aibileen) and her starchy mother.
Skeeter desperately wants to impress an editor at a publishing house in New York with a book idea, and gradually persuades the maids to talk about working for white families at a time when merely telling the truth put them in enormous jeopardy.
With its intimate portrayals of the maids' relationships with their employers and the children they care for, "The Help" appeals to readers who feel they are getting a behind-the-scenes peek into a dark period in the country's history.
"I couldn't believe how mad I would get while reading it," said Melissa Vasquez, a 30-year-old mother of three in Ingleside, Tex.

On Ms. Vazquez's blog, Coffee, Books and Laundry (at melissa-coffeebooksandlaundry.blogspot.com), she wrote: "I cannot recommend 'The Help' enough! If you haven't read it, you are missing out on a fantastic book, that is sure to be a classic."
Ms. Stockett, 40, herself a native of Jackson, said the idea for the novel came to her in the immediate aftermath of the Sept. 11 attacks, when she was living in New York. Ms. Stockett, who had another novel in her drawer that a writing coach had told her was "just awful," said she felt homesick and "tried to comfort myself by writing in the voices of the people I missed."
The first voice to come to her was that of Demetrie, the African-American maid who worked for Ms. Stockett's grandmother in Jackson in the 1970s and '80s. "She came out in the voice of Aibileen," Ms. Stockett said in a telephone interview from her home in Atlanta. "Then a few months later I came back to it and I found that Aibileen had a few things to say that were not in character, and that's how Minny got started."
She added Skeeter, she said, because she worried that readers wouldn't trust her if she only wrote about black characters. "I just didn't think that would ever be allowed to sit on the shelf," she said. "So I threw Skeeter in the mix and I felt a little better about it, because I was showing a white perspective as well."
Ms. Stockett sent query letters to more than 45 agents before Susan Ramer of Don Congdon Associates in New York read the manuscript. Ms. Ramer said she was immediately captured by "the voices, and the humor and the authenticity of them," and signed Ms. Stockett right away. She sold the manuscript to Ms. Einhorn over a weekend in the fall of 2007.
The book received generally strong reviews, with Janet Maslin of The New York Times calling it an "ultimately winning novel," although Ms. Maslin pointed out the potential risks of a book "by a Southern-born white author who renders black maids' voices in thick, dated dialect."
Indeed, some readers have been discomfited by Ms. Stockett's identity in portraying black characters. "Authors have the liberty to become whoever they want to become," said Melissa McCurdy, a 42-year-old mother of three in Little Rock, Ark., who described the novel as "racist" on her blog, Gerbera Daisy Diaries (gerberadaisydiaries.blogspot.com). "But I want to read the African-American version of 'The Help,' " she said.
Some black readers say "The Help" peddles some familiar stereotypes. "Very often, when there is something that captures a particular voice or a particular time period where African-Americans are subservient," said Faith Childs, a literary agent, "it finds a large and willing audience — and one wonders why."
But other black readers said they saw Ms. Stockett as more nuanced in her portrayals of what might initially appear as stock characters. "They are looking at the superficial aspect of this, which is that it could be construed as neo-Mammyism," said Karen Grigsby Bates, a Los Angeles-based national correspondent for NPR who loved "The Help."
"But there is a lot of sedition in this book," Ms. Grisby Bates said. "It would be wrong, wrong, wrong to assume that these black women are just curvy, comfortable people."
Tiffinee Armstrong, a co-coordinator of Enlightened ConNexTions, a book group in Raleigh, N.C., said she was initially taken aback when she learned that Ms. Stockett was white. But after reading the book, Ms. Armstrong, who is black, said, "I thought she really grabbed hold of the dialect really well and really gave a lot of insight into what was going on in Mississippi." Besides, she added, "it was definitely a page-turner."
Karla F C Holloway, a professor of English and law at Duke University, raved about the novel as "beautifully written" and said Ms. Stockett was clearly aware of the "racial tightrope she's walking."
But Ms. Holloway, who is black, said Ms. Stockett's identity pointed to a broader conundrum in publishing and the culture generally.
"Who gets to tell those stories in a way that they earn public attention?" Ms. Holloway asked. "It seems to me to reflect our bias about whom we trust as a storyteller."

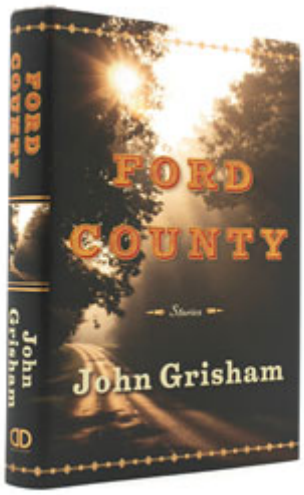
http://www.nytimes.com/2009/11/03/books/03help.html?ref=books

Bite-Size Legal Trouble and Suspense
By JANET MASLIN

FORD COUNTY

By John Grisham

308 pages. Doubleday. $24.



John Grisham had some story ideas that he didn't think could sustain full-length narrative. So he did what he customarily does: whatever he wants to. Was anyone at Doubleday going to argue with that?
Mr. Grisham took seven of his unused plot ideas and turned each of them into a sharp, lean tale free of subplots and padding. At an average length of slightly over 40 pages, these narratives are shorter than novellas but longer than conventional short stories. For a fledgling author, this format would be a tough sell; for Mr. Grisham, it's a vacation from whatever grueling work goes into the construction of fully rigged best sellers. The change invigorates him in ways that show up on the page.
"Ford County" is Mr. Grisham's only short-story collection. That doesn't mean he's put his novelistic instincts aside. This book begins on a light note and ends with a teary one; in between it's full of tacit suspense that hinges on the bending, breaking and subversion of Mississippi law. Exactly when and how will a tricky legal issue arise? You needn't see it coming to know it will be there.
In the hive of criminal creativity that is Ford County (the place introduced in Mr. Grisham's debut novel, "A Time to Kill") many a citizen seems poised on the brink of trouble. Yet Mr. Grisham often approaches that trouble in wryly humorous fashion, as he does in "Blood Drive," the book's opening story. He begins with an emergency: a local named Bailey has been injured in a construction accident in Memphis, and Bailey needs blood donors. Exactly what happened? Nobody's sure. What work was Bailey doing? Good question. His mother always said he was an assistant foreman, but he turns out to have been a mason's helper instead.
Soon three stalwarts have been recruited to make a hasty run from Mississippi to Memphis. And it takes remarkably few words for Mr. Grisham to sketch them perfectly. "A hero quickly emerged," Mr. Grisham writes archly of Wayne Agnor, a k a Aggie, whose ownership of a pickup is his main qualification for the job. The second volunteer is Calvin Marr, conveniently unemployed and eager to see what Memphis is like. The third, the guy nobody wants, is named Roger, and his father seems to volunteer Roger for the job just to get rid of him. Would Roger's drug history make him a good blood donor? "Needles certainly wouldn't intimidate him," Mr. Grisham writes.
Off they go, assured that Roger has quit drinking until Roger produces his first six-pack of beer. ("I did," he explains. "I quit all the time. Quittin's easy.") This leads to drinking, driving, a high-speed escape from a police car and eventually a visit to a Memphis strip club. By the time the three men get to a

hospital — one of 10 in Memphis, and not necessarily the right one — it's after 3 in the morning. Donating blood isn't possible. Besides, nobody bothered to find out whether Bailey was the injured man's first or last name.

As "Blood Drive" begins living up to its title, Mr. Grisham leads his threesome down a slippery slope toward life-changing legal consequences. He also leads them into so much trouble that Bailey is the character who emerges least scathed.

Then it's on to "Fetching Raymond," another story about a road trip, this one as mysterious in purpose as the Bailey rescue mission was clear. Three no-account Graneys, Inez and two of her sons (one of whom "still lived with his mother because he'd never lived anywhere else, at least not in the free world"), are headed for an unnamed destination. They are making what is apparently a regular pilgrimage for them all. They're going to visit a third brother, Raymond, at the prison where he has been spending his family's scant resources, learning big words ("what the hell is a stipend?" a brother asks), hiring lawyers, firing lawyers and doing some truly terrible writing. Raymond has also insisted on becoming the rare white Delta blues singer on death row.

The death row angle is slipped almost casually into what has until then been a fairly upbeat dysfunctional-family tale. But Mr. Grisham can give his story an unexpected twist without need of a heavy hand. His novels sometimes moralize; these short stories don't need to because they transform their agendas into pure, vigorous plot. The closing piece, "Funny Boy," is a poignant account of illness, bigotry and unexpected tenderness, none of it presented as editorializing and all of it incorporated into action.

"Fish Files," like Mr. Grisham's most recent novel, "The Associate," offers an illuminating, blow-by-blow look at the process whereby legal ethics crumble in the face of temptation. A small-town bankruptcy and divorce lawyer gets a potentially lucrative call from a New York hotshot. This causes the Ford County lawyer to access his inner Jimmy Buffett and start dreaming how he can escape to the tropics. He doesn't exactly intend to swindle, forge or lie; things just kind of work out that way, as they often do when Mr. Grisham pulls the strings. And if the story winds up as less than a full-fledged drama, it also becomes much more than a well-wrought diversion. Mr. Grisham knows how to make himself eminently readable. In "Ford County" he's careful to be exacting and informative too.

Also in "Ford County": "Casino," in which a Ford County entrepreneur finds it convenient to call himself part of the Yazoo Indian Nation for reasons of casino development and winds up reaping the consequences; "Michael's Room," the book's only faint show of preachiness, in which an unscrupulous defense lawyer who has won a courtroom victory for a pharmaceutical company is given a Dickensian look at how he has affected plaintiff lives; and "Quiet Haven," the book's sneakiest story. Why would a nice young man seek work at nursing home after nursing home and keep changing jobs so regularly? The answer isn't hard to guess, but it's the tactics that matter. A scam artist can have no better accomplice than Mr. Grisham when it comes to doing the wrong thing but doing it right.

http://www.nytimes.com/2009/11/02/books/02book.html?ref=books

Ayn Rand's Revenge
By ADAM KIRSCH

AYN RAND AND THE WORLD SHE MADE

By Anne C. Heller

Illustrated. 567 pp. Nan A. Talese/Doubleday. $35

A specter is haunting the Republican Party — the specter of John Galt. In Ayn Rand's libertarian epic "Atlas Shrugged," Galt, an inventor disgusted by creeping American collectivism, leads the country's capitalists on a retributive strike. "We have granted you everything you demanded of us, we who had always been the givers, but have only now understood it," Galt lectures the "looters" and "moochers" who make up the populace. "We have no demands to present you, no terms to bargain about, no compromise to reach. You have nothing to offer us. We do not need you."

"Atlas Shrugged" was published 52 years ago, but in the Obama era, Rand's angry message is more resonant than ever before. Sales of the book have reportedly spiked. At "tea parties" and other conservative protests, alongside the Obama-as-Joker signs, you will find placards reading "Atlas Shrugs" and "Ayn Rand Was Right." Not long after the inauguration, as right-wing pundits like Glenn Beck were invoking Rand and issuing warnings of incipient socialism, Representative John Campbell, Republican of California, told a reporter that the prospect of rising taxes and government regulation meant "people are starting to feel like we're living through the scenario that happened in 'Atlas Shrugged.' "

Rand's style of vehement individualism has never been universally popular among conservatives — back in 1957, Whittaker Chambers denounced the "wickedness" of "Atlas Shrugged" in National Review — and Rand still has her critics on the right today. But it can often seem, as Jonathan Chait, a senior editor at The New Republic recently observed, that "Rand is everywhere in this right-wing mood." And while it's not hard to understand Rand's revenge-fantasy appeal to those on the right, would-be Galts ought to hear the story Anne C. Heller has to tell in her dramatic and very timely biography, "Ayn Rand and the World She Made."

For one thing, it is far more interesting than anything in Rand's novels. That is because Heller is dealing with a human being, and one with more than her share of human failings and contradictions — "gallant, driven, brilliant, brash, cruel . . . and ultimately self-destructive," as Heller puts it. The characters Rand created, on the other hand — like Galt or Howard Roark, the architect hero of "The Fountainhead" — are abstract principles set to moving and talking.

This is at once the failure and the making of Rand's fiction. The plotting and characterization in her books may be vulgar and unbelievable, just as one would expect from the middling Hollywood screenwriter she once was; but her message, while not necessarily more sophisticated, is magnified by the power of its absolute sincerity. It is the message that turned her, from the publication of "Atlas Shrugged" in 1957 until her death in 1982, into the leader of a kind of sect. (This season, another Rand book, by the academic historian Jennifer Burns, is aptly titled "Goddess of the Market: Ayn Rand and the American Right.") Even today, Rand's books sell hundreds of thousands of copies a year. Heller reports that in a poll in the early '90s, sponsored by the Library of Congress and the Book of the Month Club, "Americans named 'Atlas Shrugged' the book that had most influenced their lives," second only to the Bible.

Rand's particular intellectual contribution, the thing that makes her so popular and so American, is the way she managed to mass market elitism — to convince so many people, especially young people, that they could be geniuses without being in any concrete way distinguished. Or, rather, that they could distinguish themselves by the ardor of their commitment to Rand's teaching. The very form of her novels makes the same point: they are as cartoonish and sexed-up as any best seller, yet they are constantly suggesting that the reader who appreciates them is one of the elect.

Heller maintains an appropriately critical perspective on her subject — she writes that she is "a strong admirer, albeit one with many questions and reservations" — while allowing the reader to understand the power of Rand's conviction and her odd charisma. Rand labored for more than two years on Galt's radio address near the end of "Atlas Shrugged" — a long paean to capitalism, individualism and selfishness that makes Gordon Gekko's "Greed is good" sound like the Sermon on the Mount. "At one point, she stayed inside the apartment, working for 33 days in a row," Heller writes. She kept going on amphetamines and willpower; the writing, she said, was a "drops-of-water-in-a-desert kind of torture." Nor would Rand, sooner than any other desert prophet, allow her message to be trifled with. When Bennett Cerf, a head of Random House, begged her to cut Galt's speech, Rand replied with what Heller calls "a comment that became publishing legend": "Would you cut the Bible?" One can imagine what Cerf thought — he had already told Rand plainly, "I find your political philosophy abhorrent" — but the strange thing is that Rand's grandiosity turned out to be perfectly justified.

In fact, any editor certainly would cut the Bible, if an agent submitted it as a new work of fiction. But Cerf offered Rand an alternative: if she gave up 7 cents per copy in royalties, she could have the extra paper needed to print Galt's oration. That she agreed is a sign of the great contradiction that haunts her writing and especially her life. Politically, Rand was committed to the idea that capitalism is the best form of social organization invented or conceivable. This was, perhaps, an understandable reaction against her childhood experience of Communism. Born in 1905 as Alissa Rosenbaum to a Jewish family in St. Petersburg, she was 12 when the Bolsheviks seized power, and she endured the ensuing years of civil war, hunger and oppression. By 1926, when she came to live with relatives in the United States and changed her name, she had become a relentless enemy of every variety of what she denounced as "collectivism," from Soviet Communism to the New Deal. Even Republicans weren't immune: after Wendell Willkie's defeat in 1940, Rand helped to found an organization called Associated Ex-Willkie Workers Against Willkie, berating the candidate as "the guiltiest man of any for destroying America, more guilty than Roosevelt."

Yet while Rand took to wearing a dollar-sign pin to advertise her love of capitalism, Heller makes clear that the author had no real affection for dollars themselves. Giving up her royalties to preserve her vision is something that no genuine capitalist, and few popular novelists, would have done. It is the act of an intellectual, of someone who believes that ideas matter more than lucre. In fact, as Heller shows, Rand had no more reverence for the actual businessmen she met than most intellectuals do. The problem was that, according to her own theories, the executives were supposed to be as creative and admirable as any artist or thinker. They were part of the fraternity of the gifted, whose strike, in "Atlas Shrugged," brings the world to its knees.

Rand's inclusion of businessmen in the ranks of the Übermenschen helps to explain her appeal to free-marketeers — including Alan Greenspan — but it is not convincing. At bottom, her individualism owed much more to Nietzsche than to Adam Smith (though Rand, typically, denied any influence, saying only

that Nietzsche "beat me to all my ideas"). But "Thus Spoke Zarathustra" never sold a quarter of a million copies a year.

Rand's potent message could lead to intoxication and even to madness, as the second half of her life showed. In 1949, Rand was living with her husband, a mild-mannered former actor named Frank O'Connor, in Southern California, in a Richard Neutra house. Then she got a fan letter from a 19-year-old college freshman named Nathan Blumenthal and invited him to visit. Rand, whose books are full of masterful, sexually dominating heroes, quickly fell in love with this confused boy, whom she decided was the "intellectual heir" she had been waiting for.

The decades of psychodrama that followed read, in Heller's excellent account, like "Phèdre" rewritten by Edward Albee. When Blumenthal, who changed his name to Nathaniel Branden, moved to New York, Rand followed him; she inserted herself into her protégé's love life, urging him to marry his girlfriend; then Rand began to sleep with Branden, insisting that both their spouses be kept fully apprised of what was going on. Heller shows how the Brandens formed the nucleus of a growing group of young Rand followers, a herd of individualists who nicknamed themselves "the Collective" — ironically, but not ironically enough, for they began to display the frightening group-think of a true cult. One journalist Heller refers to wondered how Rand "charmed so many young people into quoting John Galt as religiously as 'clergymen quote Matthew, Mark, Luke and John.' "

Inevitably, it all ended in tears, when Branden fell in love with a young actress and was expelled from Rand's circle forever. That he went on to write several best-selling books of popular psychology "and earned the appellation 'father of the self-esteem movement' " is the kind of finishing touch that makes truth stranger than fiction. For if there is one thing Rand's life shows, it is the power, and peril, of unjustified self-esteem.

Adam Kirsch is a senior editor at The New Republic and a columnist for Tablet Magazine. He is the author, most recently, of "Benjamin Disraeli."

http://www.nytimes.com/2009/11/01/books/review/Kirsch-t.html?ref=books

Rare Books Don't Always Live in Glass Cases

By GERALDINE FABRIKANT

STANDING among the 10,000 rare books in the stacks of the Linda Hall Library in Kansas City, Bruce Bradley, the director of the history of science special collections, pulls out a copy of "The Starry Messenger," the revelatory book in which Galileo detailed his astronomical observations made with his own "spyglass" — the instrument that would later be known as the telescope.

"Treat it with care," Mr. Bradley said as he gently handed me the library's first edition, one of the more than 500 initially printed in Latin as "Sidereus Nucius." The library paid $38,000 for the book in 1988 — at the time the costliest book the library had ever bought. But it's hardly the only jewel in a collection of 500,000 books, journals and pamphlets that make this private library among the largest science libraries in the world. Also in its stacks are Isaac Newton's "Principia," the 1687 book that presented his laws of gravity, and Copernicus's 1543 "On the Revolutions of the Celestial Spheres," among other noteworthy works.

But these books are not just for scholars. They are also on view for the average visitor, albeit one with a decided interest in the sciences who makes a pilgrimage to western Missouri, where the sprawling red-brick library sits majestically on a 14-acre urban arboretum just a five-minute walk from Kansas City's Nelson-Atkins Museum of Art.

The Linda Hall is among dozens of libraries across the United States that house dazzling collections and often mount eccentric exhibitions but largely remain unfamiliar to the public.

"What is fun is to become aware of these marvelous libraries that, though open to the public, are not well known and are filled with wonderful treasures," said Robert S. Pirie, a prominent book collector who lives in Manhattan and has his own library of several thousand volumes.

Many libraries, whether public or private, are the passionate inspirations of their founders.

In Southern California, the William Andrews Clark Memorial Library was created and financed by the heir to a copper-mining fortune who was a collector of rare books and an early champion of Oscar Wilde. The museum, set in a charming Beaux-Arts building in the West Adams section of Los Angeles and part of the library system of the University of California, Los Angeles, has the largest public collection of Wilde's writing, according to its head librarian, Bruce Whiteman.

Among its 110,000 volumes is the first collected edition of Shakespeare's plays and the first collection of Keats's poems, with this handwritten dedication to his friend John Byng Gattie, who was ill: "I hope your eyes will soon be well enough to read this with pleasure and ease."

The Library Company in Philadelphia was started by Benjamin Franklin in 1731 when he and a group of friends each bought a share of stock in a new entity that they created. Franklin did not come from a moneyed background, and he and his friends agreed to pool their resources to gain access to a wider range of books than any single member could afford. Today, the library holds 500,000 volumes, largely works on pre-19th-century American history.

The New York Academy of Medicine Library was founded by a group of doctors in 1847. It was opened to the public in 1878 and today holds 750,000 volumes. Its rare books collection includes the Edwin Smith Papyrus, the oldest medical papyrus: a work on surgery that was written in 1700 B.C. (It is currently on display at the Metropolitan Museum of Art.) It also has 110 copies of "The Vicar of Wakefield" by Oliver Goldsmith, himself a doctor; a collector donated them.

"Today, it is one of the great treasure houses of the history of medicine," said the book dealer Jonathan Hill of New York City. "It houses everything from early manuscripts to printed books and the classics of medicine." To one visitor the Malloch Rare Book Room at the library recalled the elegance of the Frick Collection.

Libraries across the country may be facing tougher times as young people turn increasingly to the Web. But dedicated librarians continue to build collections and provide important services to visitors.

Mr. Whiteman, the chief librarian at the Clark in Los Angeles, recalled a battle several years ago for a college notebook of Oscar Wilde's, written during 1876 and 1978 when he was at Magdalen College at Oxford, as well as the autobiography of his lover, Lord Alfred Douglas. "I knew that Magdalen College was interested," he said. "Their provost was going to try and raise some special money to let them bid." The Clark ended up paying about $175,000.

And among libraries there was a quiet tug of war behind the scenes for Michael Zinman's vast collection of early-American imprints. The 6,000 titles in the Zinman collection included — among other holdings — the first American sex manual, published in 1766, and Cotton Mather's account of the Salem witch trials from 1693.

Ultimately the Library Company got the collection, immediately increasing the size of its early American imprints by a third. (Mr. Zinman, a dealer in natural-gas turbines, held on to his whimsical collection of books with odd titles, including "The Cult of the Goldfish" and "The Truth About Baking Powder.")

The collections of the Library Company clearly reflected its founders' needs to learn about history and travel.

In contrast, the Linda Hall's collection says nothing about the passions of its benefactors: Herbert and Linda Hall. Mr. Hall, who made his fortune in grain, left a $7.5 million endowment but no particular mandate for the type of collection to be built. In 1946 the library's board, worried that Kansas City was not getting its share of defense contracts because the city did not have the infrastructure to support technology-based industry, decided the library should focus on science, engineering and technology. It got its first boost by paying $320,000 for 62,358 books and other items that had belonged to the American Academy of Arts and Sciences, which was assembled by John Adams before he became president.

Today, the Linda Hall's collection is most noted for scientific journals. For example, its two most heavily used publications are the Journal of the American Chemical Society and the organic chemistry journal Tetrahedron Letters. Among its most arcane holdings is Worm Runner's Digest.

But no matter how libraries were born, many are striving to create exhibitions that cast a wider net for visitors.

In Los Angeles, the Clark routinely holds classical music concerts, lectures and conferences. Because the space is small, it sells concert tickets by lottery.

The Rosenbach Museum and Library in Philadelphia, home to the books once owned by the Rosenbach brothers, well-known book dealers of the last century, has begun a series of hands-on tours, in which visitors can accompany a member of the staff and handle objects from the collection and learn their history. On a recent tour, a staff member, Elizabeth Fuller, let visitors handle Bram Stoker's working notes and outlines for "Dracula," which included a list of characters and Dracula's travel schedule. The library owns two copies of the first edition of "Dracula."

In June, the Library Company held a series of talks about Juneteenth, the 19th of June, 1865, when slaves in Texas heard that the Civil War had ended and that they had been freed.

In Kansas City, the Linda Hall Library mixes highly specific shows with those holding broader interest. Earlier this year it exhibited 127 single-lens microscopes from the time of Antoni van Leeuwenhoek to Charles Darwin.

Sometimes a visitor is even allowed a peek behind the scenes. On a recent visit to the New York Academy of Medicine Library, I was taken to the conservation floor, where two women were at work in a sunny room overlooking Central Park. Among the works they let me handle was a ninth-century copy of a cookbook by Apicius. Though it is the earliest cookbook in the West, almost nothing is known about Apicius himself. Both women were lawyers who quit to become librarians. At that moment, that seemed like a lovely idea to me.

IF YOU GO

The William Andrews Clark Memorial Library (2520 Cimarron Street, Los Angeles; 323-731-8529; www.humnet.ucla.edu) is open weekdays 9 a.m. to 4:45 p.m.

The Linda Hall Library of Science, Engineering and Technology (5109 Cherry Street, Kansas City, Mo.; 816-363-4600; www.lindahall.org). Hours vary.

The Library Company of Philadelphia (1314 Locust Street; 215-546-3181; www.librarycompany.org) is open 9 a.m. to 4:45 p.m. on weekdays.

The New York Academy of Medicine Library (1216 Fifth Avenue at 103rd Street; 212-822-7321; www.nyam.org) is open by appointment 10 a.m. to 5 p.m. Tuesday to Friday.

The Rosenbach Museum and Library (2008-2010 DeLancey Place, Philadelphia; 215-732-1600; www.rosenbach.org). Hours vary.

http://travel.nytimes.com/2009/11/01/travel/01culture.html?ref=books

Wilderness Warriors
By TONY HORWITZ

THE BIG BURN

Teddy Roosevelt and the Fire That Saved America

By Timothy Egan

Illustrated. 324 pp. Houghton Mifflin Harcourt. $27

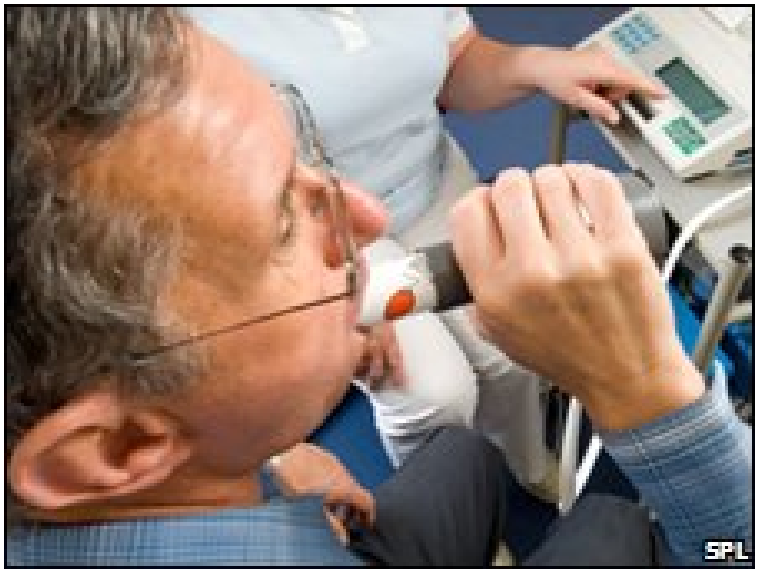
For Americans bred on Smokey Bear, it's a shock to learn that the first forest rangers were hated men whose work had little to do with smoldering s'mores.
In the still-wild West of a century ago, rangers evicted shotgun-toting outlaws who ran saloons and brothels on public land. A hunter shot a ranger dead, claiming he'd mistaken him for a deer. A mob, enraged by new limits on mining, hanged the first Forest Service chief in effigy. In Congress, foes of the agency lobbied for felling entire forests before they caught fire. "Not one cent for scenery!" cried the speaker of the House, Joseph Cannon, one of many legislators opposed to Theodore Roosevelt's conservationist agenda. Trees, after all, were just boards and railroad ties in waiting.
The story of Roosevelt's crusade to save wild places is becoming as well worn as a campfire tale. This summer brought "The Wilderness Warrior," Douglas Brinkley's biography, and the fall brings Ken Burns's PBS spectacle on the national parks. But while Roosevelt is justly celebrated for his vision and his shrewd use of the presidency as a bully pulpit — "I am against the man who skins the land!" — the task of protecting public woodlands fell to a small corps of unsung foresters. It is in praise of these pioneering conservationists that Timothy Egan has written "The Big Burn," an enlightening if uneven account of the Forest Service's embattled founding.
Egan, who writes the Outposts column for NYTimes.com and is a veteran chronicler of the West, is evidently drawn to disaster. He won a National Book Award for "The Worst Hard Time," a harrowing portrayal of the Dust Bowl. Here, he shifts from the Plains to the Northern Rockies to revisit the worst wildfire in United States history. Known as the "Big Burn," the 1910 blaze consumed three million acres in Idaho, Montana and Washington, scorched frontier towns and left a smoke cloud so dense that it hung over Denver after the flames had died down.
Egan weaves his account of the Big Burn with the creation story of the United States Forest Service. This might seem a dull, bureaucratic yarn, but Egan tells it as the stirring tale of a very odd couple: the irrepressible Teddy Roosevelt, who "burned 2,000 calories before noon and drank his coffee with seven lumps of sugar," and his chief forester, Gifford Pinchot, an ascetic loner who sometimes slept on a wooden pillow and for 20 years mystically clung to his deceased fiancée.
Raised rich in Manhattan, like Roosevelt, Pinchot was heir to a chateau with 23 fireplaces and a fortune made from clear-cutting Eastern forests. Yet this city-bred scion became a friend of the naturalist John Muir, a champion of woodlands and Roosevelt's confidant on conservation. "We dream the same dreams," Roosevelt wrote to Pinchot, and share "a peculiar intimacy." While lambasting robber barons and staking out tracts of national forest, the two men also boxed, wrestled and swam naked in the Potomac.
When Pinchot became chief of the new Forest Service in 1905, he recruited idealistic young rangers, many trained at a forestry school at Yale. This was a world away from the public lands that Roosevelt's "green rangers" were sent to survey and police. Out West, rangers faced homesteaders and railroad, timber and mining magnates engaged in the frantic land and resource grab of the early 1900s. It was hard for Ivy League foresters to get the attention — much less the cooperation — of folk in places like Taft, Mont., a boomtown of 2,500 serviced by 30 saloons and almost 500 prostitutes.
Making matters worse, Roosevelt's successor, the 335-pound William Howard Taft (a "platter of mush," one adviser called him), had little appetite for conservation. He fired Pinchot, and the newborn Forest Service, starved for funds and beset on all fronts, appeared at risk of dying in its infancy.
It was at this juncture, in the dry summer of 1910, that electrical storms and high winds spread fire across the Northern Rockies. The heart of Egan's book is a detailed, at times hour-by-hour recounting of the battle to contain the fire and evacuate towns. On one side, walls of flame; on the other, a ragtag army of

rangers, Buffalo Soldiers, hastily hired immigrants and other recruits with little or no experience at fighting fire. This should make for tense, sweaty drama. Instead, it's when "The Big Burn" runs astray.
One reason is structural. The book's first act is driven by a few strong characters, Pinchot in particular. In the longer second act, which traces the fire, the cast becomes huge and the story hard to follow. Pinchot, the book's appealing protagonist, all but vanishes. Ultimately, the coupling of the 1910 fire and the Forest Service's founding feels forced, like a railroad where the gauges don't match.
The prose adds to this disconnect. Egan's research is deep, and his details are vivid: a pocket watch stopping at the wearer's time of death, a woman burying her sewing machine to save it from fire, elk and bears fleeing the forest ahead of the flames. But rather than trust this material, Egan cranks up the temperature, charging through adjectives and clichés. Wind-driven fire is "a peek beyond the gates of hell," while a weary ranger is "going on adrenaline, a kid trying to keep a tsunami of wildfire at bay, trying to save at least one town."
The screenplay for a disaster flick also keeps elbowing its way into the text. There are obvious goodies (the humble, selfless firefighters) and baddies (the well heeled, and the purveyors of sin, who refuse to help or who escape on trains intended for women and children). Egan cuts quickly between scenes, always leaving the heroes on the brink. "I won't die here," declares "the homesteader gal with the pistol on her hip," staggering into the woods alone. Many characters appear doomed, only to miraculously resurrect. In the end, 85 people die — a sad toll, but a fraction of what Egan has led the reader to expect after all the racing flames, choking smoke and crashing trees.
Thankfully, Pinchot and quieter prose return in the book's brief final act, about the fire's aftermath. But Egan's concluding chapters seem at odds with the book's buildup. Pinchot and Roosevelt cleverly used the Big Burn to barnstorm for the Forest Service, selling it as a brave band of firefighters that needed to be expanded and equipped to prevent a repeat catastrophe. The agency's budget soared, more forests were set aside, and so, as the book's subtitle suggests, the fire of 1910 "saved" America's woodlands for future generations.
Well, not exactly. In the final pages, we learn that the Progressive Era vision of "people's forests," sustainably logged and conserved for all, was immediately betrayed. By 1920, Big Timber had co-opted the Forest Service, leading to industrial clear-cuts that "scalped" the land. "The Forest Service became the fire service," Egan writes, "protecting trees so industry could cut them down later." Pinchot, traveling as an old man to Western forests he'd fought so hard to save, was horrified to find a denuded expanse of mud and stumps. "Absolute devastation," he wrote in his diary.
This is a powerful, tragic image of a dream subverted. But it's not what the preceding heroics have prepared us for. If "The Big Burn" does become a movie, you can be sure that Hollywood will change the ending.
Tony Horwitz is the author, most recently, of "A Voyage Long and Strange: Rediscovering the New World."

http://www.nytimes.com/2009/11/01/books/review/Horwitz-t.html?ref=books

Lung cancer care 'inadequate'

Key areas of lung cancer care are still "woefully inadequate", a report by leading lung cancer experts says.



The UK Lung Cancer Care Coalition, an umbrella group composed of doctors, charities and private health firms, says UK care lags behind Europe.

It says too few patients are receiving treatment, such as chemotherapy or surgery, because of staff shortages.

The government says it already recognises that more needs to be done to improve lung cancer services.

" **Our review shows there are still huge variations and vast inequalities in care across the country** "
Dame Gill Oliver, of UK Lung Cancer Care

Lung cancer kills about 34,000 people a year - more than breast, prostate, bladder and leukaemia versions of the disease combined.

Despite being labelled a "smoker's disease", one in eight people with lung cancer have never smoked.

The coalition draws on data from this year's official national audit as well as feedback from leading doctors.

The report says in some parts of the UK, as few as 10% of patients are receiving any form of treatment and nationally the figure is only 51%.

The coalition is calling for a target of 70% - recognising that for some patients further treatment is not advisable because the cancer has already spread too far.

It estimates this would save an extra 3,000 lives a year.

One of the major problems is a lack of access to surgeons - there are only 44 full-time positions for more than 240 separate teams.

The shortfall means that some patients who would be eligible for treatment are being turned down, the report adds.

'Vast inequalities'

Dame Gill Oliver , chairman of the coalition, says: "We are still letting lung cancer patients down.

"Our review shows there are still huge variations and vast inequalities in care across the country.

"We believe that whatever the cause of their disease patients deserve the best care and support."

Five-year lung cancer survival rates are still below 9% in the UK, compared with 12.3% across Europe on average.

But the coalition believes survival rates can be doubled by 2020 by making the disease a priority.

It says more money needs to be invested in diagnostic equipment and the workforce as well as encouraging GPs to refer at-risk patients for tests at an earlier stage.

A Department of Health spokesman said: "We know there is more to do on lung cancer.

"That is why we recently re-convened the Lung Cancer and Mesothelioma Advisory Group to look at many of the issues raised in this review, including access to surgery."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8334340.stm

Published: 2009/11/02 00:11:10 GMT

Depression link to processed food

Eating a diet high in processed food increases the risk of depression, research suggests.

What is more, people who ate plenty of vegetables, fruit and fish actually had a lower risk of depression, the University College London team found.

Data on diet among 3,500 middle-aged civil servants was compared with depression five years later, the British Journal of Psychiatry reported.

The team said the study was the first to look at the UK diet and depression.

" **The UK population is consuming less nutritious, fresh produce and more saturated fats and sugars** "
Dr Andrew McCulloch, Mental Health Foundation

They split the participants into two types of diet - those who ate a diet largely based on whole foods, which includes lots of fruit, vegetables and fish, and those who ate a mainly processed food diet, such as sweetened desserts, fried food, processed meat, refined grains and high-fat dairy products.

After accounting for factors such as gender, age, education, physical activity, smoking habits and chronic diseases, they found a significant difference in future depression risk with the different diets.

Those who ate the most whole foods had a 26% lower risk of future depression than those who at the least whole foods.

By contrast people with a diet high in processed food had a 58% higher risk of depression than those who ate very few processed foods.

Mediterranean diet

Although the researchers cannot totally rule out the possibility that people with depression may eat a less healthy diet they believe it is unlikely to be the reason for the findings because there was no association with diet and previous diagnosis of depression.

Study author Dr Archana Singh-Manoux pointed out there is a chance the finding could be explained by a lifestyle factor they had not accounted for.

"There was a paper showing a Mediterranean diet was associated with a lower risk of depression but the problem with that is if you live in Britain the likelihood of you eating a Mediterranean diet is not very high.

"So we wanted to look at bit differently at the link between diet and mental health."

It is not yet clear why some foods may protect against or increase the risk of depression but scientists think there may be a link with inflammation as with conditions such as heart disease.

Dr Andrew McCulloch, chief executive of the Mental Health Foundation, said: "This study adds to an existing body of solid research that shows the strong links between what we eat and our mental health.

"Major studies like this are crucial because they hold the key to us better understanding mental illness."

He added people's diets were becoming increasingly unhealthy.

"The UK population is consuming less nutritious, fresh produce and more saturated fats and sugars.

"We are particularly concerned about those who cannot access fresh produce easily or live in areas where there are a high number of fast food restaurants and takeaways."

Margaret Edwards, head of strategy at the mental health charity SANE, said: "Physical and mental health are closely related, so we should not be too surprised by these results, but we hope there will be further research which may help us to understand more fully the relationship between diet and mental health."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8334353.stm

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Culture (Not Just Genes) Drives Evolution
Marlowe Hood, AFP

Oct. 28, 2009 -- Culture, not just genes, can drive evolutionary outcomes, according to a study released Wednesday that compares individualist and group-oriented societies across the globe.

Bridging a rarely-crossed border between natural and social sciences, the study looks at the interplay across 29 countries of two sets of data, one genetic and the other cultural.

The researchers found that most people in countries widely described as collectivist have a specific mutation within a gene regulating the transport of serotonin, a neurochemical known to profoundly affect mood.

In China and other east Asian nations, for example, up to 80 percent of the population carry this so-called "short" allele, or variant, of a stretch of DNA known as 5-HTTLPR.

Earlier research has shown the S allele to be strongly linked with a range of negative emotions, including anxiety and depression.

Critically, it is also associated with the impulse to stay out of harm's way.

By contrast, in countries of European origin that prize self-expression and the pursuit of individual over group goals, the long or "L" allele dominates, with only 40 percent of people carrying the "S" variant.

The study, published in Britain's *Proceedings of the Royal Society B: Biological Sciences*, offers a novel explanation as to how this divergence might have come about.

Setting aside discredited ideas linking genetics and race, the researchers suggest that culture and genes may have interacted over time to shape the process of natural selection, helping individuals -- and the societies in which they lived -- to survive and thrive.

Ancient cultures in Asia, Africa and Latin America highly exposed to deadly pathogens, they conjecture, may have tended toward collectivist norms in order to better combat disease.

That social transformation, in turn, could have favored the gradual dominance of the risk-avoidance S allele.

"We demonstrate that evolution is operating at least two levels," said Joan Chiao, a professor at Northwestern University in Chicago and lead author of the study.

"One is biological, which is well understood. But there is also a level where cultural traits may have been selected for themselves, emerging in congruence with the selection of different types of genes," she explained by phone.

One well known example of so-called "culture-gene co-evolutionary theory" has to do with drinking cow's milk, something humans are not intrinsically adapted to do.

Over time, milk consumption led to both the genetic selection of protein genes in cattle, and a gene in humans that encodes lactase, an enzyme that can break down the otherwise indigestible lactose in dairy.

In the case of collective cultures and the S allele, "we don't make a strong claim on the chicken-or-egg problem" of which came first, said Chiao.

"What we are proposing is that cultural and genetic selection actually operate in tandem, and that you can view human behavior as a product of culture-gene co-evolution," she said.

The study also argues that collectivist cultures may help protect against the genetic risk of depression that comes with having the S allele.

"Such support seems to buffer vulnerable individuals from the environmental risks or stressors that serve as triggers to depressive episodes," said Chiao. The fact that the United States and Europe have higher rates of anxiety and mood disorders despite having the L allele may come from the stress of living in highly individualistic cultures, she suggested.

"People have treated natural selection as a rationale for looking for universal traits, across populations and species."

"But what really matters is the diversity across populations and species which may help us better understand how natural selection has operated at both individual levels and ecosystem levels," she said.

http://dsc.discovery.com/news/2009/10/28/culture-genes-evolution.html

Curiosity: The Killer Catalyst

By: Tom Jacobs

Todd Kashdan has a deep appreciation of anxiety, which makes his engaging book *Curious?* unique among the comfort-promising volumes in the self-help section. For most of us, anxiety is a decidedly unpleasant emotion — one we strive to avert, either by avoiding situations that provoke apprehension, latching onto false but comforting certainties, or (my personal favorite) numbing out via our addiction of choice. Pointing out anxiety's usefulness is akin to putting in a good word for pain.

But of course, it's not the anxiety itself that causes problems but those dysfunctional coping mechanisms. As the George Mason University psychologist notes, anxiety is in fact one-half of a quite useful yin-yang process. Rather than resist it, he argues, we should acknowledge its existence and turn up the volume on the other side of the equation: the impulse that pulls us toward challenge and exploration.

That is to say, we need to cultivate curiosity.

"Our curiosity and threat detection systems evolved together, and they function to ensure optimal decisions are made in an unpredictable, uncertain world," he writes. "We are all motivated by the pull toward safety and seek to avoid danger, but we also possess a fundamental motivation to expand and grow as human beings."

Kashdan, who has conducted research on this topic for a decade, argues that curiosity and anxiety work together — one propelling us to explore, the other putting on the brakes so that we don't take unwise risks. The problem, in his view, is that we have devalued curiosity, putting the bulk of our energy — as individuals, communities, nations — into anxiety avoidance.

"I think we have lost the balance," he argues. "The environment has pulled us in the direction of having to constantly respond to our fears. A lot of people — especially in government — have realized fear is a useful motivating tool to get people to support whatever policies they want to push."

He's also wary about the notion of happiness as the ultimate goal of life. (Take that, Founding Fathers.) A meaningful life, he argues, is one of passion and engagement — of discovering what moves and inspires you at a deep level and then pursuing that passion.

But you'll never find that sense of purpose without searching, which is where curiosity — and tolerance of a certain level of anxiety — comes in. The good news, Kashdan argues, is that curiosity can be cultivated, and once you start approaching the world from a standpoint of inquisitiveness, the brain reinforces this behavior by releasing dopamine. As he puts it: "We are hardwired to experience a rush of excitement when something novel and unpredictable breaks through the routine."

While rather loosely structured, *Curious?* is a good read, a jargon-free summary of recent scientific research on happiness, anxiety and brain chemistry that gently nudges its readers to rethink the role anxiety plays in their lives. While it is focused on individual behavior, Kashdan's research — and that of the other psychologists he incorporates — has intriguing public policy implications.

He argues that public health officials need to rethink their emphasis on scary pronouncements about pending pandemics. "When you activate their threat systems, people are not good at collecting or synthesizing information," he notes. The government may have good information on how to prepare for a hurricane or the swine flu, but anxious people aren't able to process it effectively. Presenting the information as something new and interesting — but not necessarily alarming — could be far more effective in actually influencing behavior.

Similarly, Kashdan believes environmentalists are wrong to try to frighten people into changing their lifestyles. "Scaring people may inspire them to do something for a week or two (which is why last-minute negative political ads are effective), but three weeks later, they'll have returned to their old habits," he says. "The research suggests the best way to have someone invested in, say, environmental sustainability is finding a way to link it to the person's core values and interests."

Employing Kashdan's concepts in the classroom could result in radical changes. He envisions a less-structured educational environment in which students read books that actually engage them (perhaps volumes they choose themselves) and share what they've learned with the class. Rather than following a strict curriculum, teachers would let discussions flow freely, picking up on interesting observations and helping students to connect the dots.

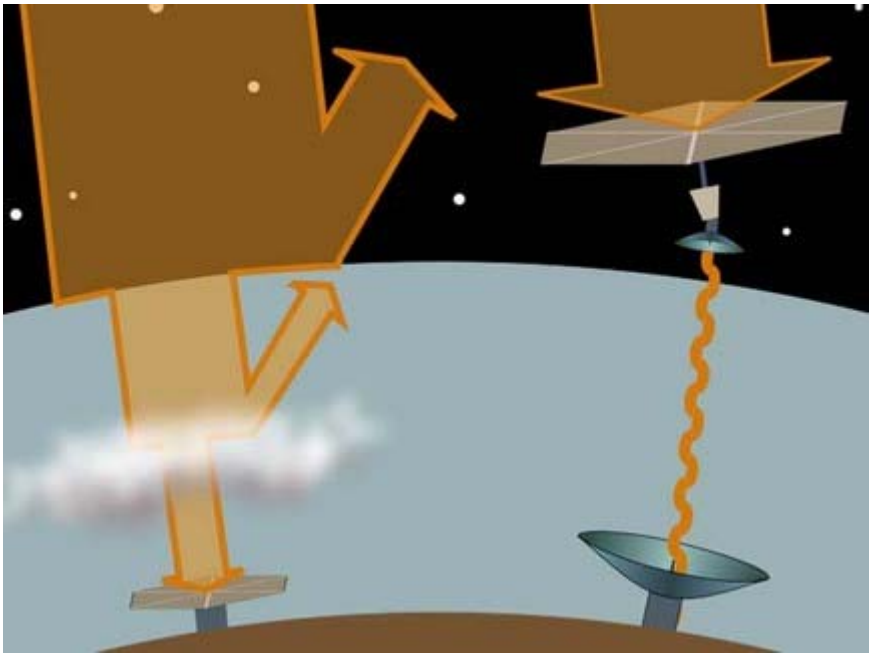
This sort of free-form lesson plan might not improve scores on standardized tests, but Kashdan persuasively argues it would make the school day a lot more interesting for students and teachers alike. "We're hyper-focused on surface content in our educational system," he argues. "If you can't develop self-control and tolerance for uncertainty, you're not going to navigate life very effectively."

At the other end of life, Kashdan quotes from recent research suggesting a mindset of continuing curiosity — of eagerness to learn new things — may stave off age-related cognitive decline. Rather than encouraging seniors to do crossword puzzles, he argues, we should be urging them to pursue new hobbies, read about new subjects, sample new dishes. It now appears that it's novelty that keeps the neurons firing.Most of us engage in what Kashdan calls passive curiosity. If something odd crosses our path (say, a dog dressed up as a punk rocker), we are interested in learning about it. But there's novelty everywhere, and it's very much worth seeking out. As evidence, Kashdan quotes a Gallup survey of 130,000 people from more than 130 nations. "The two factors that had the strongest influence on how much enjoyment a person experienced on a given day," he notes, "were 'being able to count on someone for help' and 'learned something yesterday.'"

http://www.miller-mccune.com/health/curiosity-the-killer-catalyst-1550?utm_source=Newsletter81&utm_medium=email&utm_content=1102&utm_campaign=newsletters

Snagging Free-Range Solar Power in Space Is An Option

By: Bruce Dorminey



Of the billions of points of light burning in the distance, the nearest bears down on our tiny planet from only eight light minutes.

Bound to us by nothing but gravity and an intervening black void, once above the confines of our own atmosphere, the sun is a startling revelation. Sunlight can easily turn the surface of our dusty moon from gunpowder gray into a blindingly bright sphere. Although such reflected visible radiation represents only a fraction of our own star's massive power, the question is: How do we best harness such energy?

Our own star essentially represents one gargantuan energy well. It outputs some 27 trillion times the amount of all the commercial power currently produced on Earth. In fact, a one kilometer-wide band surrounding our planet receives nearly as much energy annually as the energy potential of the world's remaining, recoverable oil reserves. That's partly because sunlight in space packs 35 percent more energy than sunlight that is filtered through earth's atmosphere.

Researchers and science fiction authors have been kicking around the idea of harnessing such solar power in space for decades but to little effect. To date, the International Space Station — with the largest solar collecting array ever installed by humans in space — only produces energy for its own consumption.

Even though the technology to make space solar power a reality has arguably existed for decades, much of the world is still mired in fossil fuel technologies. As a result, humankind only produces the continual equivalent of some 5 terawatts (or 5,000 gigawatts) of electricity a year. In contrast, when in full operation, the average nuclear plant produces about a gigawatt of electric power in the same period.

But to make matters even worse, a billion or so of the world's 6.5 billion people consume half the planet's available electricity, at an average wholesale rate of 6 to 7 cents per kilowatt electric hour. (Meanwhile, another billion or so have no access to electricity at all.)

By 2050, Earth's population is expected to hit 10 billion. If it is to prosper, and if all its citizens are to be

served more equally, it will need a continual projected flow of 20 terawatts of electricity.

Pie in the Sky

Space solar power could make up a lot of this energy shortfall, but the concept needs a Madison Avenue makeover. One of its biggest hurdles remains the perception that it is either a technological pipedream or is untenably expensive in absolute terms or relative even to other renewable resources.

"Space solar power faces enormous — and probably insurmountable — technical and economic challenges," said Steven Fetter, a physicist at the University of Maryland in College Park. "The largest solar arrays placed in space — the solar arrays for the International Space Station — cost $2,500 per watt-peak, 500 times more than solar arrays on Earth." (A watt-peak is a solar photovoltaic cell's maximum output under test conditions.)

Fetter also notes that this cost per watt-peak did not include the space station's launch costs. He concludes that space-based solar cannot compete with ground-based solar energy alternatives, even if launch costs are zero.

Policy analyst Jeff Kueter, president of the George C. Marshall Institute in Washington, D.C., is also pessimistic about current space solar prospects. Kueter says that space solar energy is one of many long-term alternative energy possibilities that need to be investigated. But like Fetter, he is adamant that neither space solar's economics nor the current state of its technology are mature enough to make it a viable energy alternative.

Fetter's own point about space solar launch costs is not without merit. Today, launch costs to place a 5,000-kilogram communications satellite into geostationary orbit can easily top $100 million. Space solar energy satellites would typically be 20 times larger.

Despite the naysaying and caveats, four decades after Peter Glaser's seminal 1968 paper advocating space solar power, the concept is gaining real traction with both entrepreneurs and engineers.

In 1973, Glaser patented the first design for a space solar power satellite.

His basic concept involves arrays of kilometer-sized on-orbit satellites that first gather the sun's energy with the most efficient photovoltaic systems yet built. These arrays then convert that energy into a microwave beams that are fired at ground-based circular receiving stations — essentially arrays of dipole antennas (or rectennas) 10 to 15 kilometers in diameter.

The incoming microwave energy then could be re-beamed to other points via wireless power transmission, then rectified into plain vanilla electricity that feeds into the existing electrical grid, or even used to manufacture synthetic hydrocarbon fuels.

With the 1973-74 Arab Oil Embargo as a prod, both the U.S. Department of Energy and NASA studied the space solar concept. In 1975, a 30 kilowatt-microwave beam transmitted from a distance of 1 mile energized an array of lights at NASA's Goldstone Deep Space Communications Complex in California's Mojave Desert. The receiving antenna converted the microwaves directly into electricity with an efficiency of better than 80 percent.

By the end of the 1970s, NASA and the DOE jointly proposed placing dozens of gigawatt-level space solar satellites into geosynchronous orbit. The idea was deemed economically unfeasible, with top-end cost estimates ranging into the trillions. And so the idea largely languished until recently.

Then last year, a U.S. and Japanese team successfully transmitted a microwave beam at low power between Maui and ground-based receivers on the Big Island of Hawaii. The microwave beam traveled some 90 miles, or almost a hundred times further than NASA's three-decade-old Goldstone test.

Glaser, now a retired aerospace engineer, recently commented that he felt that sooner or later space solar

power would not only see daylight but prove very useful on a global scale.

Time For a Commercial (Application)
Still, there has been no commercial space-to-ground demonstration of microwave beaming. But that should soon change.

This past April, Pacific Gas and Electric signed the world's first space solar power purchase agreement. Beginning in 2016, Solaren Corporation, a space solar power startup based in Manhattan Beach, Calif., will provide PG&E with 200 megawatts of space solar power per hour, or some 1,700 gigawatt/hours (GWh) per year.

That's significant, since one GWh roughly equals a sixth of Los Angeles' peak electric demand.

With a solar photovoltaic collecting array of an estimated kilometer in size, the satellite will use solar concentrators to focus sunlight onto a photovoltaic array. Energy from the photovoltaic array will then be converted into a radio frequency signal using solid-state power amplifiers. From there, it then forms a beam that can be transmitted to the ground.

Located in a rural part of Fresno County, Calif., the PG&E/Solaren rectenna will be hooked into an onsite substation that will gather up the solar electricity and adjust voltages at a so-called "delivery point." However, from the time the space solar power enters the PG&E system, the California utility projects that this new space electricity's 2016 wholesale price will be some 12.9 cents per kilowatt.

"Utilities are notoriously conservative, so we had to convince PG&E that we knew what we were doing," said Solaren's CEO Gary Spirnak. He refuses to give an exact cost for the project, except that it will be in the billions of dollars. And PG&E has only contracted to pay for energy it actually receives and none of the start-up costs.

Those costs will be huge. Spirnak, a former spacecraft project manager with the U.S. Air Force who later worked for both Hughes and Boeing, notes that Solaren will launch its estimated 100,000-kilogram geosynchronous space solar satellite in sections. This will require some three to four launches from Cape Canaveral; based on current launch cost estimates, the financial burden of launching such hefty payloads into geostationary Earth orbit would easily range into the hundreds of millions of dollars.

Spirnak said many previous space solar designs planned on moving gigawatts of electricity over many kilometers in space, and so wiring would make up a third of their system's weight. In contrast, his own team patented a design that alleviates such heavy on-orbit wiring, making the whole system significantly lighter.

A possible competitor, Space Energy, an international space solar startup with offices in Switzerland and Canada, hopes to reduce its costs at the launch pad. This might be achieved by using more economical ways of accessing space, perhaps with the SpaceX Falcon 9 rocket (a new reusable commercial launcher). Space Energy already has some $10 million in seed capital, but is at least a couple of years away from building hardware for its projects.

Amaresh Kollipara, Space Energy's chief strategy officer, said plans call for a $180 to $280 million demonstrator satellite to be launched into low Earth orbit within two years of the venture being funded.

Before 2025, Kollipara and colleagues would like to see their first phase of operation fully implemented — that is, the on-orbit robotic construction of a space solar satellite stretching over several square kilometers. It would likely be divided into separate nodes that would either be linked physically or via laser transmissions.

Space Energy's current plan is to use such a platform to beam one gigawatt of microwave energy to the ground.

"There's no way we are going to displace other forms of electricity," Kollipara said. "Space solar will simply be one energy option. But Space Energy's potential target markets would be China, India, portions of western Europe and niche regions of the U.S."

Kollipara estimates the startup's end-to-end cost per kilowatt-hour will be some 15 to 25 cents. That's more expensive than power generated from hydroelectric and coal-burning plants, he said, but is on par with costs of terrestrial solar power and wind energy.

Battlefield Tested?
Although Kollipara is optimistic about bringing solar power to the masses, he believes that Space Energy could possibly partner first with the U.S. Department of Defense in an effort to find a less dangerous and more efficient way to deliver electricity to combat zones.

As Lt. Col. Paul Damphousse of the U.S. Marine Corps, and the chief of advanced concepts for the National Security Space Office in Washington, D.C., acknowledges, it's pretty difficult to move energy around a theater of war.

In Iraq, for example, electricity is still being generated by costly diesel fuel, at a price of some $10 per kilowatt electric hour. Meanwhile, large numbers of troops have been killed or wounded while protecting convoys transporting that diesel fuel. A fixed forward base equipped with space solar rectennas could save lives, money and might give the war fighters — or even the nation-builders — a competitive advantage.

A U.S. Department of Defense space solar power project, with an estimated top-end budget in the hundreds of millions, could also help the U.S. project what Damphousse terms "soft power."

"It's no real stretch to equate energy security with national security," Damphousse said. "Overpopulation and scarcity of resources translates into conflicts. So, we are not only in the business of war fighting; we are in the business of war prevention."

To that end, he said, a 2,500-kilogram space solar power satellite could see launch within the next five years.

In addition, space solar technology may provide a solution for developing nations that have both a need for energy and telecommunications but lack infrastructure.

"Once deployed, I doubt you would ever build a conventional communications satellite again," said James Mankins, a former NASA technologist and co-founder of the Virginia-based Managed Energy Technologies. "You would piggyback communications of all kinds around the edges of the power beamer. You could provide gigabits-per-second bandwidth at a bargain-basement price."

When the beams do finally hit the rectennas, these targeted developing nations could "leapfrog the infrastructure" by using ground-based wireless power transmission for both electricity and telecommunications.

"This is going to put a revenue-generating capability in space like nothing before," said Spirnak, who envisions follow-on benefits to include both easier access to space and a new emphasis on missions to the moon and Mars.

New Kind of Moonbeams
But why bother building satellites to capture solar radiation when in the eyes of at least one researcher the moon could act as a perfect collecting platform.

David Criswell, a physicist at the University of Houston, said we've already got a big satellite — a *really* big one. "The full moon represents 13,000 terawatts of reflected sunlight," said Criswell. "Tap a few percent of that, and you've got 20 terawatts, enough to power a prosperous world."

Unlike Earth, the moon has almost no atmosphere to block the full punch of the sun's radiation. So, why not use the lunar surface as one big solar collector and beam a portion of that energy back to Earth? Plus, Criswell said that the moon's silicon and metal content easily lend itself to making glass and fiberglass for the collecting equipment on site, drastically reducing costs — a good thing, given the projected costs, which are nothing short of astronomical.

Even so, the global benefits of such an economically challenging energy source arguably more than make up for the financial risks.

The first lunar solar power demonstrator project would involve arrays of solar converters, a microwave reflector and transmitter, mobile factory assembly units; and a habitat/manufacturing facility.

All the machinery would be operated from Earth using lunar robots and set up in staged deployments. However, lunar-workers (i.e. astronauts) would be on site for maintenance of the machinery and industrial research and development.

One scenario would involve pairs of solar collecting stations some 30 to 100 kilometers across, on the lunar nearside. With the exception of a new moon or a full lunar eclipse, this would ensure that one or the other would always receive sunlight.

Like power lines emerging from a generating station, solar-generated microwaves would be beamed back in power increments ranging from hundreds of megawatts to tens of gigawatts. Earth-orbiting microwave beam-redirecting satellites would then enable 24/7 power delivery to Earth-based rectennas.

And, in the process of powering Earth, the LSP could also energize small cities on the moon; or transmit power to drive electric ion propulsion engines on lunar space tugs operating between low Earth orbit and low lunar orbit. Eventually, high-frequency lunar solar power beaming stations could even transmit power to ion propulsion space tugs operating as far out as Jupiter.

Once Criswell's lunar project hits the "break even" point at an estimated $400 billion, he expects it to then start paying for itself.

"With its Apollo lunar missions, NASA has essentially been on a bunch of camping expeditions," Criswell said. "But if this lunar space power project were done with the intensity of the Apollo program, we'd be back on the moon within 10 years. And by 2050, we could have the entire world powered."

http://www.miller-mccune.com/science_environment/snagging-free-range-solar-power-in-space-is-an-option-1544?utm_source=Newsletter81&utm_medium=email&utm_content=1102&utm_campaign=newsletters

If Bridges Could Talk …

By: Arnie Cooper

As rush hour traffic crawled across Minneapolis' Interstate 35-west bridge on a sultry August evening back in 2007, the roadway's central span suddenly gave way, plunging nearly 100 vehicles and 18 construction workers into the Mississippi or onto its banks. Although the emergency response was swift, 13 people died and 145 were injured.

An exhaustive 16-month investigation (PDF here) by the National Transportation Safety Board found that the gusset plates — responsible for holding the bridge's joints together — were only half the thickness required to carry the structure's typical loads. Moreover, modifications from previous construction projects plus the weight of construction equipment and materials added a fatal strain on the 30-year-old bridge.

But, says Jerry Lynch, a professor of civil and environmental engineering at the University of Michigan, "As unfortunate as that event is, it has called to attention the importance of infrastructure in the U.S. and the need to maintain it. This is not simply about safety. The economic prosperity of society depends on these systems."

Just think about the impact the recent Bay Bridge closure could have on the San Francisco economy.

In any case, Lynch believes the tragedy will ultimately inspire both government and the private sector to invest in additional and enhanced technologies to improve how bridges are designed and managed.

Span Plan

He should know. Lynch is the lead investigator of a project exploring new technologies to enhance the field of structural health monitoring. With the exception of a few landmarks like San Francisco's Golden Gate and St. Louis' Cape Girardeau bridges, the vast majority of the nation's spans currently lack any monitoring system.

Funded in part by a nearly $9 million grant from the National Institute of Standards and Technology's Technology Innovation Program, what some are calling a "smart bridge" system will make it possible to detect problems before they occur by alerting inspectors to structural deficiencies through a wireless relay system connected to the Internet.

And though the I-35 west bridge has since been rebuilt and now monitors everything from corrosion to temperature-induced structural changes, experts aren't drawing parallels between the collapse and tracking systems such as the smart bridges project. Catherine French, for example, a University of Minnesota professor and the principal investigator charged with monitoring the new bridge, readily admits there are limits to what health monitoring can do.

Lynch says the I-35 disaster was extremely rare. "The far majority of collapses are caused by triggering events like earthquakes, scouring rivers or vehicular damage. You can't prevent an earthquake or a barge hitting a bridge."

But for avoidable problems, Lynch's project, with its systems approach to structural health monitoring, cutting-edge materials and bridge health assessment tools, will improve both longevity and durability.

High-Performance Concrete

Credit the Romans for first harnessing the compressional power of concrete, making possible the columns we commonly associate with classical architecture. Unfortunately, in strain-prone structures like bridges, concrete's brittleness can result in failure unless it's bolstered with steel.

Enter ECC — engineered cementitious composite — a "bendable concrete" invented by one of Lynch's colleagues, Victor Li, a University of Michigan professor of civil and environmental engineering.

"ECC is rather unique, because even without reinforcement, it can take a high amount of tension load unheard of in regular concrete," Lynch says. While it deteriorates like most cement-based material, cracks in ECC are just a few microns wide, compared with hundreds of microns for traditional cement.

"When you have rain and de-icing salts on your bridges, you're allowing a lot of corrosive elements to penetrate into your buried steel. ECC is therefore more resilient against corrosion of any steel that might be buried inside."

Beyond its mechanical attributes, ECC can even quantify how its electrical properties change in response to how much strain the bridge is experiencing at a given moment.

"Using a standard volt meter you get at Radio Shack, I could tell you how much strain's in that material just by measuring its resistance," Lynch says. This "self-sensing" can reduce both cost and complexity of instrumentation.

Similarly, Lynch and his team are working on a spray-on sensing skin that can be painted or glued onto particularly vulnerable surfaces to measure both strain and the existence, location and severity of cracks. Using carbon nanotubes (think slender, spaghetti-like molecular structures), the stuff works like a distributed sensor.

"We can use this material to see how its electrical properties change under both load and chemical changes like the pH environment, which is intrinsically linked to corrosion."

The "sensing skin" will not only cover a much higher surface area (and thus eliminate the need for dense arrays of physical instruments) than traditional monitoring devices, it'll provide actual color-coded pictures, making it easier for analysts to address problems.

Up to now, one of the biggest challenges in getting cities and municipalities to incorporate health-monitoring systems has been the expense.

Part of this can be traced to the current methods for communicating data, which typically involves the use of costly cables to transfer sensor readouts to a computer that's storing the information. By going wireless, communication between the sensors themselves as well as between a sensor and a centralized data repository not only eliminates the need for cables, but allows data processing directly at the sensor.

"We can avoid inundating the bridge owner with truckloads of raw data and just provide information they can act on," Lynch says.

Complementing site-based monitoring, a fourth kind of sensor would be placed within test vehicles (probably driven by bridge owners) to measure the bridge's reaction to the strain imposed by the car or truck. According to Lynch, there has yet to be an effective way to monitor how vehicle behavior directly impacts bridges. However, vehicle-equipped sensors will help engineers and analysts predict how long a given structure will last and play a role in improving future sensor systems as well as bridge design.

Coming Soon

Over the next five years, Lynch's team will be testing out these innovations on a handful of small- to mid-scale bridges in Michigan and possibly a large suspension bridge, the recently built New Carquinez Bridge, an hour north of San Francisco.

When complete, the system will, for the first time, offer engineers and bridge operators a way to see with their own eyes just where the problems are. Commuters, though, won't be aware of these advances — "unless they looked really hard," Lynch says. "You don't want vandals vandalizing your system."

http://www.miller-mccune.com/science_environment/if-bridges-could-talk-1548?utm_source=Newsletter81&utm_medium=email&utm_content=1102&utm_campaign=newsletters

Transforming Cassandra into Pollyanna

By: Joan Melcher

Lester Brown, founder and president of the Earth Policy Institute, best known for his research in sustainable agriculture and often dire predictions of resource scarcity, last week released a report that was almost entirely good news, at least for the United States.

The release announcing an update to *Brown's Plan B 4.0: Mobilizing to Save Civilization* chirped that the country is headed for a "massive decline in carbon emissions," citing a 9 percent drop in the last two years.

According to Brown, citizens and industry may be ahead of the government in addressing concerns about energy use and climate change.

He pointed to figures from the U.S. Department of Energy that show decreases in oil use by 10 percent and coal use by 11 percent over the last two years. Projections are that emissions from coal plants will be 10.1 percent less in 2009 than the previous year.

Chief among the factors leading to the drop in carbon emissions, Brown said, are a turning away from coal-generated electricity, a drop in the nation's vehicle fleet and a notable increase in wind power.

Brown, who has a master's degree in agricultural economics from the University of Maryland, founded the Worldwatch Institute in 1974 and began releasing "State of the World" reports in 1984, which were heralded as seminal research by the global environmental movement. A MacArthur Fellow, he has been described by *The Washington Post* as "one of the world's most influential thinkers."

Miller-McCune.com caught up with him last week.

Miller-McCune.com: I'm sure one of the first questions you're asked is how much of the decline in carbon emissions has to do with the recession. Can you give any ballpark estimate of what is due to the economic pullback?

Lester Brown: One would think that would be a fairly easy distinction to make, but it's not as clear-cut as it might seem. The largest share of the decline in the last two years is probably due directly or indirectly to the recession, but there's quite a bit of it due to efficiency gains and to turning to renewables - wind, solar, geothermal energy. The fact that 102 wind farms came on line in 2008 is a very substantial development, and it either added to the energy supply or it backed out [of another sector], most likely coal.

There's another factor here, too, and that is lower prices for natural gas. A lot of utilities that have fleets of plants shift from coal to natural gas when the price for natural gas drops, partly because they have a lot more flexibility with natural gas. You can take a natural gas plant way down during the night and quickly bring it up in the morning, so you don't waste a lot of fuel. You can't do that with coal. It has to keep clunking along at more or less full pace. That's one of the reasons we've seen this 10 percent drop in carbon emissions from coal this year.

M-M: Would you hazard a guess as to what might be attributable to conservation and lifestyle changes?

Brown: It's difficult to say, and I'm reluctant to use a number. The larger share came from the recession and the smaller from efficiency gains and shifting to renewables and natural gas. Oil use went down 5 percent in 2008, and it's going down another 5 percent in 2009. Coal went down only about 1 percent in 2008, but in 2009 by 10 percent. Overall, carbon emissions were down 3 percent in 2008 and then 6 percent in 2009, and that adds up to the 9 percent for the last two years.

There is a tendency to think of this as just a temporary thing. There are things in motion now that almost guarantee that carbon emissions are going to be dropping for some years into the future, and that's what I find of most interest.

M-M: Can you elaborate?

Brown: There are a number of things in the policy pipeline, like the automobile fuel economy standards that were announced in February — a 42 percent increase in miles per gallon for cars and a 25 percent increase for light trucks by 2016. That's a very substantial factor when predicting fuel use and carbon emissions. And then we have the appliance efficiency standards. Here, what most people don't know, unless they're tracking these things closely, is that for some years now the Department of Energy has not translated congressional legislation on appliance efficiency standards into regulations that could be used by the appliance manufacturers.

Within days of taking office, Obama instructed the DOE to get this legislation translated into regulations that appliance manufacturers can use. There's a huge backlog of gains coming there. A third thing, of course, is that there are pretty strong economic incentives for developing wind, solar and geothermal, and we're going to see an enormous increase in all three of them in the years immediately ahead. The fourth thing, as of the beginning last week, is the decision by the federal government to set standards for itself in cutting carbon emissions, and that will undoubtedly encourage state governments to do the same thing.

These will add up to a very substantive decline in carbon emissions in the years ahead. Beyond that, we have some other trends that are playing an important role.

There's a lot of talk about raising automotive fuel efficiency and almost no recognition of the fact that the U.S. automobile fleet is starting to shrink. This year, we'll be selling about 10 million new cars, but the retirement rate is about 14 million cars. This is interesting for two reasons. It means the U.S. automobile fleet will shrink this year by nearly 2 percent, and it means that the automobile sector is now producing a

steel surplus. The steel used for 10 million new cars, which are relatively small compared to the 14 million being retired, is much less than the steel being scrapped. So not only is the number of cars being scrapped 40 percent more than the new cars being made, but the cars being scrapped are larger and have more steel in them than the newer, smaller cars. This is an amazing situation where we have an industry that is normally a net consumer of steel producing a steel surplus.

M-M: Another plus is that recycled steel takes less energy to produce.

Brown: Exactly. It takes about a third as much energy to produce steel from scrap as it does to produce it with virgin ore. So that's another big energy savings built in there.

M-M: You don't see the automobile industry making a comeback in sales?

Brown: It looks to us as though the number of cars scrapped is going to exceed new car sales for many years into the future. The only question is how large the margin will be.

There's another factor reducing oil consumption that, so far as I can tell, is totally ignored — that is when coal use goes down, as it is this year by 10 percent, the amount of diesel fuel to haul coal also goes down because 42 percent of the freight rail use of fuel is for hauling coal. If you reduce that by 10 percent, then you're reducing diesel fuel use in the freight sector by about 4 percent. There are all kinds of positive feedback loops here.

M-M: How do we relate this decline in carbon emissions to a 2.2 percent forecast decline in gross domestic product?

Brown: The fact that the decline in carbon emissions is substantially greater than the decline in GDP suggests that part of the decline is due to other factors, such as is gains in efficiency and substituting natural gas and renewables for coal.

We have some enormous growth coming in renewable energy resources. Another 47 wind farms came online the first half of this year, and there are another 57 under construction, quite a few of which will be finished this year. Beyond wind, we not only have rooftop solar cell installations growing by 40 percent a year or so, but we also have for the first time utility-scale solar cell farms that cover 12 miles with solar cells and produce as much electricity as a nuclear reactor.

We have the emergence of solar-thermal power plants as a major source of electricity in the Southwest. We have 15 of those in the pipeline, and I think 15 under development that have power purchasing agreements already signed. And the reason they've become so popular almost overnight is that they use a technology called molten salt technology, where you store excessive heat during the day in salt and use that heat to keep the generators going from sunset until say midnight. You get about six additional hours of generation, which covers most of the peak demand of the day. And that's important if you're turning to solar energy as a major source of energy as California, Nevada and Arizona now are.

Then we have geothermal power plants. For decades, we only had one — The Geysers north of San Francisco. Now we have 132 geothermal power plants under development. They tend to be smaller — 10 megawatts to 130 megawatts — but there are a lot of them, and they're developing all across the western U.S.

I mention these things just to give a sense of what's happening. There are 22 coal-fired power plants now scheduled to close, and they'll either be converted to natural gas or they'll use wood chips instead of coal or what have you, and that's another major source of future reduction in carbon emissions. These are plants that will probably close in the next year.

M-M: This appears to be what people working in the renewable energy field have envisioned for years — renewables really starting to take off.

Brown: Right.

M-M: Why do you think more people aren't talking about this, including people in government?

Brown: The thing that I find sort of puzzling is that official Washington hasn't grasped what is happening — either what's happening in the last two years, or what's going to be happening in the years ahead.

M-M: There are tax incentives for renewables, but they still compete with government subsidies for fossil fuels, and the effect stimulus money is having on renewables and conservation is not likely to be showing up in these numbers. Is it a groundswell as opposed to coming from the top down?

Brown: It's a combination of the two. With coal, for example, we've had this powerful grassroots movement emerge over the last year or two opposing new coal-fired power plants and it has basically led to a de facto moratorium on new coal plants. If I had to guess right now, we would not see another coal plant licensed in the U.S. There are a few in the pipeline that will come online, but we're getting pretty close to the end of coal. And I don't think we've quite realized it yet.

We're also getting reinforcement from the top. For example, the Kansas power plant that [Gov. Kathleen] Sebelius vetoed, was a really huge coal-fired power plant. First her environmental director wouldn't give the permit, so they tried to get it through the Kansas Legislature and succeeded, and she revoked it. Then her replacement negotiated an arrangement with the utilities that wanted to build this large complex whereby they'd make it smaller and reconfigure it and would begin developing some renewable resources like wind. What happened then was that [U.S. Environmental Protection Agency administrator] Lisa Jackson told them, since you now have a new plant configuration, you'll have to start the permitting process all over. She's a real warrior. I don't think most people realize that behind the scenes she's really willing to boot. She did the same thing in West Virginia, where one of the coal companies was preparing the largest mountain-top removal in history, and they had gotten a permit from the Army Corps of Engineers. She went to them and said, "Wait a minute. I don't think your permit takes into account the water pollution problems that are going to result, so I suggest you revoke it." And they did, in 24 hours.

M-M: So, it's both top down and bottom up?

Brown: Yup. In the last chapter of my book *Plan B 4.0*, I talk about models of social change. One of them I call the Pearl Harbor model, where you have a catastrophic event that changes everything. The second I call the Berlin Wall model, where you have resistance rising slowly and not very visibly, and, suddenly, you reach a tipping point and everything changes. And the third model I call the sandwich model, where you have strong support for change at the bottom matched by strong support at the top. When you have that sandwich model, you often get very rapid change.

M-M: Are there DOE projections for energy use and carbon emissions for 2010?

Brown: They are projecting a 1 percent increase in emissions in 2010.

M-M: That would relate to the economy picking up?

Brown: I think. But I doubt there's going to be any increase at all for some of the reasons I've been mentioning. I believe they will offset the recovery of the economy.

M-M: Do you have any projections — or even an educated guess — of what sort of decline in emissions we might see in 2010?

Brown: I have no projections for 2010.

M-M: You have some interesting numbers related to the nation's use of automobiles.

Brown: If you go back to 1990 and track [automobile sales], about 1994 we moved up to 15 million new cars being sold, and we had that for five years and then it jumped to 17 million and it stayed there until a couple years ago. So about 15 years from now, we'll have all these sort of large — to use a demographic term — age cohorts in the automobile fleet. Some of those cars have already been retired, and a lot more are going to be retiring. Every analyst that I've seen looking at automobile sales is saying that 17 million car sales are history.

M-M: The population is growing, so if anything you'd expect an increase in car sales.

Brown: There are other things at work here. For example, young people today do not look at cars in the same way that my generation did. For us, getting a driver's license and a car was a rite of passage. Socialization of young people centered around the automobile. Today, socialization takes place over the Internet. Because we're a more urban society, cars are less important and less valuable. Young people today do not automatically think of buying a car, especially in urban areas.

M-M: As you know, access to transmission lines is a problem for wind and other renewables. Some say that the $6 billion the administration has earmarked for transmission improvements over the next two years will fall far short of what is needed to allow new projects access to the grid. Do you agree? And, if so, what do you think is needed?

Brown: It is clearly a challenge, but what is happening is that investors are looking at this need for transmission capacity as an investment opportunity. We're looking at two major lines being built — one from southwestern Wyoming and one from southern Montana down to California. What that does is open enormous amount of wind energy in those regions to the populations of California and Arizona.

There are three grids in the country — the Eastern grid, the Western grid and the Texas grid. There are a few little links between them here and there, but they don't amount to much. There was an article recently in *The Wall Street Journal* of a firm that is proposing a sort of traffic circle being built in eastern New Mexico. That would be a place where electricity could come in and go out from these three grids, and they'd install some really heavy-duty cables to link the three grids so that electricity could move more freely around the country.

M-M: From what I remember after reading the story, they thought they could get this done in a few years. They were waiting on a ruling from the Federal Energy Regulatory Commission to allow access to the Texas power?

Brown: The timeline is relatively short term. They have not yet submitted documents to FERC for this, but John Wellinghoff [chairman of the agency] is very pro getting transmission capacity so that renewables can develop. He's another one behind the scenes playing a very positive role. He quickly approved the lines going from Wyoming and Montana down to California, for example.

M-M: So it may not be as much of a problem as some have thought? Connecting the three major grids would seem to be a huge step.

Brown: It is huge, and within each grid you have to put in some arteries where there are now only veins. But it's entirely doable, and once you get this sort of traffic circle that links them together, converts AC into DC and back, you're in business. And things will go from there.

We'll get some big pieces of it put together and it will just keep building. Looking back five years from now we'll be surprised by how much has happened.

M-M: You've spoken about how wind power will benefit from an integrated transmission system. Can you explain?

Brown: A team at Stanford has modeled wind as a national resource and concluded that after a point, wind becomes part of the baseload because if you have output from one wind farm, it's going to fluctuate quite a bit. But since no two wind farms have identical profiles, if you have two wind farms, the output will fluctuate less. And if you have a third one, it will be still less and eventually it won't fluctuate much at all.

M-M: Many of the reports you write deal with problems associated with poor resource use and unsustainable practices. It was a little surprising to see a report from the institute that is almost all good news. Was this different for you?

Brown: It's pretty exciting. Another way to look at it is that we're in a race between tipping points: natural tipping points versus political tipping points. What we're beginning to see is things happening on the renewable energy front on a scale and at a rate that we could not have imagined just two years ago when we were just finishing *Plan B 3.0*, for example.

The Chinese have been doubling their wind energy capacity each year for the past four years, and have now they have launched these six wind mega-complexes. The smallest one is 10,000 megawatts and the largest is nearly 30,000 megawatts. All together it's 100,000 megawatts: think 100 coal-fired power plants. In terms of new capacity, we've been the world leader in wind capacity the last three years. Within a matter of months, China is going to go by us so fast we may not even see them.

The other big one, even bigger, is in Europe. Munich Re announced in July that it had put together a consortium of companies, including Deutsche Bank, ABB and Siemens, and was creating a new entity whose responsibility will be to devise a strategy and develop a financial plan to develop the solar resources of North Africa.

M-M: Is that related to the Desertec plan? As I remember, that plan called also for developing wind in northern Europe and other renewables.

Brown: There's been a proposal by the Club of Rome called Desertec around for years, and in the larger plan, they're looking at integrating the wind resources of northern Europe and the solar resources of North Africa. There will [also be] some wave power and other things. There's some wind in North Africa as well. They're going to put it all together in a single system.

M-M: Is all going forward with private-entity funding?

Brown: The consortium is all private firms. I'm sure governments will get involved at some point, but the initiative has come from the private sector.

M-M: You've said we need an 80 percent reduction in carbon emissions worldwide by 2020 to address climate problems. Even with continuing reductions as you forecast, do you think there's a remote chance we could meet that goal?

Brown: Business as usual is certainly not going to get us there. But we have a far better chance than most people realize — partly because we'll be driven by mounting concern about climate change.

[The 80 percent reduction by 2020] assumes we want to save the Greenland ice sheet and at least the larger glaciers remaining in the Himalayas on the Tibetan plateau. These are the glaciers whose ice melt sustain the major rivers and the irrigation systems of India and China. If they go, then not only are they in trouble, but the whole world is in trouble.

It's hard to say how many new initiatives will be coming in the months and years ahead. There are at least 640 college presidents who have signed pledges to make their campuses carbon neutral. The mayor of Phoenix is talking about the same thing.

Things are happening on so many fronts. I haven't even mentioned the renewable portfolio standards in some of the most populous states. Those are very substantial commitments to carbon-free energy.

M-M: So you see a momentum building?

Brown: It's going to keep building, and there will be times when we'll move faster than other times and it will take many different forms. But we're headed in the right direction now.

http://www.miller-mccune.com/science_environment/transforming-cassandra-into-pollyanna-1576?utm_source=Newsletter81&utm_medium=email&utm_content=1102&utm_campaign=newsletters

A Visit to Dirty Snow Cones National Park

By: Bruce Dorminey

Like the long tail of a sleeping dragon, northwestern Montana's jagged peaks snake their way across several hundred square miles of ancient glacial plains. At first glance, this slice of the Northern Rockies, with its massive flanks carpeted by Douglas fir, spruce and lodgepole pine, looks perfectly healthy.

But above the tree line, decades of regional warming has taken its toll on the ecosystem's glaciers and permanent snowpacks. At summer's end, even from a distance of 60 miles, the mountainous eastern slope of Glacier National Park resembles a chain of dirty snow cones.

"The Little Ice Age ended about 1850," noted Dan Fagre, a U.S. Geological Survey research ecologist at the Northern Rocky Mountain science center in West Glacier, Mont. "We had 150 glaciers here in 1900. We only have 25 left now."

A recent paper co-authored by Fagre, appearing in the journal *Climatic Change*, analyzed more than 100 years of temperature data from western Montana. It concluded that the rise in its temperature extremes and seasonal averages "has been two to three times greater than that of the global average."

The authors are still trying to figure out exactly why. The end result, as the paper notes, is that the region has undergone both "a loss of extremely cold days as well as an increase in extremely hot days."

But inside the million-acre national park, in late afternoon on the last day of summer, there's already an autumn-ish nip in the air. The deciduous trees are beginning to turn and the park's remaining glaciers have finally shed the last of their seasonal snowpacks.

Fagre gestures toward the northeastern end of Lake McDonald and the disappearing Sperry Glacier in the distance. Ice and snow from Sperry used to overlap onto the Lake McDonald side of the ridge, he notes. But the glacier has shrunk to such an extent that its ice is no longer visible from this side of the mountains.

The beautiful and placid Lake McDonald, a 10-mile-long finger pointing northeast, was carved during the last major ice age 12,000 years ago at the tail end of what's termed the Wisconsinan Glaciation. But even in this current epoch of warming, the lake is still frigid to the touch.

The glaciers were gone before anyone came here to map them, Fagre said. But he said researchers determined there were once 150 glaciers in what is now Glacier Park - based on the massive glacial deposits (or moraines) left in their wake.

At Lake McDonald, glaciers bulldozed up to 478 feet of dirt — likely down to the bedrock itself — leaving large moraines on both sides the lake.

Until five years ago, both of these moraines were covered by thick forests. That's when the 2003 Robert Fire, likely caused by unusually hot and dry conditions, destroyed a good portion of one of the existing moraine's hillsides. It burned hot enough to scorch the soil.

Aside from such anomalous fires — in terms of climate and glacial studies — this "Crown of the Continent," as the park is often called, has long been a canary in the coal mine.

Fagre says at the height of the ice age, about 100 square kilometers of glacial ice covered this landscape. That figure has now been whittled down to 16.

Two decades ago, Fagre and colleagues began their program to monitor as many of the park's remaining glaciers as logistically possible, trying to take measurements of the glaciers every two to five years.

They also study the ecosystem's responses to climate change. That includes glaciers, streams, trees and forest-fire frequencies and how they are interlinked. But glaciers remain at the core of their research.

This year, Fagre and his research program's six assistants helped him survey six glaciers: Cheney, Swiftcurrent, Stanton, Blackfoot, Grinnell and Sperry.

By definition, Fagre says a glacier is a mass of ice at least 25 acres in area and 100 feet thick that moves under the force of gravity. "When glacial ice stops moving, we call it stagnant ice," said Fagre. "But gravity and deformation of ice under pressure cause glaciers to move."

Blackfoot, one of the biggest glaciers in the park, recently had a dramatic 23-acre collapse as its ice was cleaved over a large rocky knob; that's an indication that the glacier is retreating ever more quickly.

"Heretofore, it's been small incremental shrinkage of the glaciers," said Fagre. "Here it's a collapse and an avalanche of glacial ice debris that cascaded down the mountain some 750 meters."

To monitor such glaciers, it's not unusual for the researchers to risk injury to get to them. Fagre team member Lindsey Bengtson, a Geological Survey biological science technician, said that in late August — after most of the seasonal melt has dissipated — they typically take high-accuracy Global Positioning System measurements from the glaciers' lower margins.

This past August, Bengtson and four other colleagues, with two kayaks in tow, made a 5.5-mile trek into upper Grinnell Lake, the melted portion of Grinnell Glacier. "As I kayaked parallel to the upper Grinnell terminus [or the lower extent of the glacier], I collected over 1,000 points of GPS measurements, one every second," she recalled.

By overlaying aerial imagery on the glacier's latest GPS positions, they are then able to determine how far and how fast a glacier is receding. The team is still analyzing data from this most recent trek.

Even though there's no question that the park's glaciers are in an unprecedented period of contemporary retreat, how does the area's recent past stack up against the region's last few hundred years of climate history?

Fagre and colleagues reconstructed the climate here for the past 451 years by looking at the historic record and tree rings. It showed very clearly, he says, that the Little Ice Age was a period with no droughts. There was about an 80-year period, he notes, when it must have "just snowed all the time."

But what's different in the current era is that temperatures are also much greater, which makes the ecological effect of current droughts much harder on all plant species.

And, as noted earlier, the area's trees are particularly hard hit. They tend to use up the moisture in the ecosystem by August and September, said Fagre, which means a greater number of trees are becoming even more flammable.

Thus, if the warming continues, Fagre expects more fires and bigger insect outbreaks. "We'll start losing tree diversity," he said Fagre. "We'll see the alpine tree line go higher and then potentially start losing some alpine animal species," such as mountain goats and Clark's nutcracker, a songbird.

The rest of North America is also dependent on a hydrologically healthy Glacier Park. To the west, the park's waters run through the Columbia River system and into the Pacific. To the east, its waters contribute to agriculture and irrigation all the way to Canada's Lake Winnepeg. And to the southeast, its waters drain into the Missouri River system and then into the Mississippi.

More locally, the park's glaciers and snowpacks keep the park's ecosystem vibrant. "When everything else is dried out," said Fagre, "it's these glaciers that melt and keep these streams going."

The park's lakes are both cold and nutrient poor, so only a few fish species can handle the frigid, highly oxygenated water. Specifically, the park's population of bull trout thrive on such cold water, such that they've been nicknamed the "polar bear of fish." But if these waters warm significantly, the bull trout could be threatened as well.

Fagre's own research doesn't distinguish between whether the warming is natural or manmade, although he personally believes that humans are causing at least some of it.

But he "gets nervous" when people try to attribute the root of all global warming to burning fossil fuels or land-use change. That's because, as he points out, there's just so much natural variability in the climate system that still is not completely understood.

Next May marks the region's 100th anniversary as a national park. But without a significant change in the current temperature trend, some estimates are that its glaciers could disappear as early as its 110th birthday.

Fagre doesn't put a date on the remaining glaciers' demise, but does predict that if this present period of drought and warming continues, the park's glaciers will disappear "very, very soon."

http://www.miller-mccune.com/science_environment/a-visit-to-dirty-snow-cones-national-park-1570?utm_source=Newsletter81&utm_medium=email&utm_content=1102&utm_campaign=newsletters

Let's Get Wind Power Off the Ground

By: Frank Nelson

Is it pie in the sky or something much more substantial? Some scientists, academics and entrepreneurs are convinced that to meet the world's energy needs and roll back the ravages of global warming, we need only look up.

"A river of energy flows above us," said Cristina Archer, assistant professor of energy, meteorology and environmental science in the Department of Geological and Environmental Sciences at California State University, Chico."People talk about oil lakes under the ground, but we have the same [energy resource] in the sky. There's a lot of wind energy up there. It's astonishing. And it's free. It makes sense to tap into that free source."

Archer, also a consulting assistant professor in the department of civil and environmental engineering at Stanford University, is regarded as an authority on high-altitude wind power, or HAWP.In 2007, working with Ken Caldeira, senior scientist in the department of global ecology at Stanford's Carnegie Institution for Science, she began a six-month research project, crunching through 28 years of global data to determine wind characteristics up to about 7.5 miles.

Her findings, published in the journal *Energies* earlier this year, revealed immense reserves of sustainable energy at different altitudes and at different times of the year, all around the world.

"The total wind energy in the jet streams is roughly 100 times the global energy demand," Archer wrote. "Because of their abundance, strength and relative persistency, jet stream winds are of particular interest in wind power development."

Archer estimates energy demand at between 2 trillion and 2.5 trillion watts. About 6 miles up, jet stream winds, even though they don't blow hard all the time even at that height, could generate around 200 trillion watts.

Caldeira also focuses on these "large amounts of renewable power available in highly concentrated form," something he describes as a far more abundant energy resource than even the most efficient terrestrial wind or solar sites.

Grabbing the energy

Terrestrial sites can be reached by pickup trucks, and their cables can snake over the ground relatively easily. It's a point Caldeira turns to his advantage: He says power is already transmitted horizontally over hundreds of miles, so, while it might sound like science fiction to some, 6 miles vertically is "relatively nearby."

The challenge then is to suck that energy out of the air and bring it down to earth. Now several entrepreneurs and start-up companies are competing to fill that space ... almost literally.

Magenn Power, originally located in Ottawa before moving to airport facilities at Moffett Field, a former Navy blimp yard in the Bay Area, is staking its claim to airspace at around 1,000 feet.

Magenn has developed the blimp-like Magenn Air Rotor System, a revolving cylinder with three blades spinning in the wind like a paddle steamer wheel turning in water.

On-board generators send electricity down the tether to a transformer and into the grid. Or, says company founder Fred Ferguson, the power could directly supply farms, Third World villages or small island communities — anywhere that is dependent on expensive and polluting diesel generators.

Because devices like the MARS do not fly vertically above their mooring but have a bowed tether like a kite string, at 1,000 feet, this machine would probably need a tether around 2,000 feet long.

"That's not a show stopper," says Ferguson, who points to radar-carrying, helium-filled inflatables used by the military and drug enforcement agencies and tethered up to 15,000 feet using 25,000-foot cables.

Various kite-based businesses are eyeing similar altitudes. Some, flying single kites or connected groups, harness the power generated as they zigzag around the sky; others, like Makani Power, fly a rigid-winged device carrying its own turbines.

Operating in commercial air space is an issue for all HAWP companies but especially Sky WindPower — which plans to tap the wind's potential at up to 27,000 feet, or 5 miles high.

Getting it off the ground

Nettlesome airspace issues aside, the technology to build what are essentially airborne windmills is developing quickly.

Advances in new lightweight, composite materials and high-tech coatings are helping to make HAWP a reality, reducing costs, improving performance and increasing the ability to quickly winch down equipment in the face of storms, lightning or extreme winds.

Ferguson says Magenn is working on a prototype and expects to have a pre-production unit ready by about February. He believes the first commercial MARS unit could be for sale by the end of next year.

Since launching in 2006, Makani has attracted $15 million in research and development funding from Google.org, an encouraging vote of confidence from the investment arm of a company synonymous with innovation.

Makani, based in Alameda, Calif., has run test flights there and in Hawaii using a craft resembling a hang glider wing fitted with turbines; a prototype has already completed a 30-hour, computer-controlled flight.

Corwin Hardham, Makani's co-CEO, says the company hopes to have the kite — which harvests wind power for the grid by sweeping fast, circular patterns — commercially available in three to six years.

While not underestimating the challenges ahead, Hardham is bullish about the fledgling HAWP industry. "People are starting to realize this resource is too large to ignore," he says.

He believes the technology can be scaled up quickly and cost-effectively to obtain "appreciable amounts of energy," and sees a lot of interest, tempered by some skepticism. "The burden is on us to demonstrate we can make it work."

An Italian company, Kite Gen, intends using low-level kites, harnessed to a central hub, to generate power from the motion created by racing across the sky.

Robert Creighton, CEO of WindLift Kite Engine Company in the Wright Brother's old stomping grounds of North Carolina, sees kites as a mobile source of energy for pumping water, charging batteries and other small-scale projects, especially in developing countries.

Len Shepard, however, is taking things to the next level. The CEO of Sky WindPower is initially looking at between 3,000 and 12,000 feet but ultimately hopes to produce electricity at the "utility scale" even higher.

His company, based at Oroville, a Northern California town better known for hydroelectricity, has flown two prototype helicopter-like craft, each with four rotors and onboard generators. Though power is needed to help launch the device, wind then takes over, turning the rotors to maintain altitude and send electricity down the tether.

Shepard says the tether and craft have little environmental impact since they are barely visible and operate in open spaces well away from populated areas. He also believes this technology is much less hazardous for birds and bats than ground-based turbines.
According to the American Wind Energy Association, terrestrial wind power meets only about 1 percent of U.S. electricity demand, so it may not be surprising that HAWP pioneers report some skepticism and resistance.

Doubters and critics single out the danger to aircraft and the potential for lightning strikes as major obstacles in the path of high-altitude wind machines; some also think the weight of many miles of tethers will be too much for the craft to support.
Fair enough, says Shepard, who thinks Sky WindPower should have to prove to doubters that the technology really works. He hopes to be able to do just that by the end of next year.

Archer, the scientist, hesitates to predict when this huge resource will begin to be tapped commercially. "From what I know so far ... it is in the five-to-10-years time frame," she estimated.

The fledgling industry takes a major step along the road to wider acceptance with what is being billed as the world's first high-altitude wind power conference in Chico and Oroville Nov. 5-6.

Archer, who's chairing the event, hopes it may help establish an industry association or council, increasing HAWP's visibility and credibility in the eyes of the public, policymakers, regulators, investors and others.

http://www.miller-mccune.com/science_environment/lets-get-wind-power-off-the-ground-1578?utm_source=Newsletter81&utm_medium=email&utm_content=1102&utm_campaign=newsletters

Building a Better Citizen

By: David Villano

In the late 1980s, Hampton, Va., faced the challenges of many blue-collar cities along its stretch of the southern Chesapeake: rising unemployment, a stagnant economy and the flight of young families to seek better jobs and fuller lives elsewhere. City leaders gambled on a novel response. They would target young people, hoping to cultivate a generation of citizens committed to Hampton's long-term vitality. In 1990, the city launched Hampton Youth Civic Engagement, a program to instill community pride and leadership skills in young people and engage them in governance. The program was systematic, first fostering civic awareness through local service projects, then building collaboration and leadership skills through involvement with city boards and commissions on issues of increasing complexity. Young people contributed ideas — on better policing, school reform, job training — and helped with policy implementation.

Nearly two decades later, the program is still in operation and recognized as a national model for fostering civic engagement. A study of Hampton's college-age residents has found they outperform peer groups in three key measures of citizenship: the ability to engage in civic discourse, passion for their community and leadership skills. Fewer families are fleeing the city, crime is down and Hampton's voting rate is about 20 percent higher than similar communities. In 2005, the city received the Harvard Kennedy School of Government's annual Innovations in American Government Award. In 2007, *Money* magazine rated the city as one of the "Best Places to Live" in the U.S.

"What Hampton shows us is that local government can prepare its leaders of tomorrow, but it also shows that government can engage people, of all ages and backgrounds, to bring real value — things of substance — to the community today," says Carmen Sirianni, a professor of sociology and public policy at Brandeis University, whose new book, *Investing in Democracy: Engaging Citizens in Collaborative Governance*, provides an in-depth case study of the Hampton program. "Enlightened leaders recognize that public issues are getting more complex. Civic engagement today is far more complicated than just showing up at a city council meeting and raising your hand."

To be sure, Hampton's experiment in civic engineering is rarely repeated. Even rarer is the source of the inspiration — elected officials, who often view public participation in decision-making as anathema. But a growing body of evidence and the culture shift accompanying the election of President Obama are prompting policymakers at all levels of government to consider programs and policies that strengthen the skills and character traits that promote good citizenship: pride in community, trust in individuals and institutions, the ability to work in groups, membership in service organizations, and even social interaction among neighbors. Political scientists and others who study the democratic process are finding that those skills and traits often correlate with the positive policy outcomes public officials routinely hope to foster, including lower crime rates, higher academic achievement, the creation of jobs and improved health care delivery. In essence, some experts are arguing that good citizenship should not simply be a means to an end; it should, by itself, be a policy objective. "Why not?" Sirianni asks. "Government invests in a lot of things. Why not civic engagement?"

In 2000, Harvard political scientist Robert Putnam rode the talk show circuit plugging his best-seller, *Bowling Alone: The Collapse and Revival of American Community*, a data-driven analysis of civic interaction in the U.S. over the past half-century or so. Putnam coined the term "social capital" to describe the intangible, value-laden benefits of a strong network of community relationships. In short, he argued, things like trust and cooperation — the building blocks of democratic governance — are products of positive, sustained social interaction. "Bowling alone" was the metaphor for Americans' growing isolation.

Putnam's research revealed that communities where social capital is high are more likely to experience lower school dropout rates, less crime, fewer hospitalizations and higher rates of economic growth, among myriad indicators of personal and societal well-being that are positively correlated with strong community relationships. His 2003 follow-up book, *Better Together: Restoring the American Community* (co-authored with philanthropy expert Lewis M. Feldstein) grew from a series of round-table meetings — The Saguaro Seminar at Harvard's Kennedy School — where academics, industry officials and political leaders discussed strategies to replenish America's dwindling stock of social capital.

Among the seminar's early participants was Barack Obama, then an Illinois state senator.

While some researchers say Putnam overlooked the impact of online relationships and other emerging forms of community interaction, his basic thesis has held up to scrutiny. One study found that rates of heart disease decline when neighborhood bonds are strong, even when factoring out material wealth and other socioeconomic variables; another showed that social connectedness is a stronger predictor of perceived quality of life than income or educational level. A wide-ranging Knight Foundation study released last fall found a strong correlation between levels of civic engagement and cities' rates of economic growth. And a number of studies have shown that public corruption declines as social capital goes up, prompting The World Bank to encourage civic engagement as a business development strategy.

"Good citizenship makes a big difference. That we know," says Peter Levine, director of The Center for Information & Research on Civic Learning and Engagement at Tufts University's Jonathan M. Tisch College of Citizenship and Public Service. "Government functions better; public health outcomes are better; higher civic engagement among teens correlates with greater academic achievement."

Yet, as Putnam has noted, indicators of citizenship in America continue a long and, in some cases, precipitous decline, leading Levine and others to question why government officials aren't more receptive to programs that invigorate their citizenry. Over the past 50 years or so, studies show, Americans have become less knowledgeable of local and national affairs, less likely to engage in public discourse, less willing to join a group or civic organization, less likely to interact with neighbors and more likely to perceive fellow citizens as dishonest and immoral. Three years ago, the National Conference on Citizenship, a congressionally chartered nonprofit advocacy group that measures, tracks and promotes civic participation in the U.S., produced its first national Civic Health Index, a comprehensive assessment of civic well-being compiled from 40 indicators such as voting rates, frequency of public meeting attendance and confidence in government.

Despite recent gains in some categories, like volunteering and political expression, the overall trend line over 30 years shows a steady decline.

Most troubling, NCoC executive director David Smith notes, is an ongoing erosion of what he believes to be the most fundamental indicators of good citizenship: trust in neighbors and institutions and connectedness to community and religious organizations. Trust and connectedness is lowest among the so-called Millennial group — 14-to-29-year-olds. "To me this is one big red flag," Smith says. "The very foundations of our democracy are threatened if our youngest citizens do not maintain the fabric that has connected us the past 200 years."

Smith and others in the field attribute declining trust levels and other civic health indicators to a host of U.S. labor and lifestyle changes over the past half-century, including the rise of women in the work force, the explosion of television viewership and Internet use, and the isolating nature of suburbia. In short, they say, there is less of the face-to-face interaction that builds interdependence and encourages collective problem-solving within society.

Putnam's research also suggests, controversially, that rising rates of neighborhood diversity may exacerbate the trend. His latest study, based on interviews of nearly 30,000 people across the country, shows that as diversity within a community goes up, virtually every measure of civic health goes down: Fewer people vote and volunteer, they give less to charity, and they are less inclined to work on community projects. In the most diverse communities, trust among neighbors is about half the level of the most homogenous settings.

Tuft's Levine says government also bears blame for the erosion of our civic fabric by responding with increasing suspicion to citizen initiatives. Levine laments the dwindling number of civic associations and citizen boards on which people could develop the habits of collective engagement necessary for a strong democracy. In one striking example, the raw number of school board seats across the country (not per capita) has declined 80 percent since 1930. Levine faults government, at all levels, for a "strong technocratic urge" that discourages citizen engagement.

"The attitude from government is that 'we're experts so we know best,'" Levine says. "Citizen participation can be quite costly and cumbersome. But we're seeing that it can be even more costly when people feel they are not part of the process."

Brandeis' Sirianni, who studies civic engagement programs in cities around the U.S., says research is beginning to support that argument. "Neighborhood empowerment, citizen involvement — in the long run this saves money by providing better policy outcomes," he says.

For their part, Americans seem ready to re-engage, but they also, somewhat paradoxically, expect government to pave the way. The National Conference on Citizenship's 2008 Civic Health Survey found that Americans overwhelmingly support laws and policies to improve citizenship. Among the initiatives researchers tested for public support: civics education in schools, service learning and tuition-for-service programs, and town hall-style gatherings to deliberate on issues of local or national importance. In other words, Americans need cajoling. Last year, for example, 67 percent of survey respondents said volunteering was personally important to them, but only 27 percent actually do volunteer.

Smith says Americans want improved citizenship like they want improved gas mileage — through government mandates and incentives: "People say they'll gladly buy cars that get 40 miles to a gallon, but only when the government tells them they have to."

A few U.S. cities are crafting programs that provide just those kinds of mandates and incentives. Some, like San Francisco's Youth Commission, focus on connecting young people to their communities and government. Others, like the 10-year-old Boston Indicators Project, are more comprehensive, fostering discussion of critical issues and tracking progress on shared goals. And last fall, the Minneapolis City

Council created the Neighborhood and Community Engagement Commission, a mechanism to stimulate interaction between the government and citizens.

The most widely cited example of a municipal government overtly fostering better citizenship may be Seattle - another recipient of Harvard's Innovations in American Government Award — where semi-autonomous neighborhood councils can enact policy and allocate public money. Begun more than 20 years ago in response to citizen concerns over crime, drugs and growth management, the program was designed to provide residents a greater say in the allocation of tax dollars.

Since then, residents have leveraged city matching funds with their own resources and labor to create more than 3,000 community projects, including new playgrounds and art installations. An unintended consequence of the neighborhood councils seems to be an informed, engaged public that routinely scores higher on measures of civic health than is the case in comparable cities. "We've been able to build a much stronger sense of community here," says Jim Diers, author of *Neighbor Power: Building Community the Seattle Way* and founding director of the city's Department of Neighborhoods. "And in the process, our attitude toward city hall has changed, our sense of government has changed. It's not just something that spends our tax dollars; it's something that's an extension of who we are as citizens."

Such cases of systemic overhaul are rare and certainly not the only approach to invigorating citizens. Diers, who now teaches community organizing and community-driven development at the University of Washington, says government can take plenty of less-comprehensive steps that influence the key civic health indicators.

A starting point, Diers says, is for public officials to acknowledge that civic health matters and can be influenced by government policy. Diers advises public officials who want to improve citizen participation to keep it simple in the beginning, monitoring concrete activities like voting rates, meeting attendance and participation on boards and committees. Measurements of social capital and civic health reflect broader accumulations of data and are more difficult to interpret. "Conversation is a first step but sometimes a difficult one to reach," Diers says. "In Seattle, civic well-being is a priority because we've all been talking about it for a long time."

To take the conversation up a level, some experts recommend a little-used measurement tool called a "social capital impact assessment" that gauges the effects of public policy initiatives on civic life. In one instance, a group of small towns in southern New Hampshire requested such an assessment before backing a widening project of I-93. The assessment asked how neighbors would be disconnected, if church and meeting attendance would decline and whether trust would be reduced as a result of the highway project. Satisfied with the results of the assessment, local officials signed off on the widening, which is now under way, but secured state funding for a five-year state program to help the affected towns address the challenges of disruption and dislocation, and to prepare for an influx of new residents once the widening is complete.

Government can also influence civic health indicators by attending to scale. Research shows that smaller is generally better as it relates to physical and social environments. Tufts' Levine says studies show that academic achievement is inversely proportionate to school size — at least, to a point. Although some researchers are unconvinced, the argument, he says, is simple: In smaller settings, children are more likely to participate in clubs, sports and other extracurricular activities that constitute the training ground for adult civic engagement. Scale also affects trust, meeting attendance and feelings of community connectedness, Levine says, explaining why civic health tends to be higher in small towns or in larger cities — such as Seattle and Minneapolis — where neighborhood-level governance is in place.

Although the overall Civic Health Index has shown a steady decline in recent decades, two closely watched indicators used in that index — voting and volunteerism, especially among younger age groups — are up. Smith attributes this to post-9/11 programs and polices that mandate community service within many schools, and to unprecedented voter-registration and get-out-the-vote drives, especially aimed at

young people and minorities. Even the parents of children who participated in the Topeka, Kan.-based Kids Voting program were 10 percent more likely to vote than parents of non-participants.

But voting and volunteerism are the low-hanging fruit of citizenship. More vital, Smith and other researchers say, is a mindset of concern, a sense of pride and responsibility toward one's community that is less easily engineered and measured than a trip to the voting booth. Archon Fung, the Ford Foundation Professor of Democracy and Citizenship at Harvard's Kennedy School, says the keys to fostering a citizen mindset are genuine opportunities to participate in policymaking. In previous generations, he argues, those opportunities were found in neighborhood associations, churches, civic clubs and other membership organizations. Today, he says, government is centralized. Elected and appointed leaders focus inward, diminishing the relevance of membership associations and reducing opportunities for citizen partnerships.

Like a growing number of experts in government process, Fung is an advocate of "deliberative democracy," a hybrid of direct and representative democracy in which citizens gather to establish public policy. Unlike the traditional town-meeting style of governance (often associated with New England) in which all residents are invited to debate and vote on taxes, the budget and other issues, the deliberative democracy model relies on participant assemblies, often randomly selected, which advise public officials rather than set binding policy.

During his 2008 presidential campaign, John Edwards popularized the general notion with his "Citizen Congress" proposal to regularly convene 1 million Americans in national deliberations on critical policy issues as complex and diverse as foreign relations, taxes, job creation and campaign-finance reform. The challenges of facilitating such deliberative processes are daunting, but Fung believes the very complexity of our policy issues may provide the incentive for government officials to experiment. "Let's focus on the most intractable problems — where things are broken, and we seem to make little or no progress in fixing them, like health care," Fung argues. "When nothing else seems to work, politicians might give (deliberative democracy) a try."

A few years back, British Columbia randomly selected 160 voters for a citizens' assembly that convened to recommend changes to the provincial electoral system. The recommendations were then put to voters in a binding referendum, essentially bypassing elected officials.

Similarly, a year ago, as Pennsylvania legislators considered a bill to ban same-sex marriage, Carnegie Mellon University's Southwestern Pennsylvania Program for Deliberative Democracy assembled a randomly selected group of 400 voters from around the state to research and discuss the issue. At the end of the daylong event, facilitators released a "deliberative poll" showing that 70 percent of state voters support the recognition of same-sex unions. Lawmakers rejected the same-sex marriage ban.

Fung believes such communal exercises not only produce sound policy but also reignite the citizen impulse to remain informed, concerned, engaged and trusting - the social-capital measures most in decline. In many European countries, Fung adds, governments routinely target citizen engagement and other indicators of citizenship as policy objectives. Government rarely does so here, in spite of — or perhaps due to — a belief that the gold standard of democracy is practiced in America.

Fung blames "an indifference born of complacency and self satisfaction" for the reluctance of politicians and public officials to push policies that promote civic engagement. Like automakers chasing innovations or technology companies with a constant eye on the horizon, he says, government process must evolve to reflect changing conditions — or risk losing the support of its customers.

Last May, President Obama signed a directive that was little noticed outside the beltway but applauded by those who study social capital and citizenship. With his signature, the White House Office of Public Liaison — historically, a kind of gatekeeper for interest groups seeking access to the Oval Office — became the White House Office of Public Engagement. "This office will seek to engage as many Americans as possible in the difficult work of changing this country through meetings and conversations

with groups and individuals held in Washington and across the country," Obama said in a video announcement. The directive coincided with the release of his transition team's *Citizen's Briefing Book* — a collection of the best ideas and proposals submitted by ordinary Americans for addressing the nation's challenges.

It was not Obama's first step to re-energize citizens. In April, he signed the $6 billion Edward M. Kennedy Serve America Act, greatly expanding AmeriCorps and other volunteer service programs.

The extent to which Obama's programs and policies have affected citizenship in America is not clear. Typically, Smith explains, civic health declines during recessions as people hunker down, turning inward. But despite difficult economic conditions, many measures of civic health seem to be inching up. Smith stops short of attributing the findings to the Obama presidency, but he believes a canon of populist inclusivity — preached by both candidates during last year's campaign — has inspired citizens to stay informed and get involved, even after the election. "We know that Americans are eager for meaningful engagement in civic life," Smith says. "That's a very good thing. Now we need for our leaders to recognize that government can help make that happen or it can get in the way of it."

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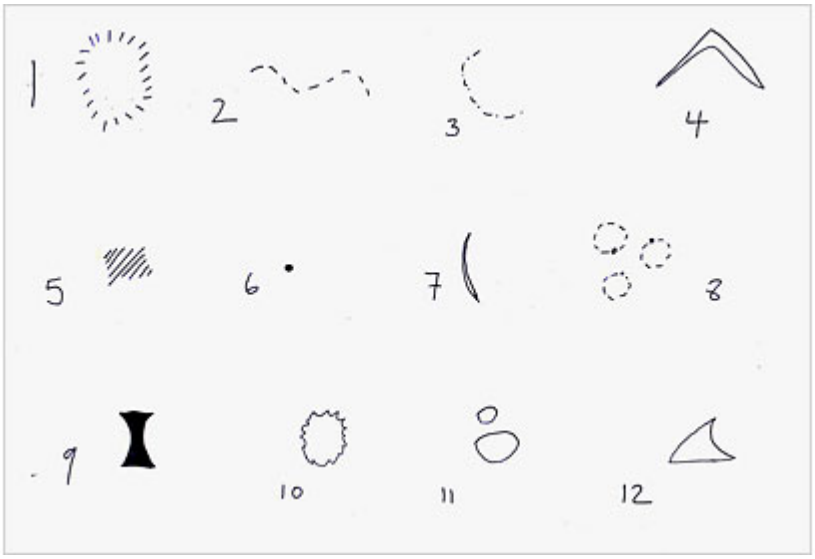
A Powerful Identity, a Vanishing Diagnosis

By CLAUDIA WALLIS



It is one of the most intriguing labels in psychiatry. Children with Asperger's syndrome, a mild form of autism, are socially awkward and often physically clumsy, but many are verbal prodigies, speaking in complex sentences at early ages, reading newspapers fluently by age 5 or 6 and acquiring expertise in some preferred topic — stegosaurs, clipper ships, Interstate highways — that will astonish adults and bore their playmates to tears.

In recent years, this once obscure diagnosis, given to more than four times as many boys as girls, has become increasingly common.

Much of the growing prevalence of autism, which now affects about 1 percent of American children, according to federal data, can be attributed to Asperger's and other mild forms of the disorder. And Asperger's has exploded into popular culture through books and films depicting it as the realm of brilliant nerds and savantlike geniuses.

But no sooner has Asperger consciousness awakened than the disorder seems headed for psychiatric obsolescence. Though it became an official part of the medical lexicon only in 1994, the experts who are revising psychiatry's diagnostic manual have proposed to eliminate it from the new edition, due out in 2012.

If these experts have their way, Asperger's syndrome and another mild form of autism, pervasive developmental disorder not otherwise specified (P.D.D.-N.O.S. for short), will be folded into a single broad diagnosis, autism spectrum disorder — a category that encompasses autism's entire range, or spectrum, from high-functioning to profoundly disabling.

"Nobody has been able to show consistent differences between what clinicians diagnose as Asperger's syndrome and what they diagnose as mild autistic disorder," said Catherine Lord, director of the Autism and Communication Disorders Centers at the University of Michigan, one of 13 members of a group evaluating autism and other neurodevelopmental disorders for the manual.

"Asperger's means a lot of different things to different people," Dr. Lord said. "It's confusing and not terribly useful."

Taking Asperger's out of the manual, known as D.S.M.-V for the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders, does not mean the term will disappear. "We don't want to say that no one can ever use this word," Dr. Lord said, adding: "It's not an evidence-based term. It may be something people would like to use to describe how they see themselves fitting into the spectrum."

But the change, if approved by the manual's editors and consultants, is likely to be controversial. The Asperger's diagnosis is used by health insurers, researchers, state agencies and schools — not to mention people with the disorder, many of whom proudly call themselves Aspies.

Some experts worry that the loss of the label will inhibit mildly affected people from being assessed for autism. "The general public has either a neutral or fairly positive view of the term Asperger's syndrome," said Tony Attwood, a psychologist based in Australia who wrote "The Complete Guide to Asperger's Syndrome" (Jessica Kingsley Publishers, 2006). But if people are told they should be evaluated for autism, he went on, "they will say: 'No, no, no. I can talk. I have a friend. What a ridiculous suggestion!' So we will miss the opportunity to assess people."The proposed changes to the autism category are part of a bigger overhaul that will largely replace the old "you have it or you don't" model of mental illness with a more modern view — that psychiatric disorders should be seen as a continuum, with many degrees of severity. The goal is to develop "severity measures within each diagnosis," said Dr. Darrel A. Regier, research director at the American Psychiatric Association and vice chairman of the diagnostic manual's task force.

Another broad change is to better recognize that psychiatric patients often have many health problems affecting mind and body and that clinicians need to evaluate and treat the whole patient. Historically, Dr. Regier said, the diagnostic manual was used to sort hospital patients based on what was judged to be their most serious problem. A patient with a primary diagnosis of major depression would not be evaluated for anxiety, for example, even though the two disorders often go hand in hand.

Similarly, a child with the autism label could not also have a diagnosis of attention deficit hyperactivity disorder, because attention problems are considered secondary to the autism. Thus, they might go untreated, or the treatment would not be covered by insurance.

The new edition, by contrast, will list not only the core issues that characterize a given diagnosis but also an array of other health problems that commonly accompany the disorder. For autism, this would most likely include anxiety, attention disorders, gastrointestinal problems, seizures and sensory differences like extreme sensitivity to noise.Parents and advocates have been clamoring for an approach that addresses the multiple health problems that plague many children with autism. "Our kids will do much better if medical conditions like gut issues or allergies are treated," said Lee Grossman, president of the Autism Society of America, a leading advocacy group.

The new diagnostic approach addresses another source of confusion: the current labels may change over time. "A child can look like they have P.D.D.-N.O.S., then Asperger's, then back to autism," Dr. Lord said. The inconsistent use of these labels has been a problem for researchers recruiting subjects for studies of autism spectrum disorder.And it can be a problem for people seeking help. In some states, California and Texas, for example, people with traditional autistic disorder qualify for state services, while those with Asperger's and pervasive developmental disorder do not.

A big challenge for the diagnostic manual team working on autism is how to measure severity in a condition that often causes a very uneven profile of abilities and disabilities. Mr. Grossman gives the example of a woman who serves on an advisory panel to his organization. She is nonverbal and depends on an electronic device to communicate, is prone to self-injury and relies on a personal aide. And yet "she's absolutely brilliant, she runs a newsletter, and she's up on all the science," he said, adding, "Where would somebody like that come out on the rating scale?"

Recent books by people with Asperger's give insights into the workings of some oddly beautiful minds. In "Embracing the Wide Sky" (Free Press, 2009), Daniel Tammet, a shy British math and linguistic savant, tells how he was able to learn enough Icelandic in a week to manage a television interview and how he could recite the value of pi to 22,514 decimal places by envisioning the digits "as a rolling numerical panorama" of colors, shapes and textures.

In "Look Me in the Eye" (Crown, 2007), John Elder Robison describes a painfully lonely childhood and an ability to look at a circuit design and imagine how it will transform sound — a talent he used to invent audio effects and exploding guitars for the rock band Kiss.

Not all people with Asperger's have such extraordinary abilities, and some who do are so crippled by anxiety and social limitations that they cannot hold down a job or live on their own.

Dr. Susan E. Swedo, a senior investigator at the National Institute of Mental Health who heads the diagnostic manual group working on autism, acknowledges the difficulty of describing such a variable disorder. Dr. Swedo said the plan was to define autism by two core elements — impaired social communication and repetitive behaviors or fixated interests — and to score each of those elements for severity.

The trick is to "walk the tightrope of truth," Dr. Swedo said, between providing clear, easily used diagnostic guidance to clinicians and capturing the individual variation that is relevant to treatment. "People say that in autism, everybody is a snowflake," she said. "It's the perfect analogy."

The proposed elimination of autism subtypes comes at the very moment when research suggests that the disorder may have scores of varieties. Investigators have already identified more than a dozen gene patterns associated with autism, but Dr. Lord, of Michigan, said the genetic markers "don't seem to map at all into what people currently call Asperger's or P.D.D." Nor have many of these genes been linked to distinct sets of symptoms. Until research can identify reliable biological markers for autism subtypes, Dr. Lord and other experts say, it is better to have no subtypes than the wrong ones.

In interviews, people with Asperger's and mild autism were divided on the prospect of losing the label. Temple Grandin, a Colorado State University animal scientist who is perhaps the best-known autistic American, said Asperger's was too well established to be thrown overboard. "The Asperger community is a big vocal community," Dr. Grandin said, "a reason in itself" to leave the diagnosis in place.

"P.D.D.-N.O.S., I'd throw in the garbage can," she added. "But I'd keep Asperger's."

But some younger people involved in the growing autism self-advocacy movement see things differently. "My identity is attached to being on the autism spectrum, not some superior Asperger's identity," said Ari Ne'eman, 21, an activist who founded the Autistic Self-Advocacy Network, a 15-chapter organization he has built while in college, adding, "I think the consolidation to one category of autism spectrum diagnosis will lead to better services."

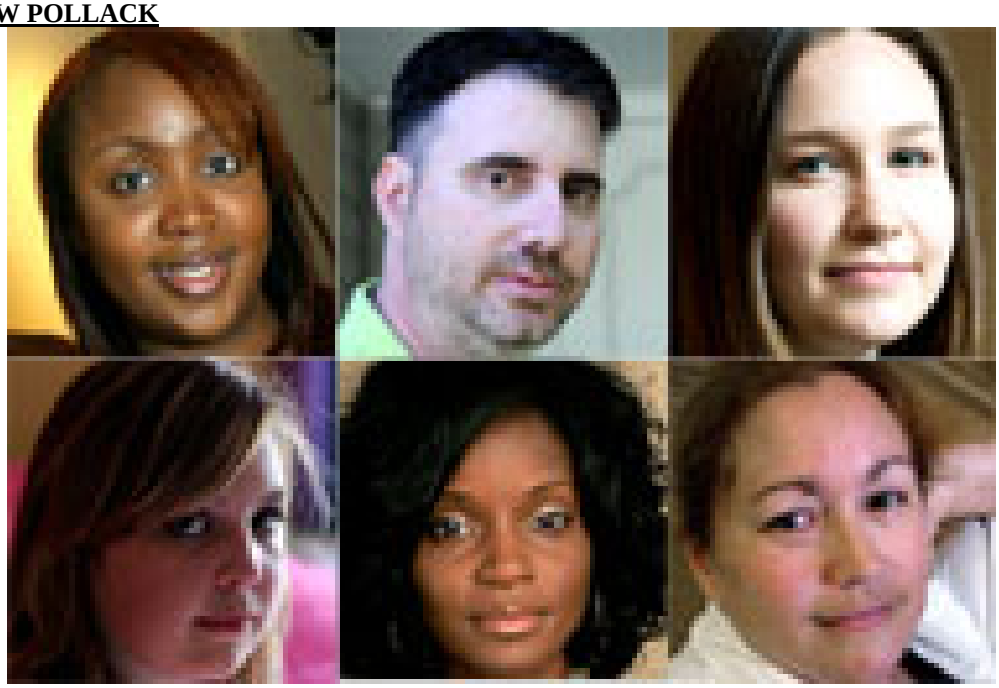
All interested parties will have an opportunity to weigh in on the proposed changes. The American Psychiatric Association is expected to post the working group's final proposal on autism diagnostic criteria on the diagnostic manual's Web site in January and invite comment from the public. Dr. Swedo and company are bracing for an earful.

Correction: An earlier version of this article incorrectly said Temple Grandin was a professor at the University of Colorado.

http://www.nytimes.com/2009/11/03/health/03asperger.html?_r=1&nl=health&emc=healthupdateema1

Lupus Drug Shows Promise in New Trial

By ANDREW POLLACK



The debilitating disease called lupus has been a graveyard for pharmaceutical companies in recent years. One drug after another has had setbacks or outright failures in clinical trials.

But the drought may have ended. The biotechnology company Human Genome Sciences said on Monday that its experimental drug had succeeded in its second big clinical trial. That raises the chances that the drug, called Benlysta, will become the first new treatment for lupus in more than 40 years.
"This is a pivotal moment in lupus research," Margaret G. Dowd, president of the Lupus Research Institute, which sponsors research but was not involved in the clinical trials, said in a statement.
It is also a pivotal moment for Human Genome Sciences, which does not yet have any marketed products. Shares of the company jumped 35 percent on Monday, closing at $25.28. As recently as last March, the stock sold for only 45 cents a share as investors had little confidence in the prospects for the company's drugs.
Human Genome, of Rockville, Md., and its partner, GlaxoSmithKline, needed two successful trials to win regulatory approval of Benlysta. Having achieved the second success on Monday, the companies said they would file for approval of the drug in the United States and Europe in the first half of 2010.
Benlysta did not perform as well in the second trial as in the first. Only the higher of two doses provided a statistically significant improvement in lupus symptoms compared with a placebo. In the first trial, both doses had such an effect.
The results of the new trial were "not as pretty" as those of the first one, but they were "good enough," Avik Roy, an analyst at Monness, Crespi, Hardt, said in a note to clients.
Human Genome's market value now exceeds $4 billion. Fidelity, T. Rowe Price and Barclays Global Investors are among the major holders of the stock. Glaxo, a large and diversified pharmaceutical company based in London, has less riding on Benlysta.
Lupus is an autoimmune disease, in which the defense system against pathogens attacks the body's own tissues. The disease, which primarily affects women of child-bearing age, can cause rashes, arthritis, mouth sores, kidney damage and other problems.
Because the symptoms of lupus wax and wane and differ from person to person, it has been difficult to demonstrate in a clinical trial that a drug is effective against the disease.

The drug is likely to cost $20,000 a year or more, in line with biotechnology drugs for other autoimmune diseases like rheumatoid arthritis and multiple sclerosis. Analysts estimate Benlysta sales could reach a few billion dollars a year.

Human Genome executives said Monday that there were about 325,000 Americans with systemic lupus under the care of rheumatologists. They estimated that the 200,000 with the most severe disease would be candidates for Benlysta.

In the primary measure of the drug's effectiveness, 43.2 percent of patients taking a high dose of Benlysta had a significant improvement in symptoms after one year compared with 33.8 percent of those getting a placebo. That suggests that only one of 10 people who take Benlysta will do better than they would on a placebo.

There were also some secondary measures for which the higher dose did not differ from a placebo in a statistically significant way in the second trial, like the assessment of doctors as to how their patients were faring. In the first trial, the differences were statistically significant for the most part.

The second trial, involving 819 patients, took place primarily in North America and Western Europe, while the first trial involved patients in Asia, South America and Eastern Europe. Because medical care in the United States and Western Europe is probably better than in those other regions, analysts say there could have been less room for Benlysta to make a difference.

The companies said the rate of side effects was not very different between those on Benlysta and those taking the placebo. However, three patients taking the drug died and five developed tumors, while none getting the placebo died and only one developed a tumor. Since twice as many patients got the drug as got the placebo, these differences might not mean anything.

Benlysta, also known as belimumab, blocks a protein that stimulates B cells, which are part of the immune system.

Human Genome, a pioneer in genomics, the practice of analyzing the human DNA, discovered the gene for that protein. That would make Benlysta, should it be approved, one of the first drugs to arise from genomics.

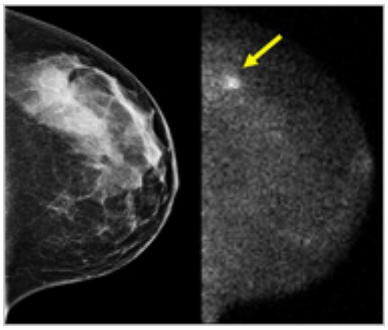
In 2000, Human Genome's stock price exceeded $100 as investors thought the company would prosper selling vital genetic information to pharmaceutical companies.

But genetic information did not greatly accelerate drug development, and selling such data did not prove a viable business model. So, like most of its fellow genomics companies, Human Genome turned to developing drugs on its own.

http://www.nytimes.com/2009/11/03/business/03lupus.html?ref=research

Quandary With Mammograms: Get a Screening, or Just Skip It?

By DENISE GRADY



Here we go again. Another study raises questions about the benefits of mammograms, and another set of confusing statements issue forth from experts.

Last month, Dr. Otis Brawley, the American Cancer Society's chief medical officer, told The New York Times that the medical profession had exaggerated the benefits of cancer screening, and that if a woman refused mammography, "I would not think badly of her, but I would like her to get it."
Then, the cancer society issued a statement saying women over 40 should keep having mammograms every year, because seven studies have shown that the test decreases the risk of death from breast cancer. But the statement also said mammography can "miss cancers that need treatment, and in some cases finds disease that does not need treatment." In other words, the test may lead to some women being treated, and being exposed to serious side effects, for cancers that would not have killed them. Some researchers estimate that as many as one-third of cancers picked up by screening would not be fatal even if left untreated. But right now, nobody knows which ones.
So what are women supposed to do?
Mammograms are no fun, to put it mildly. Like many women, I have been putting up with them in hopes that, if I get cancer, they might find it early enough to save my life and maybe help me avoid extensive surgery and chemotherapy. Have I been kidding myself?
Hoping to make sense of it all, I consulted several experts. All said mammograms were still important — after all, breast cancer kills 40,000 women a year in this country — but they differed about who really needed them and how often. All agreed that research was badly needed to figure out how to tell dangerous tumors from the so-called indolent ones.
One of the experts was Dr. Laura J. Esserman, a breast surgeon from the University of California, San Francisco, and author of the Oct. 21 report in The Journal of the American Medical Association that touched off the latest debate about mammography. Dr. Esserman described breast cancers as slow, medium or fast in growth rate and aggressiveness, and said screening seemed to be good at finding the slow ones, which probably didn't need treatment, but might not catch the aggressive and deadly types before they began to spread. But it also picks up the medium ones, and those are the women who may benefit most. Again, more research is needed to figure out which kind of tumor a patient has.
"The first thing to talk about is who's helped and who's not," Dr. Esserman said. In her view, women over 70 or 75 can stop being screened, because no studies have shown that it helps them. If they do develop breast cancer, she said, it is likely to be a slow-growing type that will not kill them.
Like many other researchers, she said that, despite the cancer society's guidelines, evidence was also lacking for a benefit in screening women from 40 to 50 — unless they have a strong family history of breast cancer or a mutation in a gene called BRCA, which greatly increases the risk.
For women 50 to 70, Dr. Esserman said, the story is different. In that age range, there is good evidence that screening can reduce the risk of death from breast cancer by 20 percent to 30 percent.
Also, she said, women should try to get a sense of their own risk, and if it is high, talk to a doctor about taking tamoxifen or raloxifene, drugs that can lower the risk.
One risk factor is having dense breast tissue, which is a double threat: cancer is more likely and harder to detect, because X-rays do not penetrate this tissue as well as they pass through fat. The only way to find

out whether you have dense breasts is with a mammogram, and the radiologist's report should mention density, Dr. Esserman said. Patients may have to request the full report.
Other risk factors include taking hormones to treat menopause symptoms; having a history of biopsies, no pregnancies before 30, or a mother or sister with breast cancer; and aging.
A risk calculator for breast cancer, used by the National Cancer Institute, provides a score based on the answers to seven quick questions. But it's only an estimate, and Dr. Susan Love, a breast surgeon and researcher in Santa Monica, Calif., cautions that the calculator is not so good at predicting individual risk.
As for screening, Dr. Love praised Dr. Brawley and Dr. Esserman for questioning the status quo.
"Boy, everybody was afraid to go there, like it was the third rail," she said, adding: "I really don't think we should be routinely screening women under 50. There's no data showing it works."
Younger women, she said, are less likely to have cancer, and they tend to have dense breast tissue, so mammograms are more likely to miss tumors. For them, she said, "it's radiation without much benefit."
Dr. Love noted that not all medical groups agreed with the cancer society's guidelines. Some recommend no screening for women under 50 or over 70, and some advise mammograms only every other year. In European countries that screen every other year, she said, the breast cancer death rates are no higher than in the United States.
She added that women from ages 50 to 70 should find out whether they have dense breasts, and those who do not could probably get by with less frequent mammograms.
But some researchers say that the benefits of yearly screening far outweigh the risks, and that if women skip it, gains against breast cancer — death rates have declined in recent years — could be undone.
Dr. Larry Norton, deputy physician in chief for breast cancer programs at Memorial Sloan-Kettering Cancer Center in Manhattan, said by e-mail: "Just because a test isn't perfect is no reason to abandon it while better tests are being developed. The bottom line is that if an individual woman wants to reduce her odds of dying of breast cancer (by at least 24 percent, which is no small effect), then she should follow the current screening guidelines."
Even if it were true that 1 in 3 cancers found by mammography would not become fatal (a figure that Dr. Norton questions), there is no sure way to tell which those are.
"And in the face of uncertainty, one must make rational choices," he said. "Say someone fires a gun at you, and you know that there is a 30 percent chance that the bullet is a blank. Do you not still duck?"
Dr. Norton also emphasizes that finding tumors when small, which mammograms can do, increases the odds that the patient will be able to avoid mastectomy and chemotherapy.
But Dr. Silvia C. Formenti, the chairwoman of radiation oncology at New York University Langone Medical Center, said: "I don't think there is enough debate. Screening does not pay off the way we expected."
Dr. Formenti said she was concerned about finding tumors in older people that would probably not kill them. But the diagnosis turns them into cancer patients and erodes their peace of mind forever.
"We take away the innocence of being healthy and not having to worry about cancer," she said. "The psychological cost of becoming a cancer patient is underrated."
Dr. Formenti said the emphasis on screening by groups like the cancer society might have misled the public into thinking that screening could prevent cancer. "It's a giant misconception," she said.
Nonetheless, she said, "between 50 and 60 is a good time to be screened" — and women over 60 may still benefit, though the evidence is not as strong. But she emphasized that women of all ages needed to assess their risks when making decisions about being screened, and that all should have their breasts examined once a year by a doctor to check for lumps or other abnormalities. An experienced doctor can feel lumps one centimeter and larger, she said, noting that even masses as large as five centimeters can still be removed by lumpectomy — preserving the breast — and may not need chemotherapy.
"In a certain sense, I have to confess that I'm happy if the public gets offended or infuriated" by the debate, Dr. Formenti said. "I want taxpayers to say: 'You have no clarity. Study it. Stop telling us you are a good girl if you get a mammogram.' "
By the time I finished the interviews I decided that, because I'm between 50 and 60, I'll keep having mammograms. But I've requested the report from my last one to find out about my tissue density, and if it's low, I might stretch the interval to 18 months or even 2 years. And I'll hope that in the meantime research does find a way to tell which tumors will kill you, and which will just sit there and mind their own business until you die of something else.

http://www.nytimes.com/2009/11/03/health/03second.html?nl=health&emc=healthupdateema1

Species' extinction threat grows

More than a third of species assessed in a major international biodiversity study are threatened with extinction, scientists have warned.

Out of the 47,677 species in the IUCN Red List of Threatened Species, 17,291 were deemed to be at serious risk.

These included 21% of all known mammals, 30% of amphibians, 70% of plants and 35% of invertebrates.

Conservationists warned that not enough was being done to tackle the main threats, such as habitat loss.

"The scientific evidence of a serious extinction crisis is mounting," warned Jane Smart, director of the International Union for the Conservation of Nature's (IUCN) Biodiversity Conservation Group.

" **At what point will society truly respond to this growing crisis?** "
Professor Jonathan Baillie, Zoological Society of London

"The latest analysis... shows that the 2010 target to reduce biodiversity loss will not be met," she added.

"It's time for governments to start getting serious about saving species and make sure it's high on their agendas for next year, as we are rapidly running out of time."

The Red List, regarded as the most authoritative assessment of the state of the planet's species, draws on the work of thousands of scientists around the globe.

The latest update lists amphibians as the most seriously affected group of organisms on the planet, with 1,895 of the 6,285 known species listed as threatened.

Of these, it lists 39 species as either "extinct" or "extinct in the wild". A further 484 are deemed "critically endangered", 754 "endangered" and 657 "vulnerable".

The Kihansi Spray Toad (*Nectophyrnoides asperginis*) is one species that has seen its status change from critically endangered to extinct in the wild.

It was only found in the Kihamsi Falls area of Tanzania, but its population had crashed in recent years from a high of an estimated 17,000 individuals.

Conservationists suggest that the rapid decline was primarily the result of of a dam being constructed upstream from the toads' habitat, which resulted in a 90% reduction in the flow of water.

"In our lifetime, we have gone from having to worry about a relatively small number of highly threatened species to the collapse of entire ecosystems," observed Professor Jonathan Baillie, director of conservation programmes at the Zoological Society of London (ZSL).

"At what point will society truly respond to this growing crisis?"

The updated data from the 2009 Red List is being made publicly available on the IUCN website on Tuesday.

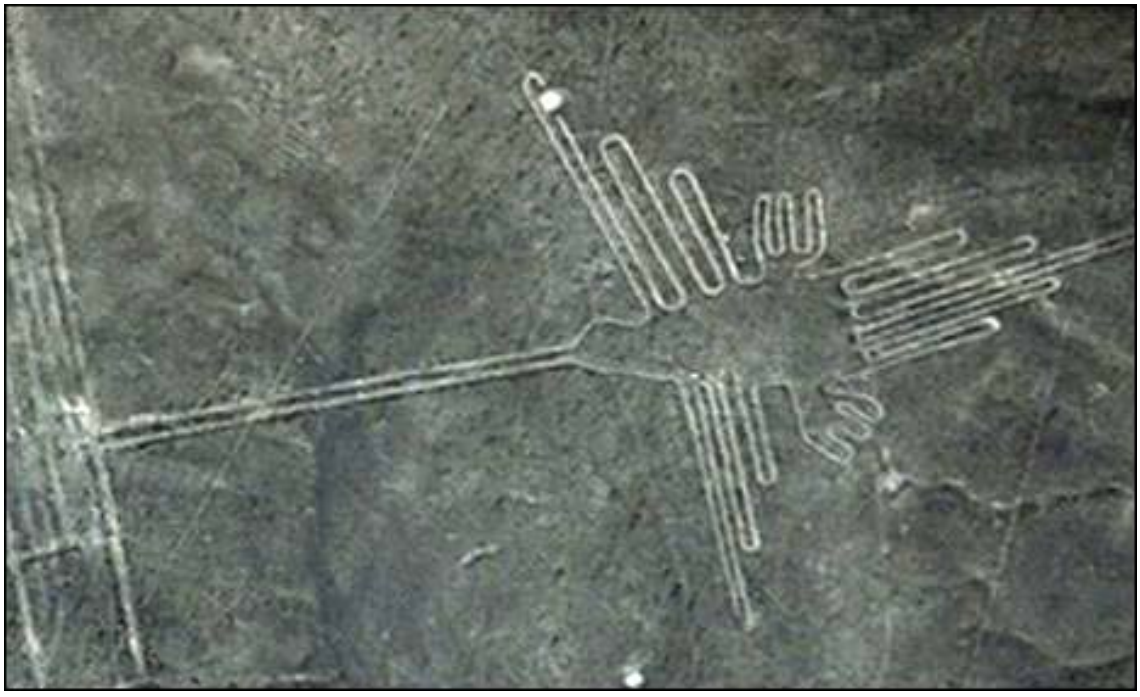
Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8338880.stm

Published: 2009/11/03 00:17:44 GMT

Logging 'caused Nazca collapse'

By Jody Bourton
Earth News reporter

The ancient Nazca people of Peru are famous for the lines they drew in the desert depicting strange animal forms.



A further mystery is what happened to this once great civilisation, which suddenly vanished 1,500 years ago.

Now a team of archaeologists have found the demise of the Nazca society was linked in part to the fate of a tree.

Analysing plant remains they reveal how the destruction of forests containing the huarango tree crossed a tipping point, causing ecological collapse.

The team have published their findings in the journal of Latin American Antiquity.

This remarkable nitrogen-fixing tree was an important source of food, forage timber and fuel for the local people
Dr David Beresford-Jones University of Cambridge, UK

"These were very special forests," says Dr David Beresford-Jones from the McDonald Institute for Archaeological Research, University of Cambridge, UK who led the team.

The huarango tree (*Prosopis pallida*) is a unique tree with many qualities and played a vital role in the habitat, protecting the fragile desert ecosystem, the scientists say.

"It is the ecological keystone species in the desert zone enhancing soil fertility and moisture and underpinning the floodplain with one of the deepest root systems of any tree known," Dr Beresford-Jones says.

The tree was also a useful resource.

"This remarkable nitrogen-fixing tree was an important source of food, forage timber and fuel for the local people."

Researchers have previously found evidence that suggests the disappearance of the Nazca society was a due to catastrophic flooding event as a result of El Nino around 500 AD.

El Nino is a cyclical event that occurs as a result of a change in ocean temperatures that can cause a change in climate and severe flooding to the the west coast of South America.

The researchers have now found new evidence that suggests the society would not have been so easily destroyed if they had not cut down the forests around them.

Analysing plant remains and pollen in soil 1.5m deep, the team was able to trace an important sequence of events which show the clearing of woodland for agriculture.

"At the bottom of the profile there is a lot of huarango pollen and little evidence of human impact," explains Dr Alex Chepstow-Lusty from the French Institute of Andean Studies in Lima, Peru who also took part in the study.

"Then, at 80cm deep, maize pollen becomes common, showing the importance of this crop, suggesting a greater need for food and an increasing population," he says.

"It is now we notice a big impact on the huarangos and a major decrease in their pollen."

The landscape only became exposed to the catastrophic effects of that El Nino flood, once people had inadvertently crossed an ecological threshold
Dr David Beresford-Jones University of Cambridge, UK

"Then suddenly corresponding with the El Nino event at AD 500 or shortly afterwards, the pollen is dominated by weeds in the family Chenopodiaceae, which are adapted to salty conditions and this landscape is now the desert seen today."

The Nazca are famous for creating complex line drawings that can only be seen from the air in the Nazca desert, Peru 400km south of Lima.

They were created between 500BC and 500AD and depict animals such as monkeys and whales as well as geometric figures several kilometres long.

As well as the lines, the Nazca also formed a sophisticated society, constructing complex irrigation systems for agriculture.

However, despite their skills and expertise, the researchers say the Nazca society inadvertently contributed to their own demise through the removal of the tree species.

Our research contradicts the popular view that Native American peoples always lived in harmony with their environment until the Spanish Conquest
Dr David Beresford-Jones University of Cambridge, UK

"The landscape only became exposed to the catastrophic effects of that El Nino flood, once people had inadvertently crossed an ecological threshold," explains Dr Beresford-Jones.

"Such thresholds or 'tipping-points' are sharply defined in these desert environments."

"Our research contradicts the popular view that Native American peoples always lived in harmony with their environment until the Spanish Conquest," Dr Beresford-Jones says.

Dr Beresford-Jones explains that with sufficient huarango cover, El Ninos were in fact not great disasters and actually created years of abundance replenishing water aquifers.

Once too much clearance had occurred the landscape was exposed to the effects of the El Nino floods.

"The river down cut into its floodplain and that floodplain narrowed hugely, irrigation systems were left high and dry," he says.

"Human induced gradual change is just as important to the full story of Nazca collapse as the major climatic impacts that eventually precipitated them."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/earth/hi/earth_news/newsid_8334000/8334257.stm

Published: 2009/11/02 11:04:33 GMT

Aspirin 'only for heart patients'

The use of aspirin to ward off heart attacks and strokes in those who do not have obvious cardiovascular disease should be abandoned, researchers say.

The Drugs and Therapeutics Bulletin (DTB) study says aspirin can cause serious internal bleeding and does not prevent cardiovascular disease deaths.

It says doctors should review all patients currently taking the drug for prevention of heart disease.

The Royal College of GPs says it supports the DTB's recommendations.

Low-dose aspirin is widely used to prevent further episodes of cardiovascular disease in people who have already had problems such as a heart attack or stroke.

" **Given the evidence, the DTB's statement on aspirin prescription is a sensible one** "
Prof Steve Field, Royal College of GPs

This approach - known as secondary prevention - is well-established and has confirmed benefits.

But many thousands of people in the UK are believed to be taking aspirin as a protective measure before they have any heart symptoms.

Controlled trials

Between 2005 and 2008, the DTB said four sets of guidelines were published recommending aspirin for the "primary prevention" of cardiovascular disease - in patients who had shown no sign of the disease.

These included people aged 50 and older with type 2 diabetes and those with high blood pressure.

But the DTB said a recent analysis of six controlled trials involving a total of 95,000 patients published in the journal the Lancet does not back up the routine use of aspirin in these patients because of the risk of serious gastrointestinal bleeds and the negligible impact it has on curbing death rates.

Dr Ike Ikeanacho, editor of the DTB, said: "Current evidence for primary prevention suggests the benefits and harms of aspirin in this setting may be more finely balanced than previously thought, even in individuals estimated to be at high risk of experiencing cardiovascular events, including those with diabetes or elevated blood pressure."

'Sensible statement'

Professor Steve Field, chairman of the Royal College of General Practitioners, said the DTB was an excellent source of independent advice for medical professionals.

He said: "Given the evidence, the DTB's statement on aspirin prescription is a sensible one.

"The Royal College of General Practitioners would support their call for existing guidelines on aspirin prescription to be amended, and for a review of patients currently taking aspirin for prevention."

June Davison, senior cardiac nurse at the British Heart Foundation said: "It is well established that aspirin can help prevent heart attacks and strokes among people with heart and circulatory disease - so this group of people should continue to take aspirin as prescribed by their doctor.

"However, for those who do not have heart and circulatory disease the risk of serious bleeding outweighs the potential preventative benefits of taking aspirin.

"We advise people not to take aspirin daily, unless they check with their doctor.

"The best way to reduce your risk of developing this disease is to avoid smoking, eat a diet low in saturated fat and rich in fruit and vegetables and take regular physical activity."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8338763.stm

Published: 2009/11/03 01:03:59 GMT

Memory test 'spots pre-dementia'

Memory and language tests can reliably reveal "hidden" early dementia, say UK experts.

Most dementias are missed for years as the symptoms can be elusive until considerable brain tissue is lost.

But doctors from Oxford found they were able to spot very early warning signs when they looked closely enough.

The findings in Neurology could help doctors diagnose dementia sooner, which is crucial since treatment is most effective when given early.

Over a span of 20 years, the researchers studied a group of 241 healthy elderly volunteers, giving them regular tests designed to measure their thinking or cognitive powers.

" **Being able to spot and measure the initial stages of dementia is a crucial challenge if we are to improve drug testing and lay the groundwork for prevention trials** "
Rebecca Wood of the Alzheimer's Research Trust

When they scrutinised the test results, the doctors found subtle clues that, in retrospect, hinted at ensuing impairment.

Linguistic problems

Specifically, the patients who went on to develop mild cognitive impairment or pre-dementia stumbled on tasks involving language expression, learning and recall.

For example, they had greater difficulty remembering the name for common objects or animals and explaining the meaning of a given word.

And those who were older and who scored lower on the language or memory tests tended to deteriorate more quickly.

Professor David Smith and his team say their findings fit with what we already know about dementia.

Experts have noted that the early stages of dementia are associated with linguistic problems, such as word-finding difficulties.

Early literary works by authors who have later been diagnosed with Alzheimer's show similar changes in language use - simpler narratives and a smaller vocabulary.

Risk lowered

Rebecca Wood of the Alzheimer's Research Trust said: "This significant long-term study shows how subtle, but measurable, problems with language or memory can predict when a healthy elderly person is likely to develop mild cognitive impairment, which frequently develops into dementia.

"Early intervention will be crucial for future dementia treatments. Being able to spot and measure the initial stages of dementia is a crucial challenge if we are to improve drug testing and lay the groundwork for prevention trials."

Latest work in Archives of General Psychiatry adds weight to the evidence that Alzheimer's dementia is at least partly inherited, and that being healthy in mid-life could help lower your risk of the disease.

Dutch researchers found that people with a parental history of Alzheimer's had higher blood pressure and indicators of arterial disease as well as different amounts of inflammatory proteins in their blood compared with those without a parental history of Alzheimer's.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8337744.stm

Published: 2009/11/03 01:05:00 GMT

Gene Therapy Repairs Injured Human Donor Lungs For The First Time

Dr. Marcelo Cypel, Toronto General Hospital Surgical Lung Transplant Fellow, and Dr. Shaf Keshavjee, Senior Scientist in the McEwen Centre for Regenerative Medicine, University Health Network and Director of the Lung Transplant Program, UHN are delivering the IL-10 gene into human donor lungs via a bronchoscope. Both are observing the catheter used to deliver the gene as it progresses inside the trachea towards the lungs. (Credit: Dr. Marcelo Cypel)

ScienceDaily (Nov. 2, 2009) — For the first time, scientists in the McEwen Centre for Regenerative Medicine, University Health Network have successfully used gene therapy to repair injured human donor lungs, making them potentially suitable for transplantation into patients. This technique could significantly expand the number of donor lungs by using organs that are currently discarded, and improve outcomes after transplantation.

In their pioneering work, a team of researchers led by Dr. Shaf Keshavjee, Senior Scientist at the McEwen Centre for Regenerative Medicine, University Health Network and Director of the Lung Transplant Program, University Health Network developed a technique of ex vivo gene delivery to donor lungs, before they are implanted into a recipient's body. The technique was shown to be simple and effective in improving lung function. Their results, "Functional Repair of Human Donor Lungs by IL-10 Gene Therapy," are published in the October 28, 2009 edition of the journal *Science Translational Medicine.*

"This work is a big step in using regenerative strategies to repair injured lungs," says Dr. Keshavjee, who is also Director, Latner Thoracic Research Laboratories and Professor and Chair, Division of Thoracic Surgery at the University of Toronto. "For the first time, we hope to improve the health of donor lungs that we could not have used before by using gene therapy to decrease inflammation and repair cells before transplantation."

Dr. Keshavjee also emphasizes that clinical trials on humans would be the next step in testing this promising approach before it could be used on patients waiting for lung transplants. In these future clinical trials, lungs repaired with the gene therapy will be offered to patients waiting for a life-saving lung transplant. The process of gene therapy used on injured lungs will be carefully explained to the patients and, if they consent, the patients will be potentially transplanted with the repaired lungs should no other suitable donor lungs become available. "This work opens the door for a variety of therapies that could potentially be applied to repair various injuries in other donor organs to improve the safety and outcome of transplants," adds Dr. Keshavjee.

Using a novel approach to overcome some of the challenges of gene therapy, the researchers first developed a strategy to preserve lungs at normal body temperature, with the lungs kept outside the body in a protective dome. The Toronto XVIVO Lung Perfusion System continuously pumps a bloodless solution of oxygen, proteins and nutrients into injured donor lungs, mimicking normal physiological conditions. This makes it possible for the injured cells to begin repairing themselves, and also sets the stage for more sophisticated repair techniques to be applied to donor lungs.

Working with pig and then human donor lungs, which were unsuitable for transplantation, the researchers first placed the lungs on the Toronto XVIVO Lung Perfusion System to warm them to normal body temperature. Then, using a specially engineered adenovirus vector -- a common cold virus -- the researchers used a bronchoscope to inject the vector with an added IL-10 gene through the windpipe into the human lungs.

The study found that lungs maintained on the Toronto Lung Perfusion System alone, the control group, did not deteriorate and remained stable. However, the donor lungs that received the gene therapy, in addition to the ex vivo perfusion, significantly improved their function with regards to blood flow throughout the lungs and their ability to take in fresh oxygen and get rid of carbon dioxide. The boosted IL-10 effect lasts for up to 30 days in the lung. The authors state that transplanting lungs which function better from the start would lead to more predictable, safer outcomes, shorter periods of mechanical ventilation and shorter intensive care unit stays for patients.

"It's as if gene therapy turbocharges each individual cell to manufacture many more proteins in its own IL-10 factory," explains Dr. Keshavjee, "This protein down-regulates or decreases the inflammatory potential of cells injured before and during the transplant process. It also has the capacity to turn down the recipient's immune system which rejects the transplanted organ."

The IL-10 gene is found normally in animal and human cells, and plays a role in inhibiting the immune response to infection or foreign materials such as transplanted organs. The researchers found that the lungs begin producing the new IL-10 anti-inflammatory proteins about six hours after insertion.

More than 80% of potential donor lungs are injured and show inflammation during the process of brain death and intensive care related complications, and cannot be used for transplantation. Moreover, inflammation and organ rejection are the two main complications after transplant surgery.

"Everything we can do to prevent lung injury, especially in the first 72 critical hours after surgery, would have a significant impact on survival and quality of life after transplantation," notes Dr. Marcelo Cypel, a transplant surgical fellow at Toronto General Hospital who is the first author of the paper. Dr. Cypel adds that patients who have severe early lung injury are at greater risk of dying after surgery, and have higher rates of organ rejection later on.

Currently, more than 50 patients are waiting for either a lung or heart-lung transplant in Ontario. About 20% of those on the wait list will die before they receive a lung transplant. In Canada, the number of people waiting for a lung transplant has doubled in the past 10 years, with 252 Canadians waiting to receive a lung transplant in 2006, compared to 119 in 1997. Two hundred and ninety-nine (299) Canadians died while waiting for a lung transplant between 1997 and 2006.

It is estimated that the number of donor organs available for lung transplants could easily be doubled with this technique to treat and improve donor lungs.

Other members of the team who contributed to this study include: Mingyao Liu, Matt Rubacha, Jonathan Young, Shin Hirayama, Masaki Anraku, Masaaki Sato, Marc de Perrot, Thomas Waddell of the McEwen Centre for Regenerative Medicine and the University of Toronto; Jeffrey Medin, Ontario Cancer Institute, Princess Margaret Hospital; and Arthur Slutsky, St. Michael's Hospital.

The study was supported by grants from the Canadian Institutes of Health Research and the Centre for Gene Therapy, National Institutes of Health, U.S.

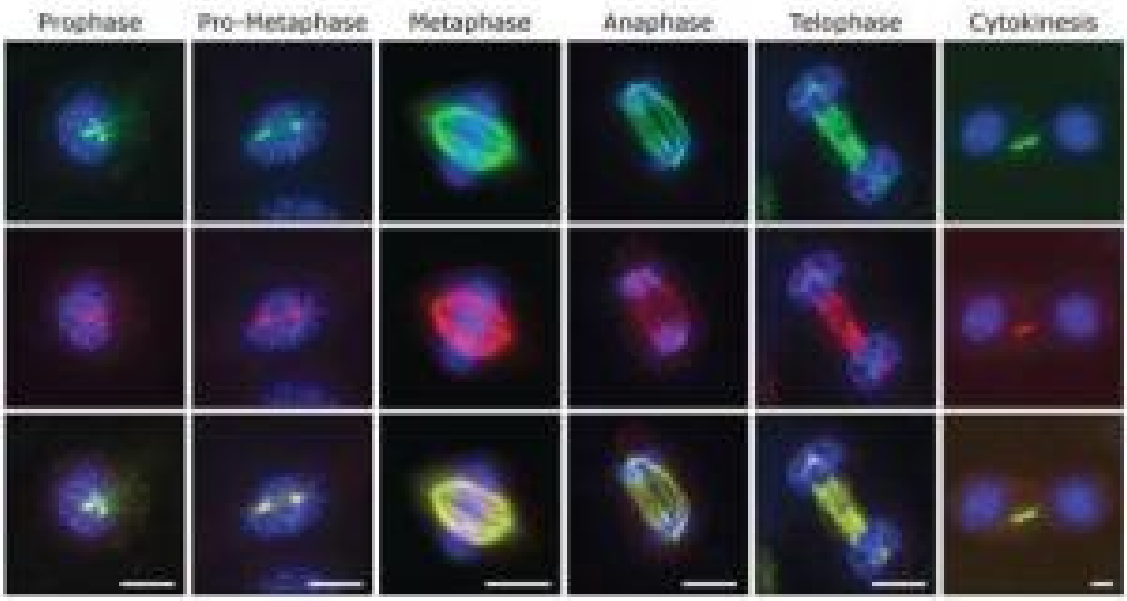
Journal reference:

1. Shaf Keshavjee et al. **Functional Repair of Human Donor Lungs by IL-10 Gene Therapy**. *Science Translational Medicine*, October 28, 2009

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

http://www.sciencedaily.com/releases/2009/10/091028142223.htm

Renal Cancer: Protein Triggers A Snowball Effect



With different colouring methods the researchers showed that the protein VHL binds to the spindle apparatus during different stages of the cell division. The chromosomes (blue) are thus distributed on the daughter cells.

ScienceDaily (Nov. 2, 2009) — If a certain protein is missing in kidney cells, fatal cell division errors arise, which can finally lead to genetically unstable cells and to renal cancer. ETH researchers tracked down the phenomenon.

Body cells divide incessantly. This is actually a "standard procedure", which in most cases proceeds without error. Particularly important during cell division, known as mitosis, is the correct distribution of the chromosomes to the new daughter cells. This requires that a spindle of microtubules is formed in the cell during the division, with the aid of which the chromosomes are pulled to the opposite poles.

Here, the fidelity-monitoring checkpoint system plays an important role. It supervises whether all chromosomes are correctly bound to the spindle microtubules. This checkpoint is activated, if errors arise during cell division, which would lead to an unequal distribution of the chromosomes on the daughter cells. The spindle checkpoint can halt cell division for as long as necessary, until the chromosomes are correctly attached to the spindle microtubulues.

Fatal consequences upon loss of a protein

With this mechanism the cell prevents the formation and accumulation of cells with abnormal sets of chromosomes. Now, however, in a publication in "Nature Cell Biology" two ETH researchers, the cell biologist Claudio Thoma from the Wilhelm Krek working group and the biochemist Alberto Toso from the Patrick Meraldi group, have identified a mechanism, which triggers an unwanted and fatal snowball effect, which can lead to kidney cells with deviating chromosome numbers and contribute to kidney cancer development.

Central to this mechanism is the von Hippel Lindau tumor suppressor protein (pVHL). During cell division this molecule is deposited on the spindle apparatus. If pVHL is missing, the cells divide incorrectly. The spindle cannot align itself correctly and changes its position like a defective compass

needle. The spindle checkpoint is also weakened. With a loss of pVHL cell division continues, chromosomes are lost; cells with incomplete or overstaffed chromosome sets develop. Aneuploid cells emerge, which contain the wrong number of chromosomes, are genetically unstable and are thus dangerous.

Metabolic conversion instead of cell death

A further unwanted effect of the pVHL deficiency: aneuploid cells do not die. If the molecule precipitates, these cells even switch over to a very efficient mode of energy production. They divide more vigorously, grow exuberantly and form cysts, which are considered as precoursor states of tumours. "80 per cent of the tumours in human cells have an abnormal number of chromosomes", states Wilhelm Krek, Professor of Cell Biology.

The loss of pVHL is in part hereditary due to mutations of the gene. There are two copies of the VHL gene. If one copy is already defective at birth, it only needs a mutation or a blockade of the second copy, for cells to no longer produce pVHL.

Medicine against degenerate cells?

Krek is convinced that the new findings on the role of pVHL have a therapeutic use. The greatest chance of success is probably in the fight against aneuploid cells. According to the ETH professor they now need to find a drug which kills them preferentially. Kidney cancer is considered as an aggressive type of cancer, since it often forms offshoots, so-called metastasis. 60 per cent of all patients, who get it, die 5 to 8 years after the treatment, because of the development of metastases, which can no longer be combatted.

Why pVHL plays such an important role only in the kidney cells, with the emergence of degenerate cells, is still unclear, because both the spindle apparatus and the protein is present in all body cells during cell division.

Cell procedures observed in real time

The work developed in a co-operation between cell biologists and biochemists, where the original authors of the paper, which was published in *Nature Cell Biology*, by chance exchanged views concerning their own special fields and discovered the close link between pVHL and cell division. Thanks to "Single Cell Life Imaging", a special optical microscope technology, the researchers could observe and follow living cells individually. The Light Microscopy Centre of the ETH Zurich, which offers the technology, is at the forefront of this technology.

Journal reference:

1. Thoma et al. **VHL loss causes spindle misorientation and chromosome instability**. *Nature Cell Biology*, 2009; 11 (8): 994 DOI: 10.1038/ncb1912

Adapted from materials provided by ETH Zurich.

http://www.sciencedaily.com/releases/2009/09/090911212654.htm

Angry Faces: Facial Structure Linked To Aggressive Tendencies, Study Suggests

New research finds that a quick glance at someone's facial structure may be enough for us to predict their tendency towards aggression. (Credit: iStockphoto/Thomas Perkins)

ScienceDaily (Nov. 2, 2009) — Angry words and gestures are not the only way to get a sense of how temperamental a person is. According to new findings in *Psychological Science*, a quick glance at someone's facial structure may be enough for us to predict their tendency towards aggression.

Facial width-to-height ratio (WHR) is determined by measuring the distance between the right and left cheeks and the distance from the upper lip to the mid-brow. During childhood, boys and girls have similar facial structures, but during puberty, males develop a greater WHR than females. Previous research has suggested that males with a larger WHR act more aggressively than those with a smaller WHR. For example, studies have shown that hockey players with greater WHR earn more penalty minutes per game than players with lower WHR.

Psychologists Justin M. Carré, Cheryl M. McCormick, and Catherine J. Mondloch of Brock University conducted an experiment to see if it is possible to predict another person's propensity for aggressive behavior simply by looking at their photograph. Volunteers viewed photographs of faces of men for whom aggressive behavior was previously assessed in the lab. The volunteers rated how aggressive they thought each person was on a scale of one to seven after viewing each face for either 2000 milliseconds or 39 milliseconds.

The photographs were very revealing: Volunteers' estimates of aggression correlated highly with the actual aggressive behavior of the faces viewed, even if they saw the picture for only 39 milliseconds. Even more interestingly, the volunteers' estimates were also highly correlated with WHR of the faces -- the greater the WHR, the higher the aggressive rating, suggesting that we may use this aspect of facial structure to judge potential aggression in others. These findings indicate that subtle differences in face shape may affect personality judgments, which may, in turn, guide how we respond to certain individuals.

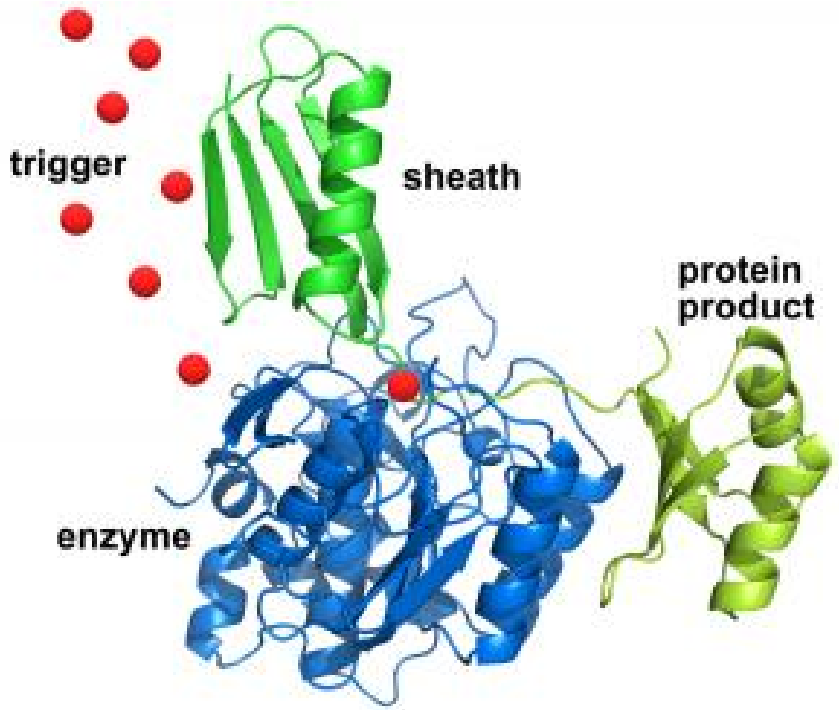
Journal reference:

1. Carré et al. **Facial Structure Is a Reliable Cue of Aggressive Behavior**. *Psychological Science*, 2009; 20 (10): 1194 DOI: 10.1111/j.1467-9280.2009.02423.x

Adapted from materials provided by Association for Psychological Science, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/10/091031002319.htm

Pharmaceutical Manufacture: Biochemical 'On-switch' Could Solve Protein Purification Challenge



The sheath (in green at top), with the desired protein linked to it (in yellow at right), first sticks to the engineered enzyme (in blue atbottom left) – allowing impurities and other proteins to be washed away. Then an infusion of triggering molecules (red dots) causes the enzyme to cut away the desired protein (at the point where the sheath and protein connect), which can be collected in a pure state. The sheath can then be washed away and the process repeated. (Credit: NIST)

ScienceDaily (Nov. 2, 2009) — Drugs based on engineered proteins represent a new frontier for pharmaceutical makers. Even after they discover a protein that may form the basis of the next wonder drug, however, they have to confront a long-standing problem: how to produce large quantities of the protein in a highly pure state. Now, a multi-institutional research team including a biochemist at the National Institute of Standards and Technology (NIST) may have found a new solution in an enzymatic "food processor" they can activate at will.

The team has found an efficient method of harvesting purified protein molecules by altering an enzyme that soil bacteria use to break down their food. In its natural form, this enzyme would be of little use to drug developers, but the team has modified it so that it can be activated at the desired moment. By creating essentially an "on-switch" for the enzyme's activity, the team has found a way to separate a single, desired protein from the mixture of thousands generated by a living cell, which remains biotechnology's natural protein factory of choice.

Bacteria use the enzyme, called subtilisin, as a sort of food processor: After producing it internally, they release the enzyme into the soil, where it uses a minuscule "blade" to chop up proteins into digestible pieces. Because it could damage the bacterium's interior, the blade has a protective sheath that only comes off once the enzyme has exited the cell.

"The enzyme and sheath are strongly attracted to each other. The enzyme's first act is to cut the sheath away," says NIST's Travis Gallagher. "The method takes advantage of their attraction in order to isolate the protein we want."

The team first creates many "sheathless" copies of the enzyme, which are modified to function only in the presence of a triggering molecule such as fluoride. The modified enzymes are bound to the surface of a strainer. Then the team uses engineered cells to generate mass quantities of a potentially therapeutic protein, each copy of which has a subtilisin sheath attached to it. After harvesting these proteins along with the thousands of others that grow in the cellular interior, they filter the mixture through the strainer, where the protein-sheath pairs are caught and stuck fast to the subtilisin while the rest of the mixture drains away.

At this point, the team flicks their switch. They add a bit of fluoride and the enzyme snips the bond between sheath and protein, releasing the desired protein free of almost all impurities. "The technique can conceivably be used to obtain any protein you like, and the process is repeatable, as the sheaths can be removed for another round of purification," Gallagher says. "For most proteins, the method can achieve greater than 95 percent purity at a single step."

The research team also includes members from Potomac Affinity Proteins, LLC (PAP) and the University of Maryland Biotechnology Institute (UMBI). UMBI holds the patent, which has been licensed to PAP. The research was supported by grants from the National Institutes of Health and the Bill and Melinda Gates Foundation.

Journal reference:

1. Gallagher et al. **Structure of a Switchable Subtilisin Complexed with a Substrate and with the Activator Azide**. *Biochemistry*, 2009; 091019130448069 DOI: 10.1021/bi900577n

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

http://www.sciencedaily.com/releases/2009/10/091022153633.htm

Newly Discovered Ankylosaur Dinosaur Is 'Biological Version Of An Army Tank'

A husband and wife team of American paleontologists has discovered a new species of dinosaur that lived 112 million years ago during the early Cretaceous of central Montana, Tatankacephalus cooneyorum. (Credit: Illustration by William Parsons)

ScienceDaily (Nov. 1, 2009) — A husband and wife team of American paleontologists has discovered a new species of dinosaur that lived 112 million years ago during the early Cretaceous of central Montana.

The new dinosaur, a species of ankylosaur, is documented in the October issue of the *Canadian Journal of Earth Sciences*. Ankylosaurs are the biological version of an army tank. They are protected by a plate-like armour with two sets of sharp spikes on each side of the head, and a skull so thick that even 'raptors' such as Deinonychus could leave barely more than a scratch.

Bill and Kris Parsons, Research associates of the Buffalo Museum of Science, found much of the skull of the newly described *Tatankacephalus cooneyorum* resting on the surface of a hillside in 1997. Because the skull was 90% complete, it was possible to justify this fossil as a new species.

"This is the first member of *Ankylosauridae* to be found within the Early Cretaceous Cloverly Geologic Formation," said Bill Parsons, who characterized the fossil as a transitional evolutionary form between the earlier Jurassic ankylosaurs and the better known Late Cretaceous ankylosaurs.

The skull is heavily protected by two sets of lateral horns, two thick domes at the back, and smaller thickenings around the nasal region. "Heavy ornamentation and horn-like plates would have covered most of the dorsal surface of this dinosaur" said Bill Parsons.

"For years, Bill and Kris have been collecting fossils from a critical time in Earth's history, and their hard work has paid off," said Lawrence Witmer, professor of paleontology at Ohio University who was not involved with this study. "This is a really important find and gives us a clearer view of the evolution of armored dinosaurs. But this is just the first; I'm sure, of what will be a series of important discoveries from this team."

Parsons also illustrated the dermal armour of this new species based on the theory by Museum of the Rockies paleontologist John R. Horner that there was an outer keratinous sheathing on it as found in modern turtle shells and bird beaks. In his new reconstruction, Parsons suggests that *Tatankacephalus* exhibited complex and colorful patterns rather than the dull appearance suggested in earlier ankylosaur portraits. "According to Horner's theory, many other dinosaurs also had this kind of sheathing and also may have been diversely colored," said Parsons.

As to its name, the broad, short horns on the back of its skull resemble the horns found on a modern buffalo skull and *Tatankacephalus* loosely translates as 'Buffalo head.' Parsons also noted, "of course any further allusions to the city of Buffalo are completely intentional as well."

Adapted from materials provided by Buffalo Museum of Science.

http://www.sciencedaily.com/releases/2009/10/091030125046.htm

A Solution To Darwin's 'Mystery Of The Mysteries' Emerges From The Dark Matter Of The Genome

A mule (cross between a horse and a donkey). (Credit: iStockphoto/Michael Klenetsky)

ScienceDaily (Nov. 1, 2009) — Biological species are often defined on the basis of reproductive isolation. Ever since Darwin pointed out his difficulty in explaining why crosses between two species often yield sterile or inviable progeny (for instance, mules emerging from a cross between a horse and a donkey), biologists have struggled with this question. New research into this field by basic scientists at Fred Hutchinson Cancer Research Center, published online Oct. 22 in *Science* Express, suggests that the solution to this problem lies within the "dark matter of the genome": heterochromatin, a tightly packed, gene-poor compartment of DNA found within the genomes of all nucleated cells.

"Speciation is one of the most fascinating, unsolved problems in biology," said Harmit Malik, Ph.D., an associate member of the Hutchinson Center's Basic Sciences Division and corresponding author of the paper.

Malik and first author Joshua Bayes, Ph.D., a former graduate student in the Malik lab, focused on understanding the cellular function of a particular fruit fly (*Drosophila*) gene dubbed Odysseus. The gene is so named because of its ability to cause havoc and male sterility when introduced into the genome of another species. Odysseus is a gene that is derived from a transcription factor, and it was long believed to be a protein that turned on expression of other genes in Drosophila testis.

Odysseus also had been previously shown to rapidly evolve in its DNA-binding domain. Based on this observation, Bayes and Malik reasoned that Odysseus must interact with some rapidly evolving DNA in the genome. They tested the hypothesis, first proposed by Malik and Hutchinson Center colleague Steven Henikoff, Ph.D., that such hybrid-sterility proteins may bind repetitive satellite DNA in heterochromatin. Such repeats are believed to evolve rapidly due to an "arms-race" for preferential transmission during the process of forming an egg, whereby only one of four chromosomes is non-randomly chosen to be included into the egg.

Consistent with this hypothesis, Bayes found that Odysseus proteins localize to heterochromatic DNA found next to centromeres and on gene-poor chromosomes, which leads to their decondensation. Dramatically, the hybrid-sterility-associated Odysseus from one species showed additional localization to the Y chromosome of the other species. Through experiments in cell lines and transgenic flies, Bayes further showed that Odysseus localization has rapidly evolved during recent evolution, evidence of the

"arms-race" that drives rapid evolution of satellite DNA repeats. Altered expression and localization has profoundly deleterious consequences for the process of sperm formation, a process that remains a mystery and is under active study in the Malik lab.

The finding that rapidly evolving heterochromatin may underlie this phenomenon also ties in with other work in Malik's lab that explores how "mismatches" originating from rapid evolution of DNA and proteins could lead to chromosome segregation defects and aneuploidy events that are sometimes precursors in transitions to cancer.

Grants from the National Institutes of Health, the Mathers Foundation and the Howard Hughes Medical Institute funded this research.

Adapted from materials provided by Fred Hutchinson Cancer Research Center, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/10/091026152816.htm

Tai Chi Exercise Reduces Knee Osteoarthritis Pain In The Elderly, Research Shows

Three seniors doing Tai Chi on the beach. (Credit: iStockphoto/Anne Clark)

ScienceDaily (Nov. 1, 2009) — Researchers from Tufts University School of Medicine have determined that patients over 65 years of age with knee osteoarthritis (OA) who engage in regular Tai Chi exercise improve physical function and experience less pain. Tai Chi (Chuan) is a traditional style of Chinese martial arts that features slow, rhythmic movements to induce mental relaxation and enhance balance, strength, flexibility, and self-efficacy.

Full findings of the study are published in the November issue of *Arthritis Care & Research*, a journal of the American College of Rheumatology.

The elderly population is at most risk for developing knee OA, which results in pain, functional limitations or disabilities and a reduced quality of life. According to the Centers for Disease Control and Prevention (CDC) there are 4.3 million U.S. adults over age 60 diagnosed with knee OA, a common form of arthritis that causes wearing of joint cartilage. A recent CDC report further explains that half of American adults may develop symptoms of OA in at least one knee by age 85.

For this study, Chenchen Wang, M.D., M.Sc., and colleagues recruited 40 patients from the greater Boston area with confirmed knee OA who were in otherwise good health. The mean age of participants was 65 years with a mean body mass index of 30.0 kg/m2. Patients were randomly selected and 20 were asked to participate in 60-minute Yang style Tai Chi sessions twice weekly for 12 weeks. Each session included: a 10-minute self-massage and a review of Tai Chi principles; 30 minutes of Tai Chi movement; 10 minutes of breathing technique; and 10 minutes of relaxation.

"Tai Chi is a mind-body approach that appears to be an applicable treatment for older adults with knee OA," said Dr. Wang. Physical components of Tai Chi are consistent with current exercise recommendations for OA, which include range of motion, flexibility, muscle conditioning, and aerobic work out. Researchers believe the mental feature of Tai Chi addresses negative effects of chronic pain by promoting psychological wellbeing, life satisfaction, and perceptions of health.

The remaining 20 participants assigned to the control group attended two 60-minute class sessions per week for 12 weeks. Each control session included 40 minutes of instruction covering OA as a disease,

diet and nutrition, therapies to treat OA, or physical and mental health education. The final 20 minutes consisted of stretching exercises involving the upper body, trunk, and lower body, with each stretch being held for 10-15 seconds.

At the end of the 12-week period, patients practicing Tai Chi exhibited a significant decrease in knee pain compared with those in the control group. Using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) pain scale, researchers noted a -118.80 reduction in pain from baseline between the Tai Chi and control group. Researchers also observed improved physical function, self-efficacy, depression, and health status for knee OA in subjects in the Tai Chi group. "Our observations emphasize a need to further evaluate the biologic mechanisms and approaches of Tai Chi to extend its benefits to a broader population," concluded Dr. Wang.

Journal reference:

1. Chenchen Wang, Christopher H. Schmid, Patricia L. Hibberd, Robert Kalish, Ronenn Roubenoff, Ramel Rones, and Timothy McAlindon. **Tai Chi Is Effective in Treating Knee Osteoarthritis: A Randomized Controlled Trial**. *Osteoarthritis and Cartilage*, 2008; 16S32 DOI: 10.1016/S1063-4584(08)60092-8

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

http://www.sciencedaily.com/releases/2009/10/091029102417.htm

Chewing Gum Can Reduce Calorie Intake, Increase Energy Expenditure, Nutritionist Finds

Subjects made two visits to the URI Energy Metabolism Lab after having fasted over night. During one visit, they chewed gum for 20 minutes before consuming a breakfast shake and twice more during the three hours before lunch. During both visits, participants remained as still as possible as measurements were conducted of their resting metabolism rates and blood glucose levels at regular intervals before and after breakfast and lunch. (Credit: Image courtesy of University of Rhode Island)

ScienceDaily (Nov. 1, 2009) — A nutrition professor at the University of Rhode Island studying the effects of chewing sugar-free gum on weight management has found that it can help to reduce calorie intake and increase energy expenditure.

Kathleen Melanson, URI associate professor of nutrition and food sciences, compared gum chewing to non-gum chewing in healthy adult volunteers who came to her lab for two standardized tests in random order. When study subjects chewed gum for a total of one hour in the morning (three 20-minute gum-chewing sessions), they consumed 67 fewer calories at lunch and did not compensate by eating more later in the day. Male participants also reported feeling significantly less hungry after chewing gum. Melanson also found that when her subjects chewed gum before and after eating, they expended about 5 percent more energy than when they did not chew gum. In addition, her subjects reported feeling more energetic after chewing gum.

"Based on these results, gum chewing integrates energy expenditure and energy intake, and that's what energy balance is about," Melanson said. According to the URI researcher, nerves in the muscles of the jaw are stimulated by the motion of chewing and send signals to the appetite section of the brain that is linked to satiety, which may explain why the act of chewing might help to reduce hunger.

Melanson said that she expected that chewing would increase the amount of energy her subjects expended. "However, what makes the energy expenditure data particularly interesting is that this study simulated real-life gum chewing, with the subjects chewing at their own relaxed, natural pace and for realistic time periods," she said.

In her study, 35 male and female subjects made two visits to the URI Energy Metabolism Lab after having fasted over night. During one visit, they chewed gum for 20 minutes before consuming a breakfast shake and twice more during the three hours before lunch. During both visits, participants remained as still as possible as measurements were conducted of their resting metabolism rates and blood glucose levels at regular intervals before and after breakfast and lunch. They also conducted periodic self-assessments of their feelings of hunger, energy and other factors during both visits.

"This was a short term study, so the next step is to do a longer study and to use subjects who need to lose weight," said Melanson. "But based on these initial results, one could hypothesize that gum chewing may be a useful adjunct to a weight management program."

The study was supported by a $25,000 research award from the Wrigley Science Institute that was presented during the 2007 annual meeting of The Obesity Society.

Adapted from materials provided by University of Rhode Island.

http://www.sciencedaily.com/releases/2009/10/091027132245.htm

New Analyses Of Dinosaur Growth May Wipe Out One-third Of Species

Dracorex (upper left) and Stygimoloch (upper right) are not distinct dome-headed dinosaurs, but young and nearly sexually mature, respectively, members of the species Pachycephalosaurus wyomingensis, according to a new study by paleontologists from UC Berkeley and the Museum of the Rockies. (Credit: Holly Woodward/Montana State University)

ScienceDaily (Oct. 31, 2009) — Paleontologists from the University of California, Berkeley, and the Museum of the Rockies have wiped out two species of dome-headed dinosaur, one of them named three years ago -- with great fanfare -- after Hogwarts, the school attended by Harry Potter.

Their demise comes after a three-horned dinosaur, *Torosaurus*, was assigned to the dustbin of history last month at the Society of Vertebrate Paleontology meeting in the United Kingdom, the loss in recent years of quite a few duck-billed hadrosaurs and the probable disappearance of *Nanotyrannus*, a supposedly miniature *Tyrannosaurus rex*.

These dinosaurs were not separate species, as some paleontologists claim, but different growth stages of previously named dinosaurs, according to a new study. The confusion is traced to their bizarre head ornaments, ranging from shields and domes to horns and spikes, which changed dramatically with age and sexual maturity, making the heads of youngsters look very different from those of adults.

"Juveniles and adults of these dinosaurs look very, very different from adults, and literally may resemble a different species," said dinosaur expert Mark B. Goodwin, assistant director of UC Berkeley's Museum of Paleontology. "But some scientists are confusing morphological differences at different growth stages with characteristics that are taxonomically important. The result is an inflated number of dinosaurs in the late Cretaceous."

Goodwin and John "Jack" Horner of the Museum of the Rockies at Montana State University in Bozeman, are the authors of a new paper analyzing North American dome-headed dinosaurs that appeared this week in the public access online journal *PLoS One*.

Unlike the original dinosaur die-off at the end of the Cretaceous period 65 million years ago, this loss of species is the result of a sustained effort by paleontologists to collect a full range of dinosaur fossils -- not just the big ones. Their work has provided dinosaur specimens of various ages, allowing computed tomography (CT) scans and tissue study of the growth stages of dinosaurs.

In fact, Horner suggests that one-third of all named dinosaur species may never have existed, but are merely different stages in the growth of other known dinosaurs.

"What we are seeing in the Hell Creek Formation in Montana suggests that we may be overextended by a third," Horner said, a "wild guess" that may hold true for the various horned dinosaurs recently discovered in Asia from the Cretaceous. "A lot of the dinosaurs that have been named recently fall into that category."

The new paper, published online Oct. 27, contains a thorough analysis of three of the four named dome-headed dinosaurs from North America, including *Pachycephalosaurus wyomingensis*, the first "thick-headed" dinosaur discovered. After that dinosaur's description in 1943, many speculated that male pachycephalosaurs used their bowling ball-like domes to head-butt one another like big-horn sheep, though Goodwin and Horner disproved that notion in 2004 after a thorough study of the tissue structure of the dome.

Many paleontologists now realize that the elaborate head ornaments of dinosaurs, from the huge bony shield and three horns of *Triceratops* to the coxcomb-like head gear of some hadrosaurs, were not for combat, but served the same purpose as feathers in birds: to distinguish between species and indicate sexual maturity.

"Dinosaurs, like birds and many mammals, retain neoteny, that is, they retain their juvenile characteristics for a long period of growth," Horner said, "which is a strong indicator that they were very social animals, grouping in flocks or herds with long periods of parental care."

These head ornaments, which probably had horny coverings of keratin that may have been brightly-colored as they are in many birds, started growing when these dinosaurs reached about half their adult size, and were remodeled as these dinosaurs matured, continuing to change shape even into adulthood and old age, according to the researchers.

In the new paper, Horner and Goodwin compared the bone structures of *Pachycephalosaurus* with that of a domeheaded dinosaur, *Stygimoloch spinifer*, discovered in Montana by UC Berkeley paleontologists in 1973, and a dragon-like skull discovered in South Dakota and named in 2006 as a new species, *Dracorex hogwartsia*.

With the help of CT scans and microscopic analysis of slices through the bones of *Pachycephalosaurus* and *Stygimoloch*, the team concluded that *Stygimoloch*, with its high, narrow dome, growing tissue and unfused skull bones, was probably a pachycephalosaur subadult, in a stage just before sexual maturity.

Dracorex is one of a kind, and thus unavailable for dissection, but morphological analysis indicates it is a juvenile that hasn't yet formed a dome, although the top of its skull shows thickening suggestive of an emerging dome.

"*Dracorex*'s flat skull, nodules on the front end and small spikes on back, and thickened but undomed frontoparietal bone all confirm that, ontogenetically, it is a juvenile *Pachycephalosaurus*," Goodwin said.

Comparison of these skulls to other fossils in the hands of private collectors confirm the conclusions, they said. In all, they looked at 21 dome-headed dinosaur skulls and cranial elements from North America.

The key to this analysis, Horner said, was years of field work in Montana by his team and Goodwin's in search of fossils of all sizes.

"We have gone out in the Hell Creek Formation for 11 years doing nothing but collecting absolutely everything we could find, which is the kind of collecting that is required," he said. "If you think about

Triceratops, people had collected for 100 years and still hadn't found any juveniles. And we went out and spent 11 years collecting everything, and we found all kinds of them."

"Early paleontologists recognized the distinction between adults and juveniles, but people have lost track of looking at ontogeny -- how the individual develops -- when they discover a new fossil," Goodwin said. "Dinosaurs are not mammals, and they don't grow like mammals."

In fact, the so-called metaplastic bone on the heads of horned dinosaurs grows and dissolves, or resorbs, throughout life like no other bone, Horner said, and is reminiscent of the growth and loss of horns today in elk and deer. In earlier studies, Horner and Goodwin found dramatic remodeling of metaplastic bone in *Triceratops*, which led to their subsequent focus on dome-headed dinosaurs.

"Metaplastic bones get long and shorten, as in *Triceratops*, where the horn orientation is backwards in juveniles and forward in adults," Horner said. Even in older specimens, such as the fossil previously named *Torosaurus*, bone in the face shield resorbs to create holes along the margin. John Scannella, Horner's student at Montana State, presented a paper reclassifying *Torosaurus* as an old *Triceratops* at the Society for Vertebrate Paleontology meeting in Bristol, U.K., on Sept. 25.

"In order for that huge amount of bone to move, there has to be a lot of deposition and resorption," Horner said.

Horner and Goodwin continue to search for dinosaur fossils in the Hell Creek Formation, which is rich in *Triceratops*, dome-headed dinosaurs, hadrosaurs and tyrannosaurs. Analysis of growth stages in these taxa will have implications for other horned dinosaurs that are being uncovered in Asia and elsewhere.

"There are other horned dinosaurs I think may be over split," that is, split into too many new species rather than being lumped together as one species, Goodwin said.

The work was supported by grants from the UC Museum of Paleontology and the Museum of the Rockies.

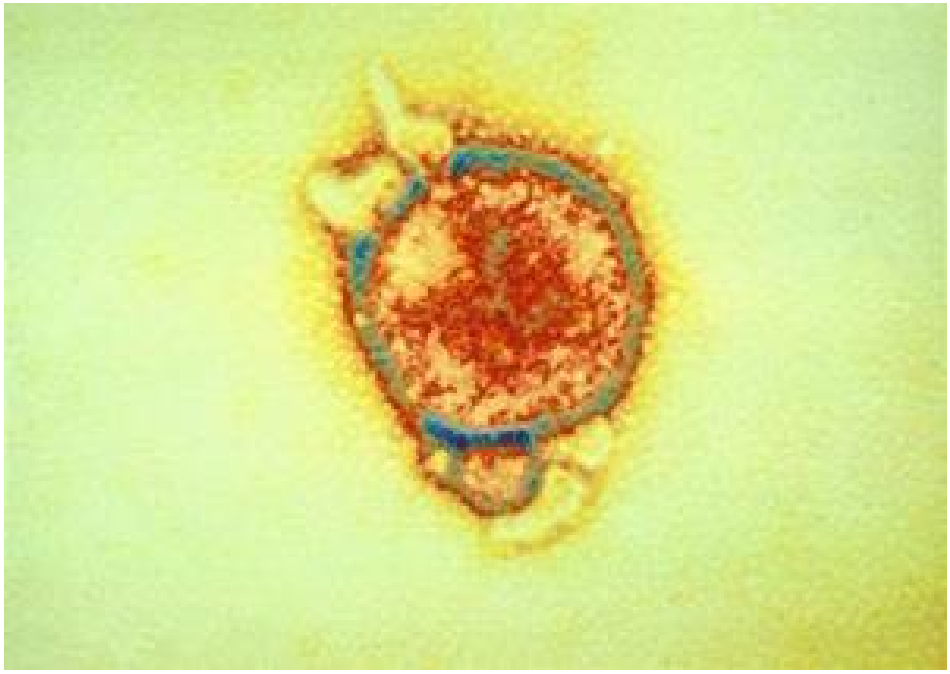
Journal reference:

1. John R. Horner, Mark B. Goodwin. **Extreme Cranial Ontogeny in the Upper Cretaceous Dinosaur Pachycephalosaurus**. *PLoS ONE*, 2009; DOI: 10.1371/journal.pone.0007626

Adapted from materials provided by University of California - Berkeley.

http://www.sciencedaily.com/releases/2009/10/091031002314.htm

Major Advance In Human Antibody Therapy Against Deadly Nipah Virus



This is an artificially colored transmission electron micrograph of Hendra virus. (Credit: AAHL Australian Biosecurity Microscopy Facility)

ScienceDaily (Oct. 31, 2009) — A collaborative research team from the Uniformed Services University of the Health Sciences (USU), Australian Animal Health Laboratory and National Cancer Institute, a component of the National Institutes of Health, reports a major step forward in the development of an effective therapy against two deadly viruses, Nipah virus and the related Hendra virus.

Nipah and Hendra viruses are found in Pteropid fruit bats (flying foxes) and are characterized by their recent emergence as agents capable of causing illness and death in domestic animals and humans.

In experiments carried out in ferrets at the Australian Animal Health Laboratory in Geelong, Victoria, Australia, where there is a high-level safety and security facility for working with live Nipah and Hendra viruses, the team of researchers demonstrated that giving an anti-virus human monoclonal antibody therapy after exposure to Nipah virus protected the animals from disease.

"These findings are extremely encouraging and clearly suggest the potential that a treatment for Hendra virus infection in a similar manner should be possible, given the very strong cross-reactive activity this antibody has against Hendra virus," said Deborah Middleton, D.V.M., Ph.D., who directed the animal experiments at the Australian Animal Health Laboratory.

Recent earlier work at the National Cancer Institute and USU resulted in the discovery and development of a human monoclonal antibody, m102.4, which could attack a critical component of both the Nipah and Hendra viruses. Antibodies -- proteins found in blood or other bodily fluids of vertebrates -- are used by the immune system to identify and neutralize viruses and bacteria.

The study's corresponding authors are Christopher C. Broder, Ph.D., professor of microbiology at USU, and Katharine Bossart, Ph.D., a USU alumna, now an assistant professor in the Department of Microbiology, Boston University School of Medicine and an investigator at the National Emerging Infectious Diseases Laboratories Institute in Boston. The pair led a team of researchers to test the effectiveness of the new antibody therapy in animals. The experiments were supported in part by the

National Institute of Allergy and Infectious Diseases, NIH. The Henry M. Jackson Foundation for the Advancement of Military Medicine, Inc. provides research support and management capabilities to the research team.

"We now have good evidence that this antibody could save human lives and the insights offered about how it works also could potentially provide a starting point to developing tools for targeting other diseases," said study co-author Dimiter S. Dimitrov, Ph.D., senior biomedical research scientist at the National Cancer Institute.

Nipah and Hendra viruses, members of the henipavirus family, are highly infectious agents that emerged from flying foxes in the 1990s to cause serious disease outbreaks in humans and livestock in Australia, Bangladesh, India, Malaysia and Singapore. Recent outbreaks have resulted in acute respiratory distress syndrome and encephalitis, person-to-person transmission, and up to 75 percent case fatality rates among humans. Additionally, these properties could allow the viruses to be used as bioterror weapons.

Initial experiments by the researchers using ferrets found that m102.4 was well tolerated, exhibited no adverse effects and retained high neutralizing activity. The findings suggested that m102.4 could potentially be used as a preventive or post-exposure agent, a diagnostic probe or a research reagent.

Hendra virus re-emerged again in August 2009, resulting in the death of several horses and one human. During the outbreak, in a compassionate attempt to save a human life, an available low dose of m102.4 was administered to an individual with advanced encephalitic disease. Although there were no adverse side effects, the patient did not improve as the irreversible damage by the virus had already been done. Like other antimicrobials, the clinical success of this antibody will depend on dose and time of administration. As Hendra and Nipah viruses cause severe disease in humans, a successful application of this antibody as a post-exposure therapy will likely require early intervention.

"In order to make clinical use of this therapeutic antibody against Hendra or Nipah virus, larger amounts will need to be prepared under proper manufacturing guidelines, carefully evaluated again in animal models and safety tested for human use" said Dr. Broder.

Dr. Bossart noted, "We hope this demonstration of anti-viral activity will foster some immediate activities to facilitate further development for future use in humans."

"There are currently no licensed and approved vaccines or therapeutics for prevention and treatment of disease caused by these viruses for humans or livestock," said Dr. Broder. "This fully-human monoclonal antibody is the first antiviral agent against the Nipah and Hendra viruses that has a genuine potential for human therapeutic use."

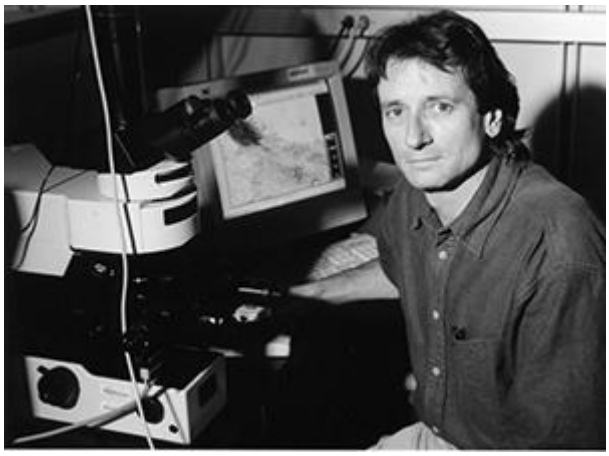
"The generation of these antibodies as therapeutics could help control outbreaks in geographical regions susceptible to henipaviruses, and could turn information from a deadly pathogen into a benefit for mankind," said Dr. Dimitrov.

Journal reference:

1. Bossart et al. **A Neutralizing Human Monoclonal Antibody Protects against Lethal Disease in a New Ferret Model of Acute Nipah Virus Infection**. *PLoS Pathogens*, 2009; 5 (10): e1000642 DOI: 10.1371/journal.ppat.1000642

Adapted from materials provided by Henry M. Jackson Foundation for the Advancement of Military Medicine, via EurekAlert!, a service of AAAS.
http://www.sciencedaily.com/releases/2009/10/091030125048.htm

Regeneration Can Be Achieved After Chronic Spinal Cord Injury



Mark Tuszynski, MD, PhD. (Credit: Image courtesy of University of California - San Diego)

ScienceDaily (Oct. 31, 2009) — Scientists at the University of California, San Diego School of Medicine report that regeneration of central nervous system axons can be achieved in rats even when treatment delayed is more than a year after the original spinal cord injury.

"The good news is that when axons have been cut due to spinal cord injury, they can be coaxed to regenerate if a combination of treatments is applied," said lead author Mark Tuszynski, MD, PhD, professor of neurosciences and director of the Center for Neural Repair at UC San Diego, and neurologist at the Veterans Affairs San Diego Health System. "The chronically injured axon is not dead."

While there are more than 10,000 new spinal cord injuries annually in the United States, nearly 250,000 patients are living in the chronic stages of injury. Yet nearly all previous spinal cord injury studies have attempted to stimulate regeneration when treatment is begun almost immediately after injury -- because, in part, scientists considered it very difficult to achieve regeneration at such long time points after injury. None had shown successful regeneration in the late, chronic stages.

Reporting in the October 29 issue of the Cell Press journal *Neuron*, the UC San Diego team demonstrated successful regeneration of adult spinal cord axons into, and then beyond, an injury site in the cervical spinal cord, the middle region of the neck. Treatment was begun at time periods ranging from six weeks to as long as 15 months after the original injury in rats.

A number of mechanisms create formidable barriers to regeneration of injured axons in chronic spinal cord injury. These include scar formation at the injury site, a partial deficiency in the intrinsic growth capacity of adult neurons, the presence of inhibitors to growth, and, sometimes, extensive inflammation. Chronically injured neurons show a loss of expression of regeneration-promoting genes, and there is progressive degeneration of spinal cord white matter beyond lesion sites -- all contributing to a poor environment for axonal re-growth.

Even under ideal laboratory circumstances, axonal re-growth is complex, requiring a combination of three things: a cellular bridge in the lesion site; a nervous system growth factor to guide axons to the correct target; and a stimulus to the injured neuron that turns on regeneration genes. Using this combinatorial treatment, the research team achieved axonal bridging beyond the original lesion site in rats when treatment was delayed for up to 15 months after the original spinal cord injury. Animals lacking the full combination treatment did not exhibit axonal regrowth.

The scientists also conducted genetic studies to measure how broad sets of genes in cells can be activated when treatment is delayed after injury. They discovered that, despite considerable delays, most genes

could still be turned on to support regeneration, indicating that a chronically injured cell can still be "primed" to grow.

The studies were done in sensory systems that relay the sense of touch from the body to the brain. In ongoing studies, the scientists are testing these approaches for regenerating axons that control movement in chronically injured rats.

"Our findings indicate that there is potential for promoting repair of the injured spinal cord even in chronic stages of injury," said Tuszynski. "While the regenerating axons grow for relatively short distances, even this degree of growth could be useful. For example, restoration of nerve function even one level below an injury in the neck might improve movement of a wrist or hand, providing greater quality of life or independence."

Contributors to the study include first authors Ken Kadoya and Shingo Tsukada, UCSD Department of Neurosciences; Paul Lu, UCSD Neurosciences and Veterans Affairs Medical Center, San Diego; Giovanni Coppola and Dan Geschwind, UCLA Department of Neurology; Marie Filbin, Hunter College, NY; and Armin Blesch, UCSD Department of Neurosciences. The study was funded by the National Institutes of Health, the Veterans Administration, the Dr. Miriam and Sheldon G. Adelson Medical Research Foundation, and the Bernard and Anne Spitzer Charitable Trust.

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

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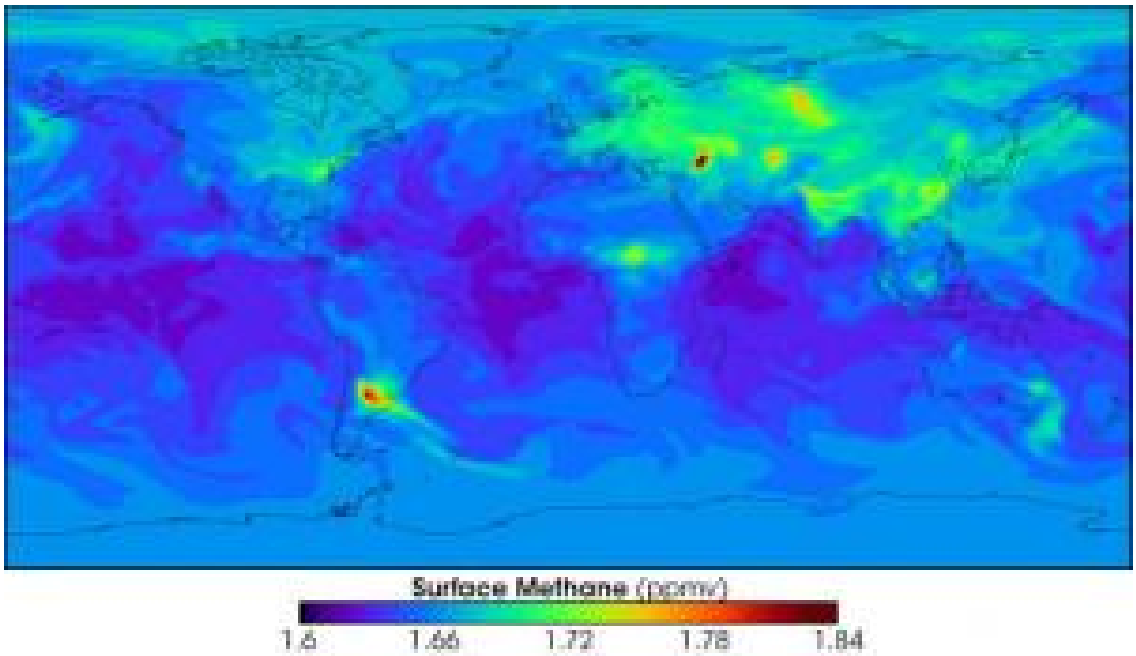
Interactions With Aerosols Boost Warming Potential Of Some Gases



This map shows the distribution of methane at the surface. New research shows that methane has an elevated warming effect due to its interactions with other substances in the atmosphere. (Credit: NASA/Goddard)

ScienceDaily (Oct. 31, 2009) — For decades, climate scientists have worked to identify and measure key substances -- notably greenhouse gases and aerosol particles -- that affect Earth's climate. And they've been aided by ever more sophisticated computer models that make estimating the relative impact of each type of pollutant more reliable.

Yet the complexity of nature -- and the models used to quantify it -- continues to serve up surprises. The most recent? Certain gases that cause warming are so closely linked with the production of aerosols that the emissions of one type of pollutant can indirectly affect the quantity of the other. And for two key gases that cause warming, these so-called "gas-aerosol interactions" can amplify their impact.

"We've known for years that methane and carbon monoxide have a warming effect," said Drew Shindell, a climate scientist at the NASA Goddard Institute for Space Studies (GISS) in New York and lead author of a study published this week in *Science*. "But our new findings suggest these gases have a significantly more powerful warming impact than previously thought."

Mixing a Chemical Soup

When vehicles, factories, landfills, and livestock emit methane and carbon monoxide into the atmosphere, they are doing more than just increasing their atmospheric concentrations. The release of these gases also have indirect effects on a variety of other atmospheric constituents, including reducing the production of particles called aerosols that can influence both the climate and the air quality. These two gases, as well as others, are part of a complicated cascade of chemical reactions that features competition with aerosols for highly reactive molecules that cleanse the air of pollutants.

Aerosols can have either a warming or cooling effect, depending on their composition, but the two aerosol types that Shindell modeled -- sulfates and nitrates -- scatter incoming light and affect clouds in

ways that cool Earth. They are also related to the formation of acid rain and can cause respiratory distress and other health problems for those who breathe them.

Human activity is a major source of sulfate aerosols, but smokestacks don't emit sulfate particles directly. Rather, coal power production and other industrial processes release sulfur dioxide -- the same gas that billows from volcanoes -- that later reacts with atmospheric molecules called hydroxyl radicals to produce sulfates as a byproduct. Hydroxyl is so reactive scientists consider it an atmospheric "detergent" or "scrubber" because it cleanses the atmosphere of many types of pollution.

In the chemical soup of the lower atmosphere, however, sulfur dioxide isn't the only substance interacting with hydroxyl. Similar reactions influence the creation of nitrate aerosols. And hydroxyls drive long chains of reactions involving other common gases, including ozone.

Methane and carbon monoxide use up hydroxyl that would otherwise produce sulfate, thereby reducing the concentration of sulfate aerosols. It's a seemingly minor change, but it makes a difference to the climate. "More methane means less hydroxyl, less sulfate, and more warming," Shindell explained.

His team's modeling experiment, one of the first to rigorously quantify the impact of gas-aerosol interactions on both climate and air quality, showed that increases in global methane emissions have caused a 26 percent decrease in hydroxyl and an 11 percent decrease in the number concentration of sulfate particles. Reducing sulfate unmasks methane's warming by 20 to 40 percent over current estimates, but also helps reduce negative health effects from sulfate aerosols.

In comparison, the model calculated that global carbon monoxide emissions have caused a 13 percent reduction in hydroxyl and 9 percent reduction in sulfate aerosols.

Nitrogen oxides -- pollutants produced largely by power plants, trucks, and cars -- led to overall cooling when their effects on aerosol particles are included, said Nadine Unger, another coauthor on the paper and a climate scientist at GISS. That's noteworthy because nitrogen oxides have primarily been associated with ozone formation and warming in the past.

A New Approach

To determine the climate impact of particular greenhouse gases, scientists have traditionally relied on surface stations and satellites to measure the concentration of each gas in the air. Then, they have extrapolated such measurements to arrive at a global estimate.

The drawback to that "abundance-based approach," explained Gavin Schmidt, another GISS climate scientist and coauthor of the study, is that it doesn't account for the constant interactions that occur between various atmospheric constituents. Nor is it easy to parse out whether pollutants have human or natural origins.

"You get a much more accurate picture of how human emissions are impacting the climate -- and how policy makers might effectively counteract climate change -- if you look at what's emitted at the surface rather than what ends up in the atmosphere," said Shindell, who used this "emissions-based" approach as the groundwork for this modeling project.

However, the abundance-based approach serves as the foundation of key international climate treaties, such as the Kyoto Protocol or the carbon dioxide cap-and-trade plans being discussed among policymakers. Such treaties underestimate the contributions of methane and carbon monoxide to global warming, Shindell said.

Unpacking the Implications

According to Shindell, the new findings underscore the importance of devising multi-pronged strategies to address climate change rather than focusing exclusively on carbon dioxide. "Our calculations suggest that all the non-carbon dioxide greenhouse gases together have a net impact that rivals the warming caused by carbon dioxide."

In particular, the study reinforces the idea that proposals to reduce methane may be an easier place for policy makers to start climate change agreements. "Since we already know how to capture methane from animals, landfills, and sewage treatment plants at fairly low cost, targeting methane makes sense," said Michael MacCracken, chief scientist for the Climate Institute in Washington, D.C.

This research also provides regulators insight into how certain pollution mitigation strategies might simultaneously affect climate and air quality. Reductions of carbon monoxide, for example, would have positive effects for both climate and the public's health, while reducing nitrogen oxide could have a positive impact on health but a negative impact on the climate.

"The bottom line is that the chemistry of the atmosphere can get hideously complicated," said Schmidt. "Sorting out what affects climate and what affects air quality isn't simple, but we're making progress."

Adapted from materials provided by NASA/Goddard Space Flight Center.

http://www.sciencedaily.com/releases/2009/10/091030100020.htm

Opening Up A Colorful Cosmic Jewel Box

The FORS1 instrument on the ESO Very Large Telescope (VLT) at ESO's Paranal Observatory was used to take this exquisitely sharp close up view of the colorful Jewel Box cluster, NGC 4755. The telescope's huge mirror allowed very short exposure times: just 2.6 seconds through a blue filter (B), 1.3 seconds through a yellow/green filter (V) and 1.3 seconds through a red filter (R). The field of view spans about seven arcminutes. (Credit: ESO/Y. Beletsky)

ScienceDaily (Oct. 30, 2009) — Star clusters are among the most visually alluring and astrophysically fascinating objects in the sky. One of the most spectacular nestles deep in the southern skies near the Southern Cross in the constellation of Crux.

The Kappa Crucis Cluster, also known as NGC 4755 or simply the "Jewel Box" is just bright enough to be seen with the unaided eye. It was given its nickname by the English astronomer John Herschel in the 1830s because the striking colour contrasts of its pale blue and orange stars seen through a telescope reminded Herschel of a piece of exotic jewellery.

Open clusters [1] such as NGC 4755 typically contain anything from a few to thousands of stars that are loosely bound together by gravity. Because the stars all formed together from the same cloud of gas and dust their ages and chemical makeup are similar, which makes them ideal laboratories for studying how stars evolve.

The position of the cluster amongst the rich star fields and dust clouds of the southern Milky Way is shown in the very wide field view generated from the Digitized Sky Survey 2 data. This image also includes one of the stars of the Southern Cross as well as part of the huge dark cloud of the Coal Sack [2].

A new image taken with the Wide Field Imager (WFI) on the MPG/ESO 2.2-metre telescope at ESO's La Silla Observatory in Chile shows the cluster and its rich surroundings in all their multicoloured glory. The large field of view of the WFI shows a vast number of stars. Many are located behind the dusty clouds of the Milky Way and therefore appear red [3].

The FORS1 instrument on the ESO Very Large Telescope (VLT) allows a much closer look at the cluster itself. The telescope's huge mirror and exquisite image quality have resulted in a brand-new, very sharp view despite a total exposure time of just 5 seconds. This new image is one of the best ever taken of this cluster from the ground.

The Jewel Box may be visually colourful in images taken on Earth, but observing from space allows the NASA/ESA Hubble Space Telescope to capture light of shorter wavelengths than can not be seen by telescopes on the ground. This new Hubble image of the core of the cluster represents the first comprehensive far ultraviolet to near-infrared image of an open galactic cluster. It was created from images taken through seven filters, allowing viewers to see details never seen before. It was taken near the end of the long life of the Wide Field Planetary Camera 2 — Hubble's workhorse camera up until the recent Servicing Mission, when it was removed and brought back to Earth. Several very bright, pale blue supergiant stars, a solitary ruby-red supergiant and a variety of other brilliantly coloured stars are visible in the Hubble image, as well as many much fainter ones. The intriguing colours of many of the stars result from their differing intensities at different ultraviolet wavelengths.

The huge variety in brightness of the stars in the cluster exists because the brighter stars are 15 to 20 times the mass of the Sun, while the dimmest stars in the Hubble image are less than half the mass of the Sun. More massive stars shine much more brilliantly. They also age faster and make the transition to giant stars much more quickly than their faint, less-massive siblings.

The Jewel Box cluster is about 6400 light-years away and is approximately 16 million years old.

Notes

[1] Open, or galactic, star clusters are not to be confused with globular clusters — huge balls of tens of thousands of ancient stars in orbit around our galaxy and others. It seems that most stars, including our Sun, formed in open clusters.

[2] The Coal Sack is a dark nebula in the Southern Hemisphere, near the Southern Cross, that can be seen with the unaided eye. A dark nebula is not the complete absence of light, but an interstellar cloud of thick dust that obscures most background light in the visible.

[3] If the light from a distant star passes through dust clouds in space the blue light is scattered and absorbed more than the red. As a result the starlight looks redder when it arrives on Earth. The same effect creates the glorious red colours of terrestrial sunsets.

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

http://www.sciencedaily.com/releases/2009/10/091029102425.htm

Battery Of The Future: New Storage Material Improves Energy Density Of Lithium-ion Battery

Stefan Koller. Researchers at the Institute for Chemistry and Technology of Materials have developed a new method that utilises silicon for lithium-ion batteries. Its storage capacity is ten times higher than the graphite substrate which has been used up to now, and promises considerable improvements for users. (Credit: Copyright TU Graz/Lunghammer)

ScienceDaily (Oct. 30, 2009) — High-performance energy storage technologies for the automotive industry or mobile phone batteries and notebooks providing long battery times -- these visions of the future are being brought one step nearer by scientists from Graz University of Technology.

Researchers at the Institute for Chemistry and Technology of Materials have developed a new method that utilises silicon for lithium-ion batteries. Its storage capacity is ten times higher than the graphite substrate which has been used up to now, and promises considerable improvements for users.

The new findings -- which came to light in the "NanoPoliBat" EU project -- have been recently submitted to the patent office by researchers together with their co-operation partner Varta Microbattery.

Modern electronic devices need more energy and even the automotive industry is hankering after increasingly powerful energy storage systems. The technological development of battery research has been inadequate for some time now. "A real revolution is needed for the development of the next generation. We need new storage materials for lithium-ion batteries," explains battery researcher Stefan Koller, who is familiar with the topic from his doctoral thesis. Together with colleagues from science and industry, he has managed to develop such a substrate material for electrochemical reactions at a low price.

Silicon gel on graphite

In the newly developed process, researchers utilise a silicon-containing gel and apply it to the graphite substrate material. "In this way the graphite works as a buffer, cushioning the big changes in volume of the silicon during the uptake and transfer of lithium ions," explains Koller.

Silicon has a lithium-ion storage capacity some ten times higher than the up-to-now commercially used graphite. The new material can thus store more than double the quantity of lithium ions without changes to the battery lifetime.This method is far cheaper than the previous ones in which silicon is separated in the gas phase. The challenge lies in the poor storage density of materials in the counter electrode in the whole battery, something which we have been doing intensive research on," says Koller.

Adapted from materials provided by TU Graz.

http://www.sciencedaily.com/releases/2009/10/091029160532.htm

Making Health Care Better

By DAVID LEONHARDT

I.

During one of our first conversations, Brent James told me a story that you wouldn't necessarily expect to hear from a doctor. For most of human history, James explained, doctors have done more harm than good. Their treatments consisted of inducing vomiting or diarrhea and, most common of all, bleeding their patients. James, who is the chief quality officer at Intermountain Healthcare, a network of hospitals and clinics in Utah and Idaho that President Obama and others have described as a model for health reform, then rattled off a list of history books that told the fuller story. Sure enough, these books recount that from the time of Hippocrates into the 19th century, medicine made scant progress. "The amount of death and disease would be less," Jacob Bigelow, a prominent doctor, said in 1835, "if all disease were left to itself."

Yet patients continued to go to doctors, and many continued to put great in faith in medicine. They did so in part because they had no good alternative and in part because, as James put it, they wanted a spiritual counselor with whom they could talk about their health. But there was something else, too. There was a strong intuitive logic behind those old treatments; they seemed to be ridding the body of its ills. They made a lot more sense on their face than the abstract theories about germs and viruses that began to appear in the late 19th century.

So the victory of those theories would require a struggle. The doctors and scientists who tried to overturn centuries of intuitive wisdom were often met with scorn. Hippocrates himself wrote that a physician's judgment mattered more than any external measurement, and the practice of medicine was long organized accordingly.

In the end, of course, the theories about germs and viruses won out. They had the advantage of being correct, and doctors — haltingly and skeptically, but eventually — embraced them. "Medicine adopted the scientific method," James said as we were sitting in his Salt Lake City office, which looks out onto the Utah State Capitol Building and the Wasatch Mountains. "It transformed medicine, and it's easy to make the case." Diphtheria, mumps, measles and polio were conquered, and pneumonia and heart attacks became far less deadly. In 1910, life expectancy at birth in the United States was less than 50 years, and it had not risen much for centuries, James noted. Life expectancy today is 78 years.

But there is one important way in which medicine never quite adopted the scientific method. The explosion of medical research over the last century has produced a dizzying number of treatments for different ailments. For someone with heart disease, there is bypass surgery, stenting or simply drugs and behavior changes. For a man with early-stage prostate cancer, there is surgery, radiation, proton-beam therapy or so-called watchful waiting. To enter mainstream use, any such treatment typically needs to clear a high bar. It will be subject to randomized trials, statistical-significance tests, the peer-review process of academic journals and the scrutiny of government regulators. Yet once a treatment enters the mainstream — once we know whether it works in certain situations — science is largely left behind. The

next questions — when to use it and on which patients — become matters of judgment, not measurement. The decision is, once again, left to a doctor's informed intuition.

"There are some real advantages to that," James says, "and in some ways there are some real disadvantages too." The human mind can sometimes do a better job of piecing together amorphous bits of information — diagnosing a disease, for example — than even the most powerful computer. On the other hand, human beings can also be unduly influenced by just a few experiences, like the treatment of an especially memorable patient. As a result, different doctors frequently end up coming up with different answers to the same question. Cardiologists in Davenport, Iowa, are quick to insert stents; cardiologists in Iowa City and Sioux City are not. They can't both be right. Some people with heart disease are getting the best treatment, and some are not. The same is true of debilitating back pain, various cancers and even pregnancy.

The health care debate of 2009 has had so many moving parts that it has sometimes seemed impossible to follow. The crisis behind the debate, though, is about one thing above all: the scattershot nature of American medicine. The fee-for-service payment system — combined with our own instincts as patients — encourages ever more testing and treatments. We're not sure which ones make a difference, but we keep on getting them, and costs keep rising. Millions of people cannot afford insurance as a result. Millions more have had their incomes pinched by rising insurance premiums. Medicare is on a long-term path to insolvency. The American health care system is vastly more expensive than any other country's, but our results are not vastly better.

Any bill that Congress passes this year is unlikely to fix these problems. The lobbying groups for drug companies, device makers, insurers, doctors and hospitals have succeeded, so far, in keeping big, systemic changes out of the bills. And yet the modern history of medicine — the story that James tells — nonetheless offers reason for optimism. Medicine has changed before, after all. When it did, government policy played a role. But much of the impetus came from inside the profession. Doctors helped change other doctors.

For the past decade or so, a loose group of reformers has been trying to do precisely this. They have been trying to figure out how to improve health care while also holding down the growth in costs. The group includes Dr. John Wennberg and his protégés at Dartmouth, whose research about geographic variation in care has received a lot of attention lately, as well as Dr. Mark McClellan, who ran Medicare in the Bush administration, and Dr. Donald Berwick, a Boston pediatrician who has become a leading advocate for patient safety. These reformers tend to be an optimistic bunch. It's probably a necessary trait for anyone trying to overturn an entrenched status quo. When I have asked them whether they have any hope that medicine will change, they have tended to say yes. When I have asked them whether anybody has already begun to succeed, they have tended to mention the same name: Brent James.

II.

ON A RECENT Wednesday morning, about 25 students gathered in a conference room in downtown Salt Lake City. The students were doctors and hospital executives who came to Utah to be taught by James. His four-month course is called the Advanced Training Program, and it is a combination of statistical methods and management theory applied to the practice of medicine. "I've wanted to go for years," Janet Porter, the chief operating officer of the Dana-Farber Cancer Institute in Boston, told me later. For anybody interested in improving the quality of health care, she said, the program is the equivalent of Harvard.

At the front of the room stood James, a 58-year-old surgeon by training who speaks with the clipped accent of an Idaho native and likes to make his points by telling stories. On more than one occasion, including this one, I watched him pour himself a Diet Coke and then leave it untouched as he jumped from one illustrative tale to another. On this morning, he was telling the class the story of Intermountain Healthcare.

In the late 1980s, a pulmonologist at Intermountain named Alan Morris received a research grant to study whether a new approach to ventilator care could help treat a condition called acute respiratory distress syndrome. The condition, which is known as ARDS, kills thousands of Americans each year, many of them young men. (It can be a complication of swine flu.) As Morris thought about the research, he became concerned that the trial might be undermined by the fact that doctors would set ventilators at different levels for similar patients. He knew that he himself sometimes did so. Given all the things that the pulmonologists were trying to manage, it seemed they just could not set the ventilator consistently. Working with James, Morris began to write a protocol for treating ARDS. Some of the recommendations were based on solid evidence. Many were educated guesses. The final document ran to 50 pages and was

left at the patients' bedsides in loose-leaf binders. Morris's colleagues were naturally wary of it. "I thought there wasn't anybody better in the world at twiddling the knobs than I was," Jim Orme, a critical-care doctor, told me later, "so I was skeptical that any protocol generated by a group of people could do better." Morris helped overcome this skepticism in part by inviting his colleagues to depart from the protocol whenever they wanted. He was merely giving them a set of defaults, which, he emphasized, were for the sake of a research trial.

The crucial thing about the protocol was that it reduced the variation in what the doctors did. That, in turn, allowed Morris and James to isolate the aspects of treatment that made a difference. There was no way to do that when the doctors were treating patients in dozens of different ways. James has a provocative way of describing his method to doctors: "Guys, it's more important that you do it the same way than what you think is the right way."

While the pulmonologists were working off of the protocol, Intermountain's computerized records system was tracking patient outcomes. A pulmonology team met each week to talk about the outcomes and to rewrite the protocol when it seemed to be wrong. In the first few months, the team made dozens of changes. Just as the pulmonologists predicted, the initial protocol was deeply flawed. But it seemed to be successful anyway. One widely circulated national study overseen by doctors at Massachusetts General Hospital had found an ARDS survival rate of about 10 percent. For those in Intermountain's study, the rate was 40 percent.

All along, Morris has been reluctant to give the protocol credit for the increase. As he explained to me, Intermountain's trial differed from the earlier study in any number of ways. Still, his once-skeptical colleagues were impressed. Orme said that the gap in survival was eye-opening for him and others. James was thrilled not only by the results but also by the fact that the doctors managed to put together such a complex set of clinical guidelines.

In the years since the ARDS study, one Intermountain department after another has embarked on a similar project. By now, the hospital has gone through the exercise for 50 clinical conditions, accounting for more than half of Intermountain's patients. For each, a committee made up of doctors, nurses and administrators has tried to identify variation and then figure out which treatments have not been working. The committee members are drawn from Intermountain's network of 23 hospitals and dozens of clinics in Utah and Idaho. These doctors and nurses can then spread the gospel of the protocol, and their words are far more influential than any printed document. Whenever possible, the guidelines are also embedded in the hospital's computer system. Doctors and nurses are presented with a default choice — how much of a given drug to prescribe, for example — and have the option of overriding it. Most important, the electronic records system allows both committees and doctors to track patient outcomes. Doctors with consistently poor results can expect to be pulled aside for a collegial conversation with a supervisor about what they might be doing wrong. Doctors with the best results can expect to be asked what they are doing right. Doctors in many areas are also eligible for bonuses of up to about $2,500 a year if their outcomes are good.

Tracking outcomes and adjusting care, however, is rarely easy or clear-cut. Among many other things, the committees have to decide how to balance Intermountain's internal evidence with published studies that are both more scientific and potentially less relevant. By any definition, the exercise depends on human judgment. At one primary-care meeting I attended, Dr. Scott Lindley said he had heard complaints from doctors who thought the committee made a mistake by setting the goal for hemoglobin A1c levels — a common measure of blood sugar in diabetes patients — at 8. If an obese person came in at 13 and the medical team reduced the level to 9, wasn't that a success? An 8 might be too ambitious a benchmark, Lindley said. "Some literature shows 9 is better," he noted.

In response, Dr. Michael Visick, another committee member, pointed out that nobody was being punished for having patients with hemoglobin levels above 8. Doctors were simply asked to take a second look at those patients. And the only reason the committee set a benchmark was that data had shown the percentage of patients with a level above 8 was rising, Visick said. That was a sign that Intermountain's diabetes care might be slipping. Lindley seemed to accept the explanation. Still, he added with a tone of mild sarcasm that he was sure his colleagues would "just go away happy" when he conveyed the explanation to them.

James's answer to such skepticism — and there is a lot of it, especially beyond Intermountain — is to show results. Intermountain has reduced the number of preterm deliveries, as well as the number of babies who must spend time in the neonatal-intensive-care unit. So-called adverse drug events, which include overdoses and allergic reactions, were cut in half in the mid-1990s. A protocol for dealing with

one broad category of pneumonia cut its mortality rate by 40 percent over several years. The death rate for coronary-bypass surgery was cut to 1.5 percent, from the national average of about 3 percent. Medicare data on heart-failure and pneumonia patients show that Intermountain has significantly lower-than-average readmission rates. In all, James estimates that the changes have saved thousands of lives a year across Intermountain's network. Outside experts consider that estimate to be fair.

Wennberg, the Dartmouth researcher, argues that Intermountain is fundamentally different from other oft-cited models of high-quality, lower-cost care, like the Mayo Clinic and the Cleveland Clinic. These places, including Intermountain, share certain traits, like having a large number of doctors who receive fixed salaries rather than being paid piecemeal for each treatment. Partly as a result, these hospitals do fewer tests, treatments and operations than other hospitals and still get excellent results. What sets Intermountain apart, Wennberg says, is that it is also making a rigorous effort to analyze and improve bedside care.

"It's the best model in the country of how you can actually change health care," Wennberg told me. I heard nearly the same argument from Anthony Staines, a health scholar and hospital regulator in Switzerland who recently completed a study of some of the world's most-admired hospitals. "Intermountain was really the only system where there was evidence of improvement in a majority of departments," Staines said.

Among James's biggest points of pride is his growing, if still small, group of imitators. Thirty-five hospitals have set up in-house versions of his course, usually run by one of his former students. "Everybody is trying to systemically improve value and quality," says Dr. John Mendelsohn, the president of the University of Texas M.D. Anderson Cancer Center in Houston, which started its course in 2005. "But at Intermountain they have worked out the operational system and the culture to do it." Based on the success of the Anderson program, the University of Texas has required all the other branches of its medical system to start their own courses.

Viewed across the entire health care system, however, the pace of change is extremely slow. The journal Health Affairs will soon publish a survey of the chairmen of more than 700 hospitals. Its main message is that many hospitals are not even aware of what they do well and what they don't. The physicians who conducted the survey, Ashish Jha and Arnold Epstein, gave the chairmen a list of issues — including financial performance, organizational strategy and the quality of health care — and asked them to name their board's two top priorities. Roughly half did not name the quality of care. Yet the chairmen said they believed that the care at their hospitals was above average. Even at those hospitals that Medicare data suggest are among the worst in the country, 58 percent of the chairmen said they thought their hospital was above average. Not a single one said the hospital was below average.

"Brent is the future," says Lucian Leape, a professor of public health at Harvard and a former surgeon. "But how long are you willing to wait? It may take 100 years."

III.

WHEN JAMES WAS growing up on a cattle ranch in Blackfoot, Idaho, as the oldest son in a family of six children, he spent a fair amount of time on a tractor. Sometimes he would have nothing to do but wait for a ditch to fill up with water. So he brought along a calculus textbook. "I'm one of the relatively rare subset of people that finds math fun," James said. "Just thinking about it was fun. It's how my brain is wired." He liked the elegance of mathematics, and he also liked that it could describe the workings of the world. Numbers could tell stories. Like many number lovers who don't want to do pure, abstract math, James decided to be an academic physicist. He enrolled at the University of Utah and spent his time there working on high-energy physics and the relatively new field of computer science.

"One day, we're in the lab and we're working away, and we had a postdoc there," James recalled. "We had a little conversation, and he said I was an idiot for going to into physics." The postdoc explained that there was "a line 200 people long for any university faculty position." After checking around, James decided that the postdoc was right, and he began looking for another field that offered both fascinating research questions and decent career prospects. Medicine seemed as if it might be the answer. He applied to the University of Utah's medical school and was accepted

James enjoyed treating patients more than he expected, and he became a cancer surgeon. But research remained his main interest. After his residency, he did a fellowship at the National Cancer Institute, outside Washington, and then took a job at the American College of Surgeons, helping to oversee its cancer research. One of his projects involved studying variation in how oncologists determined cancer stages and then treated patients.

Eventually he joined the faculty at the Harvard School of Public Health. While in Boston, he and his wife divorced, which made him want to be closer to his family out West. Salt Lake City was especially appealing because James is an observant Mormon. In 1986, he was hired by Intermountain as the director of medical research and continuing medical education. At the time, Intermountain was one of the few medical systems with electronic patient records.

The job gave James his first real chance to put his research into practice. He was no longer working where so many other reformers do, in an academic department or government agency. He was working for a hospital. But being in the real world also created a problem for him. He could not simply tell Intermountain's doctors what to do, no matter how much research he brought to bear. Doctors have a degree of professional autonomy that is probably unmatched outside academia. And that is how we like it. We think of our doctors as wise men and women who can combine knowledge and instinct to land on just the right treatment. Our fictional doctor heroes, from Marcus Welby to House, are iconoclasts who don't go by the book. They rely on intuition, and intuition is indeed a powerful thing, be it in medicine or other parts of life.

Everyone has had the experience of being able to read someone's face or voice — to know his or her mood — without knowing how. Then there are the stories of firefighters who have rushed out of a burning building shortly before it collapses. Gary Klein, a cognitive psychologist and researcher, collects examples like these, and one of the most powerful involves a paramedic who, at a family gathering, told her father-in-law that he needed to go the hospital. He said he felt fine. She prevailed on him. The next day, he was undergoing heart-bypass surgery. Like the firefighters and the face readers, the paramedic could not explain her reasoning. She did not know how she knew what she knew. When she was interviewed later, she said that she must have been tipped off by the kind of paleness and swelling that she had seen dozens of times before.

Stories like this one are deeply appealing. They allow us to feel that we are tuned into the mysterious logic of life. Indeed, in many ways we are. The human mind can store huge amounts of knowledge. Intuition is not simply belief; it springs from this knowledge. A doctor making an intuitive diagnosis is doing so on the basis of thousands of hours spent treating patients. The problem, however, is that the mind is not particularly good at sorting through this knowledge and weighing different parts appropriately. We give too much weight to information that confirms our suspicions or that is highly memorable.

Behavioral researchers have come to believe that there is a clear pattern to when intuition works and when it doesn't. "Intuitive diagnosis is reliable when people have a lot of relevant feedback," says Daniel Kahneman, a Nobel laureate in economics who recently collaborated on a project about intuition with Klein. People need a great deal of experience, and the feedback from these experiences — whether a treatment is working, say — needs to come quickly and to be clear. "But," Kahneman adds, "people are very often willing to make intuitive diagnoses even when they're very likely to be wrong." When doctors have been asked to estimate the likelihood of a treatment succeeding based on experience, for example, they give wildly divergent answers. Medicine is full of such examples.

James is a voracious consumer of social science, and he likes to frame these issues with opposing concepts: pattern matching and rate estimation. Pattern matching refers to intuition at its best. It is what people can do in those few areas in which they have had vast experience and clear feedback. Rate estimation is a task that people usually do not perform well but that happens to make up a great deal of modern medicine. "When a person says, 'In my experience,' what's actually happening is you're being dominated by one or two recent cases that you can recall or by some distant case that was either particularly good or particularly bad," James says. "My first goal for Intermountain is that anytime a physician or nurse says, 'In my experience' when they're talking to a patient, they mean, 'In my measured experience.' "

IV.

TWO YEARS AGO, Jerome Groopman, the Harvard doctor and New Yorker writer, published a book called "How Doctors Think." It would seem in many ways to be the kind of book that James and the other medical reformers would love. Groopman tells a series of stories about misdiagnosis and uses academic research, including Kahneman's, to explain how intuition could lead doctors astray. But Groopman comes to a very different conclusion than the reformers do. In the book and his subsequent writings, he lays out the central challenge to what might be called the Intermountain way.

He argues that evidence-based medicine is useful in only a limited number of run-of-the-mill situations, like distinguishing between strep throat and a simple sore throat. "Human beings are not uniform in their

biology," wrote Groopman and Pamela Hartzband, a Harvard endocrinologist (and Groopman's wife), in a Wall Street Journal op-ed article criticizing the Obama administration's plans to tie Medicare payments to so-called quality metrics. "A disease with many effects on multiple organs, like diabetes, acts differently in different people." Groopman and Hartzband mentioned a handful of studies in which protocols had led to outcomes that were no better, or even worse, than what doctors had previously been doing. A couple of the studies dealt with the regulation of blood sugar in diabetics, the same issue that came up in the primary-care meeting I attended at Intermountain.

To Groopman, a fundamental problem with "systems analysis," as he calls it, is that it discourages doctors from considering a wide-enough array of possible treatments. He also worries that if doctors are judged based on how well they follow a protocol, they may follow it even when they are correctly skeptical of it. Groopman says that the proper solution to misdiagnosis instead lies with individual doctors. If they are taught the ways in which their instincts can lead them astray, and if they reflect on their previous mistakes, they can avoid some of the pitfalls of intuition. They can become more self-aware.

This debate between intuition and empiricism is as old as Plato, who thought that knowledge came from intuitive reasoning, and Aristotle, who preferred observation. The argument has seemed especially intense lately, as one field after another has struggled to define the role of human judgment in a data-saturated society. The police officials in New York City who overhauled crime fighting were classic empiricists. The debate over education reform revolves around how well teachers can be measured and what the consequences of those measurements should be. These disagreements can sometimes be exaggerated, because everyone agrees that intuition and empiricism both have a role to play. But the fight over how to balance the two is a real one.

I asked James one day whether he had read Groopman's criticisms, and he said yes. "Groopman's right at one level," James said. "You cannot write a protocol that perfectly fits any patient. Humans that come to us for care are just too variable." James likes to say that the trained, expert mind of a physician is the most valuable resource in medicine. He adds that he is simply trying to focus that resource on the problems where it is most needed: those for which data does not have an answer.

But James then pulled out a graph that was sitting on his desk. It showed a steep fall in mortality after Intermountain put in place a heart-failure protocol. Among other things, doctors now automatically receive a beta-blocker prescription to sign, or not, as part of a patient's discharge process. The changes appear to save about 450 lives a year. Graphs like that one, he said, are the reason he believes in evidence-based medicine. It must be done right — with hospitals monitoring outcomes at every step, quickly sharing that data with doctors and altering the guidelines as necessary — and James acknowledges it isn't always done right. He is not defending protocols per se. He is defending measurement. "Don't argue philosophy," he told me. "Show me your mortality rates, and then I'll believe you."

Groopman declined to be interviewed for this article, but after talking with medical researchers and social scientists, I think there is a way to make sense of Groopman's and James's dueling narratives. The researchers say that Groopman is right to highlight examples of human judgment being just as good as data. There are many of them. Still, the overall record of decision-making approaches that are based mostly on intuition is far weaker than the record of decisions based mostly on data. To give just one example, an article in the journal Psychological Assessment, analyzing dozens of studies that compared clinical judgments with data-based diagnoses, found that clinical judgments were better in only a few instances. The two approaches were equally accurate about half of the time, but the data-based diagnoses substantially outperformed human judgment in nearly half of the studies. And with data collection becoming ever cheaper, Kahneman says that the number of occasions in which an intuitive approach beats a systemic one is getting smaller all the time.

American medicine, then, appears to have it backward. Yes, it is possible to rely too heavily on numbers and patterns when treating patients. But the bigger risk — the one we are now taking — is relying too heavily on intuition. "There is too much evidence — good evidence — that the care many patients receive isn't up to snuff," says Dr. Alan Garber of Stanford University.

Perhaps the clearest example is the Pronovost checklist. As many as 28,000 people in this country die each year from infections that come from intravenous lines. Several years ago, Peter Pronovost, a Johns Hopkins physician, developed a simple list of five steps that intensive-care doctors should take before inserting an IV line, in order to prevent the introduction of bacteria. The checklist reduced the infection rate to essentially zero at 108 hospitals in Michigan where it was adopted. Pronovost published the results

in The New England Journal of Medicine in 2006. But most intensive-care doctors are still not using the checklist. To insert an IV line, they continue to rely on their own judgment.

V.

THE COMMITTEES that James sets up to study variation in treatment do not disband after they have written their initial protocols. They meet monthly to tweak those protocols, set clinical goals and track patient outcomes. The statistics the committees examine reach down to the level of the individual doctors. Last summer, the members of the labor-and-delivery committee noticed some worrisome signs about an obstetrician at an Intermountain hospital outside Salt Lake City. His births were taking unusually long on average, and a relatively large number of them were Caesarian sections. So Ware Branch, the head of the labor-and-delivery committee, a fit obstetrician in his 50s, sent the doctor a letter asking him to think about what might be causing the trends. One item on the committee's September agenda was talking about the doctor's response.

Sitting at the head of a long conference table, Branch started the discussion by inviting the other members to predict what the doctor had said. "What do we know the first issue is?" Branch asked.

A few called out, "The data's wrong!"

This is the classic response when doctors (and many other people) are confronted with numbers indicating they could be doing their job better. Doctors often say that their outcomes look worse because their patients are sicker. In this case, the obstetrician suggested that Intermountain's numbers were just not right. Branch and his colleagues were confident of their statistics, and they thought this might be what Janie Wilson, the lead nurse on the committee, called "a little growth opportunity."

The labor-and-delivery committee was formed in 1998, and its main success since then has been reducing the number of elective inductions — births that are induced without a medical reason. Elective inductions can be convenient for doctors and expectant families and can spare mothers some of the discomfort of the final weeks of pregnancy. But since 1999, the American College of Obstetricians and Gynecologists has recommended that, for the sake of the baby's health, no elective inductions be done before the 39th week of pregnancy. The dating of pregnancy is sufficiently uncertain that what is thought to be the 38th week may really be the 36th week, and a baby born in the 36th week is more likely to have underdeveloped lungs or other problems. Early elective inductions also lead to longer labors and more C-sections.

Despite the recommendation, though, about 30 percent of elective inductions at Intermountain in 2001 were done before 39 weeks, roughly what the national share was. That year Intermountain adopted a protocol urging doctors to avoid most early inductions, and only then did the rate begin to fall. One hospital in southwest Utah has gone so far as to allow nurses to refuse a doctor's early-induction orders unless the medical director has given permission. By 2004, the share of elective inductions done before the 39th week at Intermountain fell to 5 percent, and it is now less than 2 percent. The number of newborns with respiratory problems has also dropped.

At the September meeting, Branch distributed his own response to the obstetrician's response. It was a breezy letter full of doctor bonhomie, and it profusely thanked the obstetrician for taking the time to respond in writing. "You are perfectly right to question the data," Branch wrote. "We have been found incorrect in numerous cases." But for all its politeness, Branch's letter was also pointed. With it, he attached a list of every elective induction the obstetrician had done recently and invited him to identify any that had been incorrectly classified. Branch also enclosed statistical profiles of other, similarly busy obstetricians. They performed fewer C-sections and had shorter delivery times. The letter's final section included the following:

"Lastly, quality improvement is a process, not an event. In part it works by finding variation and drawing attention to it, as has happened with you and others in this effort. And well-done quality improvement is not punitive; it's educational. It is also worth noting that those docs determined not to learn never do."

VI.

THERE IS, OF COURSE, an alternative to Intermountain's focus on doctors. Instead of creating committees charged with ensuring the best possible medical care, a hospital could turn over that responsibility to patients. Some parts of the grass-roots medical-reform movement are already trying to make this happen.

Academic research has suggested that when doctors share hard information about the risks and benefits of different treatment options, it can affect patients' decisions. Patients tend to choose less-aggressive treatments but still end up with similar outcomes and are more satisfied with their care. Intermountain is one of the hospitals starting to experiment with such "shared decision" models. Dartmouth's Hitchcock

Medical Center is the pioneer. The availability of medical information on the Internet encourages these approaches.

In the end, though, it is not clear how many decisions most patients really want to make. For the past several years, Medicare has published data on the Web comparing hospitals on various measures, like infection rates and surgical-complication rates. Patients have largely ignored it. (Do you know which hospitals to avoid where you live? I didn't before writing this article.) President Obama, when discussing his own health care in an interview earlier this year with this magazine, made a similar point. "I'm a pretty well educated layperson when it comes to medical care; I know how to ask good questions of my doctor," he said. "But ultimately, he's the guy with the medical degree."

James's strategy acknowledges this reality. He tries to win over doctors with a combination of flattery, deference and, finally, evidence. "We never name names," he told me. He admitted that Intermountain was probably too soft on doctors who evidence suggested were not giving their patients the best possible care. Intermountain rarely forces a doctor to leave.

This approach obviously involves some realpolitik. Since his fellow doctors have so much clinical autonomy, James has little choice but to woo them. As Robert Wachter, the chief of hospital medicine at the University of California, San Francisco, and an expert on medical errors, told me, "He knows that the minute he says, 'I'm right, and you must do this,' he loses everybody but the true believers." James is appealing to the same idealistic side of doctors — the flame, he calls it — that helped persuade their predecessors to adopt scientific methods a century ago.

"That flame burns brightly within the heart of any physician," he told his students during one recent class. "It's what brought us into medicine. That's what defines us as a profession. And that's your real leverage point. There are a few outliers, but don't let those outliers get you off track."

It would be a mistake, however, to see the deferential approach as solely political. James also frequently notes that many medical questions still have no data-proven answer. Many never will. When patients have conflicting symptoms, statistics and protocols won't always help. Sometimes, intuition is the only good tool a doctor has.

VII.

ONE DAY, WHILE I was standing in Intermountain's cardiology intensive-care unit, which, unlike those in many other hospitals, is next to the cardiac-surgery wing, it occurred to me that Intermountain really was not so unusual. It is unusual for a health care organization. But its story is fairly typical in the rest of the economy.

The executives at a company realize that their industry has built up all kinds of bad practices over the years. Those practices damage the quality of their product and waste money. The executives do a rigorous analysis of their operations, relying on solid information rather than conventional wisdom. And then they persuade their colleagues to make changes. Much of the lingo of management theory — "quality," "lean," "Six Sigma" — is simply a dressed-up way of describing this approach.

James peppers his classes with anecdotes about W. Edwards Deming, arguably the original quality guru, and it is easy to see why Deming would be attractive to James. Deming grew up on a farm in Iowa in the early 20th century and majored in electrical engineering at the University of Wyoming. During World War II, he was part of a committee that helped the government make wartime production more efficient. After the war, his statistical methods caught on in Japan, and the Japanese credit him with helping to make their postwar boom possible. The so-called Toyota way stems from Deming's work. Eventually, the same ideas caught on at General Electric, Intel, Wal-Mart and elsewhere in this country.

But there is a fundamental difference between Toyota and Intermountain. As Toyota built better cars than its competition for less money, it won new customers. Some rivals matched its successes (as Honda did); some lost market share (as Detroit did). No such dynamic exists in health care. William Lewis, a former director of the McKinsey Global Institute who studies productivity, says that the economic benefits from the various quality movements have been quite large but that they are also largely in the past. Most industries have incorporated Deming's big ideas and are now making only incremental progress.

"However, there is one big exception," Lewis adds. "You guessed it: health care."

Why? In part, it is the faith that patients have in their doctors. When people are buying a car, they often consult Consumer Reports or Road & Track. When they are choosing a place to have surgery, they ask their doctor to recommend a surgeon and go to the hospital where that surgeon works. Hospitals that provide less than top-quality care are rarely punished in the way that General Motors and Ford have been.

Even more important than how we choose our health care, though, is how we pay for it. One of Deming's principles is that improving quality also tends to reduce costs. That is not always the case in health care;

expensive treatments — implantable cardiac defibrillators, for instance — can bring enormous benefits. But Deming's principle holds more often than you might think. When in doubt about the best procedure, doctors tend to do more — more tests, more procedures, more surgery. So if a hospital does a rigorous analysis of what actually works, it is likely to discover a fair amount of waste.

But in our current health care system, there is no virtuous cycle of innovation, success and expansion. When Intermountain standardized lung care for premature babies, it not only cut the number who went on a ventilator by more than 75 percent; it also reduced costs by hundreds of thousands of dollars a year. Perversely, Intermountain's revenues were reduced by even more. Altogether, Intermountain lost $329,000. Thanks to the fee-for-service system, the hospital had been making money off substandard care. And by improving care — by reducing the number of babies on ventilators — it lost money. As James tartly said, "We got screwed pretty badly on that." The story is not all that unusual at Intermountain, either. That is why a hospital cannot do as Toyota did and squeeze its rivals by offering better, less-expensive care.

For all of its focus on efficiency, Intermountain, too, can be tempted by the dark side of the fee-for-service system. In one committee meeting, I listened to a debate about how much the hospital should charge patients for a certain medical device. Intermountain previously had negotiated a price reduction from the manufacturer that saved thousands of dollars on each device. But the hospital was still charging patients the old price, and the insurers, including Medicare, were still paying. That was what their reimbursement charts said they would pay.

A few people in the meeting were clearly bothered by this. They asked the finance executive, participating by speakerphone, if anything could be done. One committee member argued that Intermountain (which is nonprofit) should not overcharge for a treatment, even if it helped the hospital cover its overall expenses. The finance executive replied, apologetically, that changing the reimbursement rate would cost Intermountain millions of dollars and that there did not seem to be any way to make up for the loss. The meeting then moved on to another topic.

VIII.

IF YOU SIMPLY looked at Intermountain's overall results — the good outcomes and low costs — you might be tempted to dismiss them as a product of the environment. Utah has the youngest population of any state, as well one of the lowest rates of alcohol and tobacco use. More than half of the state's residents are Mormons. This homogeneity creates a noticeable sense of community, even a sense of mission, among many Intermountain doctors and nurses.

The places that spend far more on medical care and get worse results — south Texas, south Florida, New York City and its suburbs — don't have those advantages. They tend to have more diverse populations and a more diverse set of medical needs. None of these places is ever likely to reduce its costs, or raise its life expectancy, to Utah's levels.

But once you acknowledge all this, you are still left with some fairly striking facts. There is nothing inherently Mormon about waiting until the 39th week to deliver a baby. Nor is there something unique to Utah that allows doctors there to analyze their results and systematically try to improve them. There is no reason, really, that a hospital anywhere else cannot do the same. Maybe more hospitals will begin to do so on their own, pushed by the same internal forces that remade medicine a century ago. But maybe not. The economic incentives in health care are still pointing in the other direction. As long as doctors and hospitals are paid for each extra test and treatment, they will err on the side of more care and not always better care. No doctor or no single hospital can change that. It requires action by the government.

One big remaining uncertainty about health reform — assuming some version of it passes — is how much it will do on this front. Earlier this year, James and doctors from Dartmouth, the Mayo Clinic and the Geisinger Health System in Pennsylvania traveled to Washington to talk about health reform with a small group of Obama administration officials. It was part of a continuing effort by the evidence-based crowd to influence reform in Congress. At one point during the meeting, the doctors began to talk about a potential pilot program that would make it easier for hospitals to improve care and hold down costs. Ezekiel Emanuel, an oncologist and budget-office official (and brother of Rahm, the White House chief of staff) who has spent much of the past year trying to get such programs included in the bill, asked how much this one would cost to set up. The doctors estimated $250 million over five years. The White House officials laughed. It was a much smaller sum than they usually discussed.

Several pilot programs with similar aims have made it into some of the health-reform bills considered by Congress. One is a bundling program, in which Medicare would pay hospitals a set fee for certain operations or chronic illnesses, rather than paying piecemeal for every aspect of the treatment. Hospitals

would then have an incentive to avoid complications and readmissions, because they would no longer be automatically reimbursed for them. The hospitals that did the best job of keeping their patients healthy would end up helping their bottom lines. The details are still being fleshed out, but Medicare or private hospital groups would most likely monitor outcomes to make sure the incentives didn't lead hospitals to skimp on care or turn away the sickest patients.

These pilot programs have been largely overlooked in the public discussion of health reform, because they start small. At first, they would be voluntary. Places like Intermountain would presumably sign up for them, and high-cost hospitals would not. But the Obama administration is hoping to make the pilot programs national — and mandatory — if they are successful. In that case, the program would suddenly not be so small. It would begin to attack medicine's most upside-down incentives.

Other such ideas also have a chance to be a part of health reform. One is the so-called Cadillac tax on the most expensive health-insurance plans. It would put pressure on insurers to hold down costs, which would increase their incentive to steer patients to hospitals like Intermountain. Another idea would aim to make the market for health care more like the market for new cars. Pushed by Senator Ron Wyden, the Oregon Democrat, the proposal would encourage employers to let their workers choose from a much wider range of insurance plans, which would allow people to shop around for those that provided good, cost-effective care.

James and his allies have no illusion that any of these ideas is a silver bullet. But given the scale of Medicare's long-term budget shortfall, the only sensible strategy is to try anything that seems promising. At the top of that list is moving medicine away from the fee-for-service system and toward something like a fee-for-health system. As dispiriting as the health care debate has been at times, Congress still has a chance to pass a bill that would begin to make life easier on the hospitals trying to do the right thing and, eventually, nudge many more hospitals into that category. That would be no small thing.

Some doctors will resist the change. But the bet that James is making is that most will not. We may still want our doctor to be like Marcus Welby, but our great fortune is that he cannot be. Medicine has made too much progress. The range of cures and treatments is too vast. Every year, medical journals publish hundreds of new findings that doctors are supposed to synthesize. Yet somehow, both doctors and patients have come to imagine that a physician can accomplish far more than any human being reasonably can. As a result, modern medicine is accomplishing far less than it reasonably should.

James told me that one of his first challenges, when talking to a new group of doctors, is to persuade them he is not accusing them of failure. You can think of this as yet another part of his charm offensive, but there is something to it. Most doctors want to do the best possible job for their patients. Most also do not have the ability to do so right now. "We're still not nearly as good as we're going to be," James says.

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http://www.nytimes.com/2009/11/08/magazine/08Healthcare-t.html?_r=1&th&emc=th

Can Modern Dance Be Preserved?
By ARTHUR LUBOW

On July 27, the day after the choreographer Merce Cunningham died, there was an open house at the West Village studio in which his dance company has operated since 1971. A little before 6 p.m., some 40 current and former dancers, in warm-up clothes or street garb, drifted onto the wooden floor. As a pianist picked out strains of Bach, Robert Swinston, a longtime Cunningham dancer who was also the choreographer's assistant, held an abbreviated class in Cunningham technique. In recent years, with the master crippled by rheumatoid arthritis, Swinston or another veteran often led students and company dancers through the steps. But Cunningham would still come to the studio every day; now the company was heading forth with lonely solemnity, like a riderless horse that misses the familiar hand on the reins. In this work space where Cunningham created and rehearsed his dances, the uncanny sense that he continued to watch lingered. At the end of the session, as Swinston pressed his hands together in the Namaste gesture of thanks, the dancers hugged one another, their cheeks streaked with tears.

Increasingly frail during his last weeks, Cunningham died in his apartment in Manhattan's Flatiron district at the age of 90. Although he is generally regarded as a master of modernism, who during a half-century career unchained dance from its reliance on music and charged it inventively with the chaotic overflow and technological buzz of contemporary life, it is by no means certain that his work will survive him. Indeed, until recent years, he himself hardly seemed to care if it would. "It seemed to be that he was not interested in what happened to the work after he was no longer there," says Allan Sperling, a lawyer and a board member of the Merce Cunningham Dance Foundation. "He seemed very present-oriented." While in one sense he was averting his eyes from his mortality, Cunningham was also facing up to the fact that dance is the most fragile of the arts. Happening in the moment, it evaporates after every

rendering. Unlike drama and music, which also unfold in time, dance is not dictated by a written script or score. Although choreographers may sketch out a work for themselves with notes, dance is still taught primarily by one dancer to another, "body to body," as the saying goes, the way the arts were transmitted in ancient cultures. A sculptor's blocks of stone or a painter's pigments are paragons of stability compared to the human clay that the choreographer molds.

Dance's protean resistance to becoming a fixed object — to assuming the status of a reproducible thing — is especially true of Cunningham's genre, modern dance. A tradition that is barely a century old, modern dance was invented at the turn of the last century by women — Isadora Duncan, Loïe Fuller and Ruth St. Denis — who rejected classical ballet because they wanted to dance in a style they maintained was more natural and emotive. That impulse was picked up and run with later in the 20th century by Martha Graham. As Agnes de Mille writes in her biography of Graham: "She never wanted to choreograph, and she made this clear time after time. But since the dancing she wanted to do didn't exist, she was forced to invent it." Cunningham felt the same way. Three decades ago, explaining to the interviewer Jacqueline Lesschaeve why he became a choreographer, he said, "If someone wants to dance and has an idea about dancing that isn't traditional, he has to make the dances himself, otherwise no one else will."

In modern dance, the company typically exists to flesh out the concepts of one artist, who is also, at least at the beginning, the star dancer. In this respect, there's a crucial difference of outlook between a ballet choreographer who provides a piece to a dance company (in much the same way as a composer does for an orchestra) and a modern dancer who treats her ensemble as an extension of herself. Temperamentally and artistically, Cunningham differed about as much as possible from Graham, his fellow titan in the domain of modern dance. For one thing, he was fascinated by fragmentations and dispersals, and she was always seeking grand unity. But in the way he conceived of his enterprise, Cunningham subscribed as fully as Graham to the organic, integral connection of the choreographer and the company.

It was only in the last few years that, with characteristic taciturnity and Delphic ambiguity, Cunningham laid out a plan to separate his company, which after his death could wither away, from his choreography — which is now to be preserved by a Merce Cunningham Trust. By outlining ways in which his dances might be conserved without the dance company for which they were created, Cunningham, prodded by his colleagues, introduced a forward-looking program for modern-dance professionals, who have always focused on the here and now. Cunningham is not the only choreographer whose death this year has raised the issue of posthumous dance preservation. After Pina Bausch, who created the repertory for her own modern-dance company, died suddenly in June at 68, her troupe has continued to perform — and recently a duo of new leaders was announced — but Bausch left no blueprint for how her company and dances could outlive her. "Merce's plan is precedent-setting and will serve if not as a specific model, then as motivation and inspiration for everyone to start dealing with the realities of the situation," says Nancy Umanoff, executive director of the Mark Morris Dance Group — which itself has not yet formulated a legacy plan.

But can Cunningham's scheme really be carried out? Can the dancers and the dances be disentwined? Those whom Cunningham entrusted with his legacy are now groping to work out the Zen koan he left behind.

EVEN WHEN HE WAS lurking upstage left, you couldn't help noticing him. A wonderfully expressive dancer with clearly articulated movements, Cunningham in his youth would make stupendous leaps and continue in stride as if he had merely taken a little hop. "As a dancer his instep and his knees are extraordinarily elastic and quick; his steps, runs, knee bends and leaps are brilliant in lightness and speed," the critic Edwin Denby wrote in 1944. "His torso can turn on its vertical axis with great sensitivity, his shoulders are held lightly free and his head poises intelligently." He had the skill and discipline to do virtually anything his mind demanded of him.

Cunningham was at his core a dancer, living in the present. What he loved about dance was what, by its nature, couldn't persist. In his most famous utterance, he said that dancing "gives you nothing back, no manuscripts to store away, no paintings to show on walls and maybe hang in museums, no poems to be printed and sold, nothing but that single fleeting moment when you feel alive." When I asked Carolyn Brown, a dancer in Cunningham's original company, about the challenges in reviving old work, she emphasized his unique talents. "The problem always in these pieces, in my mind, in which Merce figured prominently is you simply cannot recreate what he did," she said. In her memoir "Chance and Circumstance," Brown describes how, seeing a revival of "Rune," a work from 1959 in which she danced, she was unable to recognize a piece that had been "homogenized into a thin, bland ersatz

mayonnaise" and had lost its rhythms "along with the jagged edges, the explosive energy, the eerie somnambulant quiet." And this was a performance by Cunningham's own company, at a time when the choreographer, even though he was no longer dancing his former roles, was very much alive.
Many of the dancers in his early companies were, like Cunningham himself, legendary for their distinctive and hard-to-replicate talents. Viola Farber had a dissociated quality of being (in Cunningham's description) "like two persons, another just ahead or behind the first." Barbara Lloyd possessed a kittenlike eroticism, and Carolyn Brown danced with a refined, balletic grace. Cunningham incorporated these unique styles as elements of the dances. "Merce never admitted publicly that something he created was done for one dancer or another, but we all knew when we saw Merce and Viola doing a duet that he had made it for her," says Sandra Neels, who began dancing with the company in 1963. "And Carolyn and Merce, too, had some duets that he created just for her."
Like the composer John Cage, who was his life partner as well as professional collaborator, Cunningham championed the use of chance procedures. As a compositional tool he found that throwing dice (or more typically, casting the hexagrams of the I Ching) allowed him to invent new movements that avoided the ruts of his personality. He focused on time and space, having concluded that dance should not depend on a musical accompaniment but needed to live independently. He would rehearse his dancers to rhythms, not music; they would typically hear the music (as well as see the sets) for the first time at the premiere. He wanted to decentralize his compositions, forsaking buildups and climaxes in favor of a democratized space in which every spot on the stage deserved attention. While in the ballet of the 19th century the principal dancers would appear stage center, opposite the royal box, and the corps de ballet would fan out alongside them, in a Cunningham dance, as on a New York street, the protagonists moved without hierarchy. All of these choices made Cunningham coolly "modern," in a way that the neo-primitivist founders of modern dance, like Duncan and Graham, were not. It also made his choreography notoriously tough to dance and confoundedly complex to recreate.
While he tolerated — and later in life, even appeared to enjoy — the revival of old work, Cunningham left the archaeological drudgery to others, limiting his involvement to fine-tuning the final product. "Merce only comes in at the end, if at all," David Vaughan, the company's longtime archivist, told me shortly before Cunningham's death. "He's usually too busy making a new piece." The documentation that Cunningham wrote down was intended for his eyes only, to facilitate the process of creating a dance. In mid-July, Swinston, Cunningham's assistant, showed me photocopied pages of Cunningham's self-styled notations, in which an outer arrow signified the direction of the movement and an inner arrow the facing of the body. The notes also might contain emotional cues. "For this one, he wrote, 'Anger, fury, demonic,' and for this, 'Slow enough to have weight and fast enough to flow,' " Swinston said. Yet Cunningham never shared such verbal cues with his dancers, believing that if he taught the correct movements, the expressive content would follow.
The finished dances and sometimes the rehearsals were videotaped, but more as an archival source for dance historians than as a tool for revivals. "I don't mind keeping up some old pieces, bringing them back, but I'm not very concerned about it," Cunningham, in midcareer, said to Jacqueline Lesschaeve. "It takes a lot of rehearsal to bring a piece back, and for lack of time I have to make the choice between giving rehearsals to old pieces or making new ones. Basically I feel more interested in working on new pieces." The day before he died, he told a former company member that he hoped his energy levels would allow him to bring dancers to his apartment to try out steps in a new piece that he was developing.
he professional preservation of choreography — even in classical ballet — is a very recent undertaking. Not until a new copyright law took effect in 1978 could choreography even be protected explicitly in the United States. Partly, this was a case of the law catching up with technology, because the advent of videotaping allowed dance to be recorded more effectively than was previously possible. As a documentation device, however, videotaping is far from perfect. It alternates between long shots and close-ups, sacrificing either movement detail or spatial organization as it does so. "It's a very useful tool," says Umanoff of the Mark Morris Dance Group. "It's the best we have at the moment."
Considering their options, choreographers generally prefer videotaping to the written systems of dance notation that translate movements into symbols. Even Laban notation, which is the best known, remains an arcane code that has never caught on with choreographers and dancers. "Very few people can write it, and very few people can read it," says Dick Caples, executive director of the Lar Lubovitch Dance Company. "No choreographer I know can do it. They don't trust giving it over to someone and saying, 'I can't check on you, but I am going to trust you to pass on this work to the world.' "

Whatever the drawbacks of using video to recreate choreography, it sufficed to copyright a dance, which could then be licensed. And so the question arose: Was a dance worth money? This was such a novel idea that when George Balanchine, after suffering a heart attack in March 1978, was urged to draw up a will, he replied: "Why do I have to make a will? I don't have anything of value." The greatest ballet choreographer of the 20th century, he had no expectation that his work would outlive him. Barbara Horgan, his longtime assistant, says: "He certainly was ambivalent. He would say on occasion, 'My ballets won't last for 20 years.' It wasn't something that preoccupied his mind."

When he was informed, however, that his dances generated licensing income that in the absence of a will would flow to a brother in the Soviet Union whom he barely knew, Balanchine was persuaded to take action. He drew up a will that distributed the rights. The preservation of the dances was not his motivation. Rather, he was leaving something of value to his heirs — especially to his fourth (and last) wife, Tanaquil Le Clercq, who was crippled by polio at the height of her dancing career. She received the American performing rights to a little more than half of Balanchine's 120 or so documented ballets.

Since Balanchine's death in 1983, the Balanchine Trust has acted as a clearinghouse to license rights and distribute royalties. It also helps companies produce the work, chiefly by sending out a répétiteur, a dance professional who thoroughly knows the piece, to instruct the dancers in the movements — "to set the dance on the company," as choreographers put it. "Let's say the Paris Opera wants to do a ballet," explains Paul Epstein, a lawyer who organized the Balanchine Trust. "Do you sprinkle fairy dust? You've got to find people to teach it, to produce the costumes, to make it work." It's a process that is made smoother by the fact that Balanchine, unlike Cunningham, was a choreographer who created dances for other people. If you wanted to perform his works, all you had to do was pay him; and, like a tailor who lets out a waistline, he obligingly changed his choreography to suit new dancers. "Unlike Merce, he allowed his ballets to be danced everywhere," Horgan says. "Many times he reminded people, 'I make dances, that's how I make a living.' He had to feed all those wives."

Although the Balanchine Trust emanated from a property bequest and not as a mission of artistic preservation, it has served as the estate-planning prototype for choreographers. Horgan became the first director of the trust, and in that pioneering position, she occasionally fielded inquiries from other dance administrators. Around 1990, she got a call from David Vaughan, Cunningham's archivist, who asked if she would pay a visit downtown to discuss estate issues; but Cunningham, when she met with him, "was charming as always, but not interested," she recalls. A couple of years later, however, the company again called to ask her to speak with Cunningham, and by then, things had changed. "John Cage had died," she explains. "Merce was John Cage's heir. I am asked down to see Merce, and now he's really interested."

CAGE WAS THE central person in Cunningham's life — and, except for Merce himself, the most influential figure in the Merce Cunningham Dance Company. A charming extrovert with a restless mind and an optimistic disposition, Cage psychologically and financially supported Cunningham's decision to found his own dance company in 1953. His contribution to the company was multifold. As music director, he composed, commissioned or suggested the scores that accompanied Cunningham's choreography. In the role of impresario, he arranged tours and found sponsoring institutions, usually academic ones, to host the ensemble.

In 1992, Cage suffered a fatal stroke. Grieving the loss and burdened with commitments for the 40th-anniversary season of his company, Cunningham relied on a former assistant of Cage's named Laura Kuhn to help him cope with the aftermath. To manage the estate, especially in responding to requests from scholars and musicians, she traveled to New York from her teaching job in Arizona every couple of weeks, until finally, exhausted, she told Cunningham she couldn't go on. "He said, 'What do you mean?' " she recalls. "I said, 'I need a desk, a bed, a fax machine, a title, a salary.' He said, 'Of course you do.' And he had a lawyer draw up the papers, and the trust was formed the next day." In 1996, Kuhn moved to New York to be the full-time executive director of the John Cage Trust.

As she grew closer to Cunningham, Kuhn prodded him to address the practical problems of his own legacy that he preferred to ignore. Others had tried. Carolyn Brown recalls that the board of the Merce Cunningham Dance Foundation asked her to sound out Cunningham on what he envisioned for his company's future. "I wrote a whole lot of questions to Merce, and he never answered them," Brown says. "Not a one." So she decided to broach it with him directly, over dinner in his apartment. "I asked questions like: 'If there is to be a choreographer, who would it be? Is there someone you would entrust your choreography to? Who should be in charge of the company?' He said, 'I have some ideas about that.' Then we talked about his cat."

Cunningham was far from unusual in avoiding this unpleasant subject, even though an ostrich position, as legend has it of ostriches, invites disaster. Just how badly things can go if the leader disregards the future was starkly illuminated by the catastrophe that befell Martha Graham's company after her death. Graham left everything she owned to her protégé, Ron Protas, whom she had met in the late '60s when he was an aspiring young photographer and she was descending into alcoholic decrepitude. With his support, she pulled herself up again for a final creative period. In her last years, though, she was increasingly remote, and Protas, installed by Graham as the artistic director of the foundation that oversaw the company, ruled as court chamberlain — in the style, his many detractors complained, of Rasputin. Relations between Protas and the dancers deteriorated drastically after Graham's death in 1991, until Protas in May 2000 revoked the company's rights to perform Graham's dances.

Facing artistic asphyxiation, the company battled him in court, until in 2002 a federal appellate court ruled that for the last 35 years of her career, Graham had drawn a salary and choreographed on a work-for-hire basis for the company, which therefore owned the dances. "It saddens me, because her wishes aren't being honored," Protas says. "What's resulted is an ongoing desecration of her legacy." To the modern-dance community, which was accustomed to viewing every tendril of a dance company — the foundation, the dancers, the choreography — as radiating from the artist at the nucleus, the decision was shocking. Yet because of the circumstances of the Graham case, it was not unwelcome. "Our souls were torn," says Dick Caples of the Lar Lubovitch Dance Company. "We all wanted the principle that Ron represented to prevail, that the artist owns the work. But so many people so hated him that it was a case of disliking the messenger." In the aftermath of the decision, single-choreographer companies realized that if the artist was to own his or her dances with certainty, the rights had to be granted formally by the board.

After the Graham fiasco, at Kuhn's urging, the Cunningham dance foundation began registering the copyrights in Cunningham's name. Kuhn also pressed Cunningham to plan for his own legacy. "After we finally finished the Cage estate, which took years, I said to Merce, 'I can't do this again and make it up as we go along,' " she recalls. Although Cunningham never told him so, Sperling, the foundation board member, says he is "absolutely certain" that the shift in the choreographer's attitude toward his own legacy came about through his satisfaction with the Cage trust.

In 2000, Cunningham assigned ownership of his dances to a newly constituted entity, the Merce Cunningham Trust. During his lifetime, Cunningham was the sole trustee. When I first spoke with Kuhn about the trust, Cunningham was still alive and closely guarding the names of the successor trustees. As it turned out, she and Sperling were named, along with two former Cunningham dancers: Swinston, the assistant to the choreographer, and Patricia Lent, who, as director of repertory licensing, negotiates rights and supplies information when other companies want to stage the dances.

efore the trust was created, Kuhn asked Cunningham, "Where are you leaving the work, are you leaving it to the foundation?" To which he replied, "Heavens, no, the foundation is there to support the company, not the work." That distinction, which is clear on paper, blurs in practice — and nowhere more so than in the duties of Lent, who, as an outgrowth of her licensing responsibilities for the foundation, is also helping to edit and funnel data into "dance capsules" that will be available to ensembles that license the pieces in the future. The capsules include Cunningham's notes, the best rehearsal and performance videotapes, input from dancers who have staged revivals, photographs of costumes and sets, music instructions, original program notes and so on.

The more data the better, because even with all available information, a dance changes when it is "set" on a new company. When Cunningham's choreography is licensed, it is almost always to ballet troupes, not modern-dance ensembles, because of the difficulty of the technique. Even if versed in Cunningham technique, however, a ballet dancer does things differently. Jeannie Steele, a former Cunningham dancer who has staged his work with other companies, explains: "One of the things that is difficult about working with a ballet company is that they see something shown to them and they think, I know what that is, it's an arabesque, I recognize the shapes. But it's totally different shifts of weight, totally different rhythms and upper-body contortions." A ballet dancer is usually predisposed to make a gesture pretty. "You say, 'No, it's awkwardness,' " she goes on. "You push them into bigger shapes, you push them out of their comfort zone."

Separately from the trust, the foundation needed to contemplate the future of the dance company. In 2005, Trevor Carlson, who is the executive director, was asked by board members to come up with a long-range plan. Soliciting ideas, he sent out questionnaires to friends of the company and a wide range of others versed in modern dance and modern art. "We began to ask whether our plan of maintaining the company was the most responsible in terms of maintaining the legacy," he says. Without Cunningham there to

create new work, support from foundations and from his wealthy friends could be expected to dwindle. And theater bookings would be harder to obtain, if the programs were entirely revivals with no premieres. "I was thinking quite sentimentally about doing my job to make sure the torch stays lit," Carlson says. He started to analyze the situation more coldbloodedly.

If the company couldn't sustain itself without Cunningham, Carlson concluded it would be more responsible to terminate in a methodical way, with a two-year world tour to give audiences a last chance to see the repertory and a third year to dismantle the organization. Although Cunningham was consulted as they drafted the plan, he did not fully engage. "Merce's review of the plan was very difficult," Carlson told me, a month before Cunningham's death. "Anytime we discussed it, he'd say, 'You're asking me to talk about when I'm not here.' He said out loud and upfront that it was important to take care of the company members. He always said that he wanted the last performances to be in New York." Cunningham proposed that ticket prices for the New York concerts be $10. But otherwise, he kept out of it.

The foundation is currently trying to raise $8 million to finance its last three years. After the foundation disbands, the trust must decide how much of the dance company to salvage, whether to continue classes in the studio, how to employ people to teach the dances to other companies — in short, to review which foundation activities are essential (and financially possible) to retain for the purpose of preserving Cunningham's legacy. Like Carlson, two of the trust members — Sperling and Kuhn — say that Cunningham reluctantly but unequivocally acknowledged that the dance company must be dissolved. I thought I detected a bit of a wiggle, however, when Kuhn told me: "He would never say, 'I don't want the company to go on.' He acted fiscally to say, 'I don't think it's really possible, but if they want to try, bless them.' "

Do they want to try? My sense is that many of the dancers do, and that by selecting two of them — Swinston and Lent — to compose half the membership of the trust, Cunningham left open that option. When I spoke to Swinston, Cunningham was in the studio. "While he's here, we're protected," Swinston said. "Whether he participated in the reconstruction or how much he participated doesn't matter. He's here." Aware that a dance performance depends on the physical characteristics of the dancers, Swinston said: "This is always the danger when a choreographer leaves, that people want it to be just so. I'd like to work with the same flexibility that Merce had. There's an openness there. Dances have to breathe." Of course, when the original choreographer makes those adjustments, they carry a greater authority. "Nobody can replace Merce," Swinston said. "He's special. But if that's the only criterion, we're sunk." Swinston said he was confident that he could keep reviving dances after Cunningham's death, but he didn't know whether he would be given the opportunity. Not many professional companies ask to perform the dances. For one thing, the technique is daunting. "There's plenty of companies that don't want to take on the challenge of a Cunningham dance," Lent admits. "The work's not easy. The work has never been easy." And then there is the music. The 19th-century ballets of Petipa have survived in large part because they are tied to immortal Tchaikovsky scores. Cunningham not only created his dances to stand independently of the music; he also commissioned scores that can be excruciating to listen to, even (or especially) for the dancers onstage. "There are not companies standing in line to get this work, and it's mostly because of the music," Sandra Neels says. "It's a very hard sell."

Despite having finally exited the stage, Cunningham is once more proposing the unprecedented. No modern-dance choreographer has ever implemented a plan that would keep the dances but dissolve the company as a way of preserving his evanescent legacy. When Balanchine bequeathed his ballets to the people he loved, he was disposing of property; the monetary value of the ballets would be determined by how many companies licensed them, but the artistic value of the pieces rested mainly on the collective memory of the performances during his lifetime. When Graham died and risked letting her dances sink in the chasm between her company and her heir, she may have been indirectly declaring that without her, the work could not or should not go on. Any choreographer would be ambivalent: it is painful to consider that a life's work will disappear, but it is also hard to think that it will be diminished by inexact performances, as fuzzy as fourth-generation photocopies. In establishing the trust and endorsing the extinction of the foundation, Cunningham seemed to be creating a structure as intelligent and farsighted as a Cunningham dance. But as any of his dancers will tell you, his steps are fiendishly difficult to carry out.

Arthur Lubow is a contributing writer for the magazine. His last article was about the conductor Valery Gergiev.

http://www.nytimes.com/2009/11/08/magazine/08cunningham-t.html?ref=magazine

Why Doesn't Exercise Lead to Weight Loss?

By Gretchen Reynolds

Sven Hagolani/Getty Images

For some time, researchers have been finding that people who exercise don't necessarily lose weight. A study published online in September in The British Journal of Sports Medicine was the latest to report apparently disappointing slimming results. In the study, 58 obese people completed 12 weeks of supervised aerobic training without changing their diets. The group lost an average of a little more than seven pounds, and many lost barely half that.

How can that be? Exercise, it seems, should make you thin. Activity burns calories. No one doubts that.

"Walking, even at a very easy pace, you'll probably burn three or four calories a minute," beyond what you would use quietly sitting in a chair, said Dan Carey, Ph.D., an assistant professor of exercise physiology at the University of St. Thomas in Minnesota, who studies exercise and metabolism.

But few people, an overwhelming body of research shows, achieve significant weight loss with exercise alone, not without changing their eating habits. A new study from scientists at the University of Colorado School of Medicine in Denver offers some reasons why. For the study, the researchers recruited several groups of people. Some were lean endurance athletes; some sedentary and lean; some sedentary and obese. Each of the subjects agreed to spend, over the course of the experiment, several 24-hour periods in a special laboratory room (a walk-in calorimeter) that measures the number of calories a person burns. Using various calculations, the researchers could also tell whether the calories expended were in the form of fat or carbohydrates, the body's two main fuel sources. Burning more fat than carbohydrates is obviously desirable for weight loss, since the fat being burned comes primarily from body fat stores, and we all, even the leanest among us, have plenty of those.

The Denver researchers were especially interested in how the athletes' bodies would apportion and use calories. It has been well documented that regular endurance training increases the ability of the body to use fat as a fuel during exercise. They wondered, though, if the athletes — or any of the other subjects — would burn extra fat calories after exercising, a phenomenon that some exercisers (and even more diet and fitness books) call "afterburn."

"Many people believe that you rev up" your metabolism after an exercise session "so that you burn additional body fat throughout the day," said Edward Melanson, Ph.D., an associate professor in the division of endocrinology at the School of Medicine and the lead author of the study. If afterburn were found to exist, it would suggest that even if you replaced the calories you used during an exercise session, you should lose weight, without gaining weight — the proverbial free lunch.

Each of Melanson's subjects spent 24 quiet hours in the calorimeter, followed later by another 24 hours that included an hourlong bout of stationary bicycling. The cycling was deliberately performed at a relatively easy intensity (about 55 percent of each person's predetermined aerobic capacity). It is well known physiologically that, while high-intensity exercise demands mostly carbohydrate calories (since carbohydrates can quickly reach the bloodstream and, from there, laboring muscles), low-intensity exercise prompts the body to burn at least some stored fat. All of the subjects ate three meals a day.

To their surprise, the researchers found that none of the groups, including the athletes, experienced "afterburn." They did not use additional body fat on the day when they exercised. In fact, most of the subjects burned slightly less fat over the 24-hour study period when they exercised than when they did not.

"The message of our work is really simple," although not agreeable to hear, Melanson said. "It all comes down to energy balance," or, as you might have guessed, calories in and calories out. People "are only burning 200 or 300 calories" in a typical 30-minute exercise session, Melanson points out. "You replace that with one bottle of Gatorade."

This does not mean that exercise has no impact on body weight, or that you can't calibrate your workouts to maximize the amount of body fat that you burn, if that's your goal.

"If you work out at an easy intensity, you will burn a higher percentage of fat calories" than if you work out a higher intensity, Carey says, so you should draw down some of the padding you've accumulated on the hips or elsewhere — if you don't replace all of the calories afterward. To help those hoping to reduce their body fat, he published formulas in The Journal of Strength and Conditioning Research last month that detailed the heart rates at which a person could maximize fat burning. "Heart rates of between 105 and 134" beats per minute, Carey said, represent the fat-burning zone. "It's probably best to work out near the top of that zone," he says, "so that you burn more calories over all" than at the extremely leisurely lower end.

Perhaps just as important, bear in mind that exercise has benefits beyond weight reduction. In the study of obese people who took up exercise, most became notably healthier, increasing their aerobic capacity, decreasing their blood pressure and resting heart rates, and, the authors write, achieving "an acute exercise-induced increase in positive mood," leading the authors to conclude that, "significant and meaningful health benefits can be achieved even in the presence of lower than expected exercise-induced weight loss."

Finally and thankfully, exercise seems to aid, physiologically, in the battle to keep off body fat once it has been, through resolute calorie reduction, chiseled away. In other work by Melanson's group, published in September, laboratory rats that had been overfed and then slimmed through calorie reduction were able to "defend" their lower weight more effectively if they ran on a treadmill and ate at will than if they had no access to a treadmill. The exercise seemed to reset certain metabolic pathways within the rats, Melanson says, that blunted their body's drive to replace the lost fat. Similar mechanisms, he adds, probably operate within the bodies of humans, providing scientific justification for signing up for that Thanksgiving Day 5K.

http://well.blogs.nytimes.com/2009/11/04/phys-ed-why-doesnt-exercise-lead-to-weight-loss/?ref=magazine

Scheme 'can cut extra emissions'

A new business scheme could slash energy bills and cut carbon emissions by 50% more than anticipated, a study by the Environment Agency will claim.

The report is expected to say that the Carbon Reduction Commitment, a government efficiency scheme, could reduce CO2 emissions by 11.6m tonnes.

This would be the equivalent of taking four million cars off the road.

The study says the government and businesses have more potential to cut energy use than originally estimated.

Main tools

There has been long-standing scheme to force heavy industries to reduce emissions, but the little-known CRC is the government's new attempt to spread the effort more broadly across business and services.

It will cover around 5,000 large organisations including construction, food, manufacturing and local authorities.

The Environment Agency report says hotels, restaurants, shops and government departments have huge potential to cut energy use - even more potential than originally estimated.

The main tools are better management of heating, air conditioning and lighting.

The study quotes the example of Kings College London, which carried out a refurbishment which allowed its buildings to use natural ventilation rather than air conditioning. Window shutters - another important insulation measure - were also added as part of the project.

As a result, the report says, the college is saving around £96,000 per year on its energy bills.

The study also points out that by simply turning lights off in areas that are not being used, businesses could shave 15% off their energy bills.

Under the CRC, organisations will be required to buy CO2 "allowances" for each tonne of CO2 they emit.

The revenue raised from selling allowances will be "recycled" back to participants according to the progress they make in reducing emissions.

Those doing best will get more money back than they put in - and those doing worse will lose out.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8348909.stm

Published: 2009/11/08 00:52:19 GMT

Studies 'overstate species risks'
By Mark Kinver
Science and environment reporter, BBC News

Some large-scale computer simulations may be overestimating the impact of climate change on biodiversity in some regions, researchers have suggested.

They said models that analyse vast areas often failed to take into account local variations, such as topography and microclimates.

Local-scale simulations, which did include these factors, often delivered a more optimistic outlook, they added.

The findings have been published in the journal, Science.

One of the studies cited in the paper looked at the fate of plant species in the Swiss Alps.

"A coarse European-scale model (with 16km by 16km grid cells) predicted a loss of all suitable habitats during the 21st Century," the researchers wrote.

"Whereas a model run using local-scale data (25m by 25m grid cells) predicted (the) persistence of suitable habitats for up to 100% of plant species."

Micro v macro

Co-author Shonil Bhagwat, a senior research fellow at the University of Oxford, UK, said when vegetation was looked at on a smaller scale, scientists saw a different picture.

"For example, smaller plots give data on microclimatic variations, whereas large-scale models predict (uniform) changes throughout the landscape."

Advances in computing power meant that more large-scale datasets were being made available to scientists, Dr Bhagwat explained.

"There is more interest in predicting widespread, large-scale effects," she told BBC News, "that is why coarser-scale models are normally used.

"However, the changes in communities of vegetation occur at a much smaller scale."

In the paper, Dr Bhagwat and co-author Professor Kathy Willis, wrote: "These studies highlight the complexities that we are faced with trying to model and predict the possible consequences of future climate change on biodiversity."

The researchers called for more micro-scale studies to be carried out that complement the overall picture presented by larger models.

However, they added that the overall picture for biodiversity loss was still bleak, especially once the rate of habitat loss and fragmentation was taken into account.

"Predicting the fate of biodiversity in response to climate change combined with habitat fragmentation is a serious undertaking fraught with caveats and complexities," they observed.

For example, Dr Bhagwat explained, the current system of having fixed nature reserves may need to be reconsidered.

"We have 12% of the Earth's land surface covered in protected areas, but climate change is likely to push species out of their home ranges and out of reserves," she added.

"So we need to look beyond reserves and create the conditions that allow the migration of species."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8344969.stm

Published: 2009/11/06 16:25:37 GMT

Gadget problems divide the sexes

Men and women have different approaches to dealing with technology problems, according to a gadget helpline.

The service found that 64% of its male callers and 24% of its female callers had not read the instruction manual before ringing up.

12% of male and 7% of female customers simply needed to plug in or turn on their appliance.

The company, Gadget Helpline, surveyed 75,000 calls received between 25 September and 23 October 2009.

The helpline has 120,000 subscribers in the UK, most of whom are over the age of 35. The average age of helpline staff is 21.

Women spent 32% longer on the phone to their helpers than men - but 66% of the helpline staff preferred speaking to them, the survey found. "There is evidence of a gender divide in technology, although a lot of it comes down to interpretation," Joanna Bawa, chartered psychologist and editor of the Usability News website, told the BBC.

In general terms men treat technology as something to be understood and conquered while women are more motivated by appliances that benefit them, she added.

Sync stress

The helpline's busiest times are Monday mornings and Boxing day, said founder and chief executive Crispin Thomas.

Getting gadgets to communicate with each other was the subject of a large number of requests for help.

"Syncing one gadget with another causes problems," he said. Newly released products also seem to cause teething problems - many of Mr Thomas' customers had difficulty setting up their Blu-Ray players in 2008 when they first became mass market. He does not believe that appliances are becoming more complicated, but thinks that they are expected to do a lot more. "Generally speaking, in a production run, 5% of appliances will contain a manufacturing fault," he added.

"But 15% - 20% get taken back to the shop for return."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/technology/8346810.stm

Published: 2009/11/06 13:14:25 GMT

Tiny tech sparks cell signal find

By Jason Palmer
Science and technology reporter, BBC News

Tiny metal particles have been shown to cause changes to DNA across a cellular barrier - without having to cross it.

The nanometre and micrometre scale particles resulted in an increase of damage to DNA across the barrier via a never-before-seen cell signal process.

Reporting in Nature Nanotechnology, the researchers say the mechanism could be both a risk and an opportunity.

They say the preliminary result is relevant as more medical therapies rely on small-scale particles.

For instance, nanoparticle-based approaches are being considered for use to improve MRI images or direct the delivery of cancer drugs.

However, they concede their model system is far simpler than the human body, where the effects will be harder to unpick.

As yet, the researchers are not even certain of the mechanism by which the signalling molecules cause damage to DNA.

Communication skills

The team studied the effects of particles made from cobalt and chromium, either 30 billionths of a metre or four millionths of a metre across.

These metals are used in implants such as artificial hips or knees.

They grew a thin, artificial membrane from human cells and placed the particles on the membrane. Beneath it, they placed fibroblast cells, which in the body help to form connective tissue.

Although the team showed that the particles had not crossed the membrane, the fibroblast cells beneath were shown to have about 10 times as many damage sites in their DNA than the case in which no particles were used.

Gevdeep Bhabra, lead author on the research from the Bristol Implant Research Centre, explained that cells in close contact are known to exhibit cell-to-cell communication through structures known as gap junctions and hemichannels.

"We used a variety of chemicals to block this cell-to-cell signalling and found that in the presence of these blockers, the damage we were seeing was completely prevented," he said.

The team stressed that the concentrations of the particles were thousands of times higher than would be found in the human body, for instance from wear and tear on implants.

As a result, there is no reason to believe that implants pose a risk via the signalling mechanism.

However, its discovery suggests that there is much work to be done to establish if the mechanism that appears to be responsible for the DNA damage is limited to those materials, or can occur in the presence of other materials of a similar size.

That issue is of particular importance as more therapeutic and imaging approaches begin to make use of nano-scale materials.

Ashley Blom, head of orthopaedic surgery at the University of Bristol, explained that although the signalling could pose a future risk, once understood it could be put to good therapeutic use.

"If the barriers in the human body do work in this way, the first exciting thing is: can we deliver novel therapies across barriers without having to cross them?

"For example, if you have a condition that affects the brain, maybe we could treat you with something that doesn't cross the blood-brain barrier, that does not come in contact with the brain."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8344815.stm

Published: 2009/11/05 18:10:16 GMT

Babies 'cry in mother's tongue'

German researchers say babies begin to pick up the nuances of their parents' accents while still in the womb.

The researchers studied the cries of 60 healthy babies born to families speaking French and German.

The French newborns cried with a rising "accent" while the German babies' cries had a falling inflection.

Writing in the journal Current Biology, they say the babies are probably trying to form a bond with their mothers by imitating them.

The findings suggest that unborn babies are influenced by the sound of the first language that penetrates the womb.

Cry melodies

It was already known that foetuses could memorise sounds from the outside world in the last three months of pregnancy and were particularly sensitive to the contour of the melody in both music and human voices.

Earlier studies had shown that infants could match vowel sounds presented to them by adult speakers, but only from 12 weeks of age.

Kathleen Wermke from the University of Wurzburg, who led the research, said: "The dramatic finding of this study is that not only are human neonates capable of producing different cry melodies, but they prefer to produce those melody patterns that are typical for the ambient language they have heard during their foetal life.

" **Newborns are highly motivated to imitate their mother's behaviour in order to attract her and hence to foster bonding** "
Kathleen Wermke, Unversity of Wurzburg

"Contrary to orthodox interpretations, these data support the importance of human infants' crying for seeding language development."

Dr Wermke's team recorded and analysed the cries of 60 healthy newborns when they were three to five days old.

Their analysis revealed clear differences in the shape of the infants' cry melodies that corresponded to their mother tongue.

They say the babies need only well-co-ordinated respiratory-laryngeal systems to imitate melody contours and not the vocal control that develops later.

Dr Wermke said: "Newborns are highly motivated to imitate their mother's behaviour in order to attract her and hence to foster bonding.

"Because melody contour may be the only aspect of their mother's speech that newborns are able to imitate, this might explain why we found melody contour imitation at that early age."

Debbie Mills, a reader in developmental cognitive neuroscience at Bangor University, said: "This is really interesting because it suggests that they are producing sounds they have heard in the womb and that means learning and that it is not an innate behaviour.

"Many of the early infant behaviours are almost like reflexes that go away after the first month and then come back later in a different form.

"It would be interesting to look at these babies after a month and see if their ability to follow the melodic contours of their language is still there."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8346058.stm

Published: 2009/11/06 10:38:56 GMT

Experts map the body's bacteria

Scientists have developed an atlas of the bacteria that live in different regions of the human body.

Some of the microbes help keep us healthy by playing a key role in physiological functions.

The University of Colorado at Boulder team found unexpectedly wide variations in bacterial communities from person to person.

The researchers hope their work, published in Science Express, will eventually aid clinical research.

They say that it might one day be possible to identify sites on the human body where transplants of specific microbes could benefit health.

The study was based on an intensive analysis of the bacteria found at 27 separate sites on the bodies of nine healthy volunteers.

Not only did the bacterial communities vary from person to person, they also varied considerably from one site on the body to another, and from test to test - but some patterns did emerge.

What is healthy?

Lead researcher Dr Rob Knight said: "This is the most complete view we have yet of the microbial side of ourselves, one that our group and others will be adding to over the coming years.

BODY SITES ANALYSED
- Forehead
- Armpits
- Head hair
- Ear canal
- Forearm
- Palm
- Index finger
- Navel
- Back of the knee
- Soles of the feet
- Nostrils
- Mouth
- Gut

"The goal is to find out what is normal for a healthy person, which will provide a baseline for further studies to look at people with diseased states."

There are an estimated 100 trillion microbes living on or inside the human body.

They are thought to play a key role in many physiological functions, including the development of the immune system, digestion of key foods and helping to deter potentially disease-causing pathogens.

The researchers took four samples from each volunteer over a three-month period - usually one to two hours after they had showered.

They used the latest gene sequencing and computer techniques to draw up a profile of the microbes found at each specific site.

Most sites showed big variations in the bacteria they harboured from test to test even within the same individual.

However, there was less variation in the bacteria found in the armpits and soles of the feet - possibly because they provide a dark, moist environment.

The least variation of all was found in the mouth cavity.

Skin sites in the head area, including the forehead, nose, ear and hair, were dominated by one specific type of bacterium.

Sites on the trunk and legs were dominated by a different group.

Researcher Dr Noah Fierer said: "We have an immense number of questions to answer.

"Why do healthy people have such different microbial communities?

"Do we each have distinct microbial signatures at birth, or do they evolve as we age? And how much do they matter?"

Transplant test

The researchers disinfected the forearms and foreheads of some volunteers, and "inoculated" both sides with bacterial communities from the tongue.

The tongue bacteria lasted longer on the forearms than foreheads.

Dr Elizabeth Costello, who also worked on the study, said: "It may be that drier areas of the skin like forearms make generally more hospitable landing pads for bacteria."

A previous study by the same examined the bacteria on 102 human hands. In total, they identified more than 4,200 species of bacteria, but only about five were shared by all 51 participants.

Dr Knight said understanding the variation in human microbial communities held promise for future clinical research. "If we can better understand this variation, we may be able to begin searching for genetic biomarkers for disease," he said.

"Because our human genomes vary so little but our repertoire of microbial genes vary so much, it makes sense to look for variations that correlate with disease at specific locations."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8342991.stm

Published: 2009/11/06 00:46:22 GMT

555 Billion Sahara Solar Energy Belt Takes Giant Step Forward

by Bridgette Meinhold, 11/03/09

A giant step has been made in what will be the world's largest renewable energy project. While previously just a grand vision for the production of clean energy in the Saharan desert, the project now has a core group of backers and a signed agreement between 12 companies wanting to move forward with the $555 billion renewable energy belt. The 12 collaborators signed articles of association last week for the DESERTEC Industrial Initiative (DII), which will work to bring more companies and groups on board as well as focus on regulations and conditions to get the project successfully completed and generating pure power from the sun.The DESERTEC Foundation vision is to install 100 GW of solar power throughout Northern Africa, with the goal of supplying 15% of Europe's energy demand with clean renewable power. So far a number of blue chip and powerful companies have signed on to be part of the project, including ABB, ABENGOA Solar, Cevital, DESERTEC Foundation, Deutsche Bank, E.ON, HSH Nordbank, MAN Solar Millennium, Munich Re, M+W Zander, RWE, SCHOTT Solar, and Siemens. The project will link multiple solar concentrating facilities around coastal North Africa and transmit most of the renewable energy through high-voltage DC lines to Europe. Additionally, desalination plants will be coupled with the solar concentrating plants to bring fresh water to people in Africa.Although still many years out from completion, the signed agreement between the founding partners will help bring cohesion and a unified force to the project. A considerable amount of work must still be done to bring this to reality, and more support must be garnered from both European agencies and companies along with organizations from the Middle East and North Africa (MENA) Region. Questions regarding energy security, fairness, social justice, water and solar rights, as well as compensation must be dealt with along the way.New DESERTEC CEO van Son says, "Now the time has come to turn this vision into reality. That implies intensive cooperation with many parties and cultures to create a sound basis for feasible investments into renewable energy technologies and interconnected grids. The DII will primarily focus on the economic, technical and regulatory conditions that must be fulfilled for successful project implementation."

+ DESERTEC Foundation

Via Cleantechnica

http://www.inhabitat.com/2009/11/03/ginormous-saharan-renewable-project-moving-forward/

Kö-Bogen: Düsseldorf's Green Roofed Crystal Complex
by Bridgette Meinhold, 11/02/09

Daniel Libeskind recently unveiled his remarkable design for the Kö-Bogen, a new mixed-use development in Germany. Set in downtown Düsseldorf, the retail and office complex is crowned with a grassy green roof and is designed to fit in with the surrounding historic architecture of Köenigsallee Boulevard. This lofted space connects two city blocks and creates a whole new zone for pedestrians, shoppers and employees to walk, run and enjoy open space in the heart of the city.

Located adjacent to the Hofgarten, Düsseldorf's central park, the Kö-Bogen will help create a larger and more continuous open green space that runs from the city center out to the park and the Rhine. The green roof will help connect the building with the beautiful historical parks surrounding the downtown area, while reducing rainwater runoff and helping to significantly reduce heating and cooling costs.The facade of the building is meant to reflect the context of the surrounding buildings through a combination of glass and natural stone. The limestone, which is locally quarried, provides important historical context for the building and makes it a natural fit for the downtown neighborhood. The two-block complex marks a synthesis between two different architectural styles – linear elements relate it to the surrounding historical buildings, while curved spaces connect it to the natural environment.The first 3 floors of the mixed-use complex contain flagship retail stores, and the top 3 floors will be utilized as office space. On the exterior of the buildings, subtle variations in window design and types of glazing help control lighting infiltration and solar heat gain, reducing energy use inside. Now that funding has been secured, construction of this new downtown development is set to begin sometime early in 2010.

+ Daniel Libeskind Studio

Via World Architecture News

http://www.inhabitat.com/2009/11/02/ko-bogen-dusseldorfs-green-roofed-city-center/#

A Solar Powered Monorail System For Bologna

by Bridgette Meinhold,
11/02/09

Iosa Ghini Associati has designed the Energy Belt, a sleek solar-powered monorail system for Bologna, Italy that will connect the airport to the city center. The system's smoothly sculpted lines run above the countryside, providing great views for travelers. The monorail will also provide infrastructure for other uses, namely a pedestrian walkway alongside the tracks and a solar system that runs along the rail's southern face.
The Energy Belt was designed to speedily move people from the main train station in Bologna out to the airport with only one intermediate stop at Lazzaretto. It crosses over one major highway, spanning the stretch of road in a graceful arc. At each station a metal screen covered in vegetation protects passengers from the elements, and also helps filter the air, provide natural insulation and shade the platform.The system is designed to operate using solar energy captured by photovoltaic panels placed at each monorail station and along the track's south-facing side. Since the solar system installed directly on the monorail infrastructure, the landscape below is not disturbed with extra equipment. Running at a height from 7 meters up to 25 meters, the Energy Belt monorail is supported by slender piers, giving the system a very small footprint along its 5,084 meters of track.

Solar powered, direct, convenient, and fast – the monorail system offers an enticing option for travelers looking to take it easy rather than driving to the airport. Its highly probable that a monorail would be more expensive than a ground level light rail system, but where's the novelty and graceful architecture in that?

+ Iosa Ghini Associati

Via Designboom

http://www.inhabitat.com/2009/11/02/a-solar-powered-monorail-system-for-bologna/

Stunning Open Air Library Pops Up in East Germany

by Mike Chino, 11/03/09

What began as an assemblage of 1,000 empty beer cartons pulled together by residents in East Germany has now evolved into an incredible open air public library. Designed by Karo Architekten in collaboration with local residents, the grassroots project revitalizes a post-industrial district in Magdeburg, Germany by creating a cultural center and pop-up library where books are free to take and leave 24 hours a day. Opened this past June, the project introduces plenty of green space and reuses the facade of an old warehouse to beautiful effect.Libraries and book lending are a great green practices insofar as they encourage the use of shared resources and cut down on crates of pressed tree pulp circulating the globe. They're even better when they foster a communal spirit of sharing, as does Magdeburg's new Open Air Library.The library was built from the ground up with the support and interaction of the surrounding community – first as a 1:1 model made from beer cartons and later as a finished project with the help of Karo Architekten, who incorporated parts of the facade from the city of Hamm's demolished Horten warehouse. During its entire planning and construction period the library accepted book donations, which are now available to borrow any time of day without a membership – simply walk up to a cubby and pull out a tome.

In addition to its book lending facilities the Open Air Library also introduces a burst of green public space to a post-industrial district. The grassy plaza features a reading cafe and a stage that hosts elementary school theater plays, public readings, concerts, and other cultural events.

+ Karo Architekten

Via ArchDaily

Photos by Anja Schlamann

http://www.inhabitat.com/2009/11/03/stunning-open-air-library-pops-up-in-east-germany/

Horse genome unlocked by science

The genome of a domestic horse has been successfully sequenced by an international team of researchers.

The work, published in the journal Science, may shed light on how horses were domesticated.

It also reveals similarities between the horse and other placental mammals, such as bovids - the hoofed group including goats, bison and cattle.

The authors also found horses share much of their DNA with humans, which could have implications for medicine.

Horses suffer from more than 90 hereditary diseases that show similarities to those in humans.

"Horses and humans suffer from similar illnesses, so identifying the genetic culprits in horses promises to deepen our knowledge of disease in both organisms," said co-author Kerstin Lindblad-Toh, from the Broad Institute at the Massachusetts Institute of Technology (MIT) in Cambridge, US.

"The horse genome sequence is a key enabling resource toward this goal."

To generate a high-quality genome sequence, the researchers analysed DNA from an adult female thoroughbred named Twilight.

The horse's DNA was sequenced using capillary DNA sequencing technology (known as Sanger sequencing) to reveal a genome that is roughly 2.7 billion "letters", or nucleotides, in size.

In addition to sequencing the genome of a thoroughbred horse, the researchers also examined DNA from a variety of other horse breeds.

These included the American quarter horse, Andalusian, Arabian, Belgian draft horse, Hanoverian, Hokkaido, Icelandic horse, Norwegian fjord horse, and Standardbred breeds.

The team surveyed the extent of genetic variation both within and across breeds to create a catalogue of more than one million single-letter genetic differences in these breeds. This is slightly larger than the genome of the domestic dog, and smaller than both the human and cow genomes.

So far, scientists have also sequenced the genomes of the platypus, mouse, rat, chimpanzee, rhesus macaque and, of course, human.

Horses were first domesticated 4,000 to 6,000 years ago. Over time, as machines have become the chief sources of agricultural and industrial muscle, those roles have shifted to sport and recreational activities.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8345578.stm

Published: 2009/11/05 22:41:38 GMT

Foetal heart rate monitor warning

Doctors are warning expectant parents that at-home foetal heart rate monitors should be used only for "fun" and not as an alternative to medical advice.

The devices, which pick up the sound of the baby's heartbeat, can give "false reassurance", the British Medical Journal reports.

They can also cause unnecessary anxiety in untrained hands, doctors warn.

The Royal College of Midwives said the availability of the devices was of concern to their members.

The warning comes after a 34-year-old pregnant woman used her foetal monitor after she noticed her baby moving less frequently when 38 weeks pregnant.

Over the weekend she had reassured herself by listening to the baby's heartbeat but went to hospital on the Monday after being unable to detect it.

" **They become dangerous when they're used by untrained people as an alternative to seeking medical attention** "
Dr Abhijoy Chakladar

An urgent ultrasound showed the baby had died in the womb and doctors believe the patient had been picking up her own heartbeat or placental blood flow with the device.

Although the tragic death may have been unavoidable, the use of a foetal heart monitor certainly delayed the patient attending hospital, says Dr Abhijoy Chakladar, an anaesthetist at Princess Royal Hospital in Sussex, who treated the patient and highlights the issue in the BMJ article.

He is quick to point out that stillbirth is a rare event and pregnant women should not be unduly alarmed.

"These monitors are great fun as long as they are just used for a bit of bonding with the baby or play with older siblings.

"But they become dangerous when they're used by untrained people as an alternative to seeking medical attention.

"Expectant mothers who notice a reduction in foetal movement or have any other concerns about their baby's health should instead contact their midwife or labour ward for expert advice and reassurance."

It is the second such case highlighted this year in the BMJ.

'No substitute'

Doctors previously raised the problem of false reassurance with a baby who survived but required neonatal intensive care.

A spokesman for the Medicines and Healthcare Products Regulatory Agency said it was aware of the case.

But he warned: "Members of the public using foetal monitors at home are unlikely to have the necessary knowledge or experience to use the device effectively and if they are concerned about the health of their baby they should seek medical advice."

Donald Peebles, spokesman for the Royal College of Obstetricians and Gynaecologists, said the devices did not really give much information anyway.

"If you're just doing it for fun and you can't pick up the heart rate because you're pointing it in the wrong direction that would unnecessarily frighten you.

"And it shouldn't be used to provide reassurance."

Mervi Jokinen, from the Royal College of Midwives, said: "These devices may be sold as a bit of fun for parents to use, but let me be categorically clear; there is absolutely no substitute for speaking to your midwife or doctor as soon as possible if you think that there is something wrong during your pregnancy."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8343317.stm

Published: 2009/11/06 00:35:31 GMT

New Synthetic Molecules Trigger Immune Response To HIV And Prostate Cancer

Artist's rendering of viruses. Scientists have developed synthetic molecules capable of enhancing the body's immune response to HIV and HIV-infected cells, as well as to prostate cancer cells. (Credit: iStockphoto/Henrik Jonsson)

ScienceDaily (Nov. 8, 2009) — Researchers at Yale University have developed synthetic molecules capable of enhancing the body's immune response to HIV and HIV-infected cells, as well as to prostate cancer cells. Their findings, published online in the *Journal of the American Chemical Society*, could lead to novel therapeutic approaches for these diseases.

The molecules -- called "*a*ntibody-*r*ecruiting *m*olecule targeting *H*IV" (ARM-H) and "*a*ntibody-*r*ecruiting *m*olecule targeting *p*rostate cancer" (ARM-P) -- work by binding simultaneously to an antibody already present in the bloodstream and to proteins on HIV, HIV-infected cells or cancer cells. By coating these pathogens in antibodies, the molecules flag them as a threat and trigger the body's own immune response. In the case of ARM-H, by binding to proteins on the outside of the virus, they also prevent healthy human cells from being infected.

"Instead of trying to kill the pathogens directly, these molecules manipulate our immune system to do something it wouldn't ordinarily do," said David Spiegel, Ph.D., M.D., assistant professor of chemistry and the corresponding author of both papers.

Because both HIV and cancer have methods for evading the body's immune system, treatments and vaccinations for the two diseases have proven difficult. Current treatment options for HIV and prostate cancer -- including antiviral drugs, radiation and chemotherapy -- involve severe side effects and are often ineffective against advanced cases. While there are some antibody drugs available, they are difficult to produce in large quantities and are costly. They also must be injected and are accompanied by severe side effects of their own.

By contrast, the ARM-H and ARM-P molecules, which the team has begun testing in mice, are structurally simple, inexpensive to produce, and could in theory be taken in pill form, Spiegel said. And because they are unlikely to target essential biological processes in the body, the side effects could be smaller, he noted.

"This is an entirely new approach to treating these two diseases, which are extraordinarily important in terms of their impact on human health," Spiegel said.

HIV is a global pandemic that affects 33 million people worldwide, while prostate cancer is the second leading cause of cancer-related death among American men, with one out of every six American men expected to develop the disease.

Funding for this research was provided by the National Institutes of Health.

Adapted from materials provided by Yale University.
http://www.sciencedaily.com/releases/2009/11/091105165527.htm

Stephen King's Glass Menagerie
By JAMES PARKER

UNDER THE DOME

By Stephen King

1,074 pp. Scribner. $35

Now that the town halls have blazed with vituperation, and fantastical patriots are girding themselves for fascist/socialist lockdown, Americans of a certain vintage must be feeling a familiar circumambient thrill. Boomers, you know what I'm talking about: cranks empowered, strange throes and upthrusts, hyperbolic placards brandished in the streets — it's the '60s all over again! Once more the air turns interrogative: something's happening here, but we don't know what it is, do we, Mr. Jones? Stop, children, what's that sound?

In Stephen King's new novel, "Under the Dome," the people of Chester's Mill, Me., get a letter from the president. Typically exalted in its rhetoric, it wrings a tear from at least one grateful citizen. But Big Jim Rennie, the town's second selectman, is disgusted. He scowls at the printed sheet. Yep, there it is in black and white: "The bastard had signed it himself, and using all three of his names, including the terrorist one in the middle."

Why is Obama writing to Chester's Mill? Because an enormous transparent dome, not breachable by prayer, bullet, laser beam or cruise missile, has suddenly and unaccountably descended over the town. Its provenance is uncertain (aliens? North Korea?), but its effect is incontrovertible: no one gets in, no one gets out. Some kind of energy field is attached to it; at close range it blows up iPods and (bad news for incautious oldsters) pacemakers, and sends a gust of "horripilation" through the human nervous system. Bummer, right? Not for the tyrant-in-waiting Big Jim and his pet goon squad. For them this is Christmas Day in the morning. Secession has occurred! The "thug in the White House," the "Blackguard in Chief," is on the other side of the dome, and Anytown, U.S.A. — with its meth factory, its profusion of religious denominations and its atavistic police department — is about to, as the phrase has it, "go rogue."

According to an author's note, King took a first crack at "Under the Dome" in 1976, but gave it up "after two weeks' work that amounted to about 75 pages." An interesting sequence of expressions must have crossed his face when he watched "The Simpsons Movie" in 2007: here, in glowing animation, was a great glassy dome landing on a clueless municipality, a civic meltdown, etc. ("We're trapped like rats!" screams Moe the bartender. "No," says the man from the E.P.A., "rats can't be trapped this easily. You're trapped like . . . carrots.") But the Simpsonian merriment bounced off him, apparently; King held on to his dome concept, waiting perhaps with his genius on "sleep" for our national politics to get a little more kinky, a little more vicious — a little more like a Stephen King novel.

So this is it: 1,100 pages of localized apocalypse from an author whose continued and slightly frenzied commerce with his muse has been one of the more enthralling spectacles in American literature. King's previous novel, "Duma Key" (2008), was a subterranean first-person trip, in the vein of "Misery" or "Bag

of Bones": Edgar Freemantle, rehabbing on the Florida coast after a construction accident that cost him his right arm and nearly his mind, starts banging out left-handed paintings whose Dalí-esque motifs have freaky real-world effects. Classic King: a maimed artistic consciousness, a symbolic journey. With "Under the Dome" we swoop up again to the God's-eye view, or to the view of some equally altitudinous but less merciful entity — a panorama of interlocking stories and a huge cast of characters, many of them being used rather cruelly. As the values of the dome assert themselves, people become matter: a woman flies through a windshield "trailing intestines like party streamers," another woman shoots herself in despair, leaving her brains drying on the wall "like a clot of oatmeal."

Big Jim, taking control of the Chester's Mill police department, starts recruiting from the local pool of jocks and bully boys, "the ever-present football player rapist," as the songwriter Gibby Haynes once put it. A town leader congratulates the chief of police on doing "a hell of a job." Where is God in all this? Pastor Coggins, who flagellates himself and prays "in an ecstatic televangelist tremolo," doesn't last long; more durable, possibly because she doesn't believe in God anymore, is the Rev. Piper Libby of the First Congregational Church. And holiest of all is Phil Bushey, known as the Chef, the heavily-armed meth wizard who commandeers the town's Christian radio station. Chef, tweaking away, has some great lines: "God has told me this, Sanders," he booms. "You're in the Lord's army now. . . . And I'm your superior. So report."

As for the prose, it's not all smooth sailing. Given King's extraordinary career-long dominance, we might expect him at this point to be stylistically complete, turning perfect sentences, as breezily at home in his idiom as P. G. Wodehouse. But he isn't, quite. "Then it came down on her again, like unpleasant presents raining from a poison piñata: the realization that Howie was dead." (It's the accidental rhyme of "unpleasant" and "presents" that makes that one such a stinker.) I felt the clutch of sorrow, too, when I read this: "What you're planning is terribly dangerous — I doubt if you need me to tell you that — but there may be no other way to save an innocent man's life."

But then, King has always produced at pulp speed. "Nov. 22, 2007 - March 14, 2009" proclaims the final page of "Under the Dome": that's 1,100 pages in 480 days. We shouldn't be too squeamish about the odd half-baked simile or lapse into B-movie dialogue, is my point. Writing flat-out keeps him close to his story, close to his source. It seems to magnetize his imagination: by the final third of this novel King is effortlessly drawing in T. S. Eliot and the Book of Revelation, the patient etherized upon a table and the Star Wormwood. Pollution thickens against the inner wall of the dome, and the sunset outside becomes alien and terrifying, a "vast, dusty glare." The dome grows metaphysical — one character, contemplating the suffering of another, feels "a clinical sorrow, safely stored inside its own dome: you could see it, could appreciate its existence, but you couldn't exactly get in there with it."

Big Jim Rennie, with his monster breakfasts and "carnivorously sociable smile," is swept to power on a wave of homicide and municipal procedure. He snaps necks, and he attends emergency-assessment meetings (echoes here of Donald Antrim's wildly black 1993 novel "Elect Mr. Robinson for a Better World," which begins with an ex-mayor being drawn and quartered by some inflamed Rotarians). He's the worm in the brain of democracy: it takes him only four days to undo just about everything. The coalition that forms against him includes a journalist, a librarian, an Iraq veteran, some acned skateboarders and an English professor from Massachusetts who (rather wonderfully) has just edited an issue of Ploughshares. Get ready, libruls, King seems to be saying: If the dome comes down, you're going to need one another.

James Parker is a contributing editor at The Atlantic.

http://www.nytimes.com/2009/11/08/books/review/JParker-t.html?nl=books&emc=booksupdateema1

How your brain sees virtual you

- 12:34 06 November 2009 by **Ewen Callaway**

How do you view yourself? (Image: Blizzard Entertainment)

As players who stay up all night fighting imaginary warriors demonstrate, slipping into the skin of an avatar, and inhabiting a virtual world can be riveting stuff. But to what extent does your brain regard your virtual self as you?

Brain scans of avid players of the hugely popular online fantasy world World of Warcraft reveal that areas of the brain involved in self-reflection and judgement seem to behave similarly when someone is thinking about their virtual self as when they think about their real one.

Disentangling how the brain regards avatars versus real individuals may help explain why some people spend large chunks of their life playing immersive online games, says Kristina Caudle, a social neuroscientist at Dartmouth University in Hanover, New Hampshire, who led the study along with her adviser William Kelley.

"It's hard to imagine from an outsider's perspective what might drive someone to spend 30 hours a week immersed in a completely imaginary world," she says. More than 11 million people play World of Warcraft each month.

Innocent or intelligent

Previously, researchers have observed that people easily adopt the persona of their virtual selves, for instance, by acting more aggressively when their avatars are tall than when they are short, irrespective of an individual's height in the real world.

To probe what brain activity might underlie people's virtual behaviour, Caudle's team convinced 15 World of Warcraft players in their twenties – 14 men and 1 woman – who play the game an average of 23 hours a week, to drag themselves away from their computers and spend some time having their brains scanned using functional MRI.

While in the scanner, Caudle asked them to rate how well various adjectives such as innocent, competent, jealous and intelligent described themselves, their avatars, their best friend in the real world and their World of Warcraft guild leader.

Self-reflection

When Caudle's looked for brain areas that were more active when volunteers thought about themselves and their avatars compared with real and virtual others, two regions stood out: the medial prefrontal cortex and the posterior cingulate cortex. That makes sense as prior research has linked the medial prefrontal cortex to self-reflection and judgement.

Interestingly, however, there was "next to no difference" in the activity in these regions when people thought of themselves and of their avatar, says Caudle, who presented the results at the annual meeting of the Society for Neuroscience.

Caudle's team also noticed key differences between how people thought about the virtual and real worlds, which must be a necessity for preserving your sense of reality. "Clearly you don't think of your virtual self as your real self," she says.

They found activity differed in a region called the precuneus, implicated in imagination. "It makes good sense to me if you're thinking about things in a virtual world you might get [activation in] these areas," says Caudle.

Better selves

In the future, Caudle hopes to study volunteers who spend less time playing World of Warcraft to see if there are differences in how their brains discriminate between real and virtual worlds.

It could be that people whose brain activity is more similar when thinking of themselves and their avatars are likelier to end up hooked, she says.

Liane Young, a social neuroscientist at the Massachusetts Institute of Technology in Cambridge is interested in what brain activity can tell us about our relationships to our virtual characters. "You have this control over your avatar such that you've created this better version of yourself. I wonder whether these neural processes support reasoning about our better selves in some kind of wishful thinking sense."

http://www.newscientist.com/article/dn18117-how-your-brain-sees-virtual-you.html

Genes show when a woman's biological clock will stop

- 04 November 2009 by **Linda Geddes**

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Is time running out? (Image: Altrendo Images/Stockbyte/Getty)

1 more image

IT IS a dilemma facing a growing number of young women: can I delay having a baby until my career is more established? A genetic test that could make this decision less of a gamble might be on offer by next year, thanks to the discovery of a gene that seems to predict the rate at which a woman's egg supply diminishes.

No one is yet sure how useful the test will be. But the aim is to tell a woman in her early 20s whether she is at high risk of early menopause. If she is, monitoring her egg supply will confirm whether her fertility is in early decline. Armed with this information she could then decide whether to start a family sooner or later, or freeze some eggs to increase her chances of conceiving later on.

Meanwhile, other hormonal and genetic markers that could help to predict egg supply more reliably are also in the works.

A woman is born with all the eggs she will ever have - 1 to 2 million immature eggs or follicles. Over her reproductive life, approximately 400 of these will mature and could be fertilised. By puberty, a girl has around 400,000 follicles left, and this continues to decline until menopause, when only a few hundred remain. The number of follicles a woman has left at any time in her life - her "ovarian reserve" - approximately reflects how many eggs she will release.

After 35, most women experience a sharp drop in their ovarian reserve, and, as result their fertility, but around 10 per cent of women experience "early ovarian ageing" in their 20s (see graph). Hormonal tests can provide a rough snapshot of a woman's ovarian reserve - and flag up declining fertility. The challenge is to predict early ovarian ageing before it happens.

Norbert Gleicher of the Center for Human Reproduction in New York reckons he can do just that, using a gene already implicated in reproductive ageing.

Women with a version of the Fragile X or *FMR1* gene that contains more than 200 repeats of the DNA sequence CGG are likely to have Fragile X syndrome, which causes mental impairment. Some women

have 55 to 200 CGG repeats: they don't have mental impairment, but are at increased risk of early menopause.

Intrigued by this relationship, Gleicher wondered whether the number of repeats in *FMR1* might also contain clues about early ovarian ageing, which is more common and less dramatic than early menopause.

He analysed the *FMR1* genes in 316 women attending his fertility clinic, and took a snapshot of their ovarian reserve by measuring levels of a hormone called anti-Müllerian hormone (AMH), an indicator of how many eggs are currently maturing in the ovaries.

In women with between 28 and 33 repeats, he found normal levels of AMH. But in women with repeats both above and below this range, AMH levels indicated early ovarian ageing. His team calculated that for every decrease of five CGG repeats below this range, the risk of a diminishing ovarian reserve increased by 40 per cent, while each increase of five CGG repeats above the range upped this risk by 50 per cent (*Reproductive Biomedicine Online*, vol 19, p 385).

Gleicher concludes that the number of CGG repeats predicts whether a woman is likely to experience premature ovarian ageing. "We can take an 18 or 20-year-old girl and check her Fragile X and make a pretty good prediction of whether she's at risk," he says. As *FMR1* is known to help regulate the transition of immature eggs to the mature state, this makes sense.

Gleicher hopes to start offering such a test next year as a tool to identify women at high risk of early ovarian ageing. Not all women flagged up by the test will struggle to conceive in their 30s - only hormone tests will confirm whether their egg reserve really is depleting faster than normal. "Then you can sit down and have a discussion about her reproductive life plan," Gleicher says. "In other words, 'do you want to have your kids before you get your PhD, or afterwards?' If the answer is 'afterwards', OK, but maybe you want to freeze some eggs."

You can discuss whether you want to have your kids before you get your PhD, or afterwards

Gleicher says he still needs to establish baseline levels for the hormones that are currently used to measure ovarian reserve, in women of different ages who aren't having fertility problems.

But many think he is jumping the gun. One criticism is that although AMH is one of the best markers of ovarian reserve going, it doesn't provide a direct measurement of the number of immature eggs or follicles that remain. "If you really want a long-term predictor for when you will enter menopause, a marker for the primary follicle pool will be more important," says Sharon Lie Fong of Erasmus Medical Center in Rotterdam, the Netherlands. "He also has to prove whether these women have lower fertility."

Although early ovarian ageing encompasses both a decline in quality as well as quantity of follicles, women with a lower reserve may not necessarily struggle to conceive, says Frank Broekmans of the University Medical Center in Utrecht, the Netherlands. He says Gleicher's results need to be confirmed using a larger group of women who are monitored for some years, to determine whether CGG repeats affect the likelihood of a pregnancy.

"You need some kind of follow-up studies on whether this test really predicts long-term events." Stephanie Sherman of Emory University in Atlanta, Georgia, who also studies *FMR1* says Gleicher's results are exciting, but she would also like to see them replicated before his test is used in the clinic.

What could be done right now, she says, is to screen women with a family history of fragile X to see if they have the telltale 55 to 200 CGG repeats, which puts them at high risk of premature menopause. "It's clear that this is an indicator of ovarian reserve."

An *FMR1* test might also help women who don't become pregnant naturally, says Bill Ledger of the University of Sheffield, UK. "Many women with early ovarian failure are curious as to why it has happened and this may help explain the phenomenon in some cases.

Women with 20 to 55 repeats in the *FMR1* gene are at higher risk of early ovarian failure

FMR1 isn't the only factor that predicts premature ovarian ageing. Broekmans recently discovered that healthy women with low levels of AMH for their age group seemed to reach menopause earlier than the median age of 51 (*Journal of Clinical Endocrinology and Metabolism*, DOI: 10.1210/jc.2007-2093). However, these women ranged from 25 to 45 years of age when they had the AMH test, and such predictions remain to be proven for younger women, who are likely to show more variability in their AMH levels.

Another option is to look at genes other than *FMR1*. Last month, Kutluk Oktay of New York Medical College told the American Society for Reproductive Medicine that women with the *BRCA1* mutation, which diminishes the ability of DNA to repair itself and raises the risk of breast and ovarian cancer, may also be at higher risk of premature ovarian ageing. Oktay is now planning larger clinical studies to confirm the finding as well as molecular studies to explore the underlying mechanisms. "DNA repair may be an important component of ovarian ageing," he says.

Meanwhile, other genetic studies have recently found a handful of common genetic mutations that influence the age of menopause (*Nature Genetics*, DOI: 10.1038/ng.387).

Most researchers agree that assessing a woman's reproductive lifespan in her early 20s could be beneficial and that Gleicher's test is a first step. But a test reliable enough to transform the lives of a large number of women will likely involve a series of genetic and hormonal markers. It will also need rigorous testing to ensure woman aren't burdened with anxiety - or given false hope.

http://www.newscientist.com/article/mg20427333.000-genes-show-when-a-womans-biological-clock-will-stop.html

Nicky Clayton: Dancing with Darwin

- 05 November 2009

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Dancers perform in the avian-inspired *The Comedy of Change* (Image: Hugo Glendinning)

Nicky Clayton is scientific adviser to the Rambert Dance Company, a leading contemporary dance company in the UK. She tells Sanjida O'Connell about her latest project, *The Comedy of Change*, which was inspired by evolution and natural selection.

Did you start out as a scientist or a dancer?

Both really, I've been dancing since I was 4. It's always been my hobby. I did ballet at first; now I mainly do salsa and tango, but I also do a jazz workout once a week. Until recently I saw myself as a scientist by day, a dancer by night and then all of a sudden this amazing opportunity presented itself to combine the two.

How did the collaboration with Rambert come about?

I was at a New Year's Day party and I met Stephen Keynes, Charles Darwin's great-grandson. Stephen had come up with an idea for a dance to celebrate Darwin's bicentennial and he invited me for lunch to meet Rambert's artistic director, Mark Baldwin, who has choreographed *The Comedy of Change*. We started brainstorming ideas for his new dance and he asked me to be part of their creative team. So I talked to the team and to the dancers about bird behaviour, including my research on corvids. I drew on examples such as the dance of the blue manakin, which, for me, is avian tango, and the Lawes's parotia (the six-plumed bird of paradise), which has a courtship dance that looks like a bird ballet.

Your scientific work is on corvids - crows, rooks and jays. Why do you find them so fascinating?

I've always been interested by birds, their elegance, grace and quizzical looks, and in many ways I identity with them. I've been told I look quite bird-like, with my designer clothes and Christian Louboutins - colourful plumage if you like. I'm fascinated by avian intelligence - what a bird's eye view of the world must be like.

What are the main scientific themes in the dance?

Distilled into its purest form, Darwin's ideas are about the biology of change and we focus on three aspects of the apparently paradoxical nature of change. One is same/different - representing individual variation within, say, male blue manakins: on one level they are the same, in both sex and species, but on another they are genetically different and natural selection operates on these differences. Another theme is past/future, about the temporal dynamics of change. Evolutionary change is a dynamic process, dependent upon time. The final theme is conceal/reveal, which is about the magical and often mercurial nature of camouflage.

How do you turn these themes into a dance?

In the same/different theme, the dancers are wearing black and white costumes, and the background is black, so one side is concealed and the other revealed. At first they all look the same and make the same movements but then subtle differences between the dancers emerge.

Is the dance full of bird-like movements?

Yes, but it is much richer than that: it reflects the three overarching themes. Although there are a lot of bird-like movements, the dancers are not wearing costumes that make them look like birds. The courtship dance of the six-plumed bird of paradise is recreated by a male soloist. Having cleared the stage, the bird jetés across in what looks like an inflatable tutu, doing amazing head and neck movements.

Bibliography

1. Rambert Dance Company will appear in *The Comedy of Change* at Sadler's Wells, London, from 3 to 7 November and then tours the UK. See video clips of the dance and Nicky Clayton speaking.

Profile

Nicky Clayton is professor of comparative cognition at the University of Cambridge where she studies the cognitive capacity of corvids - the rooks, jays and crows

http://www.newscientist.com/article/mg20427331.900-nicky-clayton-dancing-with-darwin.html?full=true&print=true

Why did our species survive the Neanderthals?

- 08 November 2009 by **Ewen Callaway**
- Magazine issue 2733.

Book information

The Humans Who Went Extinct: Why Neanderthals died out and we survived by Clive Finlayson

Published by: Oxford University Press

Price: £16.99/$29.95

ONCE upon a time, a race of cavemen ruled Europe and Asia, then mysteriously vanished, leaving little but bones and stone tools behind.

The history of the Neanderthals isn't a Brothers Grimm fairy tale, but much of what has been written about the ancient human species may as well be, says evolutionary ecologist Clive Finlayson in his informative monograph.

Take their disappearance, which a team led by Finlayson has pinpointed to the rock of Gibraltar, between 28,000 and 24,000 years ago. Since the discovery of the first Neanderthal bones in Belgium in 1829, anthropologists have proposed any number of explanations for their extinction.

Some said Neanderthals were too dim-witted to survive climatic upheaval or the arrival of our ancestors from Africa. Others contended that their diet - big mammals that were also becoming rare - did them in, while *Homo sapiens*'s more catholic diet gave them the edge to survive. Some even argued that Neanderthals didn't go extinct at all, but interbred with *H. sapiens*.None of these just-so stories quite add up, Finlayson says. There is no clear indication that Neanderthals were any less intelligent than *H. sapiens*, and genetic evidence has shown that they share with humans key changes in *Foxp2*, a gene involved in speech and language. The distinction between Neanderthal and human technology isn't as clear-cut as palaeoanthropologists sometimes suggest, and Neanderthals hunted smaller game and seafood where it was available. Meanwhile, a first-draft sequence of the Neanderthal genome offers no sign that they contributed to our gene pool.

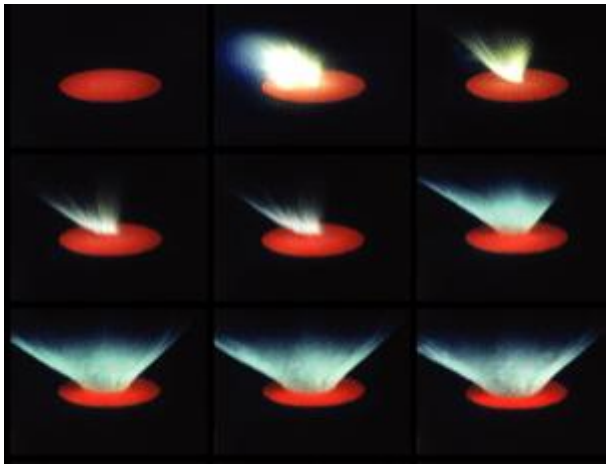
So why did Neanderthals go extinct? Finlayson argues that it was a deadly combination of bad luck and climate change. They were a species caught in the wrong place at the wrong time in a rapidly changing world. "By the time the classic Neanderthals had emerged," Finlayson laments, "they were already a people doomed to extinction."A series of ice ages ate away the forest habitats where Neanderthals and their predecessors, *Homo heidelbergensis*, made a living sneaking up on big game. As their numbers declined, those who remained took refuge in warmer parts of Europe, nearer the Mediterranean. But a final drop in temperatures that began around 50,000 years ago made even this meagre living unsustainable.

Finlayson does not rule out the possibility that Neanderthals and *H. sapiens* met. Neanderthals, our ancestors and other archaic human species probably overlapped. But such contact was unlikely to play a pivotal part in the Neanderthal's disappearance and our dominance, which Finlayson chalks up largely to luck. That may not be a fairy tale, but at least, for us, there's a happy ending.

http://www.newscientist.com/article/mg20427335.800-why-did-our-species-survive-the-neanderthals.html

Was life founded on cyanide from space crashes?

- 15:55 06 November 2009 by **David Shiga**



Cyanide impact (Image: P. H. Schultz, Brown University and AVGR)

Life may have been built on a foundation of cyanide formed in the fiery wakes of asteroids plunging through Earth's atmosphere, high-speed impact experiments suggest.

Earth was probably not born with much in the way of organic material – the complex molecules containing carbon that life requires. It formed too close to the sun for such compounds to condense from the swirling primordial disc of gas and dust.

One possibility is that organic matter formed on Earth after the planet coalesced, for example in chemical reactions induced by lightning arcing through the atmosphere, as experiments by Stanley Miller at the University of Chicago in the 1950s suggested. But the chemical reactions in this process could happen only in an early atmosphere full of methane and hydrogen, and later studies of the ancient geological record have suggested that was unlikely.

Others have suggested the building blocks came from comets and asteroids that struck Earth, because these objects are known to contain high concentrations of organic material. But the tremendous heat of impact would have burned up much of that material, converting it into simpler molecules like carbon dioxide.

Third way

Now another way for organic material to appear on Earth has been demonstrated. New experiments show that although impacts destroy the original organic molecules in comets and asteroids, they may help create new ones at the same time.

"The idea in the past has been, 'Any of this stuff coming through the atmosphere would be heated to the point where it would get wasted,'" says Peter Schultz of Brown University in Providence, Rhode Island, one of the experimenters.

"What this new work did was to show that we might actually revive these compounds."

With Seiji Sugita of the University of Tokyo, Japan, Schultz simulated asteroid and comet impacts by firing projectiles made of polycarbonate plastic, an organic material, as fast as 6 kilometres per second at metal targets in a laboratory at the NASA Ames Research Center in Moffett Field, California.

The projectiles were vaporised in a flash of light, just as an asteroid or comet would be on impact with Earth's surface.

Life-giving poison

Analysis of the spectrum of the flashes revealed abundant cyanide – a compound consisting of a carbon atom bound to a nitrogen atom – formed by chemical reactions between the projectile's carbon and nitrogen in the air.

Cyanide compounds are very reactive, so further reactions involving them on early Earth could have led to more complex carbon-containing molecules important to life, Sugita and Schultz argue.

The nitrogen in the cyanide compounds could have been especially important, since it is an ingredient of amino acids – key building blocks for life – but is relatively scarce in the raw organic material of asteroids.

Donald Brownlee of the University of Washington in Seattle, who was not involved in the study, says some of early Earth's organic material undoubtedly formed this way. But he adds that there were probably other sources too, including organic-rich particles of interplanetary dust, which fall to Earth more gently than asteroids and comets. "It gets warmed but it doesn't get extremely hot," he says.

Journal reference: *Geophysical Research Letters*, DOI: 10.1029/2009gl040252

http://www.newscientist.com/article/dn18120-was-life-founded-on-cyanide-from-space-crashes.html

Mass extinction blamed on fiery fountains of coal

- 05 November 2009 by **David Shiga**

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Another thing to pin on fossil fuels (Image: Joel Sartore/NGS/Getty)

FOSSIL fuels have a new crime to live down. A frenzy of hydrocarbon burning at the end of the Permian period may have led to the most devastating mass extinction Earth has ever seen, as explosive encounters between magma and coal released more carbon dioxide in the course of a few years than in all of human history.

Around 250 million years ago, the so-called "Great Dying" saw 70 per cent of species wiped out on land and 95 per cent in the oceans. A clue to what may have triggered this disaster lies in solidified magma from this time, which is widespread in an area of Siberia where coal is also abundant.

One suggestion is that the heat of the magma could have baked many billions of tonnes of CO_2 out of the coal over a geologically brief period of a few thousand years (*New Scientist*, 8 December 2007, p 42). The ensuing climate change and ocean acidification would account for the extinctions. Now Norman Sleep and Darcy Ogden, both of Stanford University in California, think the trigger for the Great Dying may have been even swifter and more terrifying.

Rather than causing gentle heating, magma encountering oil- and tar-soaked coal underground would melt it, producing a highly combustible material, they say. Crucially, this molten mixture would be light enough to rise quickly to the surface. There it would burn explosively on contact with oxygen in the air, blasting dust and ash into the stratosphere and releasing huge quantities of CO_2.

A molten mixture of magma and coal would burn explosively on contact with air

"You're basically going to have something like a fire fountain every few kilometres or so over this vast moonscape that's erupting, with flares going high into the air and columns of smoke and fly ash," says Sleep. The ground would be "covered with coal tar and coal fragments and pieces of basalt", he adds.

Dust injected into the stratosphere would cause drastic cooling. That would quickly switch to warming as the dust settled out of the atmosphere, leaving nothing to counteract the greenhouse effect of the increased CO_2. The climate might have swung between heating and cooling as new eruptions injected yet more dust into the stratosphere. "The climate is just going to go completely unstable," says Sleep, who presented the idea last month at a meeting of the Geological Society of America in Portland, Oregon.

Lee Kump of Pennsylvania State University in University Park agrees that a coal bed could be ignited by an intruding finger of magma in the way Sleep and Ogden envision. But he says their scenario would require many magma fingers to ignite many coal beds in the span of just a few years - whereas the solidified magma in Siberia more likely took thousands of years to intrude into rock. "[It's] possible, but seems improbable to me," he says.

If Sleep and Ogden are right, proof of their scenario may be hiding in Siberia's abundant volcanic deposits. In a burning mixture of coal and magma, the carbon in the coal would strip oxygen from iron oxide in the magma, leaving behind particles of iron.

"These things would get treated as a curiosity unless somebody was particularly looking for them," says Sleep. Part of the reason for presenting the theory at the meeting was "to get people to look at those rocks", he adds.

http://www.newscientist.com/article/mg20427333.200-mass-extinction-blamed-on-fiery-fountains-of-coal.html?full=true&print=true

Tomorrow's weather: Cloudy, with a chance of fractals

- 04 November 2009 by **Robert Matthews**
- Magazine issue 2733

Beautiful prediction (Image: Kerry Mitchell)

WE'VE all watched those vast heaps of cotton wool float across the sky. Lofted and shaped by updrafts of warm air, cumulus clouds mesmerise with their constantly changing shape. Some grow ever taller, while others wither and die before our eyes. All bear witness to the ceaseless roiling of the ocean of air we call the atmosphere.

About 80 years ago, the British mathematician Lewis Fry Richardson was pondering the shapes of such clouds when a startling thought occurred to him: the laws that govern the atmosphere might actually be very simple.

Even at the time, with scientific meteorology still in its infancy, the idea seemed absurd: key equations governing the behaviour of the 5 million billion tonnes of air above us had already been identified - and they were anything but simple.

No one was more aware of this than Richardson, who is recognised as one of the founders of modern weather forecasting. Even now, the world's most powerful computers are pushed to their limits extracting predictions of future weather and climate from the equations he wrestled with using pencil and paper.

Yet Richardson suspected that behind the mathematical complexity of the atmosphere lay a far simpler reality - if only we looked at it the right way.

Now an international team of researchers analysing signals from satellites, aircraft and ground-based stations have found clear evidence that Richardson's intuition was right and that the complexity of the atmosphere could really be an illusion.

The results point to a new view of the atmosphere as a vast collection of cascade-like processes, with large structures the size of continents breaking down to feed ever-smaller ones, right down to zephyrs of air no bigger than a fly.

The implications promise to transform the way we predict everything from tomorrow's local weather to the changing climate of the entire planet. "We may never be able to view the atmosphere and climate in the same way again," says team member Shaun Lovejoy of McGill University in Montreal, Canada.

"Rather than seeing them as so complex that only equally complex numerical models can make sense of them, we're seeing a kind of scale-by-scale simplicity."

Richardson had a reputation for having ideas decades ahead of his time. He pioneered the study of fractal geometry - the study of patterns that look the same no matter how much you magnify them - though the word "fractal" had yet to be coined. Look at the honeycomb pattern in a beehive, say, and the hexagonal structure is only visible if you're not too close or too far away. But look at some kinds of plants and you'll see their fronds are made up of ever-smaller versions of the overall leaf. This is known as scale invariance, and is a feature of fractals. Richardson noticed that coastlines have a similar property, their jagged outlines appearing just as jagged as one zooms in to ever-smaller scales.

Attempting to capture this mathematically, Richardson found the same behaviour in simple formulas called power laws, by which one quantity changes according to another raised to some power. Even something as simple as tiling your bathroom wall follows a power law: reduce the length of each square tile by $1/l$ and you'll need l^2 as many tiles. Such laws also reproduce the scale invariance of objects like ferns and coastlines, which retain the same basic form no matter how big the change in scale.

It was while looking for other examples of self-similarity that Richardson came to ponder the skies above: he noticed how the shape of clouds is constantly modified by the invisible whirls and eddies of turbulent air that surround them.

To get some insight into the laws governing turbulent fluids, Richardson performed simple experiments in which he threw bits of parsnip into a lake and watched how they moved apart under the action of the whirls and eddies on the surface. As with coastlines, Richardson found that a scale-invariant power law seemed to apply - an observation that inspired him to poetry: "Big whirls have little whirls that feed on their velocity, and little whirls have lesser whirls, and so on to viscosity" - a parody of Jonathan Swift's famous 18th-century doggerel about fleas and the little fleas that bite 'em.

But behind the humour lay Richardson's growing conviction that the atmosphere is just a collection of cascade-like processes, with large structures breaking down to feed ever-smaller ones, creating a fractal-like structure which acted according to power laws.

As with his work on weather forecasting, Richardson could only dream of a time when his ideas could be properly investigated. That time seemed to come in the 1980s, when fractals and scale invariance hit the scientific big time. Simple scaling laws were suddenly claimed to underpin everything from the size and frequency of earthquakes and avalanches to the rise and fall of stock markets. So why didn't anyone put Richardson's idea to the test and search for simple power laws describing the entire atmosphere?

The problem, says Lovejoy, lies with the word "simple". When fractals began making headlines, researchers raced to find the power laws behind a host of natural phenomena. In particular, they sought the value of the "exponent" in these power laws, the one number that governed the extent to which the phenomenon in question changed with scale. (In the bathroom tile example, the exponent is 2.) But they soon ran into trouble. "They found that this single-exponent approach didn't always work," says Lovejoy. "Many phenomena failed to obey power laws with one exponent, and people started to give up on them, saying the idea was overly simplistic and had been oversold."

Among the ideas abandoned was Richardson's claim that the atmosphere is ruled by power laws. But in their race to move on, many researchers had overlooked the possibility that describing the atmosphere might be a tad more complex than describing a coastline - and so might have needed a slightly more sophisticated approach.

Take air pressure, for example. The familiar isobars on weather charts define regions of equal pressure, similar to the elevation contours on a map. Indeed, an isobar can be thought of as a kind of "coastline", described by its own fractal law. But there's a key difference: a coastline's shape is defined only at one

specific value of height - sea level. In contrast, the isobars of air pressure form a whole array of shapes at different heights, like Russian dolls nested within each other. Air pressure is what mathematicians call a multifractal field, described by a whole set of power laws, rather than just one.

The failure of researchers to find simple power laws for the entire atmosphere says more about their naivety than about Richardson's idea, but it cast a long shadow over attempts to apply fractals to meteorology, as Lovejoy himself discovered early in his research career. Inspired by the work of the French mathematician Benoît Mandelbrot, who coined the term "fractal" in the 1970s, Lovejoy devoted half of his doctoral thesis to evidence for power laws governing rainfall. "I was getting ready to move on to my postdoctoral research when I learned that my thesis had been rejected," he recalls. "The examiner couldn't see any connection between fractals and rainfall and I was advised to remove all references to it."

Not wanting to risk a final rejection, Lovejoy did as he was told and resolved to publish the excised findings. They appeared in *Science* in 1982 (vol 216, p 185), along with Lovejoy's tentative claim that they might just be linked to Richardson's outlandish idea.

In the following years, Lovejoy teamed up with Daniel Schertzer, now at the University of Paris East, France, and set about searching for evidence for multifractal power laws lurking in weather data.

They focused on rainfall: a meteorological phenomenon whose familiarity masks the complexity of its origins. Triggered by a delicate balance of atmospheric factors, rainfall is tough to model even using the most powerful supercomputers. Yet by analysing data from the rain-detecting radar network around Montreal, Schertzer and Lovejoy found evidence for an underlying simplicity to the process.

The radar data allowed them to plot the amount of rainfall in an area, as they zoomed in and out at different scales. The researchers found their plots could be described by power laws with different exponents - a strong hint that rainfall is a multifractal process, with the underlying physics cascading down to ever-smaller scales.

While intriguing, the discovery was far from compelling. For a start, the data only allowed Schertzer and Lovejoy to extract power laws spanning scales between about 100 kilometres and 1 kilometre. To properly support their theory that the atmosphere is multifractal, they would have to show the scaling laws still held out to scales of tens of thousands of kilometres - the size of the entire planet.

The team realised that one source of meteorological data was up to the job: orbiting satellites. Scanning the planet evenly and in great detail, they build up a consistent picture at scales ranging from a few kilometres to the whole planet. And Schertzer and Lovejoy realised that a satellite launched in 1997 by NASA and the Japanese space agency JAXA could allow them to put the multifractal theory to a truly global test.

Orbiting the planet every 90 minutes, the Tropical Rainfall Measuring Mission (TRMM) peers down on a broad swathe of the Earth with sensors that detect the telltale signs of rainfall on scales down to a few kilometres. Together with their colleagues at McGill University and the University of Paris East, Schertzer and Lovejoy analysed 1200 consecutive orbits of TRMM, looking for signs of multifractal behaviour in the atmosphere.

Earlier this year, they published their findings in *Geophysical Research Letters* (vol 36, p L01801) - and they were simply stunning. The satellite data generated a beautiful collection of fractals and followed power laws on scales from tens of thousands of kilometres down to about 10 kilometres.

"It's rare that fundamental theories that have been marginalised for 80 years are suddenly and decisively proven," says Lovejoy. "Yet this is what we believe we have done for Richardson's idea that atmospheric dynamics are cascade processes."

It's rare that fundamental theories that have been marginalised for 80 years are suddenly and decisively proven

Danny McKenna of the US National Center for Atmospheric Research in Boulder, Colorado, says the evidence for power laws is convincing. He believes they could prove vital in tackling one of the most notorious problems in modelling the atmosphere.

Going off grid

Today's computer models represent the atmosphere as a vast grid-like pattern of cells, whose meteorological properties are calculated using the complex equations formulated by Richardson and his successors. The finer the grid, the better the simulation, but even the world's fastest supercomputers can't cope when the grid is made up of cells smaller than about 100 square kilometres.

To get around the problem, modellers have come up with estimates of what happens inside the cells, called parameterisations. The problem with such parameterisations is that they can fall victim to the notorious butterfly effect, by which even small inaccuracies in the initial conditions can be magnified to huge size by the non-linear nature of the processes underlying the weather. This can lead to unreliable forecasts.

McKenna believes that the discovery of scaling laws could transform the situation by providing insights into phenomena that take place on scales smaller than 100 kilometres. Robin Hogan of the University of Reading, UK, agrees that they could be a big improvement on existing techniques. "Although we won't know what individual eddies are doing at this sub-grid scale, their net ability to, say, transport heat vertically could be estimated," he says.

Now Lovejoy's team is keen to see cascades extend the reach and reliability of current models. While the existing models cannot handle structures much smaller than 100 kilometres across, the cascades may continue down to scales smaller than a millimetre. "Cascades could help fill in that missing factor of 100 million or so," says Lovejoy.

To find out, he and his colleagues are now working with researchers at the US National Oceanic and Atmospheric Administration in Boulder, Colorado, on incorporating multifractal techniques into live computer models of the atmosphere. Their aim is to make both weather and climate models reliable at the finest scales possible. It's a challenging goal, but one that Lovejoy believes is achievable. "Obviously there are many issues to be resolved," he cautions, "and it may be some years before the techniques are implemented."

Nevertheless, it seems we are closing in on a new era in our understanding of the atmosphere, one in which computer models finally get to grips with its full complexity in all its beautiful simplicity. And with the need for reliable predictions of the future climate more pressing than ever, Richardson's genius may have cut through the clouds of complexity in the nick of time.

"The history of science shows that complex phenomena usually give way to underlying simplicity," says Lovejoy. "And simplicity points the way to the future".

A reality check for climate models

It's not just more reliable weather forecasts we can expect by swapping complex numerical models for the simpler ones advocated by British mathematician Lewis Fry Richardson. Robin Hogan at the University of Reading, UK, believes that such power laws could also act as a vital reality check on climate models. Put simply, if a given model doesn't reproduce the real atmosphere's multifractal behaviour and its power laws, something must be missing.

Which raises an obvious question: how well do current models of the atmosphere perform? After all, if there's any truth in Richardson's idea, their computational complexity should give rise to cascading simplicity. Jonathan Stolle at McGill University in Montreal, Canada, has teamed up with his colleague Shaun Lovejoy, and David Schertzer at the University of Paris East, France, to examine this issue - and so far the results are encouraging.

"We've recently demonstrated that the top traditional numerical models have virtually perfect cascade structures from around 10,000 kilometres down to 100 kilometres," says Lovejoy. Power laws may be able to extend the models' reach - and accuracy - even further.

Robert Matthews is visiting reader in science at Aston University, Birmingham, UK

http://www.newscientist.com/article/mg20427335.600-tomorrows-weather-cloudy-with-a-chance-of-fractals.html?full=true&print=true

Giant crack in Africa formed in just days

- 22:17 04 November 2009 by **MacGregor Campbell**

A 500-metre-long crack opened up in just a few days in Afar, Ethiopia, in 2005 (Image: University of Rochester)

Enlarge image

A crack in the Earth's crust – which could be the forerunner to a new ocean – ripped open in just days in 2005, a new study suggests. The opening, located in the Afar region of Ethiopia, presents a unique opportunity for geologists to study how mid-ocean ridges form.

The crack is the surface component of a continental rift forming as the Arabian and African plates drift away from one another. It began to open up in September 2005, when a volcano at the northern end of the rift, called Dabbahu, erupted.

The magma inside the volcano did not reach the surface and erupt as a fountain of lava – instead, it was diverted into the continental rift underground. The magma cooled into a wedge-shaped "dike" that was then uplifted, rupturing the surface and creating a 500-metre-long, 60-metre-deep crack.

Using sensor data collected by universities in the region, researchers led by Atalay Ayele of Addis Ababa University in Ethiopia reconstructed the sequence of seismic events that led to the crack's formation. They found that a 60-kilometre-long, 8-metre-wide dike of solidified magma formed in the rift, causing the crack, in a matter of days.

'Stunning' ferocity

Similar dikes in Iceland are typically around 10 kilometres long and 1 metre wide and can take years to form. The new study shows the formation of dikes can occur in larger segments – and over much shorter periods of time – than previously thought.

"The ferocity of what we saw during this episode stunned everyone," says Cynthia Ebinger, a team member at the University of Rochester in New York.

While the Mount Dabbahu rift is still hundreds of kilometres inland, Ebinger says it could continue to widen and lengthen. "As the plates keep spreading apart, it will end up looking like the Red Sea," she says.

New ocean

Eventually it could reach the east coast of Ethiopia and fill up with seawater. "At some point, if that spreading and rifting continues, then that area will be flooded," says Ken Macdonald, a marine geophysicist at the University of California, Santa Barbara, who was not involved with the study.

Ebinger says this won't happen any time soon – it would take around 4 million years for the crack to reach the size of the Red Sea. Other areas in the Afar region are below sea level, however, and could see flooding before that if similar rifting occurs near the coastal volcanoes to the north and east that form a natural levy against the sea.

Macdonald says the process of continental plates spreading apart and filling in with magma is analogous to what happens on the deep seafloor at mid-ocean ridges, which are difficult to study because they lie a few kilometres under water. "This is very exciting in terms of its implications for the deep ocean and how mid-ocean ridges work," he told *New Scientist*.

Journal reference: *Geophysical Research Letters* (doi:10.1029/2009GL039605)

http://www.newscientist.com/article/dn18114-giant-crack-in-africa-formed-in-just-days.html

Plan to pierce heart of urban monster volcano

- 09 November 2009 by **Axel Bojanowski**
- Magazine issue 2733.

Drill if you dare (Image: R.W.W./Ambra Galassi/Flickr)

1 more image

TO ANCIENT Romans the Phlegraean Fields hosted the entrance to Hades. In modern times it is better known as the site of a "supercolossal" volcanic eruption 39,000 years ago.

Will we see the next disaster coming? That's one of the questions an ambitious drilling project hopes to answer by sinking boreholes into Campi Flegrei, as the giant collapsed volcanic crater is now called. Starting as early as next month, the Campi Flegrei Deep Drilling Project is planning to drill seven holes in the region (see map).

Though the researchers on this particular project point out that any risk is small, it will begin amid debate about whether such endeavours are safe, given the unknowns of a volcano's interior. A few say drilling might even trigger a major eruption.

Though the caldera has no visible volcanic cone, it dwarfs nearby Vesuvius. "Most of the metropolitan area of Naples is located within the caldera," says Giuseppe De Natale of the National Institute of Geophysics and Volcanology's (INGV) Vesuvius Observatory in Naples, who is leading the project.

The volcano has no visible cone but it dwarfs Vesuvius, and most of Naples is in its caldera

"A major eruption, like the one 39,000 years ago, would leave large parts of Europe buried under a thick layer of ash," says Agust Gudmundsson of the Royal Holloway University of London, one of the researchers involved in the drilling project. Since then, smaller eruptions have occurred every few centuries.

According to a study of the region by Roberto Isaia of the INGV and colleagues, Campi Flegrei is "one of the highest risk volcanic areas on Earth" and may now be primed for a blast. Isaia and colleagues found deposits from an intense period of eruptions around 4000 years ago. Before the eruptions the Earth's crust rose by several metres all across the caldera. Worryingly, crustal uplift is exactly what has happened recently. Since the late 1960s, the port of Pozzuoli near the caldera's centre has risen by around 3 metres.

Hazard planners should prepare for eruptions in decades or less, Isaia concludes (*Geophysical Research Letters*, in press).

The drilling could reveal fracture zones and pockets of magma whose location can usually only be inferred. This could show exactly where magma might ascend and collect prior to an eruption. Meanwhile, rock samples could be tested under high stresses in the lab to help model the ground deformation prior to eruption. De Natale told *New Scientist* that the project - which is under the auspices of the International Continental Scientific Drilling Program and the Integrated Ocean Drilling Program - will start in December or January.

Several incidents have plagued similar projects. In June, the Iceland Deep Drilling Project (IDDP), which aims to tap geothermal energy from hot magma, had to be stopped. At 2104 metres down, magma streamed into the borehole, causing a small explosion as the drilling fluid vaporised. That project is on hold, though it will start again in 2011 with a new borehole, says Guðmundur Ómar Friðleifsson of the IDDP. And in 2005, researchers working on a drilling project in Hawaii got a fright when magma hotter than 1000 °C leaked into the borehole.

"Under unfavourable conditions, contact of the drilling fluid with magma could be very dangerous," says Ralf Büttner, a volcanologist at the University of Würzburg in Germany. "It is even theoretically conceivable that, ultimately, a major eruption could result."

Though he does not single out the Campi Flegrei project, he warns that not enough is known about what happens in the guts of a volcano to justify drilling. "Knowledge about the viscosity and processes of gases in magma is very limited." What we do know is based on extremely small samples, which makes it difficult to extrapolate the results to larger masses, he says. So volcanic drilling projects are often based on "wishful thinking rather than on hard facts", he adds.

The greatest risk would be if the drilling accidentally pierced a silica-rich magma chamber under high pressure, releasing trapped gases, saysVolker Dietrich, also of the University of Würzburg. "The threat of explosion is extremely high. Theoretically, any type of eruption could be triggered," says Dietrich. "In some circumstances, the risk is of a total disaster."

Researchers on the Campi Flegrei project accept that there are some small risks, but say prior safety assessments found that triggering a major eruption is unlikely. Christopher Kilburn of University College London, one of the lead scientists, points out that a pressure release would need to occur over a significant portion of a magma reservoir to trigger an eruption. This is "unlikely to be satisfied by a small borehole, unless, perhaps, the magma was about to erupt anyway," he explains. Bernd Zimanowski at the University of Würzburg agrees. He says that drilling into "a tough magma chamber is no different from pricking some extremely tough cookie dough".

In any case, the Campi Flegrei drilling is unlikely to hit magma. Boreholes are expected to reach a maximum depth of 4 kilometres, around half the depth of any known reservoirs, according to Jörg Erzinger of the German Research Centre for Geosciences in Potsdam (GFZ). Even if magma flows into a borehole, Ulrich Harms, another GFZ scientist, argues it would not necessarily be dangerous. "Situations like that provide exceptional insights," Harms says.

http://www.newscientist.com/article/mg20427333.600-plan-to-pierce-heart-of-urban-monster-volcano.html

Atmospheric 'tides' trigger landslides at night

- 17:43 02 November 2009 by **Shanta Barley**

Tiny changes in atmospheric pressure between day and night can trigger landslides. The same phenomenon could be a final straw that sets off earthquakes and volcanic eruptions waiting to happen.For the past four years, William Schulz at the United States Geological Survey in Denver, Colorado, and his colleagues have been studying the movement of an enormous ongoing landslide in south-west Colorado called Slumgullion – so called because the yellowish soil reminded early European settlers of the eponymous stew.

The landslide has been continually slipping for 700 years and contains over 20 million cubic metres of material. It is moving down the mountain at an average rate of 1 centimetre per day for most of the year.

Daily cycle

To investigate what is causing Slumgullion to slide, aside from gravity, Schulz's team measured its movement hour by hour with paired spools of wire that unwind when moved apart.

They also mapped the daily cycle of atmospheric pressure "tides" over the landslide. Atmospheric tides are small variations in pressure that occur as air warms during the day.Schulz found that the landslide's movement was not continuous but closely correlated with atmospheric tides. "The landslide mainly moves when the pressure drops [at night]," says Schulz.

Upward friction

Landslides are usually triggered by rain or snowmelt flowing into the base of a "slump" of loose rock and soil.

Schulz and his colleagues suspect that an atmospheric low tide releases a tiny amount of pressure on the air and water in the soil at the surface. As a result, fluids deeper in the soil move up towards this region of lower pressure."This upward movement pulls the soil structure upward, thereby reducing the frictional strength along the base of the landslide, which is essentially a solid block sliding on a surface," says Schulz. "The reduced frictional strength is sufficient to trigger landslide movement."

"This is the first time that such an effect has been noted," says David Petley, who researches landslide mechanics and hazards at Durham University, UK.The research suggests that certain storms may have unexpectedly dangerous effects, says Petley. The rapid pressure variations associated with fast-moving storm systems such as the typhoon crossing the Philippines right now may be triggering landslides, he says.

Last straws

Schulz says that atmospheric shifts could also trigger earthquakes and volcanic eruptionsthat are already about to go off, he says.Previous research by Chi-Ching Liu of the Academica Sinica in Taipei, Taiwan, has linked the passage of typhoons with the triggering of "slow" earthquakes.

Slumgullion itself is unlikely to pose a threat. "There's a state highway around 100 metres below the landslide," says Schulz. "At the rate the landslide's moving it'll only reach it in 200 years."

Journal reference: *Nature Geosciences*, DOI: 10.1038/ngeo659

http://www.newscientist.com/article/dn18092-atmospheric-tides-trigger-landslides-at-night.html

Generation specs: Stopping the short-sight epidemic

- 06 November 2009 by **Nora Schultz**
- Magazine issue 2733

Should have spent more time outdoors? (Image: Veer Solus/Getty)

1 more image

The decline was rapid. I got my first pair of glasses aged 9, and by my mid-teens could no longer read the title on the cover of *New Scientist* at arm's length. With my mum's eyes just as bad, I always assumed that I'd inherited my short-sightedness from her and that I could do little to stop my vision from becoming a little blurrier each year.

Around the same time, however, rates of short-sightedness, or myopia, were rising to epidemic proportions around the world. Today, in some of the worst-affected countries such as Singapore, Hong Kong and Taiwan, around 80 per cent of young adults are myopic, compared to only 25 per cent a few decades back.

Rates are lower in western countries - between 30 and 50 per cent - but myopia seems to be rising steadily here too. What could be causing this mysterious epidemic? It is clear that genetics alone can't explain the condition, and the long-standing theory that reading was to blame has failed to play out in subsequent studies.

Large-scale epidemiological surveys ensued, which have pinned down the specific aspects of modern lifestyles that cause children's eyesight to deteriorate. With just a few simple measures, it now looks like we could easily prevent future generations from descending into my blurry world.

While the causes have been elusive, the anatomy of myopia has been well understood for decades. In the normal eye, the lens focuses light squarely on the retina, which records the image and sends it to the brain. We myopes, however, have eyeballs that are elongated, increasing the distance between the light-sensitive retina at the back of the eye and the lens at the front. The result is that light from distant objects is focused in front of the retina, so a blurred image is transmitted to the brain.

Near work, such as reading, had always seemed like an obvious contributor, since short-sightedness appears more common among highly educated people. According to this idea, the lenses in some children's eyes are not very good at "accommodating", or adapting their curvature to focus clearly on near

objects. Because small print, for example, would appear slightly blurred, the eyeball elongates to compensate, improving near sight at the cost of distance vision.

The theory sounds plausible, but while myopia does correlate with how well educated you are, frustratingly, researchers have tried and failed to find a strong link to specific activities like reading. Worse still, attempts to correct poor accommodation have been only marginally successful.

One of the most promising ideas was to deal with incipient myopia by preventing the blur from bad accommodation. Bifocal or multifocal lenses, with weaker power in the bottom half of the lens, were given to kids to help them focus on near objects. "The idea was that if near work is bad, you can convert it into far work by putting on the right glasses," says Ian Flitcroft, a consultant ophthalmologist at the Mater Misericordiae University Hospital in Dublin, Ireland.

Yet in 2003, the results from a large-scale trial of multifocal versus single-vision glasses, involving 469 children aged 6 to 11, found that the multifocal treatment slowed the progression of their myopia by just 0.2 dioptres over three years (*Investigative Ophthalmology and Visual Science*, vol 44, p 1492). Their myopia increased by -1.28 dioptres over this time, and since most people start wearing prescription lenses at -0.75 dioptres, the treatment was of little practical benefit.

Clearly, some important factor was missing from the equation. Lisa Jones-Jordan at Ohio State University in Columbus stumbled upon the next lead in a study published two years ago (*Investigative Ophthalmology and Visual Science*, vol 48, p 3524). Analysing the lifestyle of 514 children aged 8, her team found that within four years 111 had become short-sighted. Crucially, those children spent less time engaging in outdoor and sporting activities than those who did not become myopic - 8 hours compared to 12 hours per week.

"One idea might be that these children are outside less because they are doing more near work," says Jones-Jordan. This turned out not to be the case. Importantly, the amount of time a child spent on near work did not correlate with their level of myopia, nor with the time spent outside or playing sports.

If near work is not the determining factor, could it be that good eyesight is simply another benefit of physical exercise? Kathryn Rose at the University of Sydney put paid to that idea in a study of 2367 12-year-old Australians. Playing indoor sports turned out to have no benefits for the eyes, whereas even physically inactive time spent outside was beneficial (*Ophthalmology*, vol 115, p 1279).

"Our findings suggest that being outdoors, rather than sport per se, may be the crucial factor," says Rose. The theory has since been backed up by a study of 1249 teenagers in Singapore, led by Seang-Mei Saw at the Yong Loo Lin School of Medicine, National University of Singapore (*British Journal of Ophthalmology*, vol 93, p 997).

Since time spent indoors seemed to be such an important risk factor, Saw and Rose asked whether it might explain the extraordinarily high prevalence of short-sightedness in Asia. To find out, they compared two groups of 6 to 7-year-old children, one in Singapore and one in Australia. The team looked only at children of Chinese ethnicity, to rule out genetic differences between races as an explanation for higher myopia rates in certain countries.

The result? On average the children in Sydney spent nearly 14 hours per week outside, and only 3 per cent developed myopia. In contrast, the children in Singapore spent just 3 hours outside, and 30 per cent developed myopia. Once again, close work had a minimal influence; the Australian children actually spent more time reading and in front of their computers than the Singaporeans (*Archives of Ophthalmolology*, vol 126, p 527).

But why should the great outdoors stave off myopia? One possibility is that the sheer intensity of light outdoors somehow stalls eyeball growth, a theory supported by Regan Ashby's work at the University of Tübingen in Germany.

Ashby attempted to induce myopia in a group of chicks by blurring their vision using special lenses. He divided the birds into three groups and exposed them to different light levels for just 15 minutes each day. At the end of the five-day trial, those exposed to intense light - half as bright as direct sunlight and 30 times brighter than normal indoor lighting - were on average 40 per cent less short-sighted than chicks exposed to normal laboratory light levels during those 15 minutes. Actual daylight slashed the severity of myopia by a further 40 per cent (*Investigative Ophthalmology and Visual Science*, DOI: 10.1167/iovs.09-3419). Although the mechanism behind this remains uncertain, Ashby believes bright light may stimulate the retina to produce high levels of dopamine, a substance known to inhibit eye growth.

Other researchers, however, think this only goes part of the way to explaining the causes of myopia. "There is a 500-pound gorilla sitting in the corner of the myopia research room, and this is the three-dimensional structure of the eye," says Flitcroft.

There's a 500-pound gorilla in the myopia research room, and it is the 3D structure of the eye

He points out that peripheral vision has largely been ignored when studying myopia, since we are much more conscious of a blurred image in the centre of the retina, the fovea, than at the edges of our vision. But in a series of experiments, Earl Smith at the University of Houston, Texas, found that if he fitted monkeys with lenses that blurred only their peripheral vision, they still became myopic (*Vision Research*, vol 49, p 2386).

The finding is supported by other studies, which had found that people are more likely to become myopic if their peripheral vision is slightly long-sighted. It seems the eyeball elongates to compensate for this error (see diagram). That's bad news for us myopes, since typical glasses and contact lenses tend to overcorrect the periphery of the eye, making it slightly long-sighted again and potentially triggering further elongation. That might be why myopia tends to progress over the years.

Quick fix

Conversely, the theory might also explain why other, less conventional treatments have turned out to be unexpectedly successful at slowing the progression of myopia. Corneal refractive therapy (CRT), for example, was originally designed as a temporary solution to myopia, in which patients wear hard lenses overnight that temporarily reshape the cornea. In the morning, they take out the lenses and can see well for the rest of the day. But new research by Jeff Walline at the Ohio State University in Columbus has shown that unlike glasses or regular contact lenses, CRT actually slows progression of myopia by around 50 per cent (*British Journal of Ophthalmology*, vol 93, p 1181). Walline suggests that flattening the cornea may also reduce the blur at the edges of the subjects' vision, which might explain CRT's success.

A similar explanation may be behind the small benefit that multifocal specs carry. Perhaps they don't just correct poor accommodation, but instead reduce the blur in the lower half of the peripheral vision, says Frank Schaeffel at the University of Tübingen, Germany. "If that is the case, then reading glasses that change the focusing power around the whole periphery could easily be up to three times or more effective," he says.

His group recently started working with the eyewear firm Rodenstock on a new type of lens, which aims to achieve exactly that. Unfortunately, these glasses can distort central vision if the wearer looks through the wrong part of the lens, but Schaeffel believes further improvements will minimise this.

The importance of peripheral blur is further supported by a promising study of bifocal soft contact lenses, which have a central portion that corrects myopia, surrounded by a ring that corrects the long-sighted

defocus around the periphery of the retina. Thomas Aller, an optometrist based in San Bruno, California, and Christine Wildsoet at the University of California, Berkeley, found that bifocal contact lenses slowed myopia progression by 80 per cent (*Ophthalmic and Physiological Optics*, vol 26(s1), p 8).

The role of peripheral vision in this study isn't clear-cut, since it focused on children who tend to slightly cross their eyes when reading. Their eyes have especially poor accommodation, which may put them at particularly high risk of progressive myopia. So the success of the trial may stem from treating this problem, in addition to reducing their peripheral blur.

Flitcroft, however, is sceptical. He believes that all of these possible treatments miss a key point: in crowded environments, even people with perfect eyesight experience a significant amount of blur in their peripheral vision. "Around the edges of a book or computer screen the world is further away and blurred," says Flitcroft. "Conversely, if we look at a distant scene across a room through a window, the objects inside the room that fill our peripheral vision are then closer and [yet] also out of focus," he says.

For genetically susceptible individuals, that might be enough to trigger myopia. Time spent outdoors may benefit vision simply because it's only when we look out over large, open spaces that all objects are sufficiently far away for the eye to focus a crisp image across the whole of the retina.

The theory certainly fits in with one of Rose's observations - that living in a highly urban environment increases the risk of myopia, since the cityscape may confine our gaze to shorter distances (*Investigative Ophthalmology and Vision Science*, vol 49, p 3858). Unfortunately, if the theory proves correct, none of the proposed corrective lenses could help, since the blur varies depending on whether you look close by or into the distance.

Others, however, are more optimistic that the promising trials of bifocal contact lenses and specially designed reading glasses will continue to pan out. "I have noticed that there is a lot more willingness to believe that we may be able to come up with something that will change the way we treat myopia. Every contact [lens] and eyeglass company is working on something," says Aller, who is involved in one of these projects himself.

In the meantime, the safest bet to prevent myopia still seems to be to spend as much time outside as possible. That's good news for my own children: they currently go to a forest kindergarten where they spend the morning outside in the woods, and I can send them to a local primary school that also teaches many classes outside. And in the future, I'll be sure to keep an eye on the latest designs of reading glasses. I'm now hopeful that even with my poor genes, my kids stand a good chance of keeping their world in focus.

Are your eyes what you eat?

Seven years ago, evolutionary biologist Loren Cordain at Colorado State University in Fort Collins caused a stir by suggesting that myopia may be triggered by the excessive consumption of refined carbohydrates. The study compared diets and rates of myopia in different nations, and it seemed plausible that insulin levels which were raised in response to a high-carb diet could stimulate the eye to grow and become elongated, causing myopia.

This year, two independent studies, led by Frank Schaeffel at the University of Tübingen in Germany and Josh Wallman at the City College of New York, have provided further evidence that insulin can stimulate eye growth. Working with chicks that wore special lenses to provoke myopia, they found that injecting insulin into the chicks' eyes increased the deterioration in their sight dramatically.

Yet whether this explains the link between diet and myopia remains hotly debated. "Initially we just didn't believe Cordain's carbohydrate story, but now that we know that insulin can interfere so much, I am not

so sure," says Schaeffel. Wallman remains more doubtful, arguing that a high-carb diet may not necessarily raise insulin levels in the eye enough to cause damage.

Cordain cites studies which found that people with high blood-sugar levels are more likely to be myopic, and says that insulin levels in the eye do seem to reflect levels elsewhere in the body. High blood sugar may also promote myopia by raising levels of the growth factor IGF-1, a substance which likewise stimulates eye growth, he says.

Drugs and eye exercises

Optical interventions are not the only way to fight myopia, but two alternatives - drugs and eye exercises - have failed to live up to expectations.

Two drugs, atropine and pirenzepine, do slow myopia, but with side effects such as increased light sensitivity, dizziness and blurred vision, so most researchers and doctors are understandably reluctant to advocate their widespread use. Another approach - using exercises to teach the eye how to focus again - has no serious side effects, but there is little convincing evidence that it works. "By practising these exercises people get better at functioning with their deficit, but six months later their prescription hasn't changed," says optometrist Thomas Aller from San Bruno, California.

One piece of advice that may make sense is to look into the distance every half hour while reading. While direct evidence is lacking, studies in which animals are fitted with blurring lenses that cause myopia show that even short periods without the lenses can be beneficial.

Nora Schultz is a writer based in Berlin, Germany

http://www.newscientist.com/article/mg20427331.100-generation-specs-stopping-the-shortsight-epidemic.html?full=true&print=true

Injected cells stop body from attacking self

- 18:24 03 November 2009 by **Jessica Hamzelou**

A virtually unlimited supply of rare cells can now be produced in the laboratory to fight diseases such as rheumatoid arthritis in mice.

Crucially, these cells, which dampen down the body's immune response, have been engineered so that they target damaged tissue yet don't leave the rest of the body open to infection.Vaccines have long harnessed the body's natural ability to fight disease. Therapies that boost our natural immune response to cancer are also in the works (see *Autoimmune disease cells harnessed to fight cancer*).

But in autoimmune disease – in which the immune system mistakenly attacks the body's own tissue – the opposite is needed. So immunologists have long eyed up the cells that dampen down the immune response, known as regulatory T-cells or T-regs, for their potential to treat autoimmune disorders such as rheumatoid arthritis, diabetes and multiple sclerosis.There have been two challenges: how to obtain large supplies of the rare T-regs, which make up less than 1 per cent of all immune cells, and how to neutralise dangerous immune cells without weakening the entire immune system, leaving people open to infection. Now Hans Stauss and his colleagues at University College London have made a stab at solving both.

Straight to the joint

The team starts by extracting ordinary T-cells – immune cells that are common in the blood – from mice and using a virus to insert two genes into these cells. One gene, *FOXP3*, transforms the ordinary T-cells into T-regs. The second gene codes for a receptor for a substance called ovalbumin.Next the researchers injected ovalbumin into mice with rheumatoid arthritis, which is caused by normal T-cells attacking cartilage. Each mouse had two arthritic joints, but the researchers injected the ovalbumin into one only. Then they injected the lab-produced T-reg cells into the same mice.

The idea was that the ovalbumin would attract the cells, which would dampen down the arthritic inflammation that was attacking the joint's cartilage. The rest of the immune system, however, would remain intact.Sure enough, the injected cells homed in on the ovalbumin-injected arthritic joints and reduced inflammation, while the other joints remained inflamed.

More targets

Stauss says that a similar T-reg therapy could be developed to target autoimmune diseases that strike other parts of the body, by adding genes for receptors specific to molecules found there.

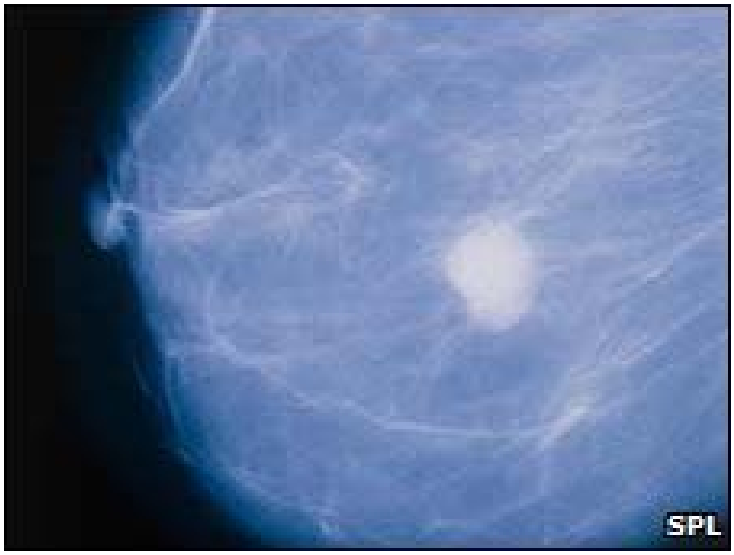
Alexandre Corthay of the University of Oslo in Norway warns of the unpredictable nature of T-regs, which regularly turn back into normal T-cells in the body. Stauss admits that this is a risk but reckons that artificially produced T-reg cells are more stable than naturally occurring ones.He also points out that because the T-regs are specific to a particular part of the body, even if they did revert, the damage they could do would be limited.

Journal reference: *Proceedings of the National Academy of Sciences*, DOI: 10.1073/pnas.0907396106

http://www.newscientist.com/article/dn18096-injected-cells-stop-body-from-attacking-self.html

Breast cancer changes with spread

Nearly 40% of breast cancer tumours change form when they spread, a UK study shows.



The researchers say this could mean that patients require changes to their treatment regime.

They analysed 211 tumours which had spread to the lymph nodes in the armpit - the place where breast cancer tends to migrate first.

The study, by Breakthrough Breast Cancer scientists in Edinburgh, appears in Annals of Oncology.

Breast cancer is a complex disease with many different types which can be treated in different ways.

Breast cancer spreads to the lymph nodes in about 40% of the 46,000 women diagnosed with breast cancer in the UK each year.

Cancer cells which spread in this way are often more difficult to treat than those in the breast - so it is vital that women receive the most appropriate treatment.

" **This suggests there is a need to test which type of disease a woman has in the lymph nodes, because it could radically alter the course of treatment she receives** "
Dr Dana Faratian Breakthrough Breast Cancer

Researchers were surprised to find the disease changed in such a high proportion of patients, and in so many ways, when it had spread.

For example, 20 tumours changed from oestrogen receptor (ER) negative to ER positive.

This change would mean hormone therapies such as tamoxifen, which would not have worked for the original tumour, could help treat the disease if it has spread.

Other tumours changed from ER positive to ER negative, which suggests those patients may be given treatments which will not benefit them - experiencing side-effects unnecessarily.

Surprising result

Lead researcher Dr Dana Faratian said: "We were surprised that such a high proportion of tumours change form when they spread beyond the breast.

"This suggests there is a need to test which type of disease a woman has in the lymph nodes, because it could radically alter the course of treatment she receives.

"We now need a clinical trial to see how these results could benefit patients."

Professor David Harrison, director of the Breakthrough Breast Cancer Research Unit, said: "This research may show why some women whose cancer has spread to the lymph nodes do not respond to treatment.

"With an additional test we may be able to treat women more effectively and also make more efficient use of NHS resources."

The researchers stress that a clinical trial needs to be carried out to fully evaluate the benefits of testing cancer cells in the lymph nodes before it can be approved for use on the NHS.

Breast cancer accounts for nearly one in three of all female cancers and one in nine women in the UK will develop breast cancer at some point in their lifetime.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8337795.stm

Published: 2009/11/04 01:13:11 GMT
ight down a wire for solar power